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"Opportunities and limits of multisensory integration in online stores—superadditivity, cross-modal correspondence, and involvement as determinants of consumer behavior."

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ABSTRACT

Multisensory marketing encompasses the potential to reduce the risks of destructive competition due to the increase in e-commerce because it influences perception, attitude, judgment, and purchasing behavior. Along with the influence of multisensory stimuli, the effects of superadditivity, cross-modal correspondence, sensory imagery, and congruence are discussed. The effect of superadditivity entails that an increase in sensory stimuli is also accompanied by positive influences on consumer behavior so that there is a cumulative effect. The effect of cross-modal correspondence assumes that there are interactions between the sensory modalities so that a conglomerate, for example, a product with multiple, combined sensory stimuli, is evaluated significantly better or worse by the recipient than products with precisely the same sensory stimuli but not combined. Sensory imagery describes the ability of recipients to imagine sensory stimuli so that multisensory marketing can have comparable effects to the sensory stimuli that have been physically perceived. Congruence is discussed as a prerequisite for multisensory marketing so that only sensory stimuli that coincide with product benefits or brand attributes can influence consumer behavior. The first two studies examine whether the effect of superadditivity, formulated in Hypothesis 1, and the effect of cross-modal correspondence, formulated in Hypothesis 2 , influence consumer behavior in an online store where only the visual stimuli are physically perceived. The variance of results with a decrease in congruence will be examined in Hypothesis 3. As part of the first two experiments performed, 30 products from a fictitious brand were created and presented in self-created online stores. A control product created for each product type, without multisensory stimuli, acted as a reference product. All other products were manipulated through different combinations of multiple sensory stimuli. Products with existing, partial, or missing congruence were selected. Based on the data from 1,016 participants, it was observed that the effect of superadditivity with the given congruence was limited. Moreover, when the cumulative mean increased, there were no significant results at any level of congruence. However, the effect of cross-modal correspondence was observed for products with complete and partial congruence, but not for products with missing congruence. In persuasion research, it was discussed that different processes can be distinguished from their

metacognitions, which can influence the process through which the attitudes are formed. The third and fourth experiments examined whether the attitude outcomes vary when formed along different pathways of metacognition. Further, the research material was influenced, considering the level of involvement, to enable the formation of attitudes on different paths of metacognitive persuasion. Based on the data from an additional 897 participants and combining them with the results from the first two studies, no significant differences were observed in the attitudes between different processes of metacognition. In their respective conclusions, it was discussed that in most cases recipients preferred multisensory products over nonmultisensory products and can thus used to avoiding ruinous competition. However, considering the cross-modal correspondence, it was recommended to test multisensory products before launching them into the market because the causes of interactions of sensory modalities have not been thoroughly researched, and the risk of adverse consequences cannot therefore be predicted. In all the studies, interactions were observed with the olfactory and gustatory senses. This observation was justified in the biopsychological processes as olfactory stimuli enter consciousness directly rather than passing through the thalamus. Additionally, it was discussed that some of the models used can also be transferred to deviating scenarios. The absence of significant differences in metacognition was discussed concerning reactivity and the level of salient emotions. The experiments primarily involved students, who were aware of the participation in a study and were probably more critical during the product evaluation, which, in turn, may have led to different observations compared to a field study. Likewise, it was discussed that comparative studies regarding metacognitions have used emotions generated by the participants through explicit memory and strong emotional associations. As part of these experiments, a weakened form of emotional activation was derived and argued based on primary studies, which could also be subliminal. A possible future study regarding the dependence of the resulting strength of attitude on the degree of salient emotions could be conducted.

Keywords: Consumer behavior, attitude, purchase intention, multisensory marketing, Eleboration Likelihood Model, metacognition, involvement, superadditivity, cross-modal correspondence, congruence

RESUMEN

El marketing multisensorial tiene el potencial de reducir los peligros de la competencia ruinosa causada por el aumento del comercio electrónico, porque influye en la percepción, la actitud, el juicio y el comportamiento de compra. En relación con la influencia de los estímulos multisensoriales, se discuten los efectos de la superaditividad, la correspondencia intermodal, las imágenes sensoriales y la congruencia. El efecto de superaditividad describe que el aumento de los estímulos sensoriales va acompañado también de influencias positivas en el comportamiento del consumidor, de modo que se produce un efecto acumulativo. El efecto de la correspondencia intermodal supone que existen interacciones entre las modalidades sensoriales, de modo que un conglomerado, por ejemplo, un producto con varios estímulos sensoriales, es evaluado significativamente mejor o peor por el receptor que los productos con precisamente los mismos estímulos sensoriales pero no combinados. La imaginería sensorial describe la capacidad de los receptores de imaginar los estímulos sensoriales, de modo que el marketing multisensorial puede tener efectos comparables a los de la percepción física de los estímulos sensoriales. Se habla de la congruencia como un requisito previo para el marketing multisensorial, de modo que sólo los estímulos sensoriales que coinciden con los beneficios del producto o los atributos de la marca pueden influir en el comportamiento del consumidor. Los dos primeros estudios derivados investigan si el efecto de la superaditividad, formulado en H1, y el efecto de la correspondencia intermodal, formulado en H2, influyen en el comportamiento del consumidor en una tienda online donde sólo se perciben físicamente los estímulos visuales. Como parte de la H3, se examinará cómo varían los resultados con la disminución de la congruencia. Como parte de dos experimentos, se crearon 30 productos de una marca ficticia y se presentaron en tiendas online de creación propia. Se creó un producto de control para cada tipo de producto, sin estímulos multisensoriales, que actuó como producto de referencia. Todos los demás productos se manipularon mediante diferentes combinaciones de estímulos multisensoriales. Para el material de investigación se eligieron productos con congruencia existente, parcial y ausente. Basándose en los resultados de 1.016 participantes, se observó que el efecto de la superaditividad con una congruencia determinada era observable de forma limitada en forma de incrementos medios

acumulativos, pero no hubo resultados significativos en ningún nivel de congruencia. Sin embargo, el efecto de la correspondencia intermodal pudo observarse con resultados significativos tanto en congruencia como en congruencia parcial, pero no con congruencia ausente. En la investigación sobre la persuasión, se discute que se pueden distinguir diferentes procesos de metacogniciones, que pueden influir en el proceso en el que se forman las actitudes. El tercer y cuarto experimento tenía como objetivo examinar si los resultados de las actitudes varían cuando se forman a lo largo de las diferentes vías de metacognición. De nuevo, se manipuló el material de investigación, pero también en lo referente al nivel de implicación, para permitir la formación de actitudes en las diferentes vías de persuasión metacognitiva. Basándose en los resultados de otros 897 participantes y combinándolos con los resultados de los dos primeros estudios, no se observaron diferencias significativas en las actitudes entre los diferentes procesos de metacognición. En las conclusiones respectivas, se discute que los productos multisensoriales fueron preferidos por los destinatarios en la mayoría de los casos en comparación con los productos no multisensoriales y, por tanto, pueden contribuir a evitar la competencia ruinosa. Sin embargo, en lo que respecta a la correspondencia intermodal, se recomendó probar los productos multisensoriales antes de lanzarlos al mercado, ya que las causas de las interacciones de las modalidades sensoriales no han sido finalmente investigadas, por lo que se puede reducir el riesgo de consecuencias adversas previstas. En todos los estudios se observaron interacciones con los sentidos olfativo y gustativo. Esto se justificó en los procesos biopsicológicos, ya que los estímulos olfativos no llegan al tálamo sino directamente a la conciencia. También se discute que algunos de los modelos utilizados también pueden trasladarse a escenarios desviados. Se discute la ausencia de diferencias significativas en la metacognición en relación con la reactividad y el nivel de emociones salientes. En los experimentos participaron predominantemente estudiantes, que eran conscientes de la participación en un experimento y, por tanto, probablemente eran más críticos, lo que a su vez puede haber dado lugar a observaciones diferentes en comparación con un estudio de campo. Asimismo, se discute que los estudios comparativos sobre las metacogniciones han utilizado emociones generadas por los participantes a través de la memoria explícita y de fuertes asociaciones emocionales. Como parte de estos experimentos, se derivó y argumentó una forma de activación emocional debilitada

basada en estudios primarios, que también podría ser subliminal. Para ello, se discute como un posible estudio posterior que el grado de saliencia en función de la fuerza resultante de la actitud debe ser investigado más a fondo.

Palabras clave: Comportamiento del consumidor, actitud, intención de compra, marketing multisensorial, Modelo de Probabilidad de Eleboración, metacognición, implicación, superaditividad, correspondencia intermodal, congruencia

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LIST OF ACRONYMS AND ABBREVIATIONS

BFI	Big Five Inventory 2
ELM	Elaboration Likelihood Model
FOM	FOM university of applied science
PKM	Persuasion Knowledge Model
NTS	Need to Smell
NFT	Need for Touch
SPI	Sensory Perception Item Set Inventory
SD	Standard deviation
SE	Standard Error
VIF	Variance inflation factor
25th	Lower percentile
75th	Upper percentile

1 INTRODUCTION

In the following chapter, the relevance of the research topic and a brief derivation of the research question will be discussed, which will be further elaborated in the second chapter through a detailed argued derivation of the hypothesis. Likewise, the course of the work is presented to obtain an overview of the structure of the work and thus a better impression of the approach utilized.

1.1 RELEVANCE AND RESEARCH QUESTION

Consumers are confronted with more information through advertising than they could explicitly process (Murayama et al., 2016). The resulting information overload leads to selective perception and reactive behavior toward advertising, which impairs the advertising effectiveness or makes it impossible (Li et al., 2020). The internet offers several opportunities for communication and advertisement. Moreover, it enables standardization and increases returns on investment, which is one of the reasons for a steady increase in online marketing activities (Kozielski et al., 2017). For example, global expenditure on online advertising increased from USD 222,829 million to USD 297,126 million between 2017 and 2019. This number is anticipated to increase to USD 407,907 million by 2024. When compared to 2017, search engine advertisement expenditure is expected to increase by 82% and social media advertisement by 122% in 2024 (Statista, 2020). Such high forecasts can be validated based on the rapidly increasing sales in e-commerce worldwide. For example, global e-commerce was USD 1,227,120 million in 2017 and increased to USD 2,062,945 million in 2019. This growth represents an increase of 68% (Statista, 2020). Since the COVID-19 pandemic, e-commerce has become more dynamic and interactive between consumers and companies, thereby increasing spending on online merchandize (Rosenbaum & Russell-Bennett, 2020). Likewise, the number of competitors on platforms such as Amazon's Marketplace also increased, further intensifying the competition (Xu, 2018). Therefore, companies are confronted with

the challenge of opposing the increased competition in digital media.

Visual attention is one way of influencing consumer behavior with regard to online stores (Mo et al., 2021). Additionally, online product designs can generate visual attention, increasing consumer trust and interest (Lindgaard et al., 2011). Furthermore, click behavior can be generated and thus the probability of a purchase can be increased (Monica et al., 2019). Sensory marketing engages consumers' senses, influencing their perception, judgment, and behavior, thereby creating an opportunity to generate visual attention and increase purchase intention (Krishna, 2012). Although gaps in research exist, numerous studies have provided valuable insights on how multisensory marketing influences the buying behavior in stationary retail (Krishna et al., 2016). For example, the probability of a purchase is significantly higher if the seller touches the customer because of an increased oxytocin level (Morhenn et al., 2008). The willingness to purchase can be influenced by the physically perceived haptic stimuli in product designs (Kampfer et al., 2017). Products are evaluated more positively when advertised with a pleasant aroma (Ruzeviciute et al., 2020). In scientific studies, the effects of superadditivity, congruence, and cross-modal correspondence are recurrently discussed. The effect of superadditivity describes that the cumulative increase in sensory stimuli positively influences the variables of purchase behavior, such as purchase intention or attitude (Klemen & Chambers, 2012). This effect is often attributed to the dual coding system (Paivio, 1969, 2009), which is also used in studies, such as those conducted by Lwin et al. (2010), to evaluate the influence of olfactory and visual stimuli on consumer behavior. The cross-modal correspondence effect describes that a specific combination of sensory stimuli can be evaluated more positively or negatively than their respective stimuli independently (Spence et al., 2014). This interaction effect leads to the fact that the taste of a glass of wine is better evaluated if positively perceived music is played (Sunaga, 2018). The congruence between sensory stimuli and the function of the persuasive object is essential for influencing consumer behavior (Krishna et al., 2016). The same conclusion was reached based on studies, such as those conducted by of Ruzeviciute et al. (2020). While these scientific findings are based on studies with physically perceived stimuli, similar effects seem to be transferable to a digital context as sensory information can be stored and retrieved by imagination (H. Tan et al., 2021). Influence of consumer behaviors by multisensory stimulus along with

imagery was highlighted by Elder and Krishna (2021) in their recent review publication, in which various studies have been summarized and existing research gaps have been identified. Theses research gaps include the limited amount of experimental research, and the difficulty in conclusively understanding the attitude formation processes in the context of imagery and multisensory stimuli to validate how the influence on consumer behavior in natural environment and conditions (Elder & Krishna, 2021). This research gap also simultaneously describes the research question of this dissertation. Only when the results of the research reveal the extent of influence of multisensory stimuli on consumer behavior in online stores, implications for the companies can be derived. This means that this dissertation tries to merge the two previously described research gaps. It is investigated whether the current research findings, mainly focusing on stationary trade, can be transferred to a digital context, where a holistic, physical perception is restricted. Likewise, within the framework of this experimental design, the extent of transfer of findings from numerous studies of other scientists to an experimental design to enable a natural environment of a purchase situation to the participants will be studied. Furthermore, the previously described research gap regarding the lack of knowledge about the attitude formation processes will be investigated by differentiating these processes based on metacognitions depending on involvement and timing of emotional activation. Thus, the research question is as follows: "How can multisensory marketing influence consumer behavior in online stores?"

1.2 OBJECTIVE AND STRUCTURE OF THE DISSERTATION

The objective of this work is to determine, within the framework of an experimental research design, how multisensory stimuli in online stores, where only visual sense can be physically perceived, influence consumer behavior. So, the basics of consumer behavior are primarily described by stating the theory of planned behavior to understand the dynamics of consumer behavior. Furthermore, the elaboration likelihood model (ELM) is explained to understand the cognitive attitude formation processes and to consider them subsequently in the digital context. Followed by the basics of multisensory marketing, as well as

biopsychological and cognitive process hypotheses and assumptions to provide the connection to the consumer behavior. The areas of brain involved are shown in the processing of multisensory stimuli and what effect this has on the perception of persuasive stimuli. Additionally, theories and assumptions like the dual coding system will be explained to show the cognitive processes involved in the processing of multisensory stimuli. Finally, the basics about the effects of superadditivity, congruence, and cross-modal correspondence, are explained based on the current state of research, and a connection to the consumer behavior will be made.

After the theoretical basics, four experimental studies will follow. In the third chapter, the first study is presented in which the effects of superadditivity and cross-modal correspondence are investigated with complete product congruence in online stores by using soft drinks as research material. Moreover, the second study will examine the effect of sensory stimuli on other product types, with decreasing product congruence. In the case of chocolates, there is partial congruence, while for that of t-shirts, no congruence is given. The third study is illustrated in the fourth chapter. Here, the persuasive stimuli are now manipulated based on the findings from the first study and based on the attitude formation processes at a metacognitive level. The aim is to gain a better understanding of the attitude formation processes related to multisensory stimuli in online stores, where only the visual stimuli is physically perceived. The last study is explained in the fourth chapter as well. This study is identical to the previous one, except for the products which are used from the second study with missing congruence. In the fifth and final chapter, the findings of all the four studies are brought together, discussed, and implications for science and practice are derived.

2 THEORETICAL FRAMEWORK AND CURRENT STATE OF RESEARCH

2.1 CONSUMER BEHAVIOR

The objective of this thesis is to investigate multisensory stimuli concerning consumer behavior in a digital context. In this chapter, the concept of consumer behavior is defined, and different perspectives related to the planned behavior model are explained. This model can provide added value in the later discussion. Moreover, the relevance of the attitude concerning consumer behavior is defined, and on the basis of this, possible changes in attitude are presented, along with ELM and its further development using metacognitive processes. The objective is also to comprehend different ways in which attitudes can be formed and how they influence consumer behavior. Additionally, experiments three and four will focus on attitude changes. For this reason, ELM will be used later to derive research implications.

2.1.1 Perspectives of consumer behavior

Revenue is generated through the sale of products and services. Digitalization provides consumers with improved transparency and comparability between different market participants. Companies ought to find ways to avoid the risk of ruinous competition despite the market transparency. Accordingly, solutions must be sought so that a company's own products are preferred to those of its competitors. Thus, it is necessary to better understand customers' needs and requirements to create products and services, and to improve the likelihood of purchase and customer attitude. This is one of the reasons why the interest in consumer research still continues, both from an economic and research perspective (Kroeber-Riel, 2013).

Consumer behavior can be described from different perspectives to understand what drives the recipients' consumption behavior. Motivational

theories are divided into content and process theories. Content theories explain the driving forces of action in needs. One of the earliest theories dates back to Lewin (1935, 1964), who traces the intentions of actions back to goals with motivations as their equivalent. Sokolowski et al. (2000) describe the motivated behavior as an interplay between an organism and its environment as the behavior fails to occur because no need-creating incentives from the environment act on an organism in today's society. Process theories offer alternative explanations or a different perspective on consumers' motives. This aspect explains consumer behavior by focusing on the advantages anticipated from consuming or using a product (Sokolowski et al., 2000). One of the well-known approaches is the Fishbein model that describes the consumer as a thoughtful and logical decision-maker (Fishbein, 1975). In addition to the benefits associated with the object of purchase, Ajzen (1991) discusses about other variables in his planned behavior model that influence consumers' decisions. Therefore, purchasing behavior is predicted by attitudes, subjective norms, and behavior control. Attitude is defined as the willingness to respond to an object or situation in a favorable or unfavorable manner (Stahlberg & Frey, 1990). Attitudes can be understood as a multidimensional construct comprising affective, cognitive, and conative dimensions (Zanna & Rempel, 1988). The cognitive dimension describes the beliefs and knowledge about an object's characteristics, whereas the affective dimension describes about the emotions associated with the object. The conative dimension explains action intention and is also described as outcomes of the previous dimensions. This assumption originates from Festinger's (1957) description of the pursuit of consistency in his cognitive dissonance theory. Thus, individuals strive to maintain a balance between attitude and behavior to avoid possible aversions (Festinger, 1957).

According to Ajzen (1991), attitude is not enough to appropriately predict consumer behavior as subjective norms and the perceived behavioral control of the recipient also influence the purchase intention. The subjective norms represent the construct of norms and values of the recipient, which is also influenced by the social environment or socially-desirable behavior (Ajzen, 1991). Social desirability describes how expectations about what is considered socially desirable influence individuals' behaviors and attitudes (Kaiser et al., 1999). Vesely and Klöckner (2020) analyzed the datasets of 29 published studies as part of three meta-studies and concluded that social desirability influences the attitude and exists as a

confounding variable in empirical studies. Pittman (2020) conducted three web-based experiments examining the impact of social desirability on purchase intention and attitudes. In all the three experiments, it was observed that if the subjects were convinced that the third parties could determine the results of the evaluation, they rated products with critical background information as socially desirable. Although the model of planned behavior (Ajzen, 1991) was published more than 30 years ago, recent studies in other contexts reveal that behavior can be explained and analyzed with this model appropriately; hence, it is also used in current research. For example, the model of planned behavior (Ajzen, 1991) was applied to the evaluation of corona protection measures in a study conducted by Ruiz-Fernandez et al. (2020). The perceived behavioral control and willingness to do what others expect as a subjective norm were used to define the viability of COVID-19 protection measures. It was observed that the perceived behavioral control was more relevant to behavioral intention than subjective norms. Measures of the government which the subjects could simply convert themselves were evaluated more critical with a higher probability of adhering to the COVID-19 protection measures. Based on a quantitative study with 200 participants using the planned behavior model (Ajzen, 1991), Aliaga-Ortega et al. (2019) examined possible factors influencing consumers' decision-making process and observed a significant influence of behavioral control on decision making. In a meta-analysis with a total of 13,121 datasets, La Barbera and Ajzen (2021) verified that subjects are more likely to behave convergently with the attitude and subjective norms when perceived behavioral control is high. Another meta-analysis conducted by Jalili & Ghaleh (2021) verifies the importance of perceived behavioral control related to the model of planned behavior (Ajzen, 1991) based on 47 studies with 15,528 datasets. Later in this thesis, the planned behavior model will become much more significant. Although the focus of the experimental design is on attitude and purchase intention, so far as observable, deviations between attitude and purchase intention could be attributed to the variable's subjective norms and perceived behavioral control.

2.1.2 Consumer persuasion in terms of the Elaboration Likelihood Model

The variables attitudes, behavioral control, and subjective norms were used to describe consumer behavior as a part of planned behavior model (Ajzen, 1991) in the previous section. This model portrays influencing relationships and states that the attitude—related to the subjective norms and behavior control—has a higher probability of targeted buying behavior, whereas the ELM (Cacioppo et al., 1986) focuses on factors influencing a change in the attitude. The ELM describes how attitude changes through a persuasive stimulus based on the cognitive processes pertaining to the level of involvement (Cacioppo et al., 1986). This dissertation aims to further understand how multisensory stimuli can influence the consumer behavior with regard to online stores. As previously described in the planned behavior model (Ajzen, 1991) and the cognitive dissonance theory (Festinger, 1957), attitude is directly related to consumer behavior. Therefore, the ELM (Cacioppo et al., 1986) will be used to explain how attitudes can be altered to derive specific implications for the experimental design used in this study. Specifically, in the third and fourth experiments, systematic manipulations will be used to influence attitudes and purchase intentions in a controlled setting. These manipulations are derived from the ELM.

Involvement, as an influencing factor in the ELM (Cacioppo et al., 1986), is defined as directed attention. Attention is an inner state of excitement measured by dilation of pupils, skin resistance, and heart rate (Greenwald & Leavitt, 1984; Williams & Bargh, 2008). Exogenous or endogenous processes can control attention. Endogenic processes are under the control of recipients, whereas exogenous processes are uncontrolled and activated by environmental stimuli (Cherry, 1953). In an experimental design, for the first time, Cherry (1953) observed the phenomenon of selective perception concerning the exogenous processes of attention control when hearing one's name and termed this as "the cocktail-party effect." If the recipients heard their name, their attention was drawn in the direction where their name was heard. Simultaneously, attention paid to the current conversation was reduced. Dodson (1915) describes that increased attention intensity is accompanied by altered information processing performance, where information processing performance is the highest at an average level of arousal.

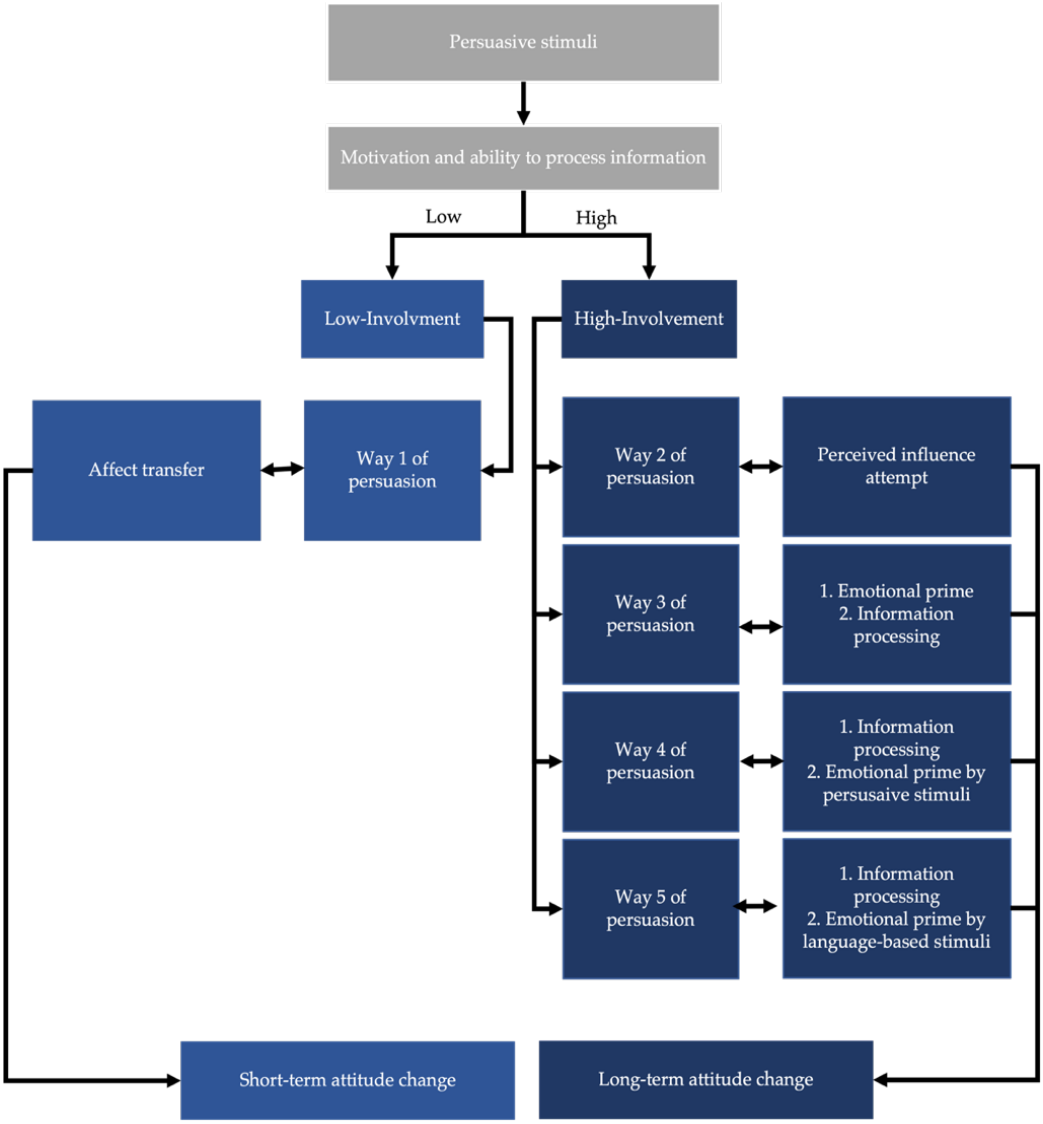
In the first advertising models, attention was still a prerequisite for generating purchasing behavior. One of the well-known and oldest models of advertising effectiveness based on attention is the AIDA model (Lewis, 1903). According to the AIDA model, attention must initially be stimulated, followed by interest and need, resulting in a directed buying behavior (Lewis, 1903). This model is hierarchical, whereas ELM is a process model. Hierarchical models are often unsuitable for predicting human behavior, so there is still no empirical evidence for the AIDA model (Barry & Howard, 1990). However, more flexible hierarchical models representing consumer behavior in different processes, such as the hierarchy-of-effects model by Lavidge and Steiner (1961), are also subject to criticism (Barry & Howard, 1990). The most critical aspect is that the cognitive processes influenced by involvement are not properly considered (Ray & Ward, 1975). Process models portray human behavior within different processes, often influenced by attention or involvement level. Heuristic models are mainly concerned with how decisions are made when cognitive resources are limited, which is often the case in a low involvement situation. They include the heuristic systematic model (Axsom et al., 1987) and the MODE model (Schuette & Fazio, 1995). While the ELM (Cacioppo et al., 1986) focuses on the attitude change wherein attention is not necessary and can be observed, for instance, by the mere exposure effect, other models, such as the alternative path model (Batra & Ray, 1986a), describes the influence of the involvement level on behavior or purchase intention. The mere exposure effect demonstrates an increased liking to a stimulus by repeated presentation of stimuli without conscious procession and thus reveals the limits of hierarchical models, such as the AIDA model (Zajonc, 1968). While Zajonc (1968) formulated this as a hypothesis, Bornstein (1989) verified this hypothesis as part of a meta-study considering 124 studies from 1968 to 1987. Attention is, therefore, not a mandatory prerequisite for advertising effectiveness, but it supports the potential for increased information processing performance (Dodson, 1915). In this research, attention is primarily discussed and examined as an additional factor influencing purchasing behavior, as in the experimental study conducted by Streicher et al. (2021). In their web-based experiment with 150 subjects, directed attention control increased product choice and the probability of unplanned purchases (Streicher et al., 2021). The level of attention or interest or even the intention to make a purchase might vary depending on the voice tone (Wang et al., 2021). The meta-studies conducted

by Jeong and Hwang (2016) and Segijn and Eisend (2019) examined the influence of multiscreening on the persuasive effect of advertising. Particularly, these results illustrate the complexity as many variables can occur differently in reality. Nevertheless, a reduced persuasive effect could still be observed in several cases. Segijn and Eisend (2019) also discuss the influence of resistance, joy, and attention level. This shows that attention or involvement is still relevant in consumer research as a directed type of attention.

As mentioned above, the ELM (Cacioppo et al., 1986) distinguishes between information processes with a high and low involvement and different implications for a possible change in attitude. Figure 1 summarizes the relationships of the following explanations to ELM and further explains the metacognitive additions to support comprehensibility. Furthermore, the research material and further manipulations in the third and fourth experiments will also be significantly influenced by the extension of this model using metacognitive processes. Significant differences between the attitudes observed depending on different metacognitive pathways of persuasion will also be investigated.

Figure 1

Meta-cognitive Elaboration Likelihood Model



In low involvement, recipients follow the peripheral path of information processing. Low involvement describes a situation in which the recipient has a low and superficial level of information processing toward the persuasive stimulus. Therefore, the recipient is unmotivated and even incapable of dealing with the content due to the low level of cognitive resources. In case of the peripheral route, recipients prefer peripheral cues, such as humor or attractive communicators,

which act as an argument for attitude change. In such a case, several arguments can convince the recipient as more number of arguments is more convincing than the significance of the content or strong arguments. The superficial processing of arguments can influence the existing attitude and lead to a positive or negative change in attitude, but which is unstable and only for a short duration. Strong arguments are preferred by recipients in the context of the central path of information processing. In the case of the central path of information processing, there is a high involvement and thus an active search for information on the recipients, combined with the motivation and ability to deal with persuasive stimulus. This is followed by an elaboration of arguments, which shows a cognitive process in which the recipient reflects on the message's arguments, interprets them, and integrates them into their attitude structure. The result is an unchanged or a positive or a negative attitude change that is stable and long-lasting (Cacioppo et al., 1986).

Shahab et al. (2021) reviewed 762 articles, of which 68 met the researchers' evaluation criteria, to empirically evaluate and verify the effect of the elaboration continuum. Manca et al. (2020) verified in a 2 x 2 x 2-between-subject design that strong arguments in a high involvement situation have a significantly stronger influence even on the recipients' unconscious attitude compared to a low involvement situation. Similarly, researchers anticipate negative emotions as an influencing factor of attitude change. However, experimental studies conducted by Lam et al. (2017) revealed that emotions influence the elaboration continuum and should not merely be viewed as peripheral stimuli, as suggested by Cacioppo et al. (1986). While congruent emotions activate congruent thoughts when a purchase decision is made, the direct effects of congruent emotions on the purchase intention can be observed in online purchase behavior. Similarly, online vendors' subjective trustworthiness activates emotions that directly influence the attitude continuum (S. C. Yang et al., 2006). Other studies discuss the attitude ambivalence concerning the congruent and noncongruent emotions as moderating influence factors and validate the association of positive emotions and a stable positive attitude (H. Jiang et al., 2016).

Moons and De Pelsmacker (2012) observed that positive and congruent emotions associated with high involvement primarily enables the recipients to make more reflective purchase intentions than individuals in a low involvement. Thus,

congruent emotions in low involvement situations increases purchase intention, in contrast to high involvement ones. Petty and Briñol (2014, 2015) discuss these effects and distinguish them between five different pathways of metacognitive persuasion. Congruent emotions in low involvement continuum lead to purchase decisions as observed by Moons and De Pelsmacker (2012). This finding is discussed by Petty and Briñol (2014, 2015) in the context of the first path of metacognition. The authors state that in the case of low involvement, the valence of emotions significantly influence attitude. This effect is also further verified in reviews by De Houwer et al. (2001) and Walther et al. (2011). A more recent meta-study conducted by Rosengren et al. (2020) based on datasets of 67 primary studies describes this effect as an affect transfer, which may influence creativity. Hwang et al. (2020) conducted a between-subject design study with two experimental groups with $n = 251$ and $n = 218$. The study findings revealed that positive emotions were activated by music, which led to an increased purchase intention in a low involvement, and information processing via the central pathway, represented by a high cognitive readiness, in a high involvement. These findings were also reflected in the study conducted by Yoon and Tinkham (2013), where a direct affect transfer to the attitudes toward the advertisements was observed with emotional priming in a low involvement setting. Payne (2005) observed the affect transfer based on stereotypical expectations, deriving a dual-process model, whereas Murphy and Zajonc (1993) observed the affect transfer based on subliminal affective priming.

According to the previous descriptions, emotions are supposed to influence attitude, justified by affect transfer directly, but attitude is generated based on low involvement and still follows the conditions of the peripheral pathway; thus, such attitude is unstable and short-lived (Petty & Briñol, 2014, 2015). Emotions appear to serve not only as an argument in a high involvement situation but also as a more cognitively intense engagement with persuasive stimulus (Hwang et al., 2020). Similarly, emotions in a high involvement situation no longer act as affect transfer to attitude. In the experiment conducted by Martin et al. (1997), congruent emotions—where sad commercials and sad-feeling subjects were used—led to a more positive evaluation than in the absence of congruence. Similarly, persuasive messages are perceived as more credible in high involvement situation (DeSteno et al., 2004; Petty & Wegener, 1993). Moreover, this situation also leads recipients to

be more resilient to their thoughts (Huntsinger, 2013). Likewise, if the content of one's thoughts matches the persuasive message, recipients become more resilient to their thoughts (Clark & Evans, 2014).

Petty and Briñol (2014, 2015) discuss that high involvement also increases the risk of perceived influence bias. The reactance theory discusses the perceived attempts to influence consumer behavior (J. W. Brehm, 1966; S. S. Brehm, 1981). According to the reactance theory, an aversive state always arises when the freedom of choice is restricted. An emotionally unpleasant state perceived as negative that makes you want to change it is known as an aversive state. In the case of perceived restricted freedom of choice, the option that is considered as threatened is valorized. A reduction choice of the aversive state is understood as given, if the threatened alternative can be observed. The reason for this is that the discrepancy between attitude and behavior would be resolved if there is a simultaneous incentive to act and commitment to behave congruently with one's attitude (Festinger, 1957). Aversive emotions will surface if an effort is made to change one's own behavior or attitude. Therefore, the probability of deviant behavior increases to resolve the aversive state (J. W. Brehm, 1966; S. S. Brehm, 1981). Friestad and Wright (1994) describe in their persuasion knowledge model that in the context of a purchase decision, most recipients are aware of the attempt to be influenced and therefore do not react with defiant behavior but rather consciously deal with the situation. They question the sender's messages and actively pursue their own goals. In a mediation study with a total of 181 subjects, Hu and Wise (2021) verified the influence of restricted freedom of choice and perceived influence attempt on playable online advertising. Focusing on the COVID-19 pandemic, Shoenberger et al. (2021) examined advertising messages with and without the cue of restricted freedom of choice in a 2 x 2-between-subject design, demonstrating the importance of reactance theory. However, all studies reflect the basic assumptions of Friestad and Wright (1994). Reactance effects are lower when the recipient makes an attempt to be influenced or interferes with their freedom of choice. Petty and Briñol (2015) justify this in the context of metacognitions with a higher willingness to cognize. However, in advertising, as opposed to a circumstance wherein a customer is consciously making a purchase, an obvious influence attempt should be avoided, as negative consequences for attitude will follow (Shoenberger et al., 2021). According to Festinger's (1956)

cognitive dissonance theory, a permanent turning away from the original attitude object can be expected as a consequence, as this should contribute to the avoidance of aversions due to the balance between attitude and behavior, and in such cases, there would be no motivation to behave differently. In this context, Festinger (1956) discusses individuals' need for consistency, derived from the observations of his experiment.

The distinction between third, fourth, and fifth paths of metacognitive persuasion depends on whether emotions becomes salient before or after information processing in a high involvement situation (Petty & Briñol, 2014, 2015). In the fifth pathway of metacognition, emotions become salient after information processing through language-based stimuli, whereas in the fourth pathway, emotions are salient before information processing based on an affective prime. In the third pathway, emotions become salient before information processing but only based on the persuasive stimulus without an additional affective prime. In all the three cases, the involvement is high; thus, emotions also accompany the elaboration of arguments, and the attitude is formed from the result. In an experimental design with five substudies, Hasford et al. (2018) substantiated the hypotheses of Petty and Briol (2014, 2015) on the timing of emotional priming and how it affects the explicit attitude. Cian et al. (2015) reveal that the nature of an affective stimulus in connection with a conscious and unconscious emotional activation also influences the attitude. This supports the differentiation in metacognitive pathways three to five according to Petty and Briñol (2014, 2015), where a distinction is made between the subliminal stimuli—which are intended to activate emotionally on different time points—while information processing takes place with different manipulations to influence attitude formation processing. However, it must also be emphasized that emotional priming in conjunction with high involvement only has a positive influence if strong arguments following that are congruent with the recipients' attitudes (Teeny et al., 2021). However, significant positive influences on brand attitudes can also be observed (Hong et al., 2022). Kranzbühler et al. (2019) verified in their meta-analysis that positive emotions influenced consumer behavior. Gratitude and pride significantly influence evaluation and sharing behavior, with the relationship for gratitude being twice as high as for pride, with $p = .015$ and $r = .60$. Love revealed a positive relationship with $p = <.001$ and $r = .60$ on evaluation and a moderate relationship with purchase intention. Joy revealed a

moderate relationship with all variables. According to Petty and Briñol (2014, 2015), in the case of high involvement, emotions would influence the valence of thoughts and strengthen them even further. They justify this by referring to the study of Briñol et al. (2007), who observed an increased certainty of attitude in an increased elaboration. The authors further referred to the publications of Briñol et al. (2007) and Petty and Krosnick (1995), who postulated that the strength of the attitude and perceived probability of possible consequences concur with this effect. The relation to the timing of emotional priming is discussed by Petty and Briñol (2015) in their review under the aspects of second cognition, whose explanations can also be found in the metacognitive assumptions in their 2014 review. If emotions are salient during thinking, emotions serve as thought validators (Petty & Briñol, 2014). Independent studies observed that when subjects were emotionally primed before cognitions, followed by a persuasive stimulus, and the message of the persuasive stimulus was congruent, subjects were more convinced of their attitude (Briñol, Petty, Gallardo, et al., 2007; Briñol, Petty, Valle, et al., 2007; Huntsinger, 2013). This, in turn, should result in a strong attitude (Briñol, Petty, & Barden, 2007; Petty & Krosnick, 1995). However, further differentiation must be made here, as premature priming could have affected infusion as a consequence (Forgas, 1995). In such a case, emotions would lead to valence thoughts as per the fourth pathway of metacognitive persuasion (Petty & Briñol, 2014). Emotions activated during cognitions have a lower likelihood of affect infusion, depicting the fifth pathway of metacognition (Petty & Briñol, 2014). If emotional priming occurs through the persuasive stimulus without additional prior emotional priming, congruence is absent, and emotions then serve as arguments (Martin et al., 1993). Emotional priming without additional prior emotional priming describes the third pathway of metacognitive persuasion (Petty & Briñol, 2014).

2.2 MULTISENSORY MARKETING

In the following section, multisensory marketing will be described in two steps. First, multisensory marketing is explained from the perspective of sensory perception. The focus will initially be on how the sensory organs identify the sensory stimuli from the environment and how these are processed further. A variety of biopsychological processes are involved in the bottom-up and top-down processes, which could be described in more detail but do not add value to the research. However, since biopsychological perception is the basis of multisensory marketing, the relevant processes will be mentioned below in a focused manner to enable the transition to the research-designrelated effect of imagery. Here, the potentials of imagery will be outlined based on primary studies, and the inferences to the research design of this thesis will be drawn.

2.2.1 Definition and sensory perception

In the beginning, it will be explained how sensory stimuli are processed biopsychologically, as this also happens when consumers come into contact with multisensory products. Furthermore, biopsychological processes can explain why multisensory marketing is able to influence consumer behavior, which will be derived from various studies. Sensory stimuli are processed and interpreted in different areas of brain depending on their modality, thus having a different influence on the perception of objects (Biswas et al., 2019). Cognitive processing of sensory stimuli increases awareness, empathy, self-reflection, and intensity of cognitions (Acevedo et al., 2018). Neurological studies support these assumptions as sensory perception activates the same brain areas that are activated while being aware, empathic and self-reflected (Acevedo et al., 2014; Aron et al., 2012; Jagiellowicz et al., 2011).

The representation of the human body takes place in the somatosensory cortex, which is located on the postcentral gyrus. Related to the postcentral gyrus, the somatosensory homunculus is often discussed in scientific studies. The

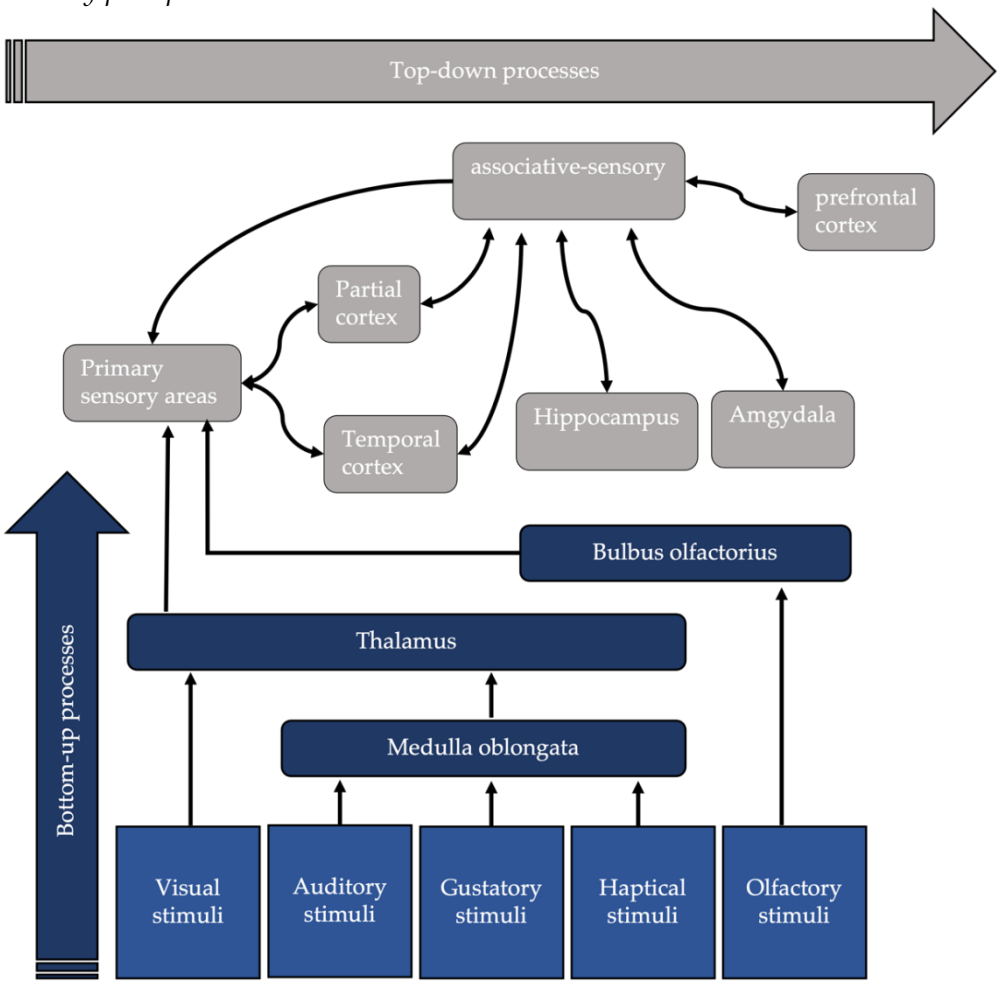
somatosensory homunculus is a reconstruction of the human body derived from the sensorimotor areas of brain (Schieber, 2018). The representation of the human body depends on the activation levels of the respective areas of which activity varies by the intensity of a perceived haptic stimulus, perceived to different extents by different locations of the skin (Dietrich et al., 2017). Some areas of skin, such as the hands, perceive sensory stimuli more frequently and intensely, influencing the representation of the human body (Roux et al., 2018). The somatosensory homunculus shows that our brain does not reflect the reality precisely and that some sensory regions have a more decisive influence on the recipient's perception. Thus certain sensory stimuli can have different influence on the recipient due to the varying activity or representation (Roux et al., 2018).

Sensory stimuli are transformed according to the bottom-up principle and, depending on the sensory modality, are transferred in different ways, except for olfactory stimuli. Its transformation is based on chemical processes, and is transferred directly to the bulbus olfactory, to different locations of the thalamus and subsequently enriched according to the top-down principle with information from long-term memory, located in the hippocampus (Biswas et al., 2019). Figure 2 is a self-generated model-like summary of the following information on sensory perception and serves to make the information comprehensible. The thalamus is responsible for endogenous and exogenous or unconscious and conscious attention regulation processes and filters the irrelevant information before it is forwarded to the somatosensory cortex (Güntürkün, 2019). Sensory information is relayed from the somatosensory cortex to the parietal cortex for spatial-visual perception and to the temporal cortex for more complex object-based processes and information (Saalmann & Kastner, 2011). Likewise, the temporal cortex is involved in cognitive semantic and pictorial cognitions (De Bellis et al., 2018). The enrichment of sensory stimuli, for example, with object-related information useful for recognizing specific objects occurs in the top-down process in the associative-sensory areas. Once the sensory stimuli are recognized, a higher depth of processing occurs in the multimodal areas, especially in the parietal cortex, temporal cortex, and prefrontal cortex where the sensory information’s are linked, and will be interpreted as motivational as well as emotional information. In this process, further information is retrieved from the hippocampus, interpreted by the amygdala as emotional information (Ghanavati et al., 2019). The prefrontal cortex is responsible for the

conscious and automatic cognitive processes, including cognition control and derived executive functional conscious behavior control (Friedman & Robbins, 2022). An experimental functional magnetic resonance imaging (fMRI) study by Day et al. (2020) with 19 males and 13 females verifies the relationship between cognition and behavioral control, and the activation of the prefrontal cortex. It shows that learned stimuli influence the degree of cognition and behavioral control. However, the prefrontal cortex activity decreases with age, decreasing the cognition control as well (Webb, 2011). The activation of the prefrontal cortex is attributed to the associative areas, also known as mediators, in turn also activate other brain areas such as the amygdala (Reitsamer et al., 2020). The activation of the amygdala is critical in cognition control since the amygdala serves as emotional regulator and shows high activity when cognitions are high (Marxen et al., 2016).

Figure 2

Sensory perception



In the three independent meta-analyses by Buhle et al. (2014), Morawetz et al. (2017), and Kohn et al. (2014), it was shown that the amygdala is associated with an emotional activation of the recipient and is even activated in information processing processes that are emotionally independent. In a clinical fMRT scan-based experimental study with 18 subjects, Sarkheil et al. (2019) observed that the amygdala is primarily used for emotional regulation and, at the same time, protects the consciousness from particularly negative stimuli. Based on the measurements of the basolateral amygdalian neurons. Beyeler et al. (2016) verified the assumption that activation of the hippocampus through retrieval of long-term information is

accompanied by activation of the amygdala, thus emotional activation of the recipient. Emotional activation is one of the essential persuasive factors in multisensory marketing (Krishna et al., 2016). Multisensory marketing uses different sensory stimuli, therefore involving the recipient and influencing their perception, judgment, emotional activation, and purchase behavior (Elder & Krishna, 2012). Furthermore, multisensory marketing can influence the evaluation of products and brands as well as decision-making (Krishna & Schwarz, 2014). Specifically, the results of an experimental study, with $n = 552$, show a relationship between multisensory stimuli in an luxury hotel with a positive brand experience and its evaluation (Wiedmann et al., 2017). Congruent visual stimuli were also able to increase the purchase probability in brick-and-mortar stores by 25%, whereas auditory stimuli by 17%, and haptic stimuli by 10% (Ghosh et al., 2021).

In the context of the experiments of these dissertation, different products such as drinks, chocolates, and t-shirts are presented in an online store and are evaluated by the participants. The most diverse senses and different combinations are addressed in different ways. For example, it is described that a bar of chocolate presented as a picture, made unique sounds and it conveys a cooling sensation when consumed. In addition, a specific flavor and aroma are also depicted in the picture. The participants perceive sensory stimuli through the characteristics portrayed and the pictures of the products. If they already imagine them, all the sensory information has reached the top-down process and thus has overcome the thalamus, which filters the stimuli from environment. Olfactory stimuli, as previously mentioned, are the only sensory stimuli that bypass the thalamus and thus always enter the top-down process. As part of the top-down process, several areas of brain are involved, as shown in Figure 2, to interpret the sensory stimuli. In this process, all the available information is retrieved. This includes experiences, emotional evaluations, chronological information, or behavioral scripts based on all product information. This leads to high hippocampus activity. According to the amygdala regulation, with increasing hippocampus activity, there is also an increase in emotional activity. In this example, the hippocampus would search for information about whether these or comparable products are known or to what extent experiences of products with comparable attributes, such as taste, smell, feeling of cool, or the sound, are already known. For example, the participant might remember an ice-cream confectionery, a product with the same cooling attributes.

Alternatively, other chocolates are remembered that crackle in the mouth when consumed, or even trying to imagine how everything might be perceived together and whether one would like it or not. According to ELM (Cacioppo et al., 1986), emotional activity's based on the sensory stimuli should be perceived as arguments or affect transfer. In any case, the valence of the increased emotional activity influences the attitude formation processes. While the theory has previously dealt with physical perception, it becomes apparent in the example of the research that no physical perception takes place.

A physical perception of sensory stimuli does not seem to be necessary to influence consumer behavior. Buzova et al. (2020) suggest that multisensory marketing, without physically perceived stimuli, but through narration influence consumer behavior. Based on their study, Tan et al. (2021) assumed that multisensory imagery has this effect because multisensory information's can be stored and retrieved. Imagery is a sensory representation of retrieved information from memory that can be modified by new information (Kosslyn et al., 2001; MacInnis & Price, 1987). However, imaginative cognitive processes can distort retrieved information, creating false memories (Lakshmanan & Krishnan, 2009; Mazzoni & Memon, 2003; Rajagopal & Montgomery, 2011; Schlosser, 2006). Several theories and assumptions describe the creation of false memories, the most agreeing that information from the long-term memory is not accurately retrieved and the gaps are unconsciously filled by new, emotionally-modified information (Johnson et al., 1993; Mitchell & Johnson, 2009; Schlosser, 2006). Similarly, it can be observed that subjects who were previously asked to imagine eating popcorn after watching a commercial were significantly more likely to be convinced one week later that they had eaten popcorn (Rajagopal & Montgomery, 2011).

Imagery has relevant importance in this empirical research, as it will be investigated to what extent the multisensory marketing in online stores can influence consumer behavior. Thus, participants will evaluate different product types in terms of their attitudes and purchase intentions toward the products. All these products are presented in online stores, thus there is no physical perception except for visually. Although, physical multisensory stimuli moderated by the involvement level can influence consumer behavior (Hwang et al., 2020), it cannot be excluded that online consumer behavior with regard to online stores is receipt with muted devices, so that only the visual sense physically interacts. In theory,

this should not have a negative impact on the persuasion of consumer behavior, since pictorial representations of sensory stimuli are already sufficient to activate the imaginative effects (Elder et al., 2017). Based on this argument, product images are used in the following experiments.

In science, a distinction is made between automatic and deliberate imagery, dependent on low and high imageries, respectively (Krishna & Elder, 2021). In automatic imagery, the pictorial imagination occurs uncontrollably and spontaneously, becoming lowly elaborated (Krishna & Elder, 2021). The importance of elaborated imagery has already been discussed by MacInnis and Price (1987) and further validated by Unnava and Burnkrant (1991). Unnava and Burnkrant (1991) hypothesized that pictorial advertising would be redundant in recall performance if the advertisement offered linguistic information leading to the same imaginative imagery, but there could be differences between high and low imagery. Based on 107 subjects, the researchers found that with high imagery, recall performance after two days was significantly higher for advertisements without pictures than for those with pictures. With a low imagery, the recall performance was significantly higher for advertising with pictures than without after two days. In an experimental cumulative research design with three studies, researchers Rajagopal and Montgomery (2011) explored the differences between advertising with low and high imagery in terms of valence and confidence in one's attitude toward the advertised product. They further discussed the phenomenon of false truths through the influence of one's own experience. Following the method of Unnava and Burnkrant (1991), they conducted a test of recall performance after two days. While further verifying the results of Unnava and Burnkrant (1991), they found that false memories can be created by imagery, and attitudes can arise from them, which are more stable and stronger in valence than when concrete experiences made attitudes.

Further studies have repeatedly verified that more variance can be explained in terms of the influence of deliberate imagery on recall performance and attitude when imagery images are generated in the context of a story (Escalas, 2004a, 2004b, 2006; Green & Brock, 2000; Y. Jiang et al., 2014; Van Laer et al., 2014), so that differences in the evaluation of an object could be explained by whether imagery is generated based on objective information or as part of narration. To study this, Jiang et al. (2014) conducted two experiments with 808 and 331 subjects,

respectively, and two follow-up studies — an eye-tracking study with 117 subjects and a memory performance study based on change of perspectives and time pressure with 146 subjects to verify the observations. Four pictures of four different hotels were presented, and the participants were asked to imagine the hotel either by themselves or using instructed imagery. Scientists also differentiated whether the objective was to obtain information or no objective was formulated. Changes in perspective were also made. The evaluation of the hotel was highest in self-directed imagery without the goal of information retrieval. This effect could be further increased if the subjects were asked to adopt different perspectives, as this facilitated the degree of imagery and enabled more difficult imaginations.

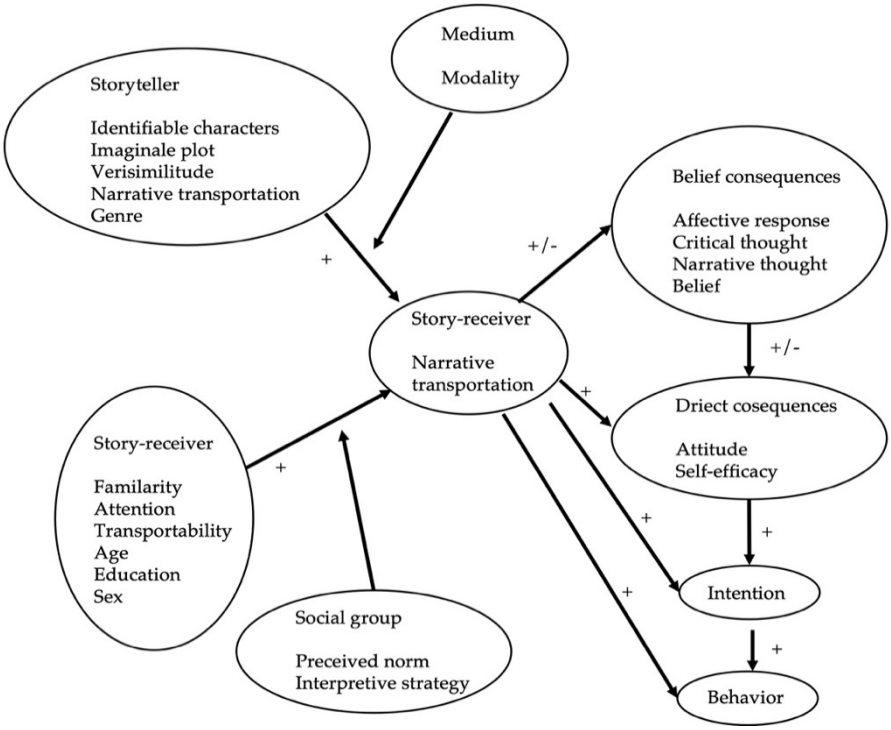
This example illustrates that imagery should not only be reduced to the perception of sensory stimuli but can also be used to create imaginary situations. Which in turn can positively influence the evaluation of products, thus creating an imaginary situation seems conducive to attitude changes. A story, however, can also generate attention and enable transportation so that the situation of an experiment can also enable the participants to empathize with an actual situation. The experiments on which this dissertation is based also start with a cover story to reduce the risk of reactivity and influence of own preferences. While these two factors will be explained in their respective chapters, the following explains what requirements should be applied to a story to enable transportation through imagery in an experimental situation.

Van Laer et al. (2014) applied the extended transportation-imagery model based on 132 effect sizes from datasets of 76 primary studies in a meta-analysis. Different variables were derived from the 76 primary studies that influence narrative transportation, i.e., the recipient's ability to imagine and participate in a story and its effects on attitude, self-efficacy, beliefs, intention, and behavior. The model is shown below in Figure 3. It is assumed that the storyteller and the receiver enable the receiver to transport, while the medium of the story and the social group of the receiver functions as a moderator effect. The storyteller must create characters in his story that the receiver can identify. Likewise, the plot and the story must show a chronology and causality. The characters must perceive action and should not show behavior that displeases the receiver. The plot should lead to an emotional climax accompanied and resolved by the characters. Likewise, the genre must please the recipient. If these aspects are respected and meet a positive valence,

the receiver is granted the possibility of transportation, which in turn can be moderated by the inclination of the receiver to the medium through which the story is told. The recipient's ability to be transported is influenced by whether they are familiar with storytelling and thus open to it. Similarly, transportation succeeds only if the receiver of the story is attentive, has sufficient emphatic ability, and is cognitively able to understand the story. Furthermore, the ability to transport increases with age until advanced age where it decreases again. Likewise, by the degree of the education and the accompanying knowledge, a restriction could occur to understand the content of the story. Finally, difference of gender between the recipient and the characters can reduce transportation due to a lower ability to identify and empathize. The connection is also moderated by the social group or the social environment of the recipient since this influences the evaluation of the story and its actors through subjective norms.

Figure 3

The Extended Transportation-Imagery Model



Note. In accordance with Van Laer et al. (2014), p. 809.

Imagery is usually an integral part of both analog and online shopping. Consumers in both worlds often expect product attributes, such as weight and taste, before picking it up or trying it out (Krishna & Elder, 2021). Furthermore, sensory imagery can be differentiated as multimodal, as the visual stimuli are always combined with at least one other sense (Krishna & Elder, 2021). Morewedge et al. (2010) as well as Cornil and Chandon (2016), observed that deliberative imagery reduces food consumption but increases evaluation and conviction of having consumed the right product. Haptically related imagery can also lead to equally perceived ownership as when haptical stimuli are perceived physically (Peck et al., 2013). Furthermore, better product evaluations can be observed based on haptical imagery compared to physically perceived haptical stimuli, which is explained by the fact that imagery generates vivid images (Brasel & Gips, 2014).

Currently, imagery is widely present in studies with new technologies such as augmented or virtual reality, where olfactory, haptic, and gustatory sensory perception is based on imagery, and the potential of new technologies is explored in this context. Augmented reality (AR) or virtual reality attempts to combine reality with the digital world. One example is "Pokemon Go." Pokemon Go is an app which can be installed in smartphones. Users are asked to scan their surroundings with their cameras to discover and collect digital creatures. This is an example of how AR connects the digital world with reality. This game has been so successful in mobilizing millions of users worldwide to explore their surroundings that researchers investigated the motivational factors caused by this game (Althoff et al., 2016; Jang & Liu, 2020; Ma et al., 2018; Malik et al., 2019; Serino et al., 2016; Shea et al., 2017; Valentine & Jensen, 2021; Vella et al., 2019). In 2021, an international conference held in Bombay, among other things, discussed the technological possibilities of AR-based online shopping, focusing on explanations and technologies (C. Yang et al., 2021). One of the persuasive factors associated with AR is the feeling of actually being able to grasp something (Dwivedi et al., 2021). Hilken et al. (2017) argued in the context of AR, based on their experimental design, the situated cognition theory and justified their results that augmented reality allows one to perceive content in a real-time context physically. Physical perception already arises from the feeling of being able to touch things in an AR context, resulting in imagery. 79 women and 77 men participated in the experiment. Within the scope of the experimental design, the digital offer of the eyeglass manufacturer "Mister Spex" was used, in which test persons can try out eyeglasses digitally using a camera of a device. Hilken et al. (2017) observed that AR had a moderating effect on service experience, purchase intention, and willingness to make decisions. In the context of a large-scale study with six substudies, Hilken et al. (2020) verified further the previously described assumptions and included recommenders and decision-makers to validate, whether and how strong can the influence of AR be on referrals. In a between-subject design with two experiments, Yim et al. (2017) compared consumer behavior in AR and in an ordinary online store, observing significant differences in the context of AR bsed on the attitude of the products and purchase intention. Brengman et al. (2018) came to similar conclusions and observed that mobile AR leads to increased perceived ownership compared to non-AR products on notebooks and smartphones in a study with 277

subjects. In the context of two experiments, Heller et al. (2019a, 2019b) observed that AR has a positive influence on processing fluency and leads to a significant increase in word-of-mouth (Heller et al., 2019a) and argues that the conscious control of haptic interaction is the reason for the positive influence (Heller et al., 2019b), arguing congruently with Hilken et al. (2017) basic assumptions about situational cognition theory. For 19 months, Y. C. Tan et al. (2021) observed consumer behavior of an international cosmetics manufacturer that offered consumers the opportunity to test lipsticks in an AR context on the website. They found substantial differences in product perception, expenditure, and time spent on the homepage, as well as congruent results compared to the studies previously mentioned. Although the studies revealed the potential of AR, most companies do not yet offer these functionalities. Thus, in the experiments of this thesis, previous studies are mainly considered in the context of imagery.

2.2.2 Theoretical background and research findings related to multisensory marketing

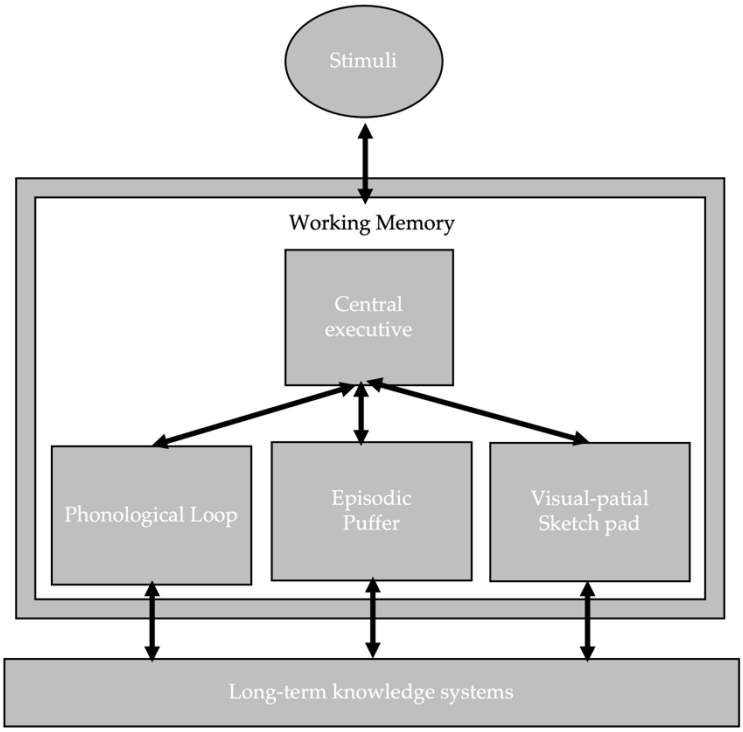
Multisensory marketing describes consumer behavior via multiple sensory stimuli (Krishna & Elder, 2021). In this context, scientific publications discuss the superadditivity effect (Krishna et al., 2016) and the cross-modal correspondence effect (Spence et al., 2014). Likewise, these publications repeatedly refer to the importance of congruence (Ruzeviciute et al., 2020).

MacInnis and Price (1987) argue that sensory information is a part of working memory. In doing so, they refer to Baddeleys and Hitch's (1974) multicomponent model of working memory and extends the assumption that sensory information is only used to enhance attention. Baddeley and Hitch (1974) describe that short-term memory is significantly more complex as explained in the multi-store model because the processes taking place in short-term memory are encoded visually, spatially, and linguistically (Brelsford et al., 1966; Phillips et al., 1967). The working memory model is shown in Figure 4. Baddeley and Hitch (1974) distinguished between the central executive, which they describe as the boss of working memory, the phonological loop, and the visuospatial notepad. The phonological loop

contains the articulatory control and phonological memory. Here, the phonological information was repeated several times, encoded into the spoken form by articulatory control processes and then retained for one to two seconds in the phonological memory, of which Baddeley and Hitch (1974) referred to as the inner ear. The visuospatial notepad organizes visual stimuli so that the spatial organization and environment can be perceived. In addition, the visuospatial notepad interacts with long-term memory and retrieves visual information from related objects that may be contextually relevant. Baddeley and Hitch (1974) described in this context that the visual-spatial notepad automatically retrieves all the visual information taking the example of an office, as soon as one enters a room, even if only a desk and a chair can be seen, all information of an office is retrieved. Two years after this review, Hitch and Baddeley (1976) published an experiment in which the subjects were asked to perform tasks involving sequences of numbers. As soon as the subjects were allowed to recite the number sequence aloud, both the correct reproduction of the number sequence and the answering of the questions increased. Krishna et al. (2016) argues this as further support of the central executive and the phonological loop. Baddeley continued to evolve this model, adding episodic buffer that mediates between the two main functions, and since recent years, he has been investigating whether the factors such as illness and age influence the functions of the model (Guazzo et al., 2020). MacInnis and Price (1987) discussed that multisensory imagery influences purchase behavior and stronger cognitions are triggered during high involvement, as more sensory information is retrieved also directing central executive attention to these stimuli through high involvement. The conclusion of MacInnis and Price (1987) regarding the working memory model (Baddeley & Hitch, 1974) suggests that there might be a positive correlation between the number of sensory stimuli of products and purchase probability, even if the stimuli are not physically perceived. Regarding this statement, a transfer to online stores already seems reasonable, as it is carried out in the experiments of this dissertation.

Figure 4

Visual illustration of the working memory model



Note. In accordance with Guazzo et al. (2020), p. 282.

Empirical surveys have observed that sensory imagery influences purchase behavior in advertisement and product designs (Davis, 1971; Healy, 2017; Kruglanski, 2001). Imagery enables the retrieval of information from memory and generation of ideas about the future (Byrne et al., 2007; Schacter et al., 2013). As postulated by MacInnis and Price (1987), the studies of Shiv and Huber (2000), Elder et al. (2017), as well as Petrova and Cialdini (2005), verify that the effect of imagery is significantly weaker when the subject has fewer cognitive resources available. A meta-study by McNorgan (2012) examined 61 neurological studies from 1997 to 2011 and supported the assumption that there is an overlap in activated brain areas between physically perceived and imaginative stimuli. Similarly, equal activities of the visual cord can be observed in both physical perception and imagery (Pearson, 2019; Pearson et al., 2015). There exist fMRI studies that observe the overlap concerning specific sensory stimuli, such as during cognitive, physical, or imaginative processing of the gustatory (Kobayashi et al.,

2004), olfactory (Bensafi et al., 2003), or haptic stimuli (Schmidt & Blankenburg, 2019; Yoo et al., 2003). However, it should not be ignored that recent studies provide unexpected results and illustrate that there are still unknown moderating or mediating variables concerning sensory imagery (Haase et al., 2020). Thus, they did not observe any significant influence on product evaluation when olfactory and gustatory stimuli were added (Haase et al., 2020). Kim et al. (2021) observed in-store purchasing behavior of 224 men and 231 women in a field experiment, and observed differences in purchasing decisions under the influence of sensory imagery. They reasoned that this might be due to different brain activities depending on gender, with a possible accompanying stronger emotional activation of women (Kim et al., 2021). Lin et al. (2018) showed that olfactory stimuli negatively influenced attitude, when the subjects were sensitive to odors. Interestingly, this effect was reversed when subjects actively sniffed with their nose. The physical exercise of the typical perceptual experience is associated with the effect of imagery. The likelihood of coming into physical contact with sensory stimuli could also have a moderating influence on the evaluation of the attitude object, requiring further research here (Sharma & Romero, 2020). The previously made assumption that there could be a positive correlation between the number of sensory stimuli in products and the purchase probability, even if they are not physically perceived, seems to be much more justified after these biopsychological studies. This assumption is based on the effect of superadditivity, which is explained next and will be one of the leading research topics of this thesis. Furthermore, the findings suggest that the transfer of superadditivity to an online store via imagery based on multisensory product presentations could positively influence consumer behavior.

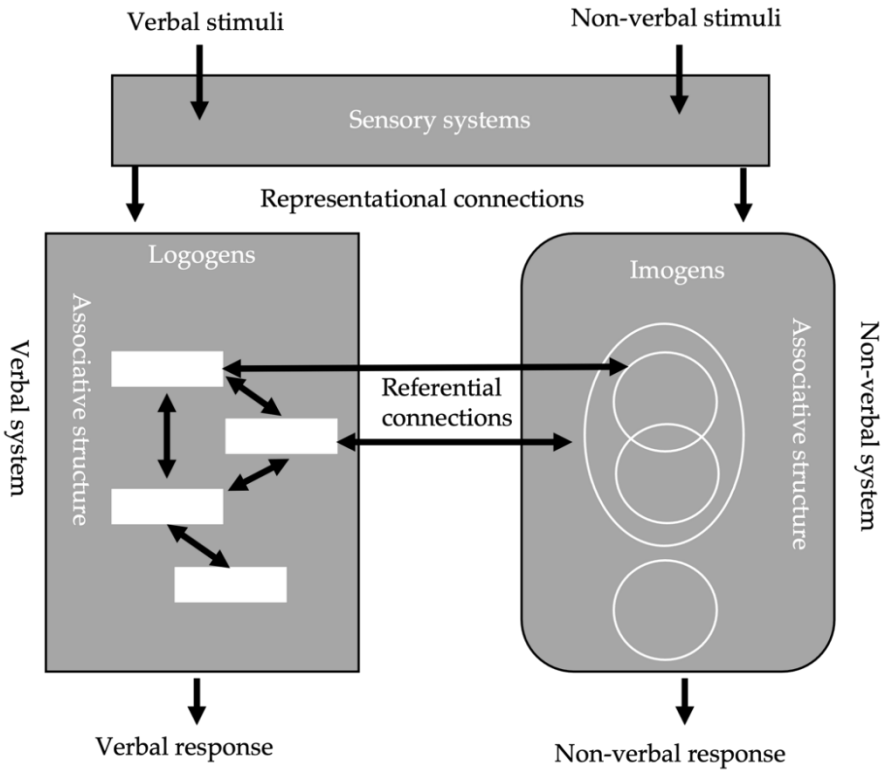
Superadditivity describes the cumulative increase of sensory stimuli and their influence on consumer behavior (Klemen & Chambers, 2012). Different sensory organs perceive each sensory stimulus and process differently depending on modality (Güntürkün, 2019). Lwin et al. (2010) found that memory performance is higher when visual and olfactory stimuli are presented simultaneously and explains the observations based on the dual coding system, according to Paivio (1969, 2009). The dual coding system assumes that memory representation of word and object information occurs both on a verbal and an imaginative coding system. Phonological information is encoded and stored in the verbal system. Paivio (1969)

said that phonetic information is stored as codes, retaining its identities and associations. However, this does not exclude the possibility that different codes associate with the same object, such as words with the same meaning in different languages. Paivio (1969) described these codes as logogens, which can also be combined and thus a new meaning is obtained. For example, the codes for "tea" and "spoon" can be associated independently but can also be combined as "teaspoon" to produce a different meaning. Sensorimotor or pictorial encoding occurs on the imaginal encoding, a nonverbal system. In addition to the visual aspects, the nonverbal representation includes all other nonverbal experiences that are both sensory information and emotions. In the verbal system, codes can be sequentially merged, acquiring new meanings but can also remain as independent identities. There is no sequential organization in the nonverbal system. Nonverbal information can be associated in parallel with sensory and emotional information. Paivio (1969) also explains that nonverbal information can lose its ordinary identity. Through experience and emotion, Paivio (1969) argues, simple geometric forms, for example, can take on a new meaning. For example, a book is not just a book, but can be a beloved novel; meaning of a triangle can take on a new meaning for students concerning geometry, so that during geometry class, a student no longer observes the actual triangle much more right angles. Likewise, visual associations can be activated and manipulated in the nonverbal system. Thus, people can imagine things and create sequences with their thoughts without linguistic associations (Paivio, 1969). Nonverbal codes, for example, in sensory or emotional information, are designated by Paivio (1969) as imogens. Although both coding systems operate independently, they are interconnected when information is retrieved recombining the independently encoded information, thus called as referential connection (Paivio, 1969, 2009). There may also be another connection within the systems, which Paivio (1969) calls an associative connection. Words can be associated with other words in the verbal system, through prior emotional enrichment. For example, one student may associate the word "school" with the word "joy" but another with "boredom." Likewise, associative connections can exist in the nonverbal system. Here, object information can be enriched with sensory information. For example, the exhaust of a car can be associated with both the sounds and smells. However, not all stimuli reach consciousness. There are verbal and nonverbal representations that are active to varying degrees, others can

be suppressed or supplanted by the more active representations. Paivio (1969) described that this is related to how intensively and emotionally the recipient perceived the stimuli of the environment. In this context, Paivio (1969) also discusses the importance of word-to-image bindings, since words that are equipped with an image or sensory information are more active and thus are easier to recall. Krishna et al. (2010) argued this as one reason for the effect of superadditivity, since a higher number of sensory stimuli lead to a more intensive engagement with the multisensory object.

Figure 5

Visual illustration of the dual coding theory



Note. In accordance with Paivio (1986) , p. 67.

This theory explains why sensory information is more easily retrieved than non-sensory information. Lwin et al. (2010) justify the improved superadditive and memory effects, referring to this model because with more sensory stimuli there

are more referential connections to the object-related representational connection which favor memory and information processing fluency effects. The cognitive involvement and the stimulation of the recipients increase with the cumulative increase in sensory stimuli (P. Li et al., 2020). Likewise, when processing sensory stimuli as a part of the top-down process, the hippocampus and amygdala are activated so that in addition to retrieving information, there is emotional activation (Güntürkün, 2019). Even if they are emotionally independent, cognitive processes are accompanied by an activation of the amygdala and thus generate an emotional activation (Sarkheil et al., 2019). In an fMRI-based laboratory experiment by Sarkheil et al. (2019), 18 subjects rated 24 images that resulted in either a strong negative valence, a neutral valence but high arousal, or that contained both conditions. Among other things, they observed that even in the case of neutral images with high arousal, the amygdala was activated. It has also been observed that the amygdala is used for emotional regulation and protects consciousness from negative emotions that are too strong. These observations support Buhle et al. (2014) as part of the meta-analysis based on 48 primary neurological studies from 2001 to 2012. According to this, when information is retrieved from the hippocampus, the amygdala is also activated for emotional regulation, since during a re-evaluation of stored stimuli, the cognitive control areas, the lateral temporal cortex and the amygdala, but not the prefrontal cortex, where the complex cognitive functions are performed, were activated as well (Buhle et al., 2014). Morawetz et al. (2017) examined the fMRI studies from previous years, confirming the results of Buhle et al. (2014), finding consensus that the amygdala was a constant component for emotional regulation and was independent of the stimulus material. The meta-analysis by Kohn et al. (2014) based on 23 primary studies with 479 subjects further verifies the assumption of emotional regulation and simultaneous activation of the hippocampus and the amygdala. The superadditivity effect creates an emotional activation that influences consumer perception and purchasing decisions (Krishna et al., 2016). Emotional activation generated by multisensory stimuli, when positive in valence, is described as pleasant and activating by recipients (Liu & Jang, 2009). The additional emotional and cognitive activation of the recipient through the superadditive effect offers potential similar to the study conducted by Lwin et al. (2010). Similarly, emotional activation is one of the essential factors in influencing consumer behavior through

multisensory stimuli (Krishna et al., 2016). In a between-subjects design with 551 subjects, where 95% of the subjects were between 19 and 28 years old, Duong et al. (2022) observed that a cumulative increase in sensory stimuli, specifically visual, auditory, and gustatory stimuli, was associated with a significant increase in attitude and in-store enjoyment.

However, the risk of sensory overload also increases (Spence, 2020). Morrin and Chebat (2005) performed an experiment in a shopping mall in the US with 800 subjects. The average expenditure of the control group was 64 dollars. Music was played in the mall for the first experimental group, and the money spent increased to 97 dollars on average. A lemon scent was sprayed in the mall in the second experimental group, and 55 dollars was spent on average. For the third experimental group, both music and lemon scent were used and an average of 37 dollars was spent (Morrin & Chebat, 2005). This is an example study where it is unclear whether the reduction in expenditure was due to sensory overload or cross-modal correspondence effect. According to the cross-modal correspondence effect, interactions across sensory modalities exist and, depending on how each sensory stimulus is evaluated, their total influence on consumer behavior may be reinforced or diminished (Spence et al., 2014). There are different approaches and reasons for specific interactions that are presented below. Although most studies focus on the effects of cross-modal correspondence and congruence, the moderating effects of superadditivity are also included; thus, the effects are enhanced when more than one sensory stimulus is activated. O'Mahony (1983) instructed 51 subjects to categorize each color into one of the four basic tastes: bitter, salty, sweet, or sour. This study was replicated by Koch and Koch (2003) with 45 students, and by Tomasik-Krótki and Strojny (2008) with 519 subjects in 17 countries with pupils and students. There was also replications in online surveys by Wan et al. (2014) with 452 subjects, Knoeferle et al. (2015) with 201 subjects, and Woods et al. (2016) with 200 subjects. The studies were consistent in associating a bitter taste with the color black, a sour taste with the color green, a sweet taste with the color red, and a salty taste with white. When the color was congruent with the typical tastes, subjects rated the product's taste significantly better than when there was no congruence (Knoeferle et al., 2015; Saluja & Stevenson, 2018). Turoman et al. (2017) conducted a web experiment involving 90 subjects from the US, the UK, and Canada. Subjects rated both round and square shapes with increasing symmetry.

The study was conducted to determine whether these shapes could be associated with the tastes—sour, salty, and sweet—and whether these shapes appeared as pleasant or threatening. It was observed that round shapes with increasing symmetry were perceived as pleasant and associated with a sweet taste. Simultaneously, angular shapes were constantly associated with sourness regardless of symmetry. With increasing symmetry, these shapes were rated less threatening and less bitter. However, the most striking finding was that with increasing symmetry, angular shapes were rated significantly more pleasant.

Especially, the gustatory sense is influenced by the interaction with other senses. For this reason, in connection with consumer research, there are often multisensory studies related to gustatory stimuli. This is because the taste is often learned together with other senses, through smelling or visualizing (Krishna & Morrin, 2008). For example, subjects find it difficult to recognize fruit juices based on their taste, if they do not have their natural color (Piqueras-Fiszman et al., 2012). The same is true for other foods (R. Jacob et al., 2020). Buechel and Townsend (2018) observed that consumers preferred aesthetic products with particular haptic elements, such as unique shapes. In this context, the shape of a glass can influence the taste evaluation of beverages (Ribeiro et al., 2021). According to Mookerjee (2021), consumers tend to associate discounted products with ugly product designs, and the purchase intention is high when the discounted products have not too beautiful or complex product designs, as this is more associated with high quality products. Similarly, visually appealing product designs are often associated with healthy foods (Hagen, 2021). The higher the effort to consume the food, the better the evaluation of the taste of the product (Troye, 2012). Festinger (1956) terms this effect as the compliance force paradigm. Individuals must justify themselves for the effort made so that the attitude follows their behavior and thus the attitude toward the object is positively validated as a justifiable reason (Festinger, 1956). Furthermore, the expected and experienced temperature of food also influences consumer behavior. Warm food increases the willingness to purchase by 25% and the level of consumption by 27% (Yamim, 2019). Similarly, Yamim (2019) observed that fat and calorie content are underestimated in cold foods.

Although the gustatory stimulus seems to have high relevance in science, especially in relation to food, the auditory stimulus is being studied from a wide range of application areas, especially in relation to cross-modal correspondence

and congruence. Field (1817) developed one of the first models of auditory and visual stimuli valence by having subjects rate the valence of sounds and colors and determined that consonants generally had positive valence. This was followed by studies that sought to predict the evaluation of songs using musical keys (Rimington, 1912; Plummer, 1915). Auditory stimuli can also be investigated concerning their congruence with gustatory stimuli. For example, in three experiments, Knoeferle et al. (2015) observed that subjects tended to associate sour tastes with fast and harsh music and sweet tastes with a high pitch. Auditory stimuli are also studied in different contexts, such as advertisements, jingles, websites, or ambient sound, which also concludes visual and often the haptically sense (Labrecque, 2020). Numerous studies investigated the relationship between consumer behavior and ambient sound. In two field and five laboratory experiments, Biswas (2018) observed that soft, positively perceived background music increases the purchase of healthy foods, whereas loud positively perceived music increases the purchase probability of unhealthy foods. Vida et al. (2007), C. Jacob et al. (2010), Broekemier et al. (2008), and Demoulin (2011) observed a relationship between positively evaluated ambient music and the number of tips and money spent in supermarkets. Similarly, Das and Hagtvedt (2016), Mohan et al. (2013), and Andersson et al. (2012) observed that congruent music influences store evaluation. There is a congruent effect similar to how chocolate is evaluated sweet or bitter when the valence of the music is matched (Kontukoski et al., 2015; Reinoso Carvalho et al., 2015). Oakes and North (2008) observed that German background music increases the purchase probability for German wine and French music for French wine. Likewise, music frequency influences the length of time spent in stores (Ju & Ahn, 2016; Knoferle et al., 2012; Milliman, 1982) and the time perceived to be spent (Oakes & North, 2008). Even fast-paced auditory stimuli without a voice can emotionally and cognitively activate the recipient and is especially useful for new content (Mas et al., 2020). Moreover, Hwang et al.'s (2020) study verifies the assumptions of low and high involvement. Subjects with low involvement are affected by interactive music and those with high involvement exhibit higher purchase intentions and stronger cognitions (Hwang et al., 2020). Klein et al. (2021) demonstrate that auditory stimuli in a positively perceived music environment reduce the willingness to process more complex information but increase liking of images and objects that require fewer cognitive resources. The

dual-process model (Paivio, 1969, 2009), derived from primary studies and a separate qualitative survey, supports the assumption that multisensory perception—as the simultaneous experience of auditory and visual stimuli in advertisements—increases heart rate; thus, attention accompanied by increased information processing significantly increases recallment (Simmonds et al., 2020). Reinoso Carvalho et al. (2015) observed an interaction between the positive evaluation of products when they were visually appealing, and the music was equally positively evaluated. These findings support the assumptions of Greenwald and Leavitt (1984) postulated within their four-stage theory based on the auditory involvement in advertisements. Moreover, these observations also support the assumptions of the dual coding system (Paivio, 1969, 2009).

There are a multitude of different explanations in terms of cross-modal correspondence, congruence effects, and observations that are incomprehensible. Spence & Levitan (2021) discuss that color associations are often due to conditioning; however, other valences may be rooted into personality. Similarly, positive valence can be generated by a congruent mood, such as being in love and a romantic-looking product (Huang et al., 2019). Sharma and Romero (2020) observed in their study with 203 subjects that when products are depicted in an advertisement with a shadow, they are perceived as heavier. This is another illustration of congruence and cross-modal correspondence. When the attribute heavy is associated with the product's characteristics, these products are evaluated more positively, and the willingness to pay more increases. Meng et al. (2021) surprisingly deduced that generic names positively influenced purchase intention, whereas congruent scents decreased it so that more variables could probably influence a positive valence. Similar observations were made by Kivioja (2017). They observed that despite congruent odors, strawberry odor with congruent products found no increase in purchase intention, despite consistent conditions and a comprehensive manipulation check. Thus, there are likely other unknown mediating variables concerning congruence. Hepola et al. (2017) described that both personal involvement and sensory intensity influence cognitive processes, affect, and activation, influencing consumer behavior in terms of valence and perceived congruence. Under this assumption, concerning Morrin and Chebat's (2005) observations, it could be assumed that the valence of the scent was already negative. The additional auditory stimulus further activated the recipient and

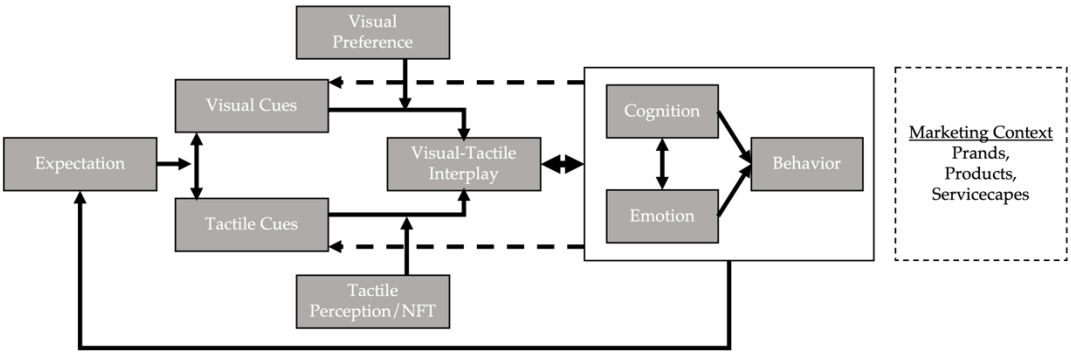
intensified the cognitive processes so that the awareness of the negative valence became present; thus, the negative affect increased, finally exerting a negative influence on purchase behavior. Hence, the negative valence might have acted as an amplifier. Spence (2022) argues that valence is mainly due to personality and, based on this, discussed possible consumer stereotypes for food regarding different olfactory and gustatory stimuli.

In their context of visual–haptic interaction, Eklund and Helmefalk (2018) selected personal valence and transferred it to haptic and visual stimuli. They argued that there are individuals who prefer a particular sense. Using primary studies, Eklund and Helmefalk (2018) developed a theoretical framework suggesting positive interaction with visual and haptic stimuli with a moderating effect of the variables' need for touch (NFT) and the visual aesthetics as depicted in Figure 6. Peck and Childers (2003) developed a 12-item NFT scale comprising instrumental dimension, the need for haptic information and autotelic dimension, the need for haptic stimulation. Individuals with high NFT scores are more receptive to persuasive haptic stimuli and show an increased affective response (Peck & Wiggins, 2006). In an online study with 78 subjects, an affect transfer could be observed and thus the valence of emotional activation had a moderating influence on the connection between NFT and purchase intention (Zheng & Bensebaa, 2022). Ranaweera et al. (2021) revealed in their study that heavy and complex structures are preferred by subjects with a high expression of NFT. Recipients with a high NFT need to perceive objects with the haptic sense, resulting in a higher object evaluation and brand perception. The fact that this variable is frequently discussed and translated into other languages, such as by Nuszbaum et al. (2010), demonstrates its relevance to consumer behavior. Other studies have already observed that combinations of visual and haptic stimuli, for example, shape, texture, light, or temperature, of the products, brands, or services influence emotional and behavioral responses (Custers et al., 2010; Klatzky & Peck, 2012; Reimann et al., 2010; Williams & Bargh, 2008). In online stores, physically perceived multisensory stimuli can also significantly increase the likelihood of purchase (Helmefalk, 2019). Eklund and Helmefalk (2018) discussed the importance of congruent perception of a product or stimulus if it has expected haptic and visual attributes. If the recipient perceives that an object does not feel as expected, negative emotions and cognitions follow, which negatively impacts buying

behavior, thereby reinforcing this effect by the interaction of visual and haptic stimuli.

Figure 6

Visual-tactile interplay model



Note. Illustration based on the study of Mas et al. (2020), p. 502.

Auditory stimuli, such as soft and hard perceived music, can positively influence product evaluations when combined with hard or soft haptic and visual congruent stimuli (Imschloss & Kuehnl, 2017). In this context, Spence (2022) described that certain products dominate certain sensory stimuli because they are more significant for that specific product. Visual, olfactory, and gustatory stimuli for food products often appear more important than auditory stimuli. This effect describes sensory dominance and explains why for some products, certain sensory inputs are more relevant to customers than others, thereby having a more significant influence on the purchase decision (Spence, 2022).

However, this also implies that the valence of a sensory-evaluated stimulus may be due to personality and the nature of the product. Here, the sensory perception item set (SPI) (Haase & Wiedmann, 2018) is one way to uncover the possible causes of low attitudes toward a multisensory product. The SPI is a scale with which recipients can evaluate objects based on four adjectives per modality and determine to what extent the sensory stimuli used for the object are subjectively perceived. Similarly, Haase et al., (2018) observed positive correlations between the SPI and attitude, brand loyalty, and purchase intention in a subsequent quantitative survey. Even if this scale does not negate the previously described multiple causes of cross-modal correspondence effect, possible causes can be

examined concerning the product design as not all causes have been researched till date. There are still no instruments to operationalize the personality factors discussed by Spence & Levitan (2021). This scale is described in more detail in Section 3.1.2, as it is a part of the four experimental studies.

2.3 INTERRELATIONSHIPS OF VARIABLES, HYPOTHESES, AND RESEARCH CONCEPT

The explanations in 2.2 discuss the potential for multisensory marketing. Multisensory marketing influences the recipient perception, emotional activation, and evaluation (Krishna et al., 2016). Likewise, multisensory products can positively influence purchase intention, attitude, loyalty, and brand perception (Wiedmann et al., 2017). Sensory stimuli are perceived through sensory organs such as skin, ears, nose, eyes, and tongue, transformed into neurotransmitters, and then transported to the brain through transductive processes (Güntürkün, 2019). As part of the top-down process, these stimuli are enriched with information from the hippocampus (Roux et al., 2018). However, this also activates the amygdala and thus generate emotional activation (Beyeler et al., 2016; Buhle et al., 2014; Cornil & Chandon, 2016; Kohn et al., 2014; Krishna & Schwarz, 2014; Morawetz et al., 2017). Emotional activation is one of the essential factors in recipient persuasion (Krishna et al., 2016). In addition, multisensory products are also associated with increased memory performance and increased information processing fluency (Lwin et al., 2010).

MacInnis and Price (1987) discuss that sensory information processing also works without physical perception, through imagery, referring to the model of Baddeley and Hitch (1974). Guazzo et al. (2020) further developed the working memory model and discussed that linguistically object-related environmental stimuli are processed. That, information is also retrieved from the long-term memory, whereby there is a mutual exchange of information in all functional areas of the working memory, but up to long-term memory processes. In their review, Krishna and Elder (2021) used primary studies to develop the possibilities of imagery concerning multisensory marketing. MacInnis and Price (1987) argue that as sensory stimuli increase, information processing increases, and the central executive of the working memory pays more attention to these sensory stimuli, thereby increasing the likelihood of involvement. Lwin et al. (2010) continue this in their experiment, discussing the effect of superadditivity and justifying it with the

dual coding system of Paivio (1969, 2009). Superadditivity describes, as explained in detail in 2.2.2, the increasing influence of consumer behavior is based on an increased amount of sensory stimuli (Klemen & Chambers, 2012). According to the dual coding system (Paivio, 1969, 2009), stimuli are encoded independently in a verbal and nonverbal system, with representational and referential connections, since the independently encoded information can be dependent on each other, likely, interacting with others associating emotional experiences (Paivio, 1969). Lwin et al. (2010) justified improved superadditivity and memory effects, referring to this model because there were more referential connections to the object-related representational connection with more sensory stimuli, which favor memory and information processing fluency effects.

However, it is not always clear whether observed consumer behavior is due to superadditivity, the cross-modal correspondence effect, sensory overload, or the effect of sensory dominance, as per the experimental study by Morrin and Chebat (2005) (see section 2.2.2). The cross-modal correspondence effect describes that there are interactions between sensory modalities, so that regardless of the evaluation of sensory stimuli independently of each other, the combination of two sensory stimuli can lead to either a more positive or a worse evaluation compared to their respective independent evaluations (Woods et al., 2016). In the context of sensory overload, a limit is reached at which the increase in further sensory stimuli cannot have any other positive influence on consumer behavior and, if this limit is exceeded, can even have negative consequences (Spence, 2020). Likewise, in the studies conducted by Spence (2020) and his colleagues in the last years as described before, in addition to the cross-modal correspondence effect, the effect of sensory dominance is discussed. Here, the preference of recipients to perceive an object with a specific sensory organ is described (Spence, 2022; Spence & Levitan, 2021). The rationale can be multifaceted, depending on the particular sensory modality and its interaction, and has not been fully explored (Spence, 2022). The explanations in 2.2 illustrate that most multisensory studies discuss congruence as a central component of the effect of multisensory marketing (Ahn et al., 2015; Cian et al., 2014; Imschloss & Kuehnl, 2017; Kivioja, 2017; Knoeferle et al., 2015; Krishna et al., 2010; Krishna & Schwarz, 2014; Lam et al., 2017; Lwin et al., 2010; Reinoso Carvalho et al., 2015; Ruzeviciute et al., 2020; Saluja & Stevenson, 2018). Eklund and Helmefalk (2018) had developed a visual-tactile interplay model in this context.

This model takes up the sensory dominance within the framework of the NFT (Peck & Childers, 2003) and the assumptions of congruence, varyfiing this within the framework of an experimental study. Here, the importance of congruence and sensory modalities and the expectations of the recipients were discussed again (Eklund & Helmefalk, 2018). However, this model is limited to haptic and visual stimuli, highlighting the research gap regarding cross-modal correspondence.

These statements, but also a large number of studies from Section 2.2.2, show that the effect of superadditivity and cross-modal correspondence and congruence can influence consumer behavior. Additionally, references are made to the studies in 2.2 for specific modalities. Only a few studies have examined all five sensory modalities, and no relevant study could be found that also examined and controlled the three effects within the framework of an experimental design. For this reason, in the following experiments, all modalities with as many possible combinations as possible, in terms of superadditivity and cross-modal correspondence are examined concerning consumer behavior, operationalized by attitude and purchase intention, since these variables were predominant in the previous studies. It will also be examined to what extent a decreasing congruence influences the results.

H1: Based on the superadditivity effect, attitude (H1a) and purchase intentions (H1b) are higher with more sensory stimuli than with fewer sensory stimuli for products in online stores, where only visual sense is physically perceived.

H2: There are interactions, based on the cross-modal correspondence effect, between specific combinations of senses, so that an additional sensory stimulus, which by itself was perceived positive, can lead to attitude (H2a) and purchase intention (H2b) for products in online stores where only visual sense is physically perceived.

H3: Based on the congruence effect, decreasing product congruence leads to differences in observed outcomes regarding superadditivity with partial congruence (H3a) and missing congruence (H3b) and cross-modal correspondence

with partial congruence (H3c) and missing congruence (H3d) related to attitude (H3.1) and purchase intention (H3.2).

In the previously mentioned hypotheses, attitude and purchase intention are dependent variables. In Section 2.1, these variables were mentioned concerning consumer behavior. Attitude is defined as the willingness to react evaluatively to an object (Stahlberg & Frey, 1990). Attitude is a multidimensional construct comprising a cognitive, affective, and behavioral dimension (Zanna & Rempel, 1988). According to cognitive dissonance theory, recipients behave according to their attitude to avoid dissonance, i.e., aversive states (Festinger, 1956). Regarding this, Ajzen (1991) discusses that purchase intention and purchase behavior, however, depend not only on attitude but also on the perceived behavioral control and subjective norms. The more behavioral control is restricted, the higher the probability that the recipient will perceive this as a restriction on their freedom of decision following in an aversive state, which has negative consequences for attitude (J. W. Brehm, 1966). As per subjective norms, the recipient's socially-desirable values and norms also influence purchase intention (Ajzen, 1991). Companies cannot always influence both behavioral control and subjective norms. Restrictions in perceived behavioral control can also arise, for example, from restrictions on income or availability of products. Similarly, companies can only influence norms and values with a massive communication effort. For this reason, this empirical work focuses on attitudes and purchase intentions. Thus, the following question will be discussed: how does multisensory stimuli influence attitude? As described earlier, the perception of sensory stimuli leads to emotional activation in the context of the top-down process and the assumption that multisensory stimuli influence the affective dimension of attitude. This could be relevant for companies exploring how attitude formation can be further influenced. According to ELM, the level of involvement influences whether and how an attitude is altered (Cacioppo et al., 1986). In a low involvement situation, recipients are more likely to be unmotivated and, as a result, cognitively constrained to elaborate on persuasive stimuli. The recipient may prefer peripheral stimuli, such as weak emotional stimuli or simple arguments, which, in turn, may result in an unstable attitude change. In a high involvement situation, the recipient is motivated and is capable of elaboration and prefers arguments with strong content.

Similarly, the timing of information processing and emotional activation can influence attitude formation processes (Petty & Briñol, 2014, 2015). Petty and Briñol (2014, 2015) distinguish five different ways of metacognitive persuasion. The first path describes the situation of a low involvement situation in which the affect is transferred to the attitude object and has a direct but temporally unstable influence on the attitude in terms of valence (Hwang et al., 2020). Furthermore, Petty and Briñol (2014, 2015) distinguish four other pathways of metacognitive persuasion, all of which presuppose the high involvement and can result in a stable and long-lasting attitude. They emphasize that it is unclear whether one of the metacognitive pathways leads to a significantly different attitude; however, they do observe a compelling argument in favor of it (Petty & Briñol, 2014, 2015). In the second path of metacognitive persuasion, the recipient perceives an attempt to be influenced as recipients tend to elaborate intensively due to high involvement and thus think reflectively (Petty & Briñol, 2014, 2015). A perceived attempt to be influenced can end in reactance (J. W. Brehm, 1966); however, in most cases, the recipient is aware of this in advance, thereby attempting to use this knowledge to their advantage (Friestad & Wright, 1994). If the arguments of the communicator or the sender of the persuasive stimulus are convincing, or if strong arguments are formulated in terms of content that match the attitude structure of the recipient, a positive and long-lasting change in attitude will occur. However, negative long-lasting attitude change can also occur when arguments are incongruent (Petty & Briñol, 2014, 2015). The third, fourth, and fifth pathways of metacognitive persuasion differ based on the time point when emotions become salient. In the third pathway, emotions are primed first, followed by information processing. In the fourth path, emotional activation occurs after the information processing of the persuasive stimulus, whereas in the fifth path, emotional activation occurs through the processing of linguistic stimuli. The differentiation in these three pathways is supported by different primary studies, such as Cian et al. (2015), Hasford et al. (2018), Briñol et al. (2007), and Huntsinger (2013) as presented in Section 2.1.2.

In the context of this empirical work, based on previous explanations, it should be examined whether differences between attitudes toward multisensory products depend on metacognitive paths of persuasion and effects of cross-modal correspondence and superadditivity. One possible result could be that for multisensory stimuli, one or more metacognitive pathways lead to significantly

more positive attitudes, and concrete implications for companies can thus be derived. Therefore, the following hypotheses will be investigated.

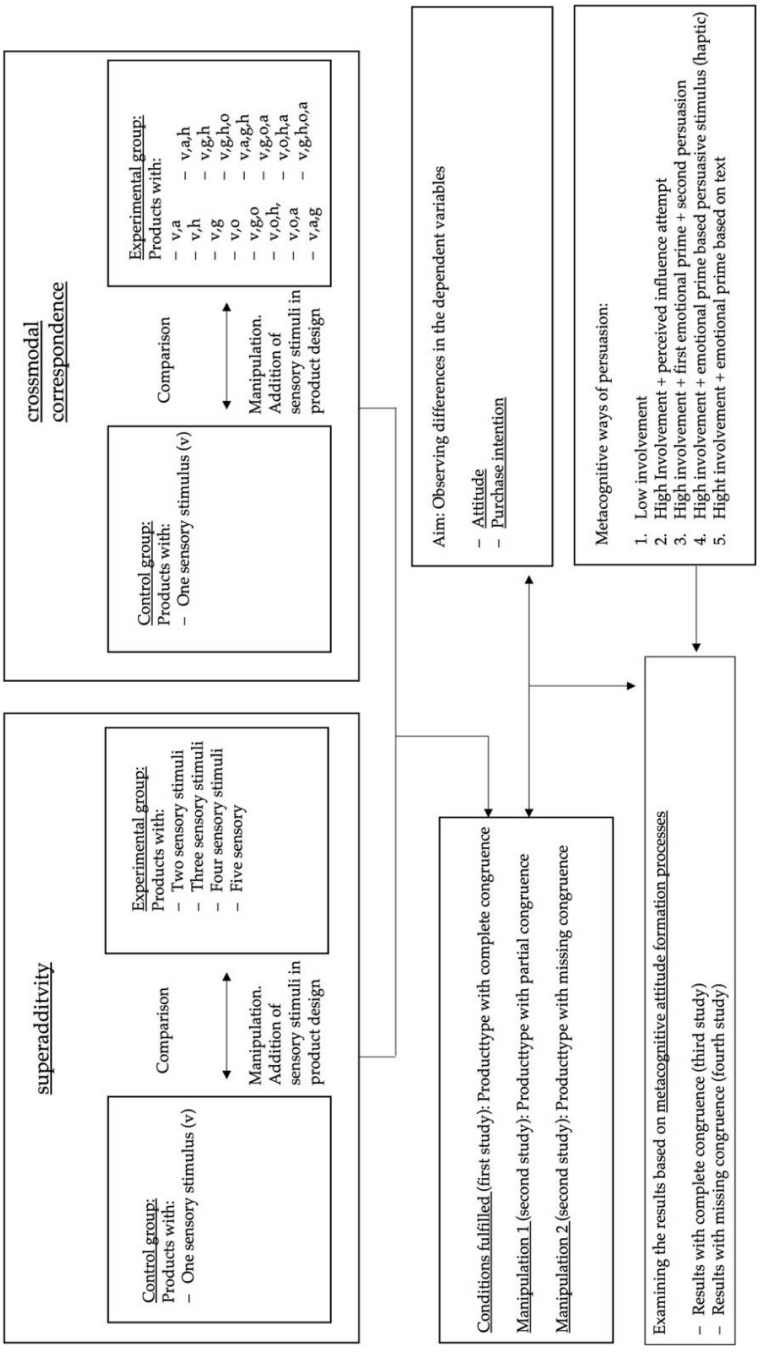
H4: Based on the superadditivity effect, attitudes are higher with more sensory stimuli than with fewer sensory stimuli for products depending on different ways of persuasion in online stores where only the visual sense is physically perceived.

After the hypotheses necessary for the empirical approach have been derived and argued, the relationships between the four subsequent experiments are depicted in Figure 7. In all four experiments, products without multisensory stimuli are used in control groups. Multisensory products are examined in experimental groups. As part of H1, it should be examined whether there are significant differences in attitude and purchase intention in superadditivity. This is shown in figure 7 in the left rectangle above the model. Here product evaluations are grouped and compared depending on the number of sensory stimuli. The increase in the number of sensory stimuli represent the manipulation. Within the framework of H2, it should be examined whether significant differences can also be observed concerning the effect of cross-modal correspondence. For this purpose, all the products with different combinations of sensory stimuli are compared with those of the control group. As products without multisensory stimuli always belong to the control group, which is modified, all multisensory products are considered manipulated, as depicted in the right rectangle above the model. As part of the third hypothesis, the influence of congruence is to be examined in a controlled situation so that further manipulation of products takes place. Different product types are added; however, sensory stimuli remain unchanged. A product type is intended to represent the situation of partial congruence, and another product type is intended to represent the noncongruent situation. The consistent sensory stimuli should enable comparability, as shown on the left in the middle of the model. Based on this, further manipulation takes place on a metacognitive level, the influence of which is to be examined within the framework of H4. This manipulation is performed for the products with complete and missing congruence. The manipulation of metacognitive processes is not achieved through the products themeselves but within the research framework through controlled

manipulation of the involvement and manipulation of the point at which emotions are salient and information is processed based on additios in the product presentations. All in all, different types of manipulations are combined and analyzed in multiple hypotheses. These manipulations occur by changing the research material with the same product type; changing the research material with the same sensory stimuli but deviating product types; and changing the research design with unchanged products, which is explained in detail in Chapter 4.

Figure 7

Model of the empricial approach



Note. v = vision, g = gustatory, a = acoustic, o = olfactory, h = haptic

3 FIRST STUDY AND SECOND STUDY – MULTISENSORY STIMULI IN ONLINE STORES WITH DECREASING CONGRUENCE

3.1 METHODS – FIRST AND SECOND STUDY

As explained in Chapter 2, the effects of superadditivity, cross-modal correspondence, and congruence are moderating and mediating the influence on consumer behavior. There are also research gaps to the extent to which these effects could be transferred to online stores in natural situations. For this reason, an experimental research design was conducted. In these experiments, superadditivity, as well as cross-modal correspondence, are investigated in the presence of decreasing product congruence. This chapter describes the research design, the hypotheses derived in the second chapter, the sample, the research material, and the scales used. Likewise, the statistical instruments are presented and explained as how far they are used to test the hypotheses. Although the second experiment was conducted after the first experiment, both studies are reported together in this chapter. It is done to reduce redundancy since, except for the research material and the assignment of the groups, the research design is almost identical.

3.1.1 Sample

665 subjects were taken in the first experiment. In the first step, the data was screened and inconsistent data was removed. This included subjects who quit the experiment in less than five minutes or prematurely. Outliers were also removed. According to Breitsohl (2019) and Tukey (1977), simple outliers can be identified with an interquartile distance greater than 1.5, and extreme outliers are defined from an interquartile distance of greater than 3. Studies show that inferential statistical procedures such as regressions and t-tests are robust to simple outliers;

only extreme outliers will be removed (André, 2022). After cleaning data, the number of participants were n = 654. 474 subjects identified themselves as female, 177 as male, two as diverse, and one chose the not specified option. 278 subjects were younger than 26 years old, 316 were younger than 36, 2 were younger than 46, and 27 subjects chose not specified. The subjects' annual gross income was up to EUR 19,000 for 116 subjects, up to EUR 39,000 for 278 subjects, up to EUR 59,000 for 201 subjects, up to EUR 79,000 for 39 subjects, up to EUR 99,000 for 10 subjects, and over EUR 100,000 for 10 subjects. 618 subjects stated that they did not have an academic degree.

Initially, 377 participants took part in the second web experiment. 26 subjects ended the experiment prematurely or had inconsistent observations, thus the final sample size is n = 351. 282 subjects stated that they were female, 64 were male, and 5 participants gave no information about their gender. About 11.11% of the test subjects stated to be older than 36 years, 131 participants stated between the ages of 26 and 34. The majority, 51.57%, 181 participants stated to be younger than 26 years. The annual gross income of the participants is broad. The gross annual income of 20.80% of the participants was below 20,000 EUR, and for 34.47%, it was between 20,000 and 39,000 EUR. About 31.91% of the participants said their gross annual income was between 40,000 and 59,000 EUR, and 12.82 % said their gross annual income was over 60,000 EUR. Since most of the participants were part-time students from the FOM university of applied science, only 8.26% of the 29 participants have an academic degree.

3.1.2 Research design

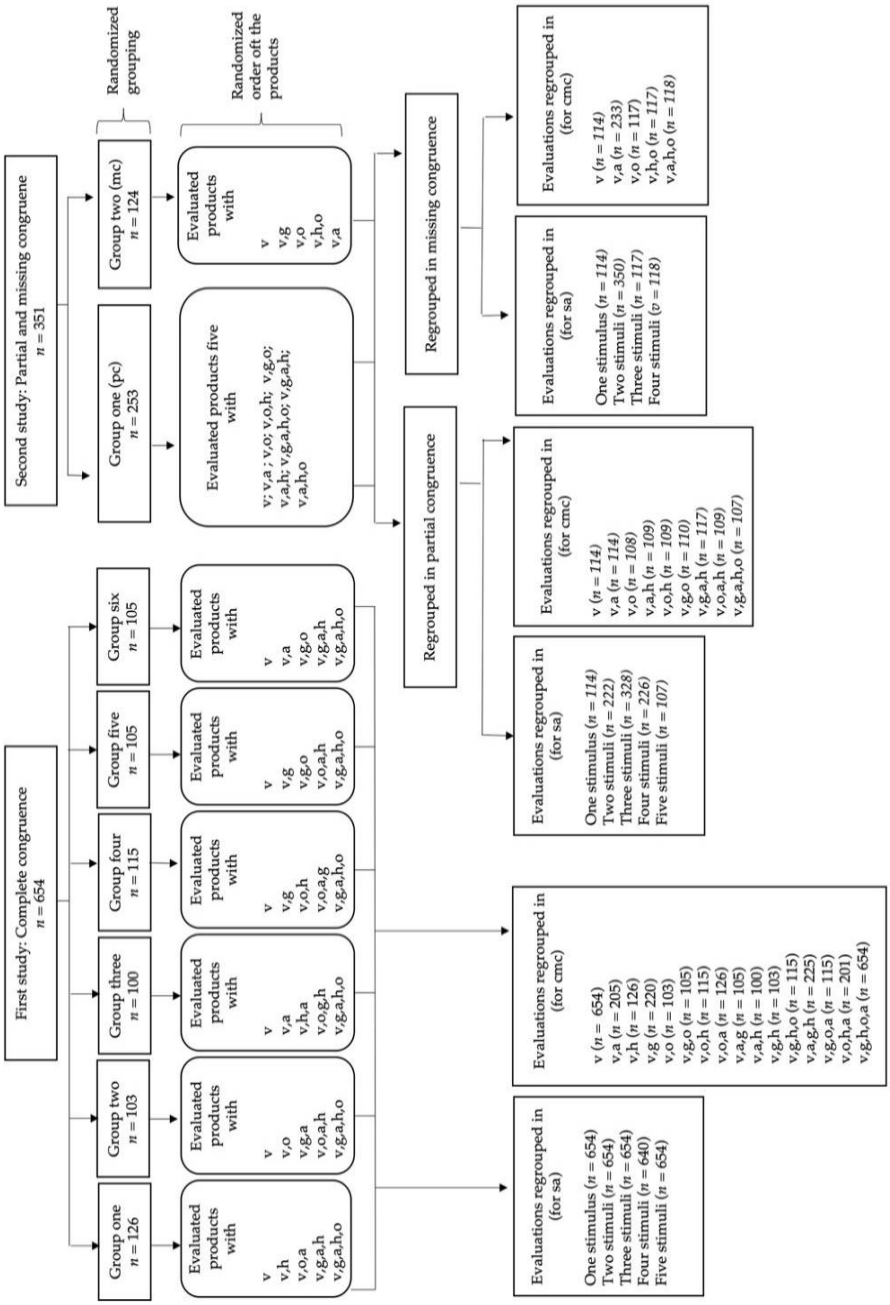
The following study is a web experiment using a between-subject design. An experiment is classified by random group assignment and by the manipulation of the independent variable (Jung et al., 2017). Experiments in social research are intended to allow conclusions to be drawn about behavior. For this purpose, situations are created in which the test subjects behave directed. To achieve valid results, the conditions of the groups to be compared must be identical, except for the intended manipulation. For this reason, it is crucial to know and be able to

control all variables (Kirk, 2011). The manipulation of the stimuli must be mundane to obtain valid results (Carpenter et al., 2005). This ensures that the subjects behave according to reality (Morales et al., 2017). To further increase the validity of the results, the manipulated stimuli should be additionally evaluated (Viglia & Dolnicar, 2020). Moreover, there are more advanced quality criteria, according to Mattila et al. (2021), Hauser et al. (2018), and McQuarrie (1998), which are considered in the research design. In Section 3.3.2, the quality criteria will be described, and their compliance will be discussed, while this section focuses on the description of the experiments.

The aim of both the experiments is to determine to what extent the effects of superadditivity and cross-modal correspondence with decreasing congruence can be applied to online stores. The experimental design for both studies is shown as a flowchart in Figure 8, which makes the following explanations more transparent. In the figure, their initial letters of the sensory stimuli are abbreviated. The first two experiments differ only in the product presentations, causing the number of groups and the respective group sizes to vary between the experiments. The different products of the second experiment are used to manipulate the degree of congruence, while in the first experiment the situation with given congruence is investigated.

Figure 8

Flowchart of the first and second study



Note. v = vision, g = gustatory, a = acoustic, o = olfactory, h = haptic, sa = superadditivity, cmc = cross-modal correspondence

In the first experiment, drinks were chosen as the research material because congruent sensory stimuli could be attributed in advance for this product type. Since these are product presentations, the visual sense is always involved, allowing a maximum of 16 different sensory combinations. The group assignment were randomized, based on self-developed PHP codes, which could be integrated into the online survey of the provider, soscisurvey.de. Since one product was created for each combination, in the first experiment all subjects rated the products with only one sensory stimulus, and the product with five sensory stimuli. Likewise, there are inevitably more products or combination of possibilities, like, with four sensory stimuli, compared to the products with two sensory stimuli, whereby the group size varied.

The second study focuses on decreasing congruence. For this reason, the research material, the number as well as the size of each group differs. Chocolate bars were chosen for partial congruence (pc), and t-shirts for missing congruence (mc). Furthermore, there are no further differences between the first and the second experiment. Since the second experiment tests the extent to which the results from the first experiment change when the level of congruence is further manipulated, it was no longer necessary to develop products for all possible combinations of senses. For this reason, the number of products was reduced so that they could be tested together in one experiment. If the results would have confirmed that more products were needed, further products would have been developed and conducted. Due to the reduced number of products, the subjects in the first group of the second experiment evaluated either five of the nine products with partial congruence or all five products with no congruence.

The assignment of the group, as well as the order of the products presented, were also randomized. The evaluations of all products were grouped either by the number of sensory stimuli—according to the superadditivity effect, or by type of sensory combinations—according to the cross-modal correspondence effect. All products were always compared with the evaluation of the product without multisensory stimuli. This means, the evaluation results were formed into five groups for the superadditivity tests depending on the number of senses. One group contains only evaluations with one sensory stimulus and thus serves as the control group. The evaluations of all products were examined for the cross-modal correspondence test since each product contains stimuli for different combinations

of senses. Thus, each product represents a group, resulting in 16 groups with complete congruence in the first study; nine products for partial congruence and five products for missing congruence in the second study, including the control group, the product without multisensory stimuli. The sensory stimuli used are congruently with the product type. The subjects evaluated all sensory stimuli contained in the respective products using SPI (Haase & Wiedmann, 2018) scale, whereby the congruence could be controlled. The evaluation is based on three scales, which are presented in detail in 3.1.2. Sociodemographic questions about the age, gender, income, and degree were asked. Moreover, the subjects were asked what research question might this study pursue. This information is essential for the third and fourth studies, since any perceived influence can be identified here.

3.1.3 Research material and scales

The research material of the first experiment consisted of 16 self-created product presentations for complete congruence of soft drinks in the first study; 9 product presentations for partially congruent chocolate bars and 5 product presentations for missing congruence of t-shirts in the second study, of the fictitious brand "delíeux." Complete research material is shown in Figure 9. Each product presentation contains different sensory stimuli combinations. The olfactory sense were addressed by certain aromas. Lavender, vanilla, and licorice are used as olfactory aromas. The aromas were represented both by name and by unique representations. For example, the right side of the label shows a lavender bush, a vanilla blossom with bourbon vanilla, or a licorice snail. For the gustatory sense, the flavors of blueberry, vanilla, or ginger were chosen. The flavor is shown by name and picture on the left side of the label. For the products where neither the olfactory nor the gustatory sense should be activated, the products were labeled as signature. The haptic sense should be activated visually by ice cubes on the bottle label and the variant name "Ice." As a product description, the website states that this product variant would have a cooling effect. When drunk, a pleasant coolness would spread through the body. The foam in the glass and the plus symbol in the product name visually represents the auditory sense. As a product feature, the website describes that the foam makes a unique, melodic sound.

In the second experiment, nearly all sensory stimuli of the research material were taken from the first experiment to ensure comparability between the sensory stimuli of all products. For example, if significant differences in attitude were observed, it could not be ruled out that the difference was not due to decreasing congruence but new interactions attributed to a new kind of sensory stimulus. For this reason, all variables should be as constant as possible to reduce the risk of such misattributions. These included tastes, smells, and haptic stimuli. The tastes included were ginger, vanilla, and blueberry flavors. Vanilla was again used for the smells. In the context of the chocolate bars and the t-shirts, a cooling effect was suggested when consuming or wearing the "Ice" product variation. Likewise, a particularly crackling sound was described as an acoustic stimulus as a product characteristic in case of products whose name contained a plus. The research material is shown in Figure 9. In addition to the product names, where the design of the respective sensory stimuli is already recognizable, the senses to be addressed are listed below the product presentation.

The SPI is conducted to ensure that all sensory stimuli are noted correctly and to control the manipulation of congruence. The research material would have been revised if the SPI (Haase & Wiedmann, 2018) had shown that the subjects did not recognize certain senses. The participants must perceive all the sensory stimuli and evaluate the products neutrally with a slight positive tendency. This is validated in both studies by using SPI (Haase & Wiedmann, 2018). The importance of a slight positive evaluation presents an additional challenge in the second experiment. The products are supposed to take over sensory stimuli of the first experiment to a greater extent, but at the same time product types must be found in which these sensory stimuli appear to be partially congruent or not congruent at all. According to the hypotheses derived in Chapter 2, the assumption was postulated that with decreasing congruence, attitude and purchase intention also decrease. Similarly, in the studies of Haase et al. (2018), a high SPI correlates with a higher attitude and purchase intention. Accordingly, it could be assumed that if the developed products show a low mean using the SPI, they also show low values in attitude and purchase intention. Similarly, from a scientific point of view, it would not be appropriate to compare products that show a high significant difference in SPI. Thus, a low SPI indicates that the sensory stimuli used were negatively evaluated, whereas a high SPI indicates positive evaluation. In order to be able to attribute the

differences in attitude, to the effect of superadditivity exclusively, all sensory stimuli should be evaluated approximately consistently since the differences could otherwise be attributed to the negatively evaluated sensory stimuli and not to the effect of superadditivity. Accordingly, significant differences can only make a scientific contribution as all products are at least tendentially comparable with each other. Achieving this could be a challenge. The verification with the SPI will show whether this assumption has been successful or not. The chocolate bars represent the situation of partial congruence. Since chocolate represents products which can be consumed, taste and smell are both congruent. Both the haptic and the acoustic stimuli are imaginable but deviant. Sweets already have existing stimuli that elicit a crackling sensations in the oral cavity during consumption, like ice confectionery. Ice confectionery consists of 50% of coconut fat and has a lower melting temperature, which draws heat from the oral cavity. As a result, the tongue surface temperature drops to around 24°C, which consumers perceive as a cooling effect. Therefore, a cooling effect seems possible. Likewise, the crackling is known, but not coming up with a unique sound. The idea is that products with similar stimuli but much weaker effects already exist, making it seem far-fetched but not impossible. These stimuli have already been worked with the research material from the first experiment, making it possible that it is suitable, but it is only verifiable in the post-survey phase using the SPI. The t-shirts represent the situation of missing congruence. T-Shirts are not consumable, so the gustatory stimulus was omitted. For the t-shirts, haptic, auditory, and olfactory stimuli is used despite the lack of congruence. Although the reference to the product is made in the product description, these stimuli are unlikely. Thus, certain odors are described as product characteristics of t-shirts. Since t-shirts are washed or contacted by other odors such as perfume or deodorant, these stimuli are unlikely. Likewise, a t-shirt that elicits a unique crackle also seems unlikely. Concerning the haptic stimuli, cooling effects were described, which can also be perceived as unlikely. However, despite the lack of congruence or suitability of the sensory stimuli, participants may perceive these stimuli positively. Thus, it seems unlikely that subjects would negatively evaluate pleasant smells, cooling effects, or an interesting sound. The primary survey will determine whether these considerations are accurate and thus tend toward a slightly positive SPI. The presentation of products was performed again on a self-developed website.

Before the actual experiment, a pre-test was conducted with 62 subjects. During this pre-test, participants were able to perform the experiment and leave comments for each experimental element, such as text boxes, figures, and scales. Participants were purposively selected. These included students, FOM lecturers, and members of the Institute of Business Psychology. On average, the mean value of the SPI for all products was $M = 2.93$ and the standard deviation was $SD = .78$. Few subjects indicated that they did not perceive all sensory stimuli positively. However, as most subjects evaluated the products in a neutral to positive manner using the scales, the research material was retained.

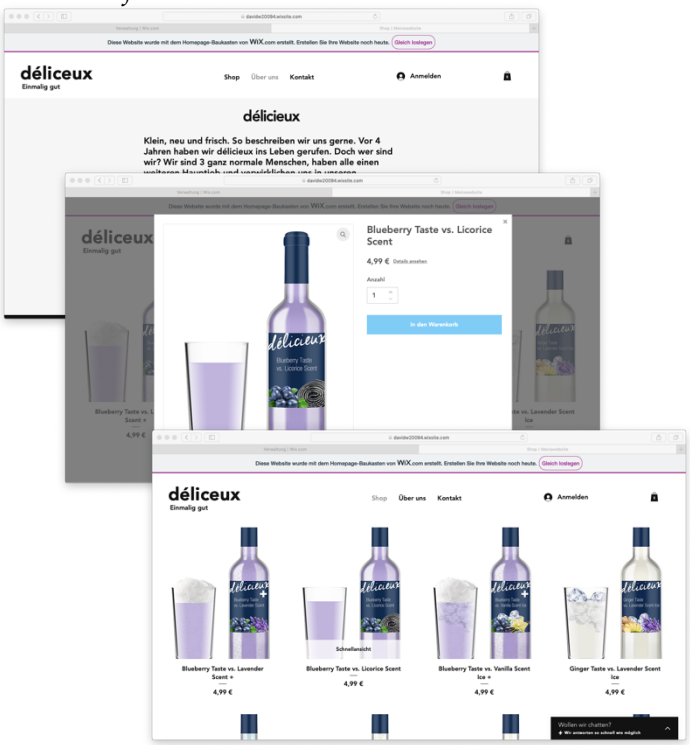
Figure 9

Research material of the first study (left) and second study (right)

For each product type, a fictional online store was created with the provider Wixx.com. The website featured all typical elements. In addition to a short company presentation, the participants can browse through all products. Each product contained a product illustration, product description, and price information. It is possible to add all products to a shopping cart, activate a chatbot, or place an order. However, the ordering process ended with the selection of payment methods. The evaluation of products took place after the website was closed.

Figure 10

Screenshots of the website



Note. Wix.com Ltd. (2022)

The SPI (Wiedmann et al., 2017) is a five-point Likert scale (1 = *disagree completely*, 5 = *fully agree*) and covers four adjectives per sense. The SPI is a scale that allows recipients to evaluate all sensory stimuli of an object. This scale was developed in several studies (Wiedmann et al., 2017), and in an additional study,

the relationship between a positive SPI and purchase behavior was investigated (Haase & Wiedmann, 2018). First, they conducted a literature review in dictionaries, encyclopedias, and glossaries to find suitable adjectives to describe sensory stimuli. 162 possible adjectives were found, then tested for suitability by four experts using a three-point scale. 80 words were found to be suitable. A further reduction of adjectives was made in a subsequent study by eight marketing managers and eight scientists. After eliminating all adjectives that could not be used universally, each expert was asked to provide a ranking per sense. Using a qualification index, the authors developed a preliminary SPI with five adjectives per sense. This index referred to the minimum and the maximum number of adjectives, the average number of mentions, and the rank. To test the performance of the preliminary SPI, an experimental study was then conducted with 100 subjects. In a neutral room without any distracting stimuli, all the subjects rated three objects each using the preliminary SPI. A 5-point Likert scaling was selected for the randomized items. A universal 11-point Likert scale was used to provide a positive or negative rating of attributes for validity purposes. Reliability was assessed using Cronbach's alpha, and validity was assessed using factor analysis, Pearson correlation matrix, Kaiser-Meyer-Olkin measure of sampling adequacy (MSA), and extracted average variance (AVE). The Cronbach's alpha was .79, the MSA was .69, and AVE was .59. All items had a p-value of less than .05, indicating significant correlations among all items. Only three items had factor loadings of less than .70, which were excluded from the preliminary SPI. In the fourth step, a field research study was conducted. 92 subjects rated additional target items in a coffee shop. The aim was to verify whether the preliminary SPI could be applied outside a laboratory. Test quality was rechecked analogous to the previous study. Two items fell below the minimum permissible factor loading of .70 and were eliminated from the preliminary SPI. In a final quantitative study, 407 subjects rated additional test items in an online survey using the preliminary SPI. Reassessment of test quality resulted in the final SPI without further elimination of adjectives. For the visual sense, attributes of items, such as aesthetic, attractive, beautiful, and pretty, were included. Euphonic, good-sounding, melodic, and sonorous for the auditory sense. Comfortable, handy, soothing, and shapely for the haptic sense. Fragrant, perfumed, and scented for the olfactory sense. Appetizing, palatable, tasty, and flavor for the taste sense. In addition, they used scales to

measure the variables of attitude, the likelihood of recommendation, and purchase intention. The reliability and validity indices of the final SPI are also appropriate and were measured per sensory stimulus. The visual sense construct achieved a Cronbach's alpha of .90, MSA of .84, and AVE of .76. The auditory sense achieved a Cronbach's alpha of .89, MSA of .84, and AVE of .76. The haptic sense achieved a Cronbach's alpha of .78, MSA of .67, and AVE of .61. The olfactory sense achieved a Cronbach's alpha of .89, MSA of .79, and AVE of .75. Moreover, the gustatory sense construct achieved a Cronbach's alpha of .91, MSA of .85, and AVE of .79 (Haase & Wiedmann, 2018).

The evaluation of products to examine the influence of consumer behavior is based on two scales by Spears and Singh (2004), where the German translation by Knoll (2015) is used, which is a 6-point scale instead of a 7-point scale. One is the purchase intention scale, a 7-point semantic differential with five items based on which the subjects should answer the question, whether or not they would buy the respective product. The possible answers of the items are—*never/definitely, definitely do not intend to buy/ definitely intend, very low/high purchase interest, definitely not buy it/definitely buy it, probably not buy/probably buy it*. The other scale is also a seven-point semantic differential with five items to measure the attitude regarding each item. The response options are—*unappealing/appealing, bad/good, unpleasant/pleasant, unfavorable/favorable, unlikable/likable*. In their scientific paper, Spears and Singh (2004) describe that there is enough evidence to assume that attitude and purchase intention are two different constructs but correlate with each other, following various studies which are described in Section 2.1.2. In the next step, previously mentioned items and scales for measuring purchase intention and multidimensional attitude were examined. Thus, the researchers adopted certain items from scales by Haley and Case (1979), Anand and Sternthal (1990), and Shimp, Stuart and Engle (1991) and added other items derived from Firshbein and Aijzen (1975). They conducted an exploratory and confirmatory factor analysis in the first study with 279 subjects, 31 items for attitude and 11 items for purchase intention. The items could be reduced to five per scale through exploratory and a subsequent confirmatory data analysis with an alpha value of .97. All items showed a factor load of greater than .90 and t-values between 19.15 and 21.37. Likewise, it could be determined using structural equation models that both positive and negative feelings toward an advertisement correlate with the attitude, and that

attitude with the purchase intention. These results were confirmed in a replication study with 232 subjects (Spears and Singh, 2004). Factor loadings and Cronbach's alpha values were slightly lower but within a reasonable range of values with factor loadings greater than .84 and Cronbach's alpha greater than .94. In the end, both scales achieved adequate reliability and validity values in the original study of Spears and Singh (2004). The attitude scale achieved an exploratory coefficient alpha of .95, a confirmatory coefficient alpha of .94, and an extracted average variance of .08. The purchase intention scale achieved an exploratory coefficient alpha of .96, a confirmatory coefficient alpha of .97, and an extracted average variance of .08. Similar results were obtained by the repeated structural equation analysis such that the scales were successfully tested for reliability and validity.

Sociodemographic characteristics were also recorded. These include gender, age, annual gross income, and level of education. Additionally, manipulation checks were conducted. The first manipulation check was performed using the SPI as written before. Only if the sensory stimuli of the products were perceived correctly can they be used as manipulation. Likewise, a manipulation concerning the involvement was carried out using the cover story and the supplementary message that further questions would follow the examination of the research material. Whether this leads to an increase in involvement was determined using the participation duration. This is especially relevant in the third and fourth studies because the situation of low involvement was also examined there. At the latest, differences in the duration of participation should become apparent. Since high involvement is accompanied by a need and an active search for information, as described in Chapter 2. The duration of participation in high involvement should be higher since a more critical examination of the research material is assumed. This argumentation is carried out in more detail in the third and fourth experiments.

3.1.4 Procedure

Participants received the access link to the survey via social media,

Instagram, and WhatsApp, as well as via the university's internal platform for recruiting subjects for empirical surveys. The minimum size of the total sample according to G*Power, based on moderate effect size and a significance level of 5%, is $n = 152$. At the beginning of the online survey, the subjects were informed of the duration estimated about 15 minutes. They were also be informed that no conclusions could be drawn about the person taking part. Furthermore, it was expressly pointed out that the researcher should be contacted if further questions arise, like about the ethical guidelines. A cover story was used. The subjects were asked to take time to empathize with the following situation:

"You have been invited with some of your friends to a friend's birthday party. Since you know that your friend likes all the products of the brand Délicieux very much, you have decided to give these products to your friend. Since the products of this brand are quite expensive, you have to choose three products. That's why you try to form your own opinion in advance to suggest specific products to your friends."

Following the cover story, the website appeared where the subjects were able to view all group-assigned products. In order to decide for products with undefined group norms, the own preference should be less relevant, and a wide selection of products should be the result, as identified in studies by Ratner and Kahn (2002) or Ariely and Levav (2000). Following the extended transportation-imagery model (Van Laer et al., 2014), the conditions for the narrative transportation should be in place regarding the goal of this story.

The plot of the story and the presented situation should be understood from already made experiences so that no requirements of previous knowledge and educational level are presupposed. The character is the subject themselves, who is in a situation that they probably experienced before-hand, but in any case comprehensible, so that identification is possible. The moderator effects due to the medium and the social group are also considered. The test person already chooses the medium so that there is no compulsion to use a medium that he rejects. Group effects were also generated, in which the moderator effects described in the model can be controlled. The respondent acts in the sense of the group, and is indirectly suggested by the order and the wish of the person receiving the gift that these products are socially desired.

After the participants closed the website, they returned to the survey, where the randomized products were evaluated depending on the assigned group, using

the scales presented in 3.1.2. First, the evaluation was done using the SPI, followed by the attitude, and finally, the purchase intention was recorded. Finally, after the evaluation of the products, the sociodemographic characteristics were assessed.

3.1.5 Data diagnostic and analytic strategy

As described in Section 3.1.1, this experiment focuses on the effects of superadditivity and cross-modal correspondence associated with decreasing product congruence, which acts as a manipulation.

Superadditivity is described as a cumulative effect based on the respective senses (Krishna et al., 2010, 2016; Krishna & Schwarz, 2014; MacInnis & Price, 1987; Ruzeviciute et al., 2020), which implies that there is a positive relationship between the number of sensory stimuli and consumer behavior (Lwin et al., 2010). According to this assumption, products with more senses should have significantly higher attitude and purchase intention than products with fewer sensory stimuli and, in any case, than products with only one sensory stimulus. The product with one sensory stimulus acts as a control group, where all other combination possibilities should be the subject of this investigation. For example, it will be investigated whether products with four sensory stimuli reveal a significantly higher attitude and purchase intention than products with three sensory stimuli. The cumulative effect can already be falsified if in one case this comparison is not significant or a product with fewer sensory stimuli is preferred. As shown in figure 8, a new grouping of the results takes place. Thus, results of all products are grouped according to the sensory stimuli. Thereby the size of the groups was changed since all test subjects were evaluated, e.g., a product with three stimuli, the group sizes without removal of outliers remained with 654 per grouping. The statistical tool selected was a multivariate analysis of variance (MANOVA), followed by an analysis of variance (ANOVA) and a post-hoc test.

ANOVA is an essential procedure used in experiments to detect differences in means. A significant difference is assumed when the within variance is low and the between variance is high. The within variance describes the spread of values within a variable, whereas the between variance describes the spread of values

between variables. A differentiation is made between a single-factor, two-factor, or multifactor and MANOVA. In the one-factorial ANOVA, the grouping variable has a factor level greater than one, whereas in the multifactorial variant, the number of factor levels can vary. While the variants described above have one dependent variable, within the MANOVA several dependent variables can be used simultaneously to reduce the risk of a cumulative alpha error. Additionally, a distinction can be made between the main effects and interactions. The main effects test whether individual independent variables have a significant effect on dependent variables. The interaction tests whether independent variables influence each other's effects (L. Lin & Dobriban, 2020).

In the present experiment, a MANOVA followed by a multifactorial ANOVA is performed, because of the number of factor levels and the investigation of interaction effects. Thus, the addition of another sensory stimulus can change the effect. This would be the case if, for example, products with three sensory stimuli were preferred to products with two sensory stimuli, but not to products with four sensory stimuli compared to products with three sensory stimuli. In this exemplary case, the effect of superadditivity would not be present and the change in direction would even reveal interactions.

The assumptions of an ANOVA is the normal distribution of variables and variance homogeneity (Backhaus, 2021). According to Galton and Quetelet (1844), observations in the context of social sciences usually become distributed with the increase in observations (Sposini, 2020). By this assumption, the likelihood of standard normal distributions increases with the sample size; thus, confidence intervals can be derived, which are the basis of inferential statistical tests. However, since only one probability is described here, an additional statistical test of the normal distribution is performed. The t-test assumes that the variables or observations to be compared are normally distributed in both groups since symmetric t-distribution is used as the test distribution. Additionally, variance homogeneity is assumed since mean values are only comparable if the variances do not differ too much from each other. The normal distribution is tested using the inferential statistical procedure, the Shapiro–Wilk test. A normal distribution can be assumed insofar as the p-value has a value of >.05 since the null hypothesis of this procedure assumes a normal distribution of the population (Manfredsson, 2016).

The variance homogeneity is tested with the inferential statistical procedure, the Levene's test. The test assumes that there is no homogeneity of variance so that a p-value of >.05 should also be present in this statistical inference procedure to meet the condition of homogeneity of variance (Shear et al., 2018). If the condition of variance homogeneity is not given and thus unknown and unequal variances are present, this situation is called the Behrens–Fischer problem. The Welch test can be performed in such cases since this inferential statistical procedure assumes unequal variances with a given normal distribution. In this procedure, fewer degrees of freedom are used, often in the decimal range, and the test statistic is not t-distributed under the null hypothesis of equal means (Delacre et al., 2019).

If normal distribution or variance homogeneity are not present, the Kruskal–Wallis test, is performed. This is a non-parametric procedure, which can also be applied at an ordinal scale level. This test assumes that if a randomly selected value is determined from the groups to be compared, one of the two is either larger or smaller, so that this test is robust to a lack of variance homogeneity. In the absence of variance homogeneity, the inferential statistical instrument, Games-Howell test, is performed as part of the post-hoc test since it does not require this assumption (Kelter, 2021).

Furthermore, bootstrapping is performed for further validation of the quality of the results. In this procedure, similar to an urn procedure, draws are performed with re-sampling, where new samples are drawn from the sample. Since values can also occur more frequently, a new distribution is produced, making parameter estimates more precise, and assumptions such as normal distributions are no longer given. How often this re-sampling should take place depends on the statistical procedure. While regressions in current studies predominantly involve 10,000 replicates, t-tests often involve 1,000 to 5,000 replicates (Konietschke & Pauly, 2014).

The ANOVA examines significant differences of the model, in the case of superadditivity on significant differences related to the grouping variable, the number of sensory stimuli. A post-hoc test compares the means of all possible pairings within the grouping variable, revealing which of the possible pairings were significant and, for example, which of the products in each pairing was preferred by the subjects. For this reason, a post-hoc test is subsequently performed on the ANOVA. Even though the p-value allows a conclusion to be drawn about

the significance of the difference under investigation, larger samples are more likely to have a p-value below the permissible level of significance. This is seen as the sample size increases, the deviation from the actual mean becomes smaller so that the distribution becomes narrower and even minor differences become significant. For this reason, the effect size according to Cohen's d is also added, as this indicator is unaffected by this effect. In addition, the effect size also makes it possible to compare the results of different tests and samples of different sizes (Kang et al., 2021; Mastrich & Hernandez, 2021).

As mentioned before, the effect of superadditivity is checked first. Significant differences based on ANOVA with a subsequent post-hoc test are checked using the p-value and the confidence intervals in case of bootstrapping. The confidence interval describes an interval in whose range all the parameters lie with a given probability of the population. As long as the upper and lower confidence intervals do not include zero, the observations lie within the permissible significance level to assume significant differences. The sign of the main difference furthermore could indicate possible interactions. If the sign of a mean comparison changes, interactions can be inferred in case of manipulation. For example, in the context of superadditivity, significant differences could exist for products with two sensory stimuli compared to products with only one sensory stimulus. The sign of the main difference indicates which of the two products showed a higher mean value and was thus preferred by the subjects. According to the superadditivity, products with more sensory stimuli should be preferred. However, if, in one case, the main difference has a different sign, there may be an interaction. Thus, the further increase of a sensory stimulus could lead to interactions. However, in the second experiment, further interactions could also be observed during the manipulation, i.e., with decreasing congruency.

The second effect to be investigated in the first experiment concerning online stores is the effect of cross-modal correspondence explained in Chapter 2. This effect describes possible interactions or alternating effects between the respective sensory stimuli. This can lead to the fact that even if two products with a different sensory stimulus were evaluated positively independent of each other, a simultaneously occurring combination of both sensory stimuli of a product could lead to a deviating, namely, a negative evaluation. The cross-modal correspondence effect can be observed in the context of this experiment as soon as

the interactions between the sensory combinations should occur. This would be the case if a product with a visual and gustatory stimuli as well as a product with a visual and olfactory stimuli were evaluated more positively than the control group, the product without multisensory stimuli, and the difference in the evaluation was significant. However, a product with all these sensory stimuli had a more negative significant evaluation compared to the control group or no significant difference. Statistically, the procedure is analogous to the effect of superadditivity. Likewise, an ANOVA with subsequent post-hoc tests is performed, whereby all assumptions also apply, and the same alternative inferential statistical procedures would be applied, if necessary, since not all assumptions are given.

3.2 RESULTS – FIRST AND SECOND STUDY

The following section describes the results of the first and second experiments. First, the sample is explained in terms of descriptive statistics. This includes product evaluations, the distribution, reliability of the scales and location parameters, followed by hypothesis testing within the framework of the inferential statistics. Here, all previously described statistical instruments and their results are processed.

3.2.1 Descriptive statistics

Cronbach's alpha is a measure of internal consistency of a construct based on item correlations. If the Cronbach's alpha value is greater than .90, the internal degree of consistency is rated as excellent; between .70 and .80 as acceptable to good (Cho, 2022). All other values are rated as questionable to unacceptable. The Annex 8 shows Cronbach's alpha values and the correlation coefficients of the respective items. Correlation coefficients can assume -1 or +1 and would represent a perfect negative or positive linear relationship (Backhaus, 2021; Schober et al., 2018). All Cronbach's alpha values are in an excellent range for the soft drinks. Most correlation coefficients indicate a perfect linear relationship. Item 10 of the SPI is the only item that shows a moderate correlation. All other items show a clear linear relationship. The Cronbach's alpha values of the constructs also show excellent ranges. Thus, the values for attitude are $\alpha = .96$, for purchase intention $\alpha = .98$, and for the SPI $\alpha = .96$.

In the second study, for the variables—attitude and purchase intention—all correlation coefficients are in an appropriate range of values, ≥ .77. The correlation coefficients of the SPI are lower for both products and fluctuate between .42 and .78. In comparison, the lowest correlation coefficient is .79 for the attitude and .78 for the purchase intention. Once again, the lowest correlation coefficients can be observed for the items of the factor haptics. Nevertheless, the SPI also has adequate reliability. In addition, the mean values of all variables again indicate a slight

positive trend, so it can be assumed that, despite the sometimes-low correlation coefficients, the sensory stimuli were recognized by the participants and, related to the similar mean values, are comparable with those of the first experiment. In order to be able to evaluate the reliability, the results of the confirmatory factor analysis follows.

Table 1 represents the results of the confirmatory factor analysis. The exploratory factor analysis reduces data, variables, or items, to derive a small number of factors, whereas the confirmatory factor analysis checks whether existing assumptions about constructs can be held. Thus, confirmatory factor analysis is more of a hypothesis test than an exploratory statistical instrument. Since already tested scales or constructs are used in this experiment, the confirmatory factor analysis checks whether the assumption of these constructs may also be assumed in this experiment, whereby conclusions can then be drawn about the current reliability of the scales (Backhaus, 2021).

For the first experiment, the confirmatory factor analysis concludes that the variables attitude (X^2 = 153.33, p = <.001, CFI = .99, TLI = .98, RMSEA p = <.001, SRMR = .01), purchase intention (X^2 = 274, 14, p = <.001, CFI = .99, TLI = .98, RMSEA p = < .001, SRMR = .01), and SPI (X^2 = 2053.43, p = <.001, CFI = .97, TLI = .96, RMSEA p = <.001, SRMR = .05) showed sufficient model goodness. The Chi-Quadrat p-value is smaller than .05 for all variables, which means that the covariance matrix calculated from the model parameters differs significantly from the actual covariance matrix (Hecker & Wiese, 1994; Lautsch et al., 1992). The Comparative Fit Index and the Tucker–Lewis Index are greater than .95 in all variables, so it can be assumed that the respective variables or scales with the individual items are better than if all items of the respective scales had not correlated with each other (Bentler, 1990; Cai et al., 2021; Cao et al., 2021; Tucker & Lewis, 1973). The values of the RMSEA and SRMR are also within a proper range for all variables. The RMSEA should be <.08 for good to adequate model fit. As soon as the SRMR assumes a value range of <.05, a good model fit can be assumed, while all values >.10 are outside an adequate range. Both indices describe how well the correlation matrix derived from the model matches that from the data (Shi et al., 2020).

With the exception of the RMSEA and the SRMR, all indices for attitudes toward the chocolate are in a reasonable range (X^2 (5) = 80.16, p = <.001, CFI = .98, TLI = .96, RMSEA = .12, SRMR = .02). This observation also continues with the

purchase intention (X^2 (5) = 104.23, p = <.001, CFI = .99, TLI = .97, RMSEA p = <.001, SRMR = .01) and SPI (X^2 (160) = 293.84, p = <.001, CFI = .92, TLI = .91, RMSEA p = <.001, SRMR = .08). Similar results can be observed with the t-shirts for the attitude (X^2 (5) = 64.21, p = <.001, CFI = .99, TLI = .96, RMSEA p = <.001, SRMR = <.001) , purchase intention (X^2 (5) = 115.09, p = <.001, CFI = .98, TLI = .96, RMSEA p = <.001, SRMR = <.001) and SPI (X^2 (98) = 198.63, p = <.001, CFI = .94, TLI = .93, RMSEA p = <.001, SRMR = <.001). The chi-square test is less than .05 for all variables, which means there is a significant difference between the determined covariance matrix and the actual covariance matrix. The CFI and TLI are greater than .95 in all the variables. This implies that the items can better explain the factors than if none of the items had correlated with one other. Likewise, the RMSEA p-value is <.05 and the SRMR <.10, so in all the variables, the correlation matrix determined based on the model corresponds to that of the data set with reasonable deviations.

In addition to the model quality, the factor loadings are examined in detail furthermore. Here, it is examined how well the items did sufficiently represent the respective variables. The estimate describes how much the variable increases when the value of the item increases by one. Representativeness of the items can be assumed if the estimates have similar values. The standard error and the Z-value are used to determine the p-value, which describes the likelihood of an alpha error. The p-value should be less than .05. The p-value of all the items of all the variables is below the permissible significance level. Similarly, all the estimates of the respective factors are also in a similar range. However, the values of the factor haptics are again consideration within the SPI. This factor was already conspicuous in the Cronbach's alpha test. Previously, Cronbach's alpha values were low compared to the other items. Again, it is the same case with the estimates. While the estimates of the other items scatter closer around .95, these scatter around .70. Nevertheless, the indicators are sufficient so that the inferential statistics or hypothesis testing can be continued.

Table 1

Factor loadings: First and second study

					95% Confidence Interval	
Factor	Estimate	Std. Error	z-value	p	Lower	Upper
Soft drinks–Attitude						
A01	1.42	.021	68.25	<.001	1.38	1.46
A02	1.26	.018	70.71	<.001	1.23	1.29
A03	1.24	.019	67.12	<.001	1.21	1.28
A04	1.15	.018	63.92	<.001	1.11	1.18
A05	1.27	.019	65.38	<.001	1.23	1.31
Soft drinks–Purchase Intention						
PI01	1.35	.019	72.09	<.001	1.31	1.38
PI02	1.35	.018	74.51	<.001	1.31	1.38
PI03	1.46	.020	74.44	<.001	1.42	1.49
PI04	1.32	.018	73.92	<.001	1.28	1.35
PI05	1.54	.022	71.52	<.001	1.50	1.59
Soft drinks–Vision						
aesthetic	0.92	.017	55.23	<.001	.89	.95
attractive	0.99	.017	58.80	<.001	.95	1.02
beautiful	0.96	.016	60.40	<.001	.93	.99
pretty	0.92	.016	56.89	<.001	.89	.95
Soft drinks–Acoustic						
euphonic	1.02	.016	63.35	<.001	.98	1.05
good-sound	.99	.016	61.07	<.001	.96	1.03
melodic	.94	.016	57.76	<.001	.90	.97
sonorous	1.02	.016	63.47	<.001	.99	1.05
Soft drinks–Haptic						
comfortable	.74	.016	46.74	<.001	.71	.79
handy	.62	.016	37.31	<.001	.58	.65
soothing	.75	.018	42.23	<.001	.71	.78
well-shaped	.73	.016	45.15	<.001	.69	.76
Soft drinks–Olfactory						
fragrant	1.10	.016	68.47	<.001	1.06	1.12
nice smelling	1.10	.016	67.82	<.001	1.07	1.13

perfumed	1.08	.016	66.82	<.001	1.04	1.10
scented	1.05	.017	61.90	<.001	1.01	1.09
Soft drinks–Gustatory						
appetizing	1.11	.016	67.92	< .001	1.08	1.14
flavorful	1.07	.017	63.85	< .001	1.032	1.09
palatable	1.10	.016	69.19	<.001	1.072	1.14
taste	1.06	.016	65.47	<.001	1.026	1.09
Chocolate–Attitude						
EG01	1.17	.03	35.33	<.001	1.10	1.24
EG02	1.03	.03	36.63	<.001	.97	1.08
EG03	1.00	.03	34.86	<.001	.95	1.06
EG04	.86	.03	30.03	<.001	.81	.92
EG05	.98	.03	32.37	<.001	.92	1.04
Chocolate–Purchase Intention						
KA01	1.24	.03	39.02	<.001	1.18	1.31
KA02	1.27	.03	40.55	<.001	1.21	1.34
KA03	1.40	.03	40.79	<.001	1.33	1.47
KA04	1.25	.03	40.59	<.001	1.19	1.31
KA05	1.53	.04	38.50	<.001	1.46	1.61
Chocolate–Vision						
aesthetic	.68	.08	8.60	<.001	.53	.84
attractive	.65	.07	9.19	<.001	.51	.79
beautiful	.56	.07	8.59	<.001	.43	.68
pretty	.52	.07	7.16	<.001	.38	.66
Chocolate–Acoustic						
euphonic	.91	.09	10.60	<.001	.75	1.08
good-sound	.96	.08	11.78	<.001	.80	1.13
melodic	.99	.08	11.92	<.001	.83	1.15
sonorous	.99	.09	11.50	<.001	.82	1.16
Chocolate–Haptic						
comfortable	.59	.10	6.01	<.001	.40	.79
handy	.42	.10	4.44	<.001	.24	.61
soothing	.72	.08	9.04	<.001	.57	.88
well-shaped	.60	.08	7.86	<.001	.45	.75
Chocolate–Olfactory						
fragrant	.89	.08	10.92	<.001	.73	1.04

nice						
smelling	.93	.07	13.30	<.001	.79	1.07
perfumed	.91	.07	12.24	<.001	.76	1.06
scented	.82	.08	10.55	<.001	.67	.97
Chocolate–Gustatory						
appetizing	.93	.08	12.17	<.001	.78	1.08
flavorful	.82	.08	10.75	<.001	.67	.97
palatable	.87	.07	11.93	<.001	.72	1.01
taste	.96	.09	11.16	<.001	.79	1.13
T-Shirt–Attitude						
EGT01	1.21	.04	27.21	<.001	1.12	1.30
EGT02	1.15	.04	31.30	<.001	1.07	1.22
EGT03	1.08	.04	29.29	<.001	1.00	1.15
EGT04	.98	.04	25.26	<.001	.90	1.05
EGT05	1.07	.04	28.32	<.001	1.00	1.15
T-Shirt–Purchase Intention						
KAT01	1.28	.04	32.97	<.001	1.21	1.36
KAT02	1.28	.04	33.78	<.001	1.20	1.35
KAT03	1.35	.04	34.48	<.001	1.27	1.43
KAT04	1.23	.04	33.66	<.001	1.15	1.30
KAT05	1.45	.05	31.81	<.001	1.36	1.54
T-Shirt–Vision						
aesthetic	.96	.08	11.40	<.001	.80	1.13
attractive	1.00	.08	12.07	<.001	.84	1.17
beautiful	.86	.08	11.00	<.001	.71	1.01
pretty	.96	.09	10.73	<.001	.78	1.14
T-Shirt–Acoustic						
euphonic	.95	.08	11.59	<.001	.79	1.11
good-sound	1.04	.08	12.33	<.001	.87	1.20
melodic	1.03	.08	13.56	<.001	.88	1.18
sonorous	1.08	.08	13.34	<.001	.93	1.24
T-Shirt–Haptic						
comfortable	.92	.09	10.49	<.001	.75	1.09
handy	.78	.09	8.99	<.001	.61	.95
soothing	.78	.09	8.61	<.001	.60	.96
well-shaped	.50	.08	6.38	<.001	.35	.66
T-Shirt–Olfactory						

fragrant	1.10	.08	14.04	<.001	.94	1.25
nice smelling	1.05	.08	13.63	<.001	.90	1.20
perfumed	1.09	.08	14.21	<.001	.94	1.24
scented	.82	.08	10.11	<.001	.66	.98

The location parameters and an overview of the essential descriptive indicators for both the studies are presented in Table 2 for the attitude, purchase intention, and SPI of all products. In the first study, except for three products, each product was evaluated based on the attitude scale by at least one participant within the minimum and maximum range of the scale. All the medians and means show minor differences, which could indicate few outliers. However, the standard deviations are more significant than the differences between the medians and means, indicating a lack of normal distribution. Likewise, it can be seen that the number of outliers could be small since the lower percentiles are more significant than the minimum, and the upper percentiles are lower than the maximum. For example, the maximum for all products is 6, but more than 75% of the subjects evaluated the products at a maximum of 5.2 or lower. Thus, the outliers refer to less than 25% of the participants. In all the cases, the Shapiro–Wilk p-value indicates for all the products' significant levels or those which are very close to the range of reversal, so that a lack of normal distribution is assumed for all the products in the further analysis. This assumption, based on the descriptive indicators, is further strengthened by the distribution plots in Annex 1, showing distribution plots for all the products based on their respective attitude. The order of the histograms correspond to the order of sensory stimuli in the descriptive indicators table 2. The products with the sensory stimuli—vision, acoustic, haptic and vision, olfactory, haptic—were the only combinations close to the range of reversal. The distribution plots illustrate the assumption of the missing normal distribution. The distribution plot was represented on the Y-axis, and the frequency or density of the value was represented on the X-axis. In this case, it is the frequency of responses of the respective value of the attitude scale. Due to the lack of normal distribution, bootstrapping is performed for the attitude and purchase intention of all the products. The figures in Annex 2 show boxplots for all the products based on their respective attitude, purchase intention, and SPI. The order of the boxplots in Annex

2 correspond to the order of the sensory stimuli in Table 1 with the descriptive indicators. Boxplots visualize the distribution of variables based on the descriptive indicators. The median is shown in the middle of the boxplot, whereas the lower and upper percentiles limit the size. All points outside the boxplot correspond to outliers with an IQR distance of 1.5. Outliers with a triple IQR distance are additionally marked with the value (André, 2022; Tukey, 1977). Outliers with a 1.5 times IQR distance are observed for the products with the sensory combinations—vision, acoustic, gustatory, haptic and vision, gustatory, haptic, olfactory and vision, olfactory, haptic, acoustic. The IQR corresponds to the difference between the upper and lower percentile and is 1.2 for the product with the sensory stimuli vision, acoustic, gustatory, haptic. Accordingly, outliers are present in observations with a value smaller than 2 and larger than 6. In the data set, two outliers of 225 observations are at 1.8. For the product with the sensory stimuli vision, gustatory, haptic, and olfactory, three outliers are present in 99 observations with a value smaller than 1.5. One outlier at 201 observations could be identified with a value of 1.4 for the product with the sensory stimuli vision, olfactory, haptic, acoustic. Since all of these outliers are within 1.5 times the IQR distance and are rare to the respective number of observations, the inferential statistical procedures, performed later on, are robust to these outliers, they are not removed from the data set.

The maximum range of the purchase intention scale was completely covered. The mean and median values are close together, whereas the standard deviation is more significant compared to the attitude, which could be due to the lack of normal distribution. The product with the sensory stimuli vision, gustatory, olfactory is conspicuous. Only for this product, the median is lower than the mean value. Also, this product has the lowest value in the upper percentile, which indicates a right-skewed distribution. The remaining percentiles approximate those of the attitude. The p-values of the Shapiro–Wilk tests confirm no normal distribution for any variable, which is also visualized in the distribution plots and boxplots for the purchase intention in Annex 1 and 2. The right-skewed distribution of the product with the stimuli vision, gustatory, olfactory can also be seen. The figure showing the boxplots for purchase intention show no outliers for this variable for any of the products. Because the post-hoc test compares all pairings on which the ANOVA is based, and not all variables are normally distributed, bootstrapping is also performed.

The medians and means of the SPI are close to each other, as with the other variables, but the standard deviations are more minor, which means that normal distributions could be present. The p-value of the Shapiro–Wilk test shows that for seven products the observations are normally distributed. The normal distribution of this variable is irrelevant since no inferential statistical tests are performed. The SPI was used to check whether the evaluation of the products based on the SPI is comparable with each other. The range of the mean value is between 2.61 and 3.46 and for the standard deviation between .62 and .90 and, based on this five-pool Likert scaling, corresponds to a medium and tendentially positive level. However, it is conspicuous that only the SPI has a higher number of outliers, especially for four products.

Since the sample size in the first experiment was n = 654, a strict outlier elimination was carried out at an IQR distance of 1.5. Due to the smaller sample size, only extreme outliers with an IQR distance of 3 are removed in the second study. In order to make the following explanations of the outlier analysis more comprehensible, box plots of the second study were also shown in Annex 7. Simple outliers are marked with a point, and extreme outliers are marked with a number as well. For the chocolate product type, there are simple outliers below the lower quartile for the variable attitude for the products with the sensory stimuli vision, acoustic and vision, olfactory, gustatory and for vision, olfactory, haptic. There are no outliers for the variable purchase intention. In SPI, there are outliers both above the upper quartile and below the lower quartile for the sensory stimuli vision, haptic, acoustic and vision, olfactory and vision, olfactory, gustatory, and vision, olfactory, haptic. However, since the SPI is not part of the inferential statistical analysis, removing outliers is unnecessary. Extreme outliers could not be observed in any variable. This can also be comprehended by using the box plots, as no numbers at points are listed here that would indicate extreme outliers. In the case of the t-shirt product type, compared to the chocolate bars, there are fewer outliers and again no extreme outliers in any of the variables. In case of attitude, the control group was only present in the case of the product, where only one visual stimulus was contained. Again, no outliers can be observed in terms of purchase intention. In the SPI, outliers can be observed in the sensory stimuli vision, acoustic, haptic, olfactory and vision, olfactory, haptic.

Concerning the location parameters, the data showed no clear tendency for

the normal distribution of the products in the respective variables. There wereboth normally distributed and abnormally distributed sensory combinations for all the variables. The median and mean values are close together in all cases, the largest deviation being .31. This confirms the assumption that no outlier causes a shift in the distribution. However, it can be observed that in most cases, the distance between the medians and percentiles is small, which in these cases also indicates a lack of normal distribution. The p-value of the Shapiro–Wilk statistics confirms these observations. In some cases, the p-value was below .05, so that in these cases, it can be assumed that the distribution was not normal. For this reason, bootstrapping was carried out as part of the post-hoc test. The explanations were also visible in the distribution plots in Annex 3-6. In most cases, there was no unambiguous normal distribution.

Table 2

Descriptive statistics first and second study

	n	Mean	Median	Std. Dev.	Shapiro-Wilk	Min.	Max.	25th	75th
Attitude – First study – Soft drinks									
v	654	3.39	3.40	1.25	<.001	1.00	6.00	2,40	4,20
v,a	205	3.41	3.60	1.20	.002	1.00	6.00	2,40	4,20
v,a,g	105	4.03	4.00	1.04	.022	1.00	6.00	3,40	5,00
v,a,g,h	225	4.32	4.60	1.02	<.001	1.80	6.00	3,80	5,00
v,a,h	100	3.84	4.00	1.20	.057	1.00	6.00	3,00	4,80
v,g	220	3.76	4.00	1.31	<.001	1.00	6.00	2,80	4,80
v,g,h	103	4.16	4.40	1.27	<.001	1.00	6.00	3,20	5,00
v,g,h,o	99	4.20	4.40	1.20	<.001	1.40	6.00	3,60	5,00
v,g,h,o,a	654	4.19	4.40	1.32	<.001	1.00	6.00	3,20	5,20
v,g,o	105	3.04	2.80	1.35	.002	1.00	6.00	2,00	4,00
v,g,o,a	115	3.71	4.00	1.44	<.001	1.00	6.00	2,70	4,90
v,h	126	4.04	4.20	1.23	<.001	1.00	6.00	3,20	5,00
v,o	103	3.94	4.20	1.35	.001	1.00	6.00	3,00	5,00
v,o,a	126	3.83	4.00	1.24	.012	1.00	6.00	3,00	4,80
v,o,h	115	4.02	4.00	1.13	.059	1.00	6.00	3,20	4,80
v,o,h,a	201	4.28	4.40	1.08	<.001	1.40	6.00	3,60	5,00
Purchase Intention – First study – Soft drinks									

v	654	2.93	2.80	1.29	<.001	1.00	6.00	2.00	4.00
v,a	205	2.95	2.80	1.30	<.001	1.00	6.00	2.00	4.00
v,a,g	105	3.57	4.00	1.17	.009	1.00	6.00	2.80	4.40
v,a,g,h	225	3.86	4.00	1.27	<.001	1.00	6.00	3.00	5.00
v,a,h	100	3.41	3.80	1.30	.002	1.00	6.00	2.35	4.40
v,g	220	3.23	3.40	1.44	<.001	1.00	6.00	2.00	4.40
v,g,h	103	3.63	4.00	1.46	<.001	1.00	6.00	2.50	5.00
v,g,h,o	99	3.75	4.00	1.41	.001	1.00	6.00	2.80	5.00
v,g,h,o,a	654	3.74	4.00	1.47	<.001	1.00	6.00	2.60	5.00
v,g,o	105	2.27	1.80	1.42	<.001	1.00	6.00	1.00	3.00
v,g,o,a	115	3.71	4.00	1.44	<.001	1.00	6.00	2.70	4.90
v,h	126	3.66	4.00	1.23	.003	1.00	6.00	3.00	4.40
v,o	103	3.31	3.40	1.46	<.001	1.00	6.00	2.00	4.50
v,o,a	126	3.41	3.40	1.31	.008	1.00	6.00	2.40	4.40
v,o,h	115	3.45	3.80	1.34	.002	1.00	6.00	2.20	4.20
v,o,h,a	201	3.73	4.00	1.33	< .001	1.00	6.00	2.80	4.80
SPI – First study – Soft drinks									
v	654	2.74	2.80	.81	<.001	1.00	5.00	2.10	3.30
v,a	205	2.85	2.85	.79	.027	1.00	4.70	2.35	3.40
v,a,g	105	3.21	3.25	.67	.009	1.00	4.70	2.90	3.65
v,a,g,h	225	3.52	3.55	.62	.055	1.95	5.00	3.10	3.95
v,a,h	100	3.02	3.20	.77	<.001	1.00	4.65	2.70	3.54
v,g	220	2.99	3.15	.85	.002	1.00	5.00	2.45	3.60
v,g,h	103	3.31	3.42	.75	.005	1.10	4.65	2.95	3.80
v,g,h,o	99	3.30	3.40	.80	.084	1.10	4.90	2.85	3.80
v,g,h,o,a	654	3.45	3.60	.81	<.001	1.00	5.00	3.00	3.99
v,g,o	105	2.61	2.50	.82	.254	1.00	4.50	2.05	3.25
v,g,o,a	115	3.14	3.15	.90	.321	1.00	5.00	2.63	3.75
v,h	126	3.13	3.18	.74	.213	1.00	5.00	2.65	3.55
v,o	103	3.26	3.25	.71	.143	1.00	4.60	2.85	3.78
v,o,a	126	3.30	3.33	.83	.158	1.00	5.00	2.80	3.84
v,o,h	115	3.26	3.35	.83	.015	1.15	5.00	2.80	3.80
v,o,h,a	201	3.46	3.45	.72	.001	1.20	5.00	3.10	3.95
Attitude–Second study–Chocolate									
v	114	3.90	4.00	1.04	.131	1.40	6.00	3.00	4.80
v,a	114	4.18	4.20	.89	<.001	2.20	6.00	3.80	4.80
v,h,a	109	3.97	4.00	1.08	.018	1.80	6.00	3.20	4.60

v,h,a,g	117	3.41	3.60	1.36	<.001	1.00	5.80	2.40	4.60
v,h,a,o	109	4.36	4.60	.89	<.001	2.20	6.00	3.80	5.00
v,o	108	4.57	4.80	.78	.001	2.60	6.00	4.00	5.00
v,o,g	110	4.63	4.80	.82	<.001	2.60	6.00	4.20	5.00
v,o,g,h,a	107	4.52	4.60	.90	.006	2.20	6.00	4.00	5.10
v,o,h	109	4.59	4.80	.80	.007	2.60	6.00	4.00	5.00

Purchase Intention – Second study – Chocolate

v	114	3.35	3.30	1.33	.001	1.00	6.00	2.00	4.40
v,a	114	3.72	4.00	1.20	.006	1.00	6.00	3.00	4.40
v,h,a	109	3.30	3.20	1.40	.003	1.00	6.00	2.20	4.20
v,h,a,g	117	2.67	2.20	1.48	<.001	1.00	6.00	1.20	3.80
v,h,a,o	109	3.69	4.00	1.28	.002	1.00	6.00	2.80	4.60
v,o	108	4.11	4.30	1.12	.010	1.00	6.00	3.20	5.00
v,o,g	110	4.17	4.40	1.24	<.001	1.00	6.00	3.25	5.00
v,o,g,h,a	107	3.86	4.00	1.35	.002	1.00	6.00	2.70	5.00
v,o,h	109	3.99	4.20	1.10	<.001	1.00	6.00	3.20	5.00

SPI – Second study – Chocolate

v	114	3.19	3.25	.96	.001	1.00	5.00	2.50	4.00
v,a	114	3.05	3.13	.70	.005	1.13	4.38	2.50	3.50
v,h,a	109	3.15	3.27	.75	.035	1.00	5.00	2.73	3.50
v,h,a,g	117	2.84	2.94	.85	.073	1.00	4.50	2.25	3.44
v,h,a,o	109	3.40	3.50	.58	.809	2.00	5.00	3.00	3.75
v,o	108	3.70	3.75	.54	.024	2.00	4.88	3.47	4.00
v,o,g	110	3.77	3.83	.71	.020	1.33	5.00	3.33	4.25
v,o,g,h,a	107	3.57	3.60	.59	.577	1.85	5.00	3.13	4.00
v,o,h	109	3.62	3.67	.63	.171	1.83	4.83	3.17	4.00

Attitdue–Second study–T-Shirt

v	114	3.82	3.90	.92	.053	1.40	6.00	3.40	4.60
v,a	233	3.64	3.80	1.10	<.001	1.00	6.00	3.00	4.40
v,a,h,o	118	3.75	4.00	1.26	.001	1.00	6.00	3.00	4.60
v,o	117	3.76	4.00	1.19	.008	1.00	6.00	2.80	4.60
v,o,h	117	3.64	3.80	1.20	.167	1.00	6.00	2.80	4.60

Purchase Intention – Second study – T-Shirt

v	114	2.88	3.00	1.19	.002	1.00	5.80	2.00	4.00
v,a	233	2.59	2.40	1.28	<.001	1.00	6.00	1.60	3.60
v,a,h,o	118	2.82	2.60	1.44	<.001	1.00	6.00	1.60	4.00
v,o	117	2.69	2.40	1.40	<.001	1.00	6.00	1.60	3.80
v,o,h	117	2.70	2.60	1.39	<.001	1.00	6.00	1.60	3.80
SPI – Second study – T-Shirt									
v	114	2.98	3.00	.87	.008	1.00	4.75	2.50	3.75
v,a	233	2.78	2.75	.81	.022	1.00	5.00	2.25	3.38
v,a,h,o	118	3.03	3.13	.72	.449	1.00	5.00	2.63	3.50
v,o	117	3.14	3.25	.83	.083	1.25	5.00	2.50	3.63
v,o,h	117	3.19	3.25	.74	.038	1.00	5.00	2.73	3.67

Note. v = vision, g = gustatory, a = acoustic, o = olfactory, h = haptic

3.2.2 Inferential statistics

Considering the effect of superadditivity, it was assumed that this is present if it can be observed that products with a cumulative increase in sensory stimuli have a higher and significant mean difference from the control group, products without multisensory. For this reason, the variables—attitude and purchase intention—of the respective products were regrouped depending on the number of sensory stimuli. Thus, mean values were formed for the variables attitude and purchase intention of all products with one, two, three, four, and five sensory stimuli. In the next step, an MANOVA followed by two ANOVA´s were performed for the groupings, attitudes, and purchase intention toward products with a different number of sensory stimuli; and a Levene test. The statistics of Levene's test indicate a missing variance of homogeneity for attitude ($F(4, 3251) = 3.70$, $p = .005$) and for the purchase intention ($F(4, 3251) = 5.80$, $p = <.001$). Because of the missing variance homogeneity the Welch test was conducted, which indicated significant differences between the products with a different number of sensory stimuli based on attitude ($F(4, 1625) = 46.86$, $p = <.001$, est. $w^2 = .05$) and purchase intention ($F(4, 1624) = 46.05$, $p = <.001$, est $w^2 = .05$). The p-value for both variables was below the .05 rejection level. The variance between the groups, taking the alpha

error with a probability of 5% into account, seems to show a sufficiently significant and small difference within the groups. Furthermore, mean effect sizes can be observed using the omega square test. The omega square estimates the variance explained by the variables of the model. Furthermore, compared to the partial Eta square test, the number of groups is added, which reduces the risk of bias due to a too-small sample. Likewise, the ranges of values of the Cohen d. In addition, the MANOVA ($F(4, 3215) = 25.09$, $p = < .001$, Wilk's $\Lambda = .94$) also shows significant results; the significances are similar to ANOVA, and therefore there are no biases or misconceptions regarding the cumulative alpha error. Since there was no variance homogeneity and normal distribution, bootstrapping was performed for the following post-hoc test with 5,000 replicates, making the mean differences of all possible pairings visible so that conclusions can be drawn about the effect of superadditivity. The results were considered in Table 3.

For two pairings, it can be observed that there are no significant differences in both attitude ($p_{tukey\ \text{five vs. four stimuli}} = 1.00, .01$, 95% CI [−.13, .15], $p_{tukey\ \text{three vs. two stimuli}} = .678, .09$, 95% CI [−.05, .23]) and purchase intention ($p_{tukey\ \text{five vs. four stimuli}} = .990, −.04$, 95% CI [−.19, .12], $p_{tukey\ \text{three vs. two stimuli}} = .953, .06$, 95% CI [−.09, .20]). Accordingly, there are no higher scores in attitude and purchase intention for the products with three compared to two and for five when compared to four sensory stimuli in this experiment. The products with four sensory stimuli showed a higher purchase intention than the products with five sensory stimuli, although this difference was insignificant. Significant differences were observed for products with more sensory stimuli with p-values less than .05 and with confidence intervals where none surrounded zero for all other pairings. Effect sizes fluctuated from moderate effects between $d = .30–.50$ and up to strong effects from d greater than .50. Although it was observed that products with a greater number of sensory stimuli had a higher attitude and purchase intention scores, except for one pairing in purchase intention, these differences were not significant for the products with five sensory stimuli compared to products with four sensory stimuli and for products with three sensory stimuli compared to products with two sensory stimuli. Thus, the assumption of superadditivity could not be fully observed, so H1 is rejected for this study, and the null hypothesis is accepted.

Since the p-value of the Levene test was below the significance level of .05 in the second experiment, a lack of variance homogeneity can be assumed for attitude

($F_{chocolate}(4, 992) = 11.49$, $p = <.001$, $F_{t\text{-}shirt}(3, 695) = 4.82$, $p = .002$) and purchase intention ($F_{chocolate}(4, 3251) = 6.98$, $p = <.001$, $F_{t\text{-}shirt}(3, 695) = 3.04$, $p = 0.028$), so the results of the Welch test are reported. The results of the Welch test show that in the case of chocolate ($F_{attitude}(4, 376) = 13.57$, $p = <.001$, est $w^2 = .06$, $F_{purchase\ intention}(4, 375) = 12.20$, $p = <.001$, $w^2 = .05$), significant differences in both variables can be assumed for products with a different number of sensory stimuli, whereas this observation was not valid for t-shirts ($F_{attitude}(3, 268) = .79$, $p = .501$, est. $w^2 = .000$, $F_{Purchase\ Intention}(3, 265) = 1.54$, $p = .206$, est. $w^2 = .002$). Thus, the p-value in both variables for the chocolate was below the rejection range of .05. Accordingly, it can be assumed that the variance within the groups was small enough, and large enough between the groups to assume a significant difference under the aspect of an alpha error. Furthermore, appropriate effect sizes can be observed based on the omega square values. For chocolate, medium effects can be observed for both attitude and purchase intention. Both the p-values and the effect sizes were outside the tolerance range for the t-shirt. Once again, the MANOVA results show consistent results compared to the ANOVA`s for both chocolate ($F(4, 992) = 9.15$, $p = <.001$, Wilk's $\Lambda = .93$) and the t-shirts ($F(4, 695) = .92$, $p = .48$, Wilk's $\Lambda = .99$). The results of the post-hoc test were reported. This was carried out in order to be able to obtain further findings, as mean comparisons of all possible pairings were carried out as part of this test. Because of the predominantly missing normal distribution and variance homogeneity, a bootstrapping with 5,000 replicates was carried out. The results of the post-hoc test are visible in the Table 3. In addition to the p-value, mean differences, confidence intervals, and effect sizes were also reported. Confidence intervals were additionally used to determine the direction of an effect. Although Welch's test for chocolate indicated significant differences in the groups, the post-hoc test results show that this significance level does not hold for all pairings. Thus, the mean differences in attitude are not significant for four out of ten possible pairings ($p_{tukey\ four\ vs.\ one\ stimuli} = .999$, −.03, 95% CI [−.28, .22], $p_{tukey\ five\ vs.\ two} = .693$, .15, 95% CI [−.05, .36], $p_{tukey\ five\ vs.\ three} = .827$, .12, 95% CI [−.08, .32], $p_{tukey\ thee\ vs.\ two} = .995$, .03, 95% CI [−.12, .19]). In terms of the significance of the differences, the results of the purchase intention behave almost identically ($p_{tukey\ four\ vs.\ one\ stimuli} = .710$, −.20, 95% CI [−.51, .12], $p_{tukey\ five\ vs.\ two} = .997$, −.05, 95% CI [−.36, .24], $p_{tukey\ five\ vs.\ three} = .999$, .04 95% CI [−.25, .32], $p_{tukey\ thee\ vs.\ two} = .931$, −.09, 95% CI [−.31, .12]). Like the previous experiment, not all mean differences were significant for products with a higher number of

sensory stimuli than products with fewer sensory stimuli. However, according to H1, it was formulated that each cumulative increase also leads to significant differences compared to products with a lower number of sensory stimuli. For this reason, as with soft drinks, the alternative hypothesis must now also be falsified for the chocolate bars. The effect of superadditivity was not present even in the case of partial congruence in online stores, where only the visual stimulus was physically perceived. Likewise, unlike in the first experiment, no cumulative increase in mean can be observed in relation so that products with a higher number of sensory stimuli do not always lead to a higher attitude (M_{one} = 3.90, SD_{one} = 1.04, M_{two} = 4.34, SD_{two} = .86, M_{three} = 4.40, SD_{three} = .95, M_{four} = 3.87, SD_{four} = 1.25, M_{five} = 4.5, SD_{five} = .90) or purchase intention (M_{one} = 3.35, SD_{one} = 1.33, M_{two} = 3.91, SD_{two} = 1.17, M_{three} = 3.82, SD_{three} = 1.31, M_{four} = 3.16, SD_{four} = 1.47, M_{five} = 3.86, SD_{five} = 1.35). A cumulative increase in the mean could also not be observed for the t-shirts or in the absence of congruence both in attitude and purchase intention (M_{one} = 3.82, SD_{one} = .92, M_{two} = 3.68, SD_{two} = 1.13, M_{three} = 3.64, SD_{three} = 1.20, M_{four} = 3.75, SD_{four} = 1.26) or purchase intention (M_{one} = 2.88, SD_{one} = 1.19, M_{two} = 2.62, SD_{two} = 1.32, M_{three} = 2.70, SD_{three} = 1.34, M_{four} = 2.82, SD_{four} = 1.45). Furthermore, it can be seen from Table 3 that in the case of the t-shirts or missing congruence, no pair shows any significant differences at all. Due to the lack of significance, the effect of superadditivity cannot be observed even in the last situation, the absence of congruence. Thus, both the first and third hypotheses for superadditivity are rejected.

Table 3

Post-Hoc test–Superadditivity: First and second study

			95% bca† CI							
		Mean Difference	Lower	Upper	SE	bias	t	d	p tukey	
Soft drinks–Attitude										
Five	Four	.01	−.13	.15	.07	<.001	.09	.005	1.000	
	One	.80	.66	.94	.07	−.001	1.15	.62	< .001	***
	Three	.36	.22	.50	.07	<−.001	5.20	.28	< .001	***
	Two	.50	.31	.59	.07	<.001	6.52	.35	< .001	***
Four	One	.80	.70	.92	.08	−.001	11.32	.65	< .001	***

	Three	.36	.22	.49	.08	<–.001	5.08	.29	< .001	***
	Two	.50	.31	.58	.08	<–.001	6.40	.36	< .001	***
One	Three	–.44	–.57	–.30	.07	<.001	–6.27	–.35	< .001	***
	Two	–.35	–.48	–.20	.07	.001	–4.95	–.27	< .001	***
Three	Two	.10	–.05	.23	.07	<.001	1.32	.07	.678	
Soft drinks–Purchase Intention										
Five	Four	–.04	–.19	.12	.08	.001	–.47	–.03	.990	
	One	.82	.66	.96	.08	<.001	1.65	.59	< .001	***
	Three	.50	.29	.60	.08	<–.001	5.85	.31	< .001	***
	Two	.50	.34	.66	.08	<.001	6.56	.35	< .001	***
Four	One	.90	.70	.99	.07	<–.001	11.06	.65	< .001	***
	Three	.48	.34	.64	.08	–.001	6.28	.35	< .001	***
	Two	.54	.39	.69	.078	<–.001	6.99	.39	< .001	***
One	Three	–.37	–.51	–.21	.07	<–.001	–4.80	–.27	< .001	***
	Two	–.31	–.46	–.17	.07	<–.001	–4.09	–.23	< .001	***
Three	Two	.10	.09	.20	.08	<.001	.72	.04	.953	
Chocolate–Attitude										
Five	Four	.65	.41	.88	.12	<–.001	5.48	.57	< .001	
	One	.62	.36	.87	.13	–.002	4.54	.63	< .001	
	Three	.12	–.08	.32	.10	<–.001	1.06	.13	.827	
	Two	.15	–.05	.36	.10	–.002	1.30	.18	.693	
Four	One	–.03	–.28	.22	.13	–.002	–.27	–.03	.999	
	Three	–.53	–.73	–.34	.10	<–.001	–6.07	–.49	< .001	
	Two	–.50	–.70	–.30	.10	–.002	–5.19	–.46	< .001	
One	Three	–.48	–.72	–.29	.11	.001	–4.54	–.51	< .001	
	Two	–.46	–.69	–.24	.11	<.001	–3.98	–.50	< .001	
Three	Two	.03	–.12	.19	.08	–.001	.40	.04	.995	
Chocolate–Purchase Intention										
Five	Four	.70	.37	1.01	.16	<.001	4.48	.49	< .001	***
	One	.50	.16	.86	.18	–.003	2.82	.38	.039	*
	Three	.04	–.25	.32	.15	.001	.27	.03	.999	
	Two	–.05	–.36	.24	.15	<.001	–.34	–.04	.997	
Four	One	–.20	–.51	.12	.16	–.004	–1.27	–.14	.710	
	Three	–.66	–.91	–.42	.12	<.001	–5.74	–.48	< .001	***
	Two	–.75	–1.00	–.51	.13	<.001	–5.99	–.56	< .001	***
One	Three	–.46	–.75	–.19	.14	.004	–3.22	–.35	.011	*
	Two	–.56	–.84	–.26	.15	.004	–3.64	–.45	.003	**

Three	Two	−.09	−.31	.12	.11	<−.001	−.80	−.07	.931
T-Shirt – Attitude									
Four	One	−.06	−.34	.21	.14	.004	−.45	−.06	.970
	Three	.11	−.20	.43	.16	.001	.77	.09	.870
	Two	.08	−.19	.33	.13	.003	.61	.06	.930
One	Three	.18	−.09	.46	.14	−.003	1.21	.17	.623
	Two	.14	−.07	.34	.10	−.001	1.14	.13	.663
Three	Two	−.04	−.30	.21	.13	.002	−.33	−.04	.987
T-Shirt – Purchase Intention									
Four	One	−.07	−.41	.28	.18	< .001	−.38	−.05	.981
	Three	.12	−.25	.48	.19	.003	.69	.08	.902
	Two	.20	−.11	.49	.15	.001	1.37	.14	.518
One	Three	.19	−.16	.51	.17	.003	1.06	.14	.712
	Two	.26	−.00	.51	.13	.icht 001	1.82	.20	.264
Three	Two	.07	−.20	.37	.15	−.002	.53	.06	.952

** p < .01, *** p < .001

Note. The mean difference estimate is based on the median of the bootstrap distribution.

Cohen's d does not correct for multiple comparisons.

Bootstrapping based on 5000 successful replicates.

† Bias corrected accelerated.

P-value and confidence intervals were adjusted for comparing a family of five estimates (confidence intervals corrected using the Tukey method).

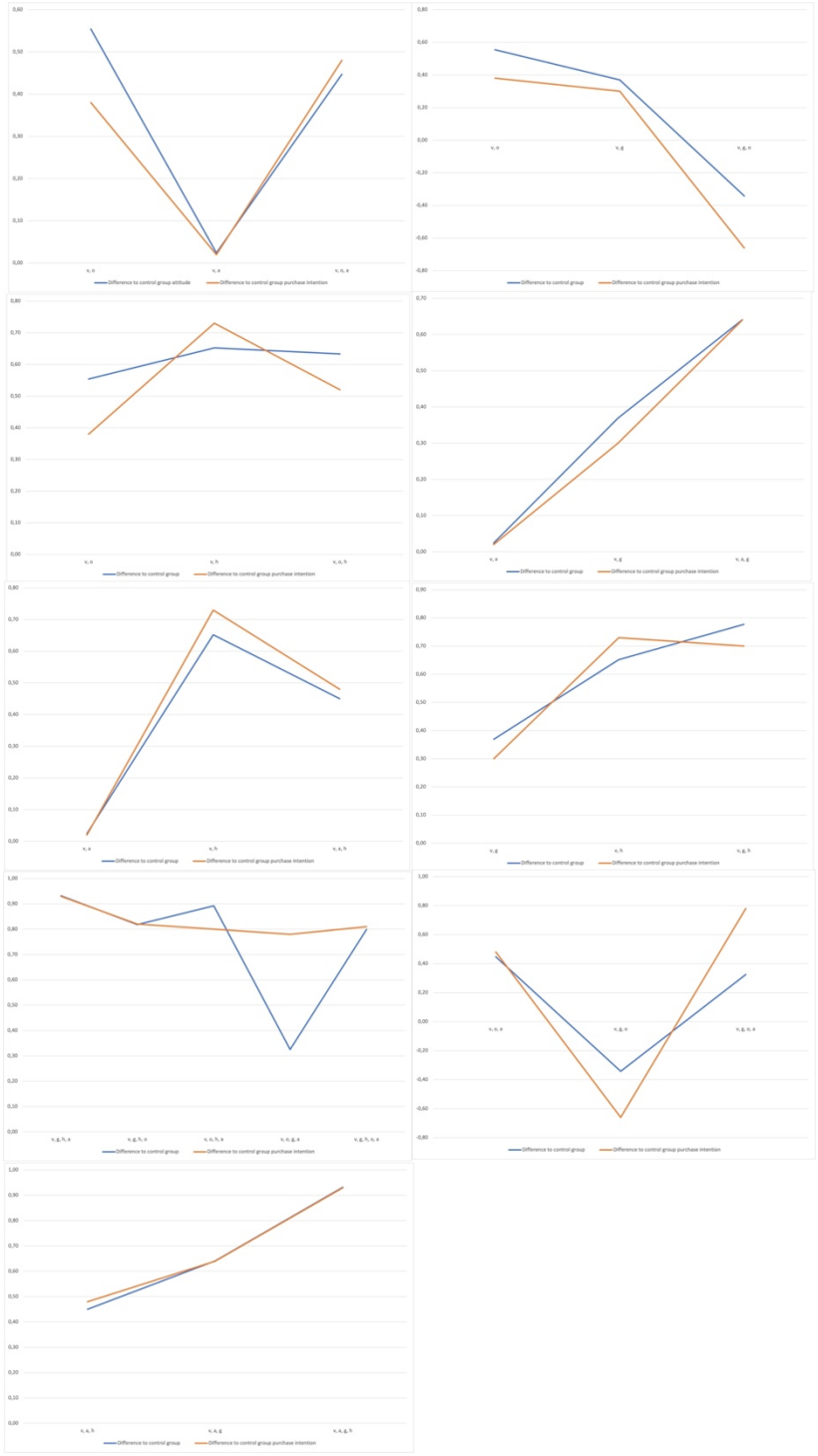
The effect of cross-modal correspondence can be observed if there are any interactions between the sensory stimuli. This would be the case if the product with the sensory stimuli—vision, olfactory, and vision, gustatory—show significant differences from the control group, the products without multisensory stimuli, with a negative mean difference, and the product containing all these three sensory stimuli show no significant differences or mean difference changes in a positive range.

Levene's test statistics indicate a lack of variance homogeneity in attitude ($F(15, 4255) = 4.23$, $p = <.001$) and purchase intention ($F(15, 3240) = 3.24$, $p = <.001$), so the results of the Welch test were reported. The Welch test indicates significant differences between the different sensory combinations based on attitude (F(15,

810) = 19.71, p = <.001, est. w^2 = .08) and purchase intention (F(15, 810) = 18.44, p = <.001, est. w^2 = .07). The post-hoc test allows an average comparison of all possible 120 pairings. Since, in contrast to superadditivity, the comparison to the control group was sufficient, only the relevant pairings were shown in table 4. The deviations from the control group were also visualized in the figure 11 to support the traceability of the results described. In the context of the cross-modal correspondence, all possible interaction effects based on the products examined in the second hypothesis were shown in figure 11. The mean value differences to the control group for the respective product to be compared were shown graphically by a connected line.

Figure 11

Illustration of the interactions - First study



The effect of cross-modal correspondence could be observed using several pairs. For attitude the pairs vision, gustatory (p_{tukey} = .013, −.37, 95% CI [−.56, −.17]) and vision, olfactory (p_{tukey} = .003, −.55, 95% CI [−.83, −.28]) show significant differences with moderate effect sizes to the control group (d_{Vg} = −.29, d_{Vo} = −.44). For the conglomerate of these three stimuli ($p_{tukey\ v,o,g}$ = .386, .34, 95% CI [−.06, −.62]), significant differences cannot be observed. Furthermore, a positive sign can be observed in the mean difference, so that in the conglomerate of the three sensory stimuli, the subjects preferred the product of the control group, although the subjects preferred the products with the same sensory stimuli recombined in different products compared to the control group. These observations were consistent with the definition of the effect of cross-modal correspondence. Different observations occurred for the purchase intention. There were no significant results for vision, gustatory (p_{tukey} = .223, −.31, 95% CI [−.52, −.09]) and vision, olfactory (p_{tukey} = .357, −.38, 95% CI [−.70, .09]). The conglomerate of these three senses indicated significant differences with the control group (p_{tukey} = <.001, .66 ,95% CI [.33, .92]) with a moderate effect size d = .50. As with the attitude, a change in sign could be observed, although the direction was different. In the purchase intention, the conglomerate was preferred, compared to the products where only two of the three identical sensory stimuli were combined at a time. Interaction effects do not only mean that a change in preference was observed. There was also an interaction as soon as the conglomerate continued the direction of the mean value and was higher than in the respective products where the identical senses were divided into different products. Such interaction effects could also be observed in the collected data. Thus, the mean values for the conglomerates with the four sensory stimuli vision, gustatory, acoustic, haptic were significantly higher for both variables ($p_{tukey\ attitude}$ = <.01, −.93, 95% CI [−1.10, −.77], $p_{tukey\ purchase\ intention}$ = <.01, −.94, 95% CI [−1.13, −.73]) than the mean values with the respective single combinations vision, haptic, acoustic ($p_{tukey\ attitude}$ = .06, −.45, 95% CI [−.69, .20], $p_{tukey\ purchase\ intention}$ = .08, −.48, 95% CI [−.76, .21] and vision, gustatory, haptic ($p_{tukey\ attitude}$ = <.01, -.78, 95% CI [-1.03, −.51], $p_{tukey\ purchase\ intention}$ = < 0.01, −.70, 95% CI [−1.01, −.41]). These interaction effects also appear in the collected data in combinations where the acoustic and gustatory stimuli were combined. Thus, comparable interaction effects can also be observed for the combination vision, gustatory, and vision, acoustic ($p_{tukey\ vision,\ acoustic}$ = 1.00, −.02, 95% CI [−.22, .57], $p_{tukey\ vision,\ gustatory}$ = .01, −.37, 95% CI [-.56, ,.17], $p_{tukey\ vision,\ acoustic,}$

$_{\text{gustatory}}$ = <.001, −.65, 95% CI [−.86, −.41]). Another interaction effect can be observed in both variables for the conglomerate vision, gustatory, olfactory, acoustic ($p_{tukey\ \text{attitude}}$ = .41, −.33, 95% CI [−.60, −.04], $p_{tukey\ \text{purchase intention}}$ = <.001, −.79, 95% CI [−1.07, −.51]) compared to the products of three each of these sensory stimuli vision, olfactory, acoustic ($p_{tukey\ \text{attitude}}$ = .02, −.45, 95% CI [−.68, −.22], ptukey$_{\text{purchase intention}}$ = .03, −.48, 95% CI [−.73, .23]) and vision, gustatory, olfactory ($p_{tukey\ \text{attitude}}$ = .04, .34, 95% CI [.06, .62], $p_{tukey\ \text{purchase intention}}$ = <.001, .66, 95% CI [.33, .92]). The product with the combinations vision, gustatory, olfactory have reached a difference in the attitude score of .33 points and a purchase intention of .66 and are so below the control groups. On the other hand, the product with the sensory stimuli vision, olfactory, acoustic, was preferred by the participants in both variables with a difference of -.45 in attitude and -.48 in purchase intention compared to the control group. Assuming that the effect of cross-modal correspondence would be present, it could be expected that the conglomerate of all these sensory stimuli could show a mean deviation because the combination with gustatory sense resulted in a worse evaluation than the product of the control group. On the other hand, the product with an auditory sense was preferred to that of the control group. If, all sensory stimuli coincide into one product, the expectation could be justified that the conglomerate's product would still be preferred to that of the control group, but no longer strongly, because the gustatory sense should reduce the preference. However, since the effect of the cross-modal correspondence was present, the preference, i.e., the mean of the attitude and purchase intention, was significantly higher than for the product where the gustatory stimulus was not included. Since the effect of the cross-modal correspondence has already been observed based on several examples, the hypothesis of H2 cannot be falsified. Finally, another noticeable observation that should be described, even if it is irrelevant for the inferential analytics. For the product with the sensory stimuli vision, olfactory, gustatory, acoustic, the difference to the control group for the variable purchase intention is .46, lower than for the attitude. Such a high discrepancy between purchase intention and attitude can only be observed with this product.

In the second experiment, the results of the Levene test indicate a lack of variance homogeneity due to a below critical value of < .05 for attitude ($F_{\text{chocolate}}$(8, 988) = 11.60, p = <.001, $F_{\text{t-shirt}}$(4, 694) = 4.24, p = .002) and for the purchase intention ($F_{\text{chocolate}}$(8, 988) = 3.98, p = <.001, $F_{\text{t-shirt}}$(4, 694) = 2.57, p = .037). The results of the

MANOVA show congruent results. Due to the lack of homogeneity of variance, the results of the Welch test were reported, which indicate that there are fundamentally significant differences in the combinations of senses concerning the attitude for the chocolate bars, but not for the t-shirts ($F_{chocolate}(8, 411) = 16.03$, $p = < .001$, est. $w^2 = .01$, $F_{t\text{-}shirts}(4, 307) = .80$, $p = .526$, est. $w^2 = .000$). In the case of purchase intention, significant differences can only be assumed for the attitude ($F_{chocolate}(8, 411) = 13.90$, $p = < .001$, est. $w^2 = .01$, $F_{t\text{-}shirts}(4, 306) = 1.23$, $p = .275$, est $w^2 = < .001$). Although the p-values for the chocolates indicate significant differences, the omega squares in both cases were .01, so only a weak effect can be assumed. In the previous experiment i.e., with given congruence, the omega square for the attitude was .08 and indicated a medium effect. As in the first experiment, one reason for this could be that not all pairings showed significant differences from the control group. Since the effect size was even smaller, there could be a more number of insignificant pairs. For this reason, the post-hoc test results were reported to be able to observe the possible interactions and thus the effect of the cross-modal correspondence. Again, the MANOVA results showed consistent results compared to the ANOVA`s for both the t-shirts ($F(4, 1{,}386) = .79$, $p = .63$, Wilk's $\Lambda = .99$) and chocolates ($F(4, 1{,}967) = 10.75$, $p = <.001$, Wilk's $\Lambda = .85$). Since there is again no normal distribution in all the variables and a lack of homogeneity of variance must also be assumed, bootstrapping was carried out with 5,000 replicates. The post-hoc test results, which were shown in the Table 4 confirm the suspicion. The number of insignificant pairs of observations was higher than in the first experiment, which was the reason for the smaller effect size. This was irrelevant for the hypothesis test since the effect of the cross-modal correspondence already exists if interactions could be observed based on at least one example or conglomerate. The cross-modal correspondence effect could be observed using the combination vision, haptic, acoustic, gustatory for attitude ($p_{tukey\ v,h,a,g} = .004$, .49, 95% CI [.19, .80]), and purchase intention ($p_{tukey\ v,h,a,g} = .002$, .68, 95% CI [.32, 1.04]). This combination has a positive main difference since the subjects evaluated the chocolate without multisensory stimuli better compared to the ones with these stimuli separately. This observation again corresponds to the effect of the cross-modal correspondence. The participants rated all products with these sensory stimuli but in different combinations. Only with this combination, the product of the control group were preferred, although other products where these same sensory stimuli were already included were

evaluated opposite. This product was already the lowest in the descriptive statistics as part of the evaluation based on the SPI (Haase & Wiedmann, 2018), also with a slightly positive tendency according to the prerequisite.

Due to the lack of significance, the effect of cross-modal correspondence cannot be observed in any of the pairs for the t-shirts. Accordingly, it can be stated that the results behave differently as the congruence decreases.

The effect of the cross-modal correspondence with partial congruence could only be observed using one example and if there is no congruence for any pair. Following the procedure described in Section 4.1.2, the second and the third hypothesis can thus be verified.

Table 4

Post-Hoc test–Cross-modal correspondence: First and second study

		95% bcaŧ CI							
	Mean Difference	Lower	Upper	SE	bias	t	d	p_{key}	
Soft drinks–Attitude									
v, a	−.02	−.22	.16	.10	−.001	−.24	−.02	1.000	
v, h	−.65	−.88	−.41	.12	−.002	−5.39	−.52	<.001	***
v, g	−.37	−.56	−.17	.10	<.001	−3.81	−.29	.013	*
v, o	−.55	−.83	−.28	.14	.001	−4.20	−.44	.003	**
v, g, o	.34	.06	.62	.14	−.001	2.62	.27	.386	
v, o, h	−.63	−.86	−.40	.12	<−.001	−5.04	−.51	<.001	***
v, o, a	−.45	−.68	−.22	.12	<−.001	−3.70	−.36	.020	*
v, a, g	−.65	−.86	−.41	.11	−.002	−4.90	−.52	<.001	***
v, a, h	−.45	−.69	−.20	.13	−.004	−3.37	−.36	.060	
v, g, h	−.78	−1.03	−.51	.13	<.001	−5.90	−.62	<.001	***
v, g, h, o	−.82	−1.07	−.55	.13	< .001	−6.10	−.66	<.001	***
v, a, g, h	−.93	−1.09	−.77	.08	−.002	−9.70	−.78	<.001	***
v, g, o, a	−.33	−.60	−.04	.14	<−.001	−2.59	−.25	.407	
v, o, h, a	−.89	−1.06	−.71	.09	−.002	−8.89	−.73	<.001	***
v, g, h, o, a	−.80	−.94	−.66	.07	−.002	−11.62	−.62	<.001	***

Soft drinks–Purchase Intention									
v, a	−.02	−.23	.18	.10	.002	−.19	−.02	1.000	
v, h	−.74	−.96	−.49	.12	<.001	−5.55	−.57	<.001	***
v, g	−.31	−.52	−.09	.11	.001	−2.89	−.23	.223	
v, o	−.38	−.70	−.09	.16	.002	−2.66	−.29	.357	
v, g, o	.66	.33	.92	.15	.003	4.55	.50	<.001	***
v, o, h	−.52	−.79	−.26	.13	<.001	−3.78	−.40	.015	*
v, o, a	−.48	−.73	−.23	.13	<.001	−3.62	−.37	.026	*
v, a, g	−.64	−.88	−.39	.13	<.001	−4.48	−.50	<.001	***
v, a, h	−.48	−.76	−.21	.14	.003	−3.28	−.37	.079	
v, g, h	−.70	−1.01	−.41	.15	.004	−4.88	−.54	<.001	***
v, g, h, o	−.82	−1.11	−.51	.15	<.001	−5.59	−.63	<.001	***
v, a, g, h	−.94	−1.13	−.73	.10	<.001	−8.89	−.73	<.001	***
v, g, o, a	−.79	−1.07	−.51	.14	<–.001	−5.70	−.60	<.001	***
v, o, h, a	−.80	−1.00	−.59	.10	−.001	−7.29	−.62	<.001	***
v, g, h, o, a	−.81	−.97	−.67	.08	.002	−1.79	−.59	<.001	***
Chocolate – Attitude									
v, a	−.28	−.51	−.03	.13	−.001	−2.14	−.29	.444	
v, h, a	−.08	−.35	.19	.14	−.004	−.56	−.07	1.00	
v, h, a, g	.49	.19	.8	.16	−.003	3.82	.40	.004	**
v, h , a, o	−.46	−.71	−.21	.13	−.001	−3.52	−.47	.013	*
v, o	−.67	−.91	−.43	.12	<–.001	−5.10	−.72	<.001	***
v, o, g	−.73	−.98	−.49	.12	<–.001	−5.65	−.78	<.001	***
v, o , g, h	−.62	−.88	−.37	.13	−.003	−4.74	−.63	<.001	***
v,o,h	−.69	−.95	−.46	.12	<–.001	−5.33	−.75	<.001	***
Chocolate – Purchase Intention									
v,a	−.37	−.7	−.03	.17	<.001	−2.17	−.29	.429	
v, h, a	.06	−.31	.41	.17	.002	.32	.04	1.00	
v, h, a, g	.68	.32	1.04	.18	−.003	4.06	.49	.002	**
v, h, a, o	−.34	−.67	.02	.18	<.001	−1.95	−.26	.579	
v,o	−.75	−1.08	−.44	.16	.004	−4.38	−.61	<.001	***
v,o,g	−.81	−1.13	−.47	.17	.001	−4.74	−.63	<.001	***
v,o,g,h	−.5	−.86	−.15	.18	.006	−2.91	−.38	.087	

v,o,h	−.63	−.95	−.30	.16	−.002	−3.68	−.52	.008	**
T-Shirt - Attitude									
v,a	.18	−.05	.40	.11	−.002	1.37	.17	.645	
v,h,a,o	.07	−.22	.36	.15	−.002	.45	.06	.992	
v,o	.06	−.21	.34	.14	−.003	.43	.06	.993	
v,o,h	.18	−.09	.46	.14	−.002	1.21	.17	.748	
T-Shirt – Purchase Intention									
v,a	.29	.02	.57	.14	−.002	1.93	.24	.302	
v,h,a,o	.07	−.27	.40	.17	.002	.38	.05	.995	
v,o	.20	−.14	.52	.17	<−.001	1.12	.15	.795	
v,o,h	.19	−.17	.51	.17	<.001	1.06	.14	.825	

** p < .01, *** p < .001

Note. The mean difference estimate is based on the median of the bootstrap distribution.

Note. Cohen's d does not correct for multiple comparisons.

Note. Bootstrapping based on 5,000 successful replicates.

† Bias corrected accelerated.

Note. P-value and confidence intervals were adjusted for comparing a family of five estimates (confidence intervals corrected using the Tukey method).

3.3 DISCUSSION – FIRST AND SECOND STUDY

In the following section, the results are interpreted and critically examined. The results will be compared with theory to gain a comprehensive understanding of the results and to be able to draw possible conclusions. Likewise, the results and the research design are critically scrutinized in the context of the limitations.

3.3.1 Interpretation

Under the first hypothesis, the effect of superadditivity was investigated about the product presentations in online stores, where only the visual stimuli were physically perceived. The hypothesis was falsified because no significant differences were observed in the first experiment, with given congruence, and second experiment with partial and missing congruence. However, while a cumulative increase in attitude was observed in the first study, the difference with the products with fewer sensory stimuli was not always high enough to be significant. The effect of superadditivity was accounted by the dual coding system in studies such as Lwin et al. (2010). Paivio (1969, 2009) postulated that recipients encode information separately both in an analog and a symbolic coding system, and thus this information can be retrieved separately or together. The more sensory stimuli encoded, the higher the probability of increased involvement (MacInnis & Price, 1987). These assumptions go back to the working memory model of Baddeley and Hitch (1974) because, with an increase in sensory information, the central executive has to process more information from the visual-spatial sketch pad, from the long-term knowledge systems as well as from the episodic buffer (Guazzo et al., 2020; P. Li et al., 2020; MacInnis & Price, 1987). An increased involvement increases the recipient's readiness for elaboration and directed information intake (Cacioppo et al., 1986). The fMRI studies from the second chapter also illustrate that with increase in cognitive performance, increase in amygdala activation occurs, accompanied by increase in emotional activation, even when processing objectively and unemotional information. The increased emotional activation is that the amygdala serves for emotional regulation and protects the person from too strong

cognitions (Acevedo et al., 2014, 2018; Jagiellowicz et al., 2011; Kohn et al., 2014; Marxen et al., 2016; Mitchell & Johnson, 2009; Morawetz et al., 2017; Noto et al., 2021; Reimann et al., 2010; Schmidt & Blankenburg, 2019; Swartz et al., 2014; Yoo et al., 2003). Thus, when driven by positive valence or positive perception of the persuasive stimulus, the likelihood of central and stable attitude change increases (Cacioppo et al., 1986). Similarly, sensory information can form additional images, forming new identities through referential connection to logogens (Paivio, 1969, 2009). Lwin et al. (2010) argue that with increased referential connections, recall probability and processing fluency are improved. Increased processing fluency can generate a misattribution such that the recipient unconsciously projects the positively perceived processing fluency effect onto the object, in this case, sensory products (Bornstein, 1989; Zajonc, 1968). Thus, both explicit and implicit attitude changes can be justified by multisensory stimuli. Similarly, other studies postulate that multisensory stimuli improve information processing through dual encoding. For example, in two experimental studies, scientists Minas and Dennis (2019) concluded that background music could improve creative output by up to 40%. Furthermore, in the study by Klemen and Chambers (2012), a cumulative effect can be observed in terms of the number of sensory stimuli. Similar observations were also described by Sunaga (2018), Duong et al. (2022) and Spence et al. (2014). In addition, however, the study results by Meng et al. (2021) should not go unmentioned — should the product names already infer concrete olfactory expectations and generate vivid cognitive images, the likelihood of a lower purchase intention increases.

In the context of the experiment by Meng et al. (2021), the product characteristics were concretely described, whereby a lower purchase intention can be justified following the study results. Nevertheless, these factors should not influence the mean differences such that the effect of superadditivity be observable. No stable cumulative effects could be observed concerning the attitude and purchase intention in the experiments. Thus, no significant differences could be observed for products with two when compared to products with three sensory stimuli; and for products with four compared to five sensory stimuli. However, regardless of the lack of significance, a cumulative increase in the mean was observed. The effect of superadditivity can thus be observed, but in the absence of significance, the risk of alpha error is too significant to assume this effect

conclusively. Thus, the causes of the lack of significance of the two pairings must be determined. Due to the cumulative increase of the mean value, it can indeed be observed that the mean value increases with the increase of further sensory stimuli, the mean value of the variables attitude and purchase intention. Thus, based on the main differences, it could be observed that it was higher when the number of sensory stimuli differed significantly among the compared products. The smaller the difference concerning the number of sensory stimuli of the products compared, the smaller the main difference and thus also the effect size. However, it would be risky to assume that the cumulative effect was too weak when only one stimulus was increased. The slight main difference for the pairings of four compared to five sensory stimuli and for two compared to three sensory stimuli is significantly smaller at .01 than for the pairing of four compared to three sensory stimuli at .36. Following the dual coding system, it seems that in these pairings, the respective sensory stimuli were not coded independently of each other but much more as an undifferentiated conglomerate. If the sensory stimuli had been encoded independently, information processing would be higher, and as the theory suggests, so would the evaluation of the products. It is true that the mean values also indicate this, but not enough. The differences should have been more significant. This suggests that the sensory stimuli were not perceived in the products. However, this cannot be confirmed since the results of the SPI showed consistent evaluations with a slightly positive tendency for all the products. At a glance, however, the results could also be justified in terms of a marginal utility in the cumulative increase in sensory stimuli. However, this can be negated since the mean differences do not decrease consistently with a cumulative increase in sensory stimuli.

Furthermore, the results are based on observations of several products. For example, there were five products with two sensory stimuli each, and six products with three sensory stimuli each. Similarly, the conditions of all participants were identical for all products. All subjects evaluated one product with one, two, three, four, and five sensory stimuli. Furthermore, the presentation was in a randomized order. Although it can be postulated quite clearly that multisensory products show a significantly higher attitude and purchase intention than products without multisensory stimuli, but the consistent cumulative and significant increase cannot be explained. From the theory, this effect could be substantiated. Likewise, no

confounding variables can be identified in the empirical survey. Since the effect is observable but not significant, it seems more likely to be due to the lack of physical awareness of the sensory stimuli. Physical perception of sensory stimuli is unnecessary since based on imagery sensory information can be stored and retrieved (Tan et al., 2021). Similarly, in their review based on primary studies, Elder and Krishna (2021) were able to comprehensibly verify the influence of multisensory stimuli on consumer behavior with given imagery. However, the effect on consumer behavior seems to be weaker with given imagery than with a physical perception. To keep the results comparable between the studies, the sensory stimuli from the first study are retained in the following research, where the focus is on decreasing congruence. The findings from this study suggest that in addition to the significance of the mean differences, the means' tendency must also be examined. These observations do not contradict the state of art. Thus, the observations of Tan et al. (2021) seem to be present in the first experiment as well. The perception of the products took place on the website. This is also where the sensory information was probably stored and retrieved again during the evaluation later in the experiment. Similarly, an increase in the mean value was observed, which was also congruent with the remarks of Krishna and Elder (2021). Accordingly, variables are present that attenuate imagination's effect on consumer behavior. One possibility is that the products were perceived in a natural environment, in an online store. All confounding variables are removed in a laboratory experiment or in a purely quantitative survey, where only an evaluation of the products takes place. The elimination of a distraction concerning the perception of the research object or the object to be evaluated was tried. Keeping the confounding variables constant is essential to observe the effects and understand the psychological influencing factors. However, such situations in which the obtained findings were observed do not correspond to the reality. For this reason, experiments are necessary to gain further knowledge. In this experiment, an online store has been added. Participants explored the online store and perceived the sensory stimuli contained in the products in a natural setting, but also under the influence of the online store. For this reason, the online stores of all experimental groups in the study were identical to keep the influence of possible confounding variables constant. The participant’s attention was thus directed to the products and the online store. The weakened focus could also be a possible

reason for the weakened effect of imagery.

Within this experiment related to the second hypothesis, the effect of cross-modal correspondence could be observed based on several pairings so that the current research results reported in the theoretical foundations are further supported. Concerning the studies presented in Section 2.2.2, expectations regarding possible results were plausible. Morrin and Chebat (2005) observed that negative interactions occurred simultaneously when visual, auditory, and olfactory stimuli were used. For some products, a multisensory perception is necessary because it has been learned how certain products look, taste or smell so that visual, olfactory, and gustatory stimuli correspond to each other and influence the product evaluation (Buechel & Townsend, 2018; Krishna & Morrin, 2008; Piqueras-Fiszman et al., 2012). The fact that expected haptic and visual stimuli do not occur can negatively influence consumer behavior and that individual preferences also moderate this for certain sensory stimuli, which is discussed in the context of the visual-tactile-interplay model (Das & Hagtvedt, 2016). Possible results can already be assumed from the described studies. So, research material used soft drinks with unexpected sensory stimuli presented as a specific sounding foam. Thus, this trait might be expected to be unexpected and, when negatively valence, to result in lower attitude and purchase intent compared to productive individuals without auditory stimuli. However, the results of the SPI (Wiedmann et al., 2017) should be considered accordingly because perceived positive auditory stimuli can have a positive impact on consumer behavior (Andersson et al., 2012; Broekemier et al., 2008; Das & Hagtvedt, 2016; Demoulin, 2011; C. Jacob et al., 2010; Ju & Ahn, 2016; Knoferle et al., 2012; Kontukoski et al., 2015; Milliman, 1982; Mohan et al., 2013; Reinoso Carvalho et al., 2015; Vida et al., 2007).

In the first experiment, interactions were observed for products where auditory, gustatory, and haptic stimuli were used. Based on the haptic–visual interaction model (Eklund & Helmefalk, 2018), the lowest attitude and purchase intention toward the product was with the visual and auditory stimulus. However, the results of the SPI (Wiedmann et al., 2017) revealed that the subjects evaluated the auditory stimulus with a slight positive tendency, like the other sensory stimuli. Nevertheless, it can be observed here that, as argued in the haptic–visual interaction model (Eklund & Helmefalk, 2018), unexpected sensory stimuli can negatively affect consumer behavior. However, with the addition of multiple

sensory stimuli, the adverse effects related to the unexpected expression of the sensory stimulus seem to diminish. In the case of the product with the four sensory stimuli —vision, gustatory, auditory, haptic—a significant preference for both variables—attitude and purchase intention—could be observed compared to the product variants with three sensory stimuli, in which these same sensory stimuli were combined differently with each other. The haptic–visual interaction model (Eklund & Helmefalk, 2018) includes haptic and visual stimuli in its argumentation, and concerning two sensory stimuli, the results suggest that the model can even be transferred to interaction with visual and auditory stimuli. However, the model's assumptions seem to be more applicable when there are no more than two sensory stimuli, which the model does not postulate either. These observations again allow the assumption that the interaction between the different sensory modalities has not yet been fully explored and that with the increase in sensory stimuli, other variables are at work, which is not known yet. However, it could also be that the influence is underestimated in science, that recipients tend to prefer one sensory stimuli when perceiving the environment, which has already been observed in the research on the NFT (P. Li et al., 2020; Nuszbaum et al., 2010; Peck & Childers, 2003; Peck & Wiggins, 2006; Ranaweera et al., 2021; Spence, 2020, 2022; Zheng & Bensebaa, 2022). As said in 2.2.2, the NFT describes the desire by some people to perceive objects preferentially with the haptic sense.

In the product variants with visual, olfactory stimuli, and visual and gustatory, significant differences in terms of attitude could be observed, with the participants preferring the multisensory products. Interactions could be observed in the conglomerate of all three sensory stimuli so that the subjects now preferred the control group for this product. Similar observations were already made in Morrin and Chebat (2005) experiments regarding the interactions between visual, auditory, and olfactory stimuli. Different observations could also be made concerning the purchase intention. According to the planned behavior model, purchase intent is highly predicted by subjective norms, perceived behavioral control, and attitude (Ajzen, 1991). Since the attitude and the purchase intention differ in this case, this can, according to this model, be due to the subjective norms and the perceived behavioral control. The subjective norm describes the influence of the social environment and the learned norms and values system on the purchase intention. In the cover story, which is based on the quality criteria of the

extended transportation-imagery model (Van Laer et al., 2014) adverse effects induced by a subjective norm should be excluded, as the participants were encouraged by the social environment to buy the products of the experiment . In addition, the products do not have any properties that could be viewed as socially or politically critical. Therefore, it would have to be concluded that the perceived behavioral control caused the different purchase intentions. In the research design, there was undoubtedly a restriction on purchasing behavior. The participants were informed that the financial resources were only sufficient for three products and that a decision had to be made. The restriction was made in order to increase the involvement on one hand, and on the other, due to the lack of a subjective norm of the social environment, to increase the probability that the participants would decide not just for one but for several products, and at the same time the influence of their preference is reduced (Ariely & Levav, 2000; Ratner & Kahn, 2002). However, this restriction can also increase the risk of reactance (J. W. Brehm, 1966; S. S. Brehm, 1981; Hu & Wise, 2021; Shoenberger et al., 2021). But, it also states that subjects were aware of being the subject of a study of purchasing behavior, so the impact on purchase intention should be small (Friestad & Wright, 1994). In the case of reactance, this would also reduce attitude, which was not observed in this case (Petty & Briñol, 2014, 2015).

On the other hand, the variables subjective norm, attitude, and perceived behavioral control are declared as independent of each other in the context of the planned behavior model (Ajzen, 1991). More recent studies that further validate the planned behavior model do not show any co-linearity diagnostics in their studies (La Barbera & Ajzen, 2021; Pittman, 2020; Ruiz-Fernandez et al., 2020; Vesely & Klöckner, 2020). Due to the lack of co-linearity diagnostics, it cannot be finally clarified that the social norm and the perceived behavioral control rather have a mediating or moderating effect on the purchase intention or even attitude, the latter supporting the statements of Petty and Briñol (2014, 2015). They were detached from whether the subjective norm and the perceived behavioral control function as an independent, mediator or moderator variable concerning the purchase intention or attitude. The available observations can only be used to discuss but not to answer.

Two other factors can also be discussed that can explain the discrepancy between purchase intention and attitude. On the one hand, the reactivity and, on

the other hand, unknown influencing variables on the purchase intention. Reactivity describes that when the subjects are aware of being the subject of research, they respond differently than when they are not in the research (McQuarrie, 1998). However, reactivity does not appear to be the reason for the divergent observation in this case, as in all other cases, such divergences between attitude and purchase intention could be observed. Therefore, it is reasonable to assume that other variables, as described above, influence cross-modal interrelationships. These variables can even directly affect the interrelationships between attitude and purchase intention, which has not been explicitly addressed in any research to the best of the author's knowledge till date. These observations may reveal new research gaps that further research could address in more detail.

As a part of the third hypothesis, it was assumed that, with decreasing congruence, different results should have been observed in comparison to the first study under otherwise identical conditions. The reason is that congruence is discussed as a mediator for positive influences on consumer behavior (Demoulin, 2011; Krishna et al., 2016; L. Wang et al., 2020). There were numerous studies presented in Section 2.2.2 where given congruence mediates the effect of multisensory stimuli on consumer behavior (Andersson et al., 2012; Das & Hagtvedt, 2016; Ghosh et al., 2021; Hilken et al., 2017; Huang et al., 2019; Kontukoski et al., 2015; Mohan et al., 2013; Oakes & North, 2008; Reinoso Carvalho et al., 2015; Ruzeviciute et al., 2020; Spence & Levitan, 2021; Y. C. Tan et al., 2021). An often-replicated with more minor variations per study but with comparable results examined which tastes consumers associate with which colors and that, given congruence and positive valence, a positive evaluation of the respective object (Knoeferle et al., 2015; Koch & Koch, 2003; O'Mahony, 1983; Saluja & Stevenson, 2018; Tomasik-Krótki & Strojny, 2008; Wan et al., 2014; Woods et al., 2016). In this context, Zheng and Bensebaa (2022) argue in an affect transfer that negative evaluations occur if there is no congruence, and positive evaluations if there is a congruence (Das & Hagtvedt, 2016). As with the effect of superadditivity, the connection to the amygdala regulation and the multicomponent model of attitude (Zanna & Rempel, 1988) must also be established since the cross-modal correspondence also uses several sensory stimuli that contribute to increased cognition and emotional activation. However, there are also such studies where congruence and positive valence did not have a positive impact on consumer

behavior (Haase et al., 2020; Kivioja, 2017; Meng et al., 2021) Similarly, other studies suggest that a perceived congruence and valence may be influenced by other variables such as gender or personality (Huang et al., 2019; Kim et al., 2021; M. H. (Jenny) Lin et al., 2018; Spence & Levitan, 2021). Derived from the studies, congruence can be identified as a mediator, whereby it must be assumed that other variables influence consumer behavior concerning multisensory stimuli. Nevertheless, it can be deduced from this that in the absence of congruence, no significant or only very weak differences in attitude and purchase intention are observed between the products of the control group and the multisensory products of the experimental group since the mediator is missing. However, based on the studies, what happens when there is partial congruence cannot be deduced.

Several deviating observations were made in the second experiment, which is the follow-up study. In the situation of a partial product congruence, no cumulative increase of the mean, neither in attitude nor in purchase intention, could be observed with the increase of further sensory stimuli in the product representations. Again, analogous to the previous experiment, it was observed that the mean difference in attitude and purchase intention was not always significant for products with more sensory stimuli compared to the products with fewer sensory stimuli. Comparable results could be observed in the situation of missing product congruence. Likewise, there was no cumulative increase in the mean values of the variables—attitude and purchase intention—with increase in sensory stimuli. However, there were no significant results in any pair or mean comparison. While in the case of partial product congruence, significant differences were observed in a few pairs for products with more sensory stimuli compared to products with fewer sensory stimuli. There were no significant pairs at all in the absence of product congruence. The sensory stimuli were almost identical to the previous study. Furthermore, the SPI evaluations indicated that all sensory stimuli met the requirements. All sensory stimuli were evaluated at least neutral with a value slightly above 2.5, but predominantly in a value range between three and four, corresponding to a positive tendency. Thus, the modified stimuli of the auditory and haptic senses were also subjected to same conditions. Furthermore, the evaluation of the sensory stimuli is comparable to those of the first experiment. All evaluations show a slight positive tendency. The deviations of the results to the first experiment can therefore not be attributed to the products or the research

material. Additionally, the online stores were identical, so that this variable was kept constant and cannot explain the deviations either. Divergent results were expected, but what is surprising at this point is that the products showed comparable evaluations in terms of attitude, purchase intention, and SPI. This means that despite the lack of congruence, the sensory stimuli were perceived positively. A tendency toward positive purchase intention and attitude was measured at the same time. Nevertheless, decreasing congruence lead to divergent results, although the mean values of attitude and purchase intention and the evaluation of the sensory stimuli are comparable to the first study. This needs to be discussed, even if divergent results were expected. According to Paivio (1969, 2009), the dual coding system was mentioned as a theoretical construct to account for superadditivity. This model is also used in other scientific populations to derive this effect (Lwin et al., 2010). With regard to this model, sensory information was represented in an imaginal system. As Paivio (1969, 2009) stated, object information encoded using the verbal system and the imaginal system is more likely to be retrieved from memory. The ELM (Cacioppo et al., 1986) postulates that a cognitively more intensive examination of a stimulus material corresponds to the central path of information processing and that an attitude formed in this way is stable and long-lasting. This assumption also establishes the connection to product congruence. On the central path of information processing, which is characterized by motivation and the ability to deal with the stimulus, there is also an elaboration of the stimulus-related information or arguments. Only when these are perceived as positive by the recipient, do these arguments lead to the central change in attitude described above. In this experiment, however, the product-related information has been manipulated. While the sensory stimuli of the chocolate seemed debatable but not unrealistic, those of the t-shirts were entirely unrealistic and improbable. As a part of the evaluation based on the SPI, it was found that the participants in the experiment tended to rate the respective sensory stimuli positively, and this was unexpected. The condition of the experiment, based on the cover story and the indication that questions follow, designed for high involvement, seems to be accurate. Assuming high involvement, the participants' information processing followed the central route, so that the noncongruent sensory stimuli should not have a positive match with the existing attitude structure and thus attitudes toward these products should be lower than for

products with congruent sensory stimuli. By indicating that questions would be asked, the participants should have been sufficiently motivated to explore the products and the website. This also showed the processing time of the experiment. The processing time is discussed in more detail in the third and fourth experiments since a further manipulation of the involvement was accompanied by a possible change in the processing time. Most of the participants were students at the FOM university of applied science. As part of the study program, they worked on this experiment to collect participant hours necessary to submit their thesis. The experimenter used anonymized codes to check whether the participants were taking part and whether they were serious as soon as it could be observed that students answered the processing implausibly quickly or all scales identically, the points for participation were not given, and this data was removed from the data set as part of the consistency check. The students' additional awareness of control and the reference to subsequent questions should have generated sufficient motivation, which also seems to be indicated by an average processing time of approximately 9 minutes. Accordingly, it can be assumed with caution that an elaboration of the information from the research material took place. The stronger the arguments, the higher the likelihood of a central change in attitudes. This is discussed in the ELM and from the studies as empirically verified by Shimp et al. (1991). Similar to the SPI, a slightly positive trend was also observed in the mean values for attitude and purchase intention. Due to the increasing lack of congruence, it could be obvious that the average attitude toward soft drinks (M = 3.92, SD = 1.23) with multisensory stimuli was lower than that of the chocolate bars (M = 4.28, SD = 1.22) but higher than the t-shirts (M = 3.72, SD = 1.19). While the low attitude toward the T-shirts compared to the soft drinks met expectations, the attitude toward the chocolate bars did not. As previously described, noncongruent sensory stimuli should not positively match the attitude structure, and thus attitudes should be lower toward products with congruent sensory stimuli. It seems that the central pathway of ELM is not sufficient to explain the results, again supporting the added value of the third and fourth experiments. In the following experiments, further surveys are carried out in order to be able to check whether the results can be explained by one or more of the five ways of information processing. One of these was already the subject of this experiment and can therefore be ruled out.

These findings can be transferred to the second effect of this experiment, the effect of the cross-modal correspondence. Unlike the effect of superadditivity, this effect cannot be explained by using a model, which also emphasizes the relevance of the third and fourth studies. The effect of the cross-modal correspondence describes the interactions between the sensory modalities. In the first experiment, the effect of the cross-modal correspondence could already be observed using several examples. For example, in the case of soft drinks with gustatory, visual, and olfactory stimuli, significant differences in attitude compared to the control product could be observed. With the product or the conglomerate in which all these sensory stimuli were combined, there were no significant differences with the control group. In the case of purchase intention, a reversal of preference could even be observed. Here the product of the control group was preferred to the conglomerate. Similar observations could also be made in the second experiment. A reversal of the preference for a conglomerate with partial product congruence was also observed here. If there was no product congruence, no significant results were available. Analogous to the previous statements, this corresponded to the assumptions of the third hypothesis and was therefore expected, but there is also a lack of theoretical bases to justify this. The central way of information processing does not seem to be sufficient, since based on the previous statements, the highest mean values of the attitudes would have been expected for the soft drinks. The question is whether other variables are missing that can explain these results. In the following experiments, additional emotional stimuli are presented differently. The question behind this is whether differences in attitudes can be observed when emotional priming occurs at different points in the cognitive information dissemination process. Perhaps the results can be understood based on these metacognitive processes. This will be the case if the results of one of the five metacognitive processes correspond more clearly to the expectations and the level of the mean values.

3.3.2 Limitations

Certain limitations are also present in the first experiment. One limitation is

the possible limited representativeness of the sample. Although the sample size was sufficiently large at $n = 654$, most participants in the experiment were female part-time students with low-to-moderate annual gross incomes. This is not representative of the population of all eligible consumers. However, in principle, it is necessary to critically evaluate the quality criteria of objectivity, reliability, and validity. In conclusion, it can be stated that the quality criterion of objectivity has been satisfied. Two aspects must be considered here. One, the influenceability by the test leader and subjectivity of the test persons. During the survey, the experimenter was unable to influence the results. The link to the survey was distributed via social media and the FOM university of applied science. Thus, the study director could not influence the response to the results due to anonymity. Two, scales were tested for reliability and were employed for the experiment unaltered. The research material was created following the existing congruence by the investigator. Both, the research material and sensory stimuli used were designed according to subjective discretion. Through a pre-test and the use of the scale, the investigator was able to verify whether the research material used was appropriate, which was measured by the SPI, demonstrating a neutral to positive tendency for all products. This indicated that the subjects could perceive and evaluate the sensory stimuli.

The focus of the experiment was on attitude and purchasing behavior. This was performed by the scales of Spears and Singh (2004). These scales showed adequate reliability values in the original study as described before. Therefore, the suitability of these scales could already be justified before the survey. In the context of descriptive statistics, outlier analyses and factor loadings, and Cronbach's alpha values were also carried out in conjunction with supplementary statistical figures for the surveyed sample. All scales indicated adequate test validity. This again indicates that the model, the attitude scale, is represented by the respective items creeping out. Again, all ratios were within a reasonable range, as were the Cronbach’s alphas and the correlation coefficients of the respective items. The items handy and shapely were outside the range of values for the haptics within the SPI. Since the other items of this factor were in an appropriate range and the SPI showed comparable mean values for all the products, these items were continued unchanged. Finally, the reliability of this experiment can only be conclusively assessed if it is repeated with comparable results. Validity describes whether the

right thing was examined or measured. An adequate validity can be assumed since this scale was also used in other studies. Furthermore, the validity was checked within the framework of the experiment. In most cases, the purchase intention behaved similarly to attitude. This can be justified naturally because a high attitude by the model of the considered trade usually leads to a high purchase intention. However, this proves that these variables are appropriate to operationalize purchase behavior. Furthermore, no contradictions could be observed based on the SPI. Thus, the SPI was neutral with a positive tendency, and was positive also to the tendency of the attitude.

In a meta-analysis, McQuarrie (1998) validated 443 experimental studies in the publication period from 1990 to 1997 regarding how many reality criteria were taken into account in experiments in advertising effectiveness research and evaluated these experiments based on these criteria. According to McQuarrie (1998), these criteria were essential in order to be able to control the disturbing variance reactivity in experiments. The reality criteria includes presenting the research material in a natural environment. Furthermore, McQuarrie (1998) discusses that it is essential that the subjects decide between different alternatives, like in reality. Another criterion discussed was that it is important to show other product or advertising presentations. Subjects should also be able to repeatedly deal with the research material because this is also the case in reality. Finally, the influence of existing attitudes toward well-known brands was discussed, and it makes more sense to use unknown brands. The reality criteria can be considered as best controlled. Nonetheless, it should not be ignored that reactivity would probably exist, as discussed in the context of the interpretation of the results. However, the presented products' research material were presented on the self-created websites in a real-looking online store. The second and third criteria were conducted by always presenting and evaluating more than one product on the website. Likewise, it was explicitly formulated in a cover story that one had to decide on three products. Since the participants could decide for themselves whenever they want to leave the website included in the online survey, the participants could look at all products as often as they want, which means that the fourth criterion should also be met. The last criterion is about the fictitious brand, so that there were no existing brand attitudes to the research material that could have influence the results.

In addition, it was planned to follow the further quality criteria, according to Mattila et al. (2021) and Hauser et al. (2018). Compliance with these criteria should be carried out retrospectively. One of the problems with experiments is the complexity and ineffectiveness of the manipulations. Mattila et al. (2021) recommends division into several studies and the implementation of pre-tests to check the effectiveness of the manipulation. The complete research design examines the effects of superadditivity and cross-modal correspondence with decreasing product congruence in online stores. The division of the research design and thus the reduction in complexity was carried out. In this experiment, the manipulation of the congruence was kept constant. The focus could thus be placed on manipulating the products through a different number and combinations of sensory stimuli. A pre-test was also carried out to check the suitability of the research material. Both were planned in advance and also carried out. Another aspect is the selection of the sample. Here Mattila et al. (2021) discuss that almost students participate in many experiments, which means that representativeness may no longer be guaranteed. This was already reported at the beginning of this chapter. Although access to the experiment was also distributed outside the university, over 90% of the participants were students at the FOM university of applied science. Therefore, this criterion was not complied with, and conclusions about the population may not be applicable. In addition, the test subjects should sufficiently be motivated to participate. As a part of their studies, students must take part in a certain number of studies in order to be able to submit their thesis. The motivation to participate can therefore be considered to be present. However, the motivation to answer honestly was not, as the motivation was extrinsic. Nevertheless, outlier analyses were carried out, and it also seems unlikely that all 654 test subjects answered dishonestly as the variances were observed. The group size of 30 was significantly exceeded, and post-hoc tests were also carried out to reduce the risk of cumulative alpha errors. The weaknesses of the p-value were also discussed in Section 3.1.3. For this reason, other key figures such as the effect size, the main difference, and the confidence intervals after bootstrapping were also considered and taken into account in the interpretation. Finally, the experiment should be viewed from an ethical point of view. The creation of the experiment and this entire scientific work was created and carried out according to the specifications and rules of the Seventh Edition of the American Psychological

Association (APA). This also includes the ethical framework. In principle, experiments always face challenges from an ethical and moral point of view since the subjects were deliberately manipulated and thus possibly deceived. It should also be noted that the experiment was carried out entirely anonymously. Conclusions about the respective participant were and are not possible at any point in time. The experiment began with an introductory presentation of the experiment. Here the test subjects were informed about the duration and the procedure. It was also noted that this survey belongs to the consumer research department. In addition, the investigator's contact details were given to receive further information and be able to ask questions about the study. After taking part, the test subjects were also allowed to inquire about the specific aim of the survey. Without exception, students received this information on their online campus.

As in the first experiment, a confirmatory factor analysis was conducted, and Cronbach's alpha was determined in conjunction with an item correlation analysis in the second study. This analysis showed that the quality criteria of reliability and validity were also met in the sample of the second experiment. A given validity is assumed since the scales have already been empirically tested, providing adequate reliability ratios. Since, as planned, the experimenter did not intervene in the course of the experiment, and the suitability of the research material was checked based on the empirically tested SPI scale, the quality criterion of objectivity can be considered to have been met. The minimum group size of $n = 30$ was reached. Since this was a follow-up study that included product congruence as an additional element, a further criterion, according to Mattila et al. (2021), namely the reduction of the complexity of the experimental design by dividing it into several substudies, was observed. Furthermore, in addition to the p-values, other statistical indicators, such as the effect size or the mean difference were calculated. By adding the mean difference, it was possible to detect the interactions that would not have been possible by looking only at a p-value. The addition of the effect size is, in any case, an essential complement to the p-value, which is robust to large samples, but in this experiment, again, all effect sizes were associated with significant differences with moderate effects. The effectiveness of the manipulation, which is another criterion according to Matilla (2021), was attempted to be ensured by the SPI. The SPI enabled the research material to be designed in such a way that all subjects could understand and perceive the respective sensory stimuli by the participants,

as well as succeeded in ensuring that the complete research material of all studies was evaluated at a comparable level by the participants, thus enabling a comparison between experiments. However, it remains unclear whether only the lack of product congruence can explain the results of the t-shirts. Perhaps t-shirts are unsuitable for multisensory stimuli study.

In a survey conducted by the German institute, Statista (2022), 51% of the 4,524 respondents said they had returned goods ordered from online stores in the past 12 months. The largest share of returns was clothing at 33% and shoes at 18%. All other product types ranged from 2% to 8%, with food accounting for 4% of returns. An international survey by PCW (2018) asked 22,480 respondents what online retailers' most popular free services were offered. 65% of respondents said it was free to return shipping. Looking at these figures, what added value to the sensory stimuli for clothing offers for the purchase decision should be considered. If the clothing is returned with a high willingness to buy, goods may be ordered even without a high attitude or purchase intention, as they will be sent back again. The question is which stimuli are relevant in this purchase decision process and whether this differs from food, which has a lower willingness to return. Basically, unlike clothing, food cannot be returned after a single-use. This could be a relevant factor influencing the impact of multisensory stimuli as a persuasive tool. Finally, it can also be stated that the ethical rules of the APA were observed in this experiment. The anonymity of the participants is ensured so that even sensitive information such as salary and debt settlement cannot be assigned to a specific person, not even to the experiment manager. The participants also remained emotionally and physically unharmed. In addition, the participants were allowed to obtain further information and background on the experiment.

3.3.3 Generalizability and implications

Based on a reliable study, it can be stated that multisensory products are also preferred in online stores without multisensory stimuli. The assumption is that the more the stimuli, the better observation of increase in cumulative mean value compared to the products without multisensory. Products with more sensory

stimuli were always significantly preferred than those without sensory stimuli. However, more is not always better. For example, over the products with four and five sensory stimuli the products without multisensory stimuli were significantly preferred. However, it can be deduced from the results that products with multisensory stimuli are better than products without multisensory stimuli.

This observation could also be examined in the context of cross-modal correspondence. Interactions between the sensory stimuli could be observed based on various products. For example, preference was given to products with selected smells and flavors. However, the product that combined these two stimuli were rated significantly poorly, even worse than the control group. Thus, it can be stated that with a given product congruence, multisensory products have a competitive advantage. However, because of the risk of interactions between the sensory stimuli, a multisensory product should be pre-tested before launching on the market. This study can be used to derive the causes of the interactions. It remains to be seen whether the same combinations of senses show alternation in the following study with decreasing congruence. If this were the case, a stable effect could have been observed since this would then also be stable against further manipulation concerning the congruence. Whether this effect can be explained by one of the five metacognitive processes of attitude, change will then be further investigated in the third and fourth studies.

Following this follow-up study, it is possible to derive implications, although a final consideration is only possible after the third and fourth experiments. The effect of superadditivity could not be observed through significant differences in mean values for a given product congruence, but with a cumulative increase in the mean value with an increase in further sensory stimuli in product presentations in online stores, where only the visual sense was physically perceived. With decreasing and missing product knowledge, the observations were indifferent. From this, it can be deduced that products containing more sensory stimuli are preferred by the test persons when given a product congruence. In any case, there were significant differences compared to products with only one sensory stimulus. The implication for companies is that products with congruent multisensory stimuli also make sense in online stores in terms of competitiveness, even if the effect in online stores seems to be weaker.

Concerning the effect of cross-modal correspondence, it can be stated that it

is also available in online stores with a given and partial product congruence. This realization, in some ways, limits the previous implications. If product evaluations or settings and shopping tables of individual products are not grouped according to the number of sensory stimuli, it can be observed that products with a higher number of sensory stimuli are preferred. There are products with multisensory stimuli in which even the control group, i.e., products with only one sensory stimulus, were significantly preferred by subjects or showed a significantly higher attitude and purchase intention. The previous implication should therefore be limited to the fact that the probability is high that the test persons prefer multisensory products. However, it is also possible that a single combination of sensory stimuli has the opposite effect, even if the respective sensory stimuli in other products or combinations led to a significantly higher attitude or purchase intention. Since the results with decreasing congruence are not yet conclusively known based on this study, the recommendations of other scientists such as Elder and Krishna (2021) should be followed. The scientific findings of multisensory stimuli about purchasing behavior can be transferred to online stores if there is congruence, even if the effect of superadditivity seems to be weakened. Multisensory products are always able to circumvent the risk of ruinous competition discussed in the introduction. However, because of the effect of cross-modal correspondence, the products should be empirically examined concerning attitude and purchase intention in any case before market launch.

As in the context of the interpretation of the results of this experiment, the results cannot be conclusively understood as the congruence decreases. For this reason, two further experiments are added as follow-up studies. Here it is examined whether metacognitive processes can explain the results. For this reason, further manipulations are carried out so that results can be obtained empirically in the identical experimental design, in which different cognitive information processing processes are primed during information processing. The further development of ELM, described in the second chapter, serves as the theoretical framework.

4 THIRD AND FOURTH STUDY–EXTENDING THE RESULTS BASED ON METACOGNITIVE PROCESSES WITH COMPLETE AND MISSING CONGRUENCE

4.1 METHODS – THIRD AND FOURTH STUDY

Derived from the results of the first two studies, it was formulated as an implication in Section 3.3.3 that the theories and models used are not sufficient, and thus, further theoretical concepts must be used to explain the results thoroughly. For this reason, the findings of the ELM, which was further developed based on metacognitive processes and described in detail in Section 2.1.2, were included in the research design of the third and fourth experiments. The division of information processing pathways is based on metacognitive processes. While the first pathway of metacognitive information processing corresponds to the peripheral pathway of the ELM, pathways two to five are variations of the central information processing pathway. The third and fourth experiments differ only in the research material, intended to represent the situation of given and missing congruence. Because of this, the research design is almost identical, so for reasons of redundancy, just like the first two experiments, the third and fourth experiments are described, and their results are reported together in this chapter.

4.1.1 Research design, research material, and scales

In the third experiment, 396 subjects participated. After removing inconsistent and incomplete information, data from 377 subjects were utilized, where 290 participants identified themselves as females and 83 participants as males. All other participants did not provide gender-related information. About 98% of the participants do not currently hold an academic degree, 2% hold a bachelor's degree, one respondent holds a doctorate, and the remaining did not provide any information. About 74 participants reported a gross annual income of

less than 20,000 EUR, 153 subjects between 20,000 and 39,000 EUR, 119 between 40,000 and 59,000 EUR, and 11 participants of more than 60,000 EUR. About 203 subjects reported being between 18 and 25 years old, 117 between 26 and 30, 42 between 31 and 40, and 15 participants were older than 41.

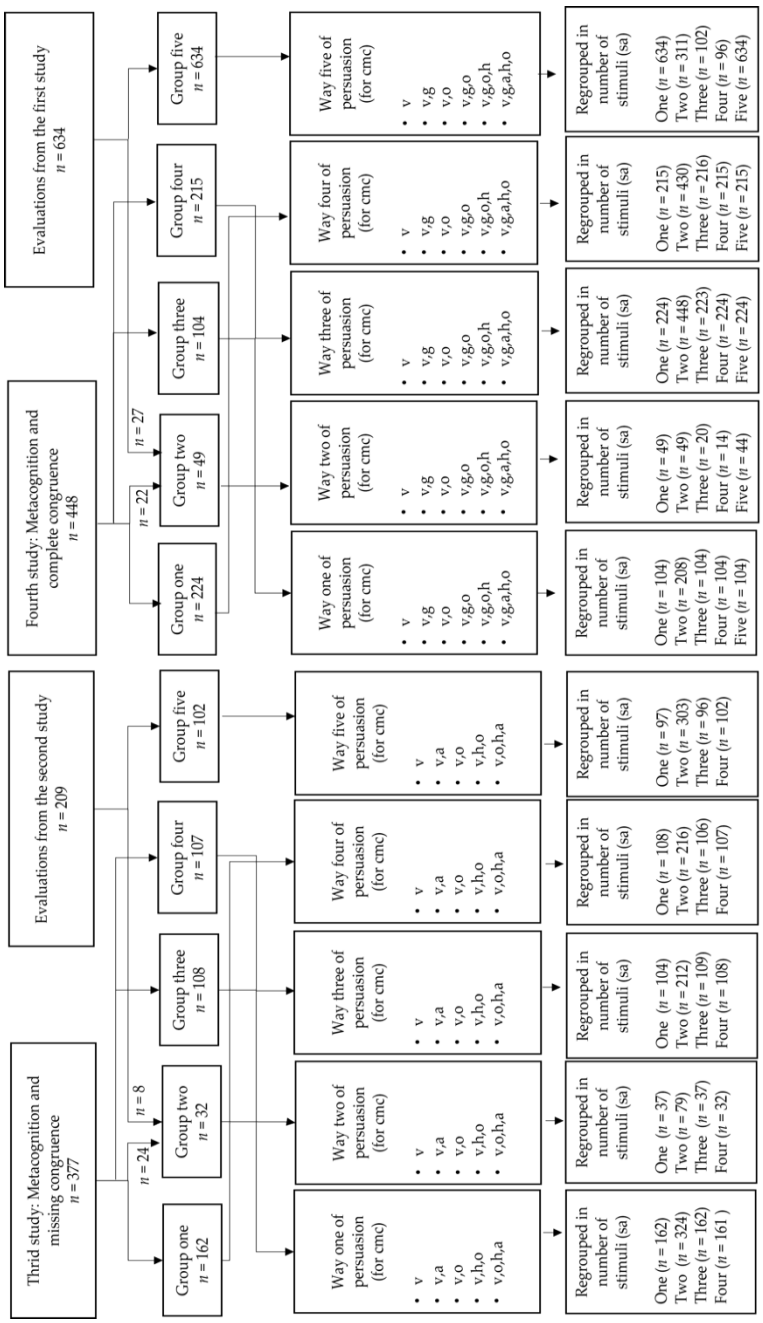
In total, 501 participants took part in the fourth experiment. After reviewing and removing inconsistent and incomplete information, 448 data sets remain for further analysis. 327 subjects identified as females, and 121 subjects identified as males in the fourth experiment. No participant chose diverse or refused to provide information. About 436 participants do not have an academic degree, 10 participants have a bachelor's degree, and two participants have a doctorate. Moreover, about 110 participants reported a gross annual income of less than 20,000 EUR, 161 participants less than 40,000 EUR, 145 with less than 50,000 EUR, and 32 having more than 50,000 EUR. Further, about 258 participants were between 18 and 25 years old at the time of the survey, 136 participants were between 26 and 30, 41 participants were between 31 and 40, and 13 participants older than 41.

The requirements of an experiment and their characteristics were already explained in more detail in Section 3.1.1 so that in the following, the focus is placed on the differences between the experimental designs. The third and fourth experiments are based on the metacognitive attitude formation processes derived from the ELM but the research design is almost identical to those of the previous experiments. The difference is due to the five different metacognitive attitude change processes. The flowchart in Figure 12 shows the design of the third and fourth experiments. The third experiment comprised 326 participants. These participants were randomly assigned to one of the three groups. Thus, 162 participants were assigned to group one, 107 to group four, and 108 to group three. Group one represents the fourth way of metacognitive persuasion; group four represents the third way; and group three represents the first way. The fifth group with $n = 102$ corresponds to the fifth way of persuasion. The data already collected from the second experiment were used for this purpose. The second group with $n = 32$ corresponds to the second way, influenced perception with high involvement. In all the experiments, the participants were openly questioned whether the research objective of the respective experiment was being pursued. All the subjects who reported sensory perceptions were assigned to the second group to use data from both the third and fourth experiments. In the fourth experiment, the same

scheme was followed to assign participants to groups. Data from the first experiment were used for the fifth and second groups with 634 and 49 participants, respectively. The fourth experiment comprised 104 participants in group one, 215 in group four, and 224 in group three. New research material with different combinations of sensory stimuli was employed in both the experiments. The different combinations employed to investigate the effect of cross-modal correspondence were illustrated in the middle of the flow chart, in the assignment of metacognitive persuasive ways, as each combination was examined with all persuasive ways. Furthermore, the effect of superadditivity was examined in this experiment to regroup the results depending on the number of sensory stimuli presented in the lower part of the flow chart. Employing some data from the first and second experiments for the fourth and third experiments, respectively, again illustrates the interrelationships of the studies. Therefore, in the fourth chapter, a reference is made again to the referring experiments. For example, the key findings of the second experiment presented before the results of the third experiment are in the context in which the research material was manipulated concerning the metacognitive routes of persuasion; this holds true for the first and fourth experiments.

Figure 12

Flowchart of the third and fourth study



Note. v = vision, g = gustatory, a = acoustic, o = olfactory, h = haptic, sa = superadditivity, cmc = cross-modal correspondence

As mentioned in Chapter 3, the third and fourth experiments follow the metacognitive attitude formation processes derived from the ELM (Cacioppo et al., 1986). The aim was to explain the results from the previous experiments using metacognitive models. Therefore, new research material was essential to represent all metacognitive processes. Consequently, further manipulations were performed. In the first experiment, the research material was manipulated through different sensory stimuli; in the second study, further manipulation was performed by changing the congruence. After adding the research material, further manipulation was performed to represent the third and fourth paths of the metacognitive persuasion. As explained previously, the third way begins with emotional priming. The research material posits to ensure this by depicting a smiling woman. Electromyographic studies of the musculus zygomaticus major by Winkielman and Cacioppo (2001) and Reber et al. (1998) suggest that even mild contraction of this muscle increases processing fluidity and increased affectivity. In their experiment, Strack et al. (1988) demonstrated that subjects evaluate cartoons as funnier when they hold a pen in their mouth. According to Chartrand and Bargh (1999), the observation of emotionally significant behavior already leads to an uncontrolled imitation of this movement, thereby generating an emotional reliving. In their review, Elder and Krishna (2012), based on various studies, suggested that merely imagining motor movements activates the corresponding brain areas and thus has a comparable effect. Scheier et al. (2012) discussed such stimuli as codes of embodiment research that they examined in their experiment using deodorant bottles. Accordingly, embodiment describes the feedback of behavior to the emotional world with an accompanying changed emotional perception (Adelmann & Zajonc, 1989). Therefore, the research material should lead to an emotional reliving through the smiling woman, thereby achieving emotional priming as an effective stimulus. In the context of the fourth path of metacognitive persuasion, emotional priming should occur through persuasive stimuli. As described in Chapter 2, Briñol and Petty (2015) noted that the affect thus arising follows a different metacognitive process of attitude change. Therefore, haptic stimuli were chosen for research material for t-shirts as well as soft drinks. Product presentations were created where a hand touched a t-shirt or soft drink. While these two products represent the third and fourth pathways of metacognitive persuasion, representatives for the first, second, and fifth pathways must now be identified.

The first path describes the situation of low involvement. In a low involvement situation, the recipient's readiness for cognition is low, implying that the information tends to be perceived passively through peripheral stimuli, such as humor, which have a primary influence on attitude change, even if this is unstable and short-lived because of the low involvement (Cacioppo et al., 1986). In the previous and these experiments, involvement was stimulated by a cover story and the indication that questions regarding the products presented on the website would follow. Both the cover story and indication regarding questions did not occur with subjects assigned to the first group to avoid a high involvement situation. As an indicator, the time taken to complete the questionnaire was examined in the context of the results, which should be longer with an increase in involvement, according to this assumption. The second way of metacognitive persuasion describes a situation of perceived influence and the identification of the persuasive stimuli by the recipient (Petty & Briñol, 2014, 2015). Here, a distinction is no longer made between the involvement levels since a perceived influence increases the involvement depending on the reactance theory (Petty & Briñol, 2015). Perceived influence can result as interference with freedom of choice and in a perceived loss of control (J. W. Brehm, 1966). In all the experiments, the subjects were eventually asked to share the research objective as per their understanding. This was an open text field. As soon as a subject suspected persuasion of the sensory perceptions, these subjects were assigned to this group. The fifth way of metacognitive persuasion is described as a high involvement situation in which information processing occurs through an emotional prime mediated by language (Petty & Briñol, 2015). This situation corresponds to the data from the first two experiments. The subjects had to read the product descriptions to learn about the sensory stimuli. Therefore, all data for the third experiment, barring perceived influence, were taken from the second experiment and that for the fourth from the first experiment.

Product presentations for five t-shirts and six soft drinks were created and used in the experiment. The sensory stimuli used were chosen on the basis of the results from the first two studies. In particular, the product presentations where olfactory and gustatory stimuli were used, interactions could be observed with the soft drinks. Therefore, these stimuli were placed in the foreground. In the case of the t-shirts, one product presentation with four sensory stimuli was particularly

visible because this was the only research material of such a product type that could be observed to have interactions. This and three other random combinations of stimuli were used for the third experiment.

Figure 13

Examples of the research material - Third and Fourth study

Since the third and fourth experiments emphasize the metacognitive processes of attitude change, only the attitude scale of Spears and Singh (2004) was employed. Moreover, this scale was used in the first two experiments. The SPI scale was no longer necessary because the same sensory stimuli were used. The reliability indicators of the attitude scale in the original study can be found in Section 3.1.2 and are not described again to avoid redundancy.

4.1.2 Procedure and data diagnostics

The procedure was identical to the first and second experiments. Participants received the access link to the survey via social media—Instagram and WhatsApp—as well as via the university's internal platform to recruit subjects for empirical surveys. The minimum size of the total sample according to G*Power, based on the moderate effect size and 5% significance level, is n = 152. The participants were provided access to the online experiment via a link. This was followed by an introductory explanation of the further course of the experiment. Subsequently, the subjects were redirected to the experiment website. Barring the research material, the website corresponds to the presentation in Section 3.1.1. Again, this was a functional website with online stores. The participants could add products to their shopping cart, select a payment method, and click on order. By exiting the website, the participants returned to the survey. The participants were presented with five products in a randomized order, depending on the group, for the evaluation using the attitude scale. This was followed by sociodemographic questions and an open-ended question regarding the research objective as per their understanding.

Similar to the first two experiments, the results of the variable attitudes were classified according to the number of sensory stimuli employed to investigate the effect of superadditivity and according to the sensory stimuli combinations represented by the respective product representation to examine the effect of cross-modal correspondence. Furthermore, each grouping variable was grouped according to the metacognitive pathway of persuasion. Therefore, the tables of the descriptors and inferential statistics in the following section will be structured differently from the first experiments. Hence, within the framework of superadditivity, the number of sensory stimuli was categorized into five different pathways, implying that differences in the metacognitive pathways could be examined for each number. Moreover, this procedure was conducted for the effect of cross-modal correspondence. Consequently, all nine products were also grouped according to the metacognitive paths, implying that significantly more data were examined and processed. While in the first two experiments, the results for one ANOVA for the effect of superadditivity on attitude were reported, now the results

of five ANOVAs, one for each number of sensory stimuli, were reported. In examining the cross-modal correspondence effect, the results of nine ANOVA models were reported. Subsequently, as part of the post-hoc tests, different pairings were examined to gain possible insights and conclude. To ensure comprehensibility, similar to the first two experiments, only the most relevant results were discussed and presented in the continuous text from the tables based on the theoretical foundations, which are representative of the knowledge acquired.

4.2 RESULTS – THIRD AND FOURTH STUDY

In this section, the results of the third and fourth studies are presented together. In the beginning, descriptive indicators and the samples are described. This also gives an impression of the characteristics of the sample. Since the inferential statistical methods can be negatively influenced in their test quality by extreme outliers, outlier analysis and a description of the distribution of the variables was also carried out. The distribution descriptions are necessary because the applied models were based on the basic distribution assumptions, and bootstrapping must be carried out to negate these assumptions. It could also be the case that the attitude scale is not reliable in these surveys due to a deviating sample. Even if the risk is low, since the scales in the previous experiments had excellent reliabilities, a new reliability test was carried out. Inferential statistics follow in connection with the hypothesis tests. Again, the focus is on reporting the ANOVA results and the post-hoc tables to describe significant differences between the persuasion pathways.

4.2.1 Descriptive statistics

Annex 10 shows the results of Cronbach's alpha analysis. The Cronbach's alpha measures the internal consistency that describes how well the individual items represent the assigned variable (Cho, 2022). A value of .90 describes an excellent representation, whereas values of .60 and below are considered questionable, thus these items or the construct is unreliable. The item-rest correlation describes how well the individual items correlate. This value should be greater than .40 (Schober et al., 2018). The Cronbach's alpha and the correlation coefficients of the variable attitude are in an excellent range in both studies and thus sufficiently reliable. The Cronbach's alpha values are more significant than .90 across all items, and correlation coefficients are in an excellent value range with at least .88.

As described in Section 3.2.1, a distinction is made between exploratory and

confirmatory factor analysis, where confirmatory factor analysis will be used in the further course, as the attitude scale has already been scientifically tested. In exploratory factor analysis, the number of data is condensed, e.g., reducing the number of items necessary for a scale. Thus, at the end of the analysis, the assumption is postulated that the respective attributes or items represent a variable. In confirmatory factor analysis, it is tested whether this assumption holds making this procedure more comparable to a hypothesis test, and it is often used in addition to Cronbach's alpha in the context of reliability tests (Backhaus, 2021). In addition to the item-specific statistical indicators shown in the Table 5, which serve to obtain further information on the individual items, statistical indicators of the model or, in this case, for the variable attitude, were to be examined in advance.

The confirmatory factor analysis concludes with sufficient model goodness for the variable attitude for the third study (X^2 = 131.15, p = <.001, CFI = .99, TLI = .98, RMSEA p = <.001, SRMR = .01) and fourth study (X^2 = 111.25, p = <.001, CFI = .99, TLI = .99, RMSEA p = <.001, SRMR = .01). With p-values smaller than .05 for all variables, the Chi-Quadrat Test points out that the covariance matrix calculated from the model parameters differs significantly from the actual covariance matrix. Therefore, the observations from the third and fourth studies are not random and are significant (Hecker & Wiese, 1994; Lautsch et al., 1992). Based on the results of the Comparative Fit Index and the Tucker–Lewis index with values greater than .95, the observed variances can be predicted by the model, even if the items were not correlated to each other (Bentler, 1990; Cai et al., 2021; Cao et al., 2021; Tucker & Lewis, 1973). In both studies, the p-value of the RMSEA is smaller than .05, and the value of the SRMR is smaller than .01. So it can be assumed that the correlation matrix derived from the model matches that from the data (Shi et al., 2020).

Likewise, the statistical ratios in the Table 5 confirm the good reliability ratios. The estimate is close together in both studies and varies between 1.21 and 1.42. Moreover, the standard errors are low, with values smaller than .03. The p-value is below the significance level, and the confidence intervals are in a positive range and do not enclose 0. Ultimately, it can be assumed that the attitude scale also has very good reliability in the third and fourth experiment. With a high likelihood, the variable attitude was measured without measurement error so that the analyses can now be continued with the inferential statistics.

Table 5

Facor loadings: Third and fourth study

						95% Confidence Interval	
Factor	Indicator	Estimate	Std. Error	z-value	p	Lower	Upper
Attitude Study 3							
	EG01	1.41	.03	56.46	<.001	1.37	1.46
	EG02	1.30	.02	57.88	<.001	1.26	1.35
	EG03	1.31	.02	56.04	<.001	1.27	1.36
	EG04	1.21	.02	51.78	<.001	1.16	1.25
	EG05	1.22	.02	52.68	<.001	1.18	1.27
Attitude Study 4							
	EG01	1.42	.02	68.37	<.001	1.38	1.46
	EG02	1.35	.02	71.21	<.001	1.31	1.39
	EG03	1.36	.02	68.54	<.001	1.32	1.40
	EG04	1.22	.02	64.85	<.001	1.19	1.26
	EG05	1.28	.02	62.70	<.001	1.24	1.32

Table 6 shows different indicators of the descriptive statistics for all the products grouped according to the sensory stimuli and the metacognitive pathways of persuasion from the third and fourth studies. These indicators serve to identify outliers and get an impression of the distribution of the relevant variables. Chapter 3.2.1 has already described that only in the first experiment moderate outliers with an interquartile range of 1.5 were removed because the sample size of n = 654 was high. In the third and fourth experiments, the group sizes were unequal, especially the group of the second pathway of cognitive persuasion, so that, as in the second experiment, only extreme outliers with an interquartile range distance of greater than 3 are removed. However, inferential statistical procedures such as t-tests were robust against moderate outliers with a sample or group size of more than 30 observations (André, 2022; Ramsey & Wiley, 1978; Tukey, 1977). Bootstrapping can also be performed, making the results more robust to outliers and violations of the normal distribution and variance homogeneity (Konietschke & Pauly, 2014). The interquartile range describes the range in which the middle 50% of the results scatter and thus corresponds to the difference between the lower and upper quartile (Backhaus, 2021). To identify outliers, the interquartile range is multiplied by 1.5 for moderate, or 3 for extreme

outliers and then checked to see whether observations with this range are below the lower or upper quartile. Table 6 shows that most observations in the lower quartile were between 2 and 3, and those in the upper quartile were between 4 and 5. For the observations (T-Shirt$_{_v_Way2}$: 25th = 2.80, 75th = 4.60, T-Shirt$_{_v_Pathway5}$: 25th = 2.40, 75th = 4.20, T-Shirt$_{_voha_Pathway5}$: 25th = 3.25, 75th = 4.60, Soft Drink$_{_vgoh_Pathway5}$: 25th = 3.55, 75th = 5.00) the distances of the lower and upper quartile are 1.8 and smaller and thus smaller than for the other observations. Because the interquartile range is smaller, the probability of outliers increases.

Similarly, the likelihood of finding outliers could be high in the soft drink, where all sensory stimuli were used, as here, the upper quartile with values between 5.00 and 5.40 was high compared to the other products. Boxplots were created to visualize outliers and can be found in the Annex 9. The rectangular area represents the interquartile range in the boxplots, whereas moderate outliers are visualized with a dot, and extreme outliers with a number. It can be seen from the boxplots that, as suspected, moderate outliers are present in the products with small interquartile ranges. Extreme outliers are not present in the data set, so no further data need to be removed, and the distributions of the observations of each will be discussed below. By removing extreme outliers, distributions are less consumed. For example, outliers can increase or decrease the mean, leading to left or right-skewed distributions. The median is robust to outliers. The probability of skewed distributions thus increases the distance between the mean and median. The standard deviation can also give an impression of the distribution. The larger the standard deviation, the higher the probability of a broad distribution of observations. A normal distribution has a bell shape, where the median and mean are ideally equal, and the standard deviations are minor. Besides histograms, where the distributions are graphically visualized, statistical methods such as the Shapiro–Wilk test can also test normal distributions. As the Shapiro–Wilk test assumes normal distribution in its null hypothesis, there is a normal distribution taking into account a given probability of error as soon as the p-value is greater than .05. The p-values in the Table 6 show that where the means and median are close and the standard deviation is small, p-values below .05 are usually observed. In principle, however, the data was not stringent, so some observations were normally distributed and while some were not. For this reason, in the inferential analysis, bootstrapping is performed for all variables that are part of the post-hoc

analysis.

Table 6

Descriptive statistics third and fourth study

	n	Mean	Median	Std. Dev.	Shapiro-Wilk	Min.	Max.	25th	75th
Missing congruence–Third study									
T-Shirt–Attitude–v									
Pathway 1	162	3.95	4.00	1.12	.008	1.00	6.00	3.20	4.80
Pathway 2	37	4.05	4.20	1.03	.018	1.40	6.00	3.60	4.80
Pathway 3	104	3.94	4.20	1.24	.003	1.00	6.00	3.15	4.80
Pathway 4	108	3.87	4.00	1.34	.006	1.00	6.00	3.00	5.00
Pathway 5	97	3.67	3.80	1.06	.010	1.00	6.00	3.20	4.40
T-Shirt–Attitude–v,o									
Pathway 1	162	3.49	3.60	1.19	.022	1.00	6.00	2.60	4.40
Pathway 2	32	3.73	3.90	1.14	.591	1.60	6.00	2.80	4.60
Pathway 3	108	3.71	3.60	1.35	.014	1.00	6.00	3.00	4.65
Pathway 4	109	3.48	3.60	1.36	.008	1.00	6.00	2.60	4.40
Pathway 5	101	3.79	4.00	1.21	.008	1.00	6.00	2.80	4.80
T-Shirt–Attitude–v,a									
Pathway 1	162	3.67	3.86	1.15	.012	1.00	6.00	2.84	4.52
Pathway 2	47	3.80	4.00	1.09	.387	1.40	6.00	3.20	4.70
Pathway 3	104	4.04	4.30	1.24	.002	1.00	6.00	3.20	5.00
Pathway 4	107	3.67	3.60	1.27	.102	1.00	6.00	2.80	4.60
Pathway 5	202	3.62	3.80	1.13	.001	1.00	6.00	2.85	4.40
T-Shirt–Attitude–v,o,h									
Pathway 1	162	3.75	4.00	1.40	<.001	1.00	6.00	2.60	5.00
Pathway 2	37	3.81	4.00	1.09	.539	1.20	6.00	3.00	4.40
Pathway 3	109	3.65	3.80	1.37	.015	1.00	6.00	2.60	4.60
Pathway 4	106	3.54	3.60	1.29	.014	1.00	6.00	2.60	4.40
Pathway 5	96	3.58	3.50	1.23	.199	1.00	6.00	2.60	4.60
T-Shirt–Attitude–v,o,h,a									
Pathway 1	161	3.89	3891	1.47	<.001	1.00	6.00	2.80	5.20
Pathway 2	32	3.08	3075	1.45	.101	1.00	6.00	2.00	4.00

Pathway 3	108	3.67	3667	1.47	<.001	1.00	6.00	2.40	4.80
Pathway 4	107	3.43	3428	1.41	.010	1.00	6.00	2.40	4.60
Pathway 5	102	3.88	3884	1.16	.005	1.00	6.00	3.25	4.60
Complete congruence–Fourth study									
Soft drink–Attitude–v									
Pathway 1	104	3.51	3.80	1.36	.006	1.00	6.00	2.55	4.60
Pathway 2	49	3.58	3.60	1.25	.257	1.00	5600	2.80	4.60
Pathway 3	224	3.62	3.80	1.30	<.001	1.00	6.00	2.60	4.60
Pathway 4	215	3.42	3.40	1.34	<.001	1.00	6.00	2.40	4.40
Pathway 5	634	3.38	3.40	1.26	<.001	1.00	6.00	2.40	4.20
Soft drink–Attitude v,o									
Pathway 1	104	3.79	4.00	1.28	.003	1.00	6.00	2.80	4.80
Pathway 2	23	3.90	3.80	1.03	.463	2.20	5.80	3.00	4.60
Pathway 3	224	3.74	4.00	1.27	<.001	1.00	6.00	2.80	4.80
Pathway 4	215	3.82	4.00	1.33	<.001	1.00	6.00	3.00	4.80
Pathway 5	99	3.90	4.20	1.35	.002	1.00	6.00	3.00	5.00
Soft drink–Attitude–v,g									
Pathway 1	104	3.42	4.00	1.36	<.001	1.00	6.00	2.00	4.00
Pathway 2	26	3.69	3.80	1.09	.252	1.40	5.40	3.00	4.55
Pathway 3	224	3.64	4.00	1.20	.002	1.00	6.00	2.80	4.60
Pathway 4	215	3.63	4.00	1.29	<.001	1.00	6.00	2.60	4.60
Pathway 5	212	3.77	4.20	1.31	<.001	1.00	6.00	2.80	4.80
Soft drink–Attitude–v,g,o									
Pathway 1	104	2.90	2.60	1.41	<.001	1.00	6.00	1.95	4.00
Pathway 2	20	2.97	2.70	1.42	.084	1.20	5.60	1.60	4.00
Pathway 3	223	3.19	3.00	1.34	<.001	1.00	6.00	2.00	4.40
Pathway 4	216	3.24	3.00	1.37	<.001	1.00	6.00	2.15	4.40
Pathway 5	102	3.03	2.80	1.35	.002	1.00	6.00	2.00	4.00
Soft drink–Attitude–v,g,o,h									
Pathway 1	104	3.77	4.00	1.37	.003	1.00	6.00	2.80	4.80
Pathway 2	14	4.14	4.20	1.23	.859	1.40	6.00	3.45	4.95
Pathway 3	224	3.87	4.00	1.30	<.001	1.00	6.00	2.80	4.80
Pathway 4	215	4.01	4.20	1.29	<.001	1.00	6.00	3.20	5.00
Pathway 5	96	4.19	4.40	1.22	.001	1.00	6.00	3.55	5.00
Soft drink–Attitude–v,g,o,h,a									
Pathway 1	104	3.95	4.20	1.42	<.001	1.00	6.00	2.60	5.00

Pathway 2	44	4.34	4.70	1.32	.006	1.40	6.00	3.40	5.40
Pathway 3	224	4.08	4.40	1.43	<.001	1.00	6.00	3.00	5.20
Pathway 4	215	4.20	4.60	1.37	<.001	1.00	6.00	3.20	5.20
Pathway 5	634	4.17	4.40	1.32	<.001	1.00	6.00	3.20	5.20

Note. The term Pathway is considered to be an abbreviation for the manipulation based on the metacognitive pathways of persuasion

4.2.2 Inferential statistics

In the following inferential statistical analysis, the hypotheses derived from the research results and the current state of research are tested. It was assumed that metacognitive attitude formation processes could explain the results of the first two experiments. The ELM, which Briñol and Petty (2014) revised based on studies on metacognition and attitude changes, was served as the basis. Briñol and Petty (2014) thus derived five different pathways of metacognitive persuasion that should influence the attitude formation processes. As described above, groups were formed for each pathway. Next, it will be examined whether there are any significant differences in the subjects' attitudes between the five pathways, differentiated according to the effect of superadditivity and cross-modal correspondence.

Before taking a closer look at the inferential statistical methods, the mean values are examined in the Table 7 in matrix form for both studies. Here, the mean values of the attitude are compared according to the number of sensory stimuli and according to the metacognitive pathways. The fifth pathway represent the results from the second experiment. Table 7 already provides an insight into possible significant differences, at the same time, supporting the comprehensibility of the post-hoc results presented later. It should be noted that, as already described in Section 4.1.1, the results of the fifth pathway of metacognition were taken from the first and second experiments, which in this presentation also makes it possible to compare the connection to these studies. The mean values of the third experiment or those of the t-shirts, does not increase for any metacognitive pathways for an increase in the number of sensory stimuli. Similarly, no metacognitive pathways

can be identified in which the mean value is systematically higher as a function of the number of sensory stimuli. Based on the fifth pathway, it can be seen that a similar mean value tendency could already be observed in the second experiment. Accordingly, no cumulative increase in the mean value with a higher number of sensory stimuli could be observed in the third experiment and were thus congruent with the results from the second experiment. Furthermore, it can already be observed here that no metacognitive path leads to a higher mean value in attitude than others, so the assumption can already be made that few pairings will show significant differences within the framework of the post-hoc test.

In the first experiment, it was observed regarding the effect of superadditivity that with existing congruence based on the product type—soft drinks—a cumulative but not significant increase in the mean value could be observed with the increase in sensory stimuli. The results of the fifth path were interesting. These results originate from the first experiment, but no longer for all the 16 products, but only for five products examined more closely in the fourth experiment. Contrary to the expectations, no cumulative increase in the mean value of the attitude can be observed for the increase in sensory stimuli in the fifth path. These observations were therefore made by averaging the results of several products. For the products selected for the fourth experiment, this effect was not present in the first study. As with the t-shirts, no cumulative increase in the mean value of the attitude with the increase in sensory stimuli was observed for any metacognitive pathway. Also, no metacognitive pathway can be identified as a function of the sensory stimuli that shows a systematically higher attitude. Accordingly, comparable results are expected in the post-hoc tests.

Table 7

Mean values–Superadditivity: Meta cognition

	One	Two	Three	Four	Five
T-Shirt					
Pathway 1	3.95	3.58	3.75	3.89	-
Pathway 2	4.05	3.78	3.81	3.08	-
Pathway 3	3.94	3.87	3.65	3.67	-
Pathway 4	3.87	3.58	3.54	3.43	-

Pathway 5	3.67	3.68	3.58	3.88	-
Soft Drinks					
Pathway 1	3.51	3.61	2.90	3.77	3.95
Pathway 2	3.58	3.79	2.97	4.14	4.34
Pathway 3	3.62	3.69	3.19	3.87	4.08
Pathway 4	3.42	3.72	3.24	4.01	4.20
Pathway 5	3.38	3.81	3.03	4.19	4.17

Note. The term Pathway is considered to be an abbreviation for the manipulation based on the metacognitive pathways of persuasion.

Table 8 shows the results of the post-hoc test of the third and fourth study with regard to the effect of superadditivity. The post-hoc tests were based on the ANOVA analyses, one per sensory stimulus per product. The Levene test indicates a lack of variance homogeneity for the t-shirts in all four models ($F_{\text{One stimulus}}$ (4, 503.00) = 2.84, p = .024, $F_{\text{Two stimuli}}$ (4, 1129.00) = 2.45, p = .044, $F_{\text{Three stimuli}}$ (4, 505.00) = 2.70, p = .026, $F_{\text{Four stimuli}}$ (4, 1129.00) = 3.95, p = .004)), with p-values less than .05. For soft drinks, models can be fitted with both given ($F_{\text{One stimulus}}$ (4, 1221.00) = .88, p = .477, $F_{\text{Three stimulus}}$ (4, 660.00) = .27, p = . 895), as well as with missing variance homogeneity ($F_{\text{Two stimulus}}$ (4, 1441.00) = 2.52, p = .030, $F_{\text{Four stimulus}}$ (4, 648.00) = .73, p = .572, $F_{\text{Five stimulus}}$ (4, 1216.00) = 1.31, p = .264). The results of Levene's test indicate a lack of variance homogeneity in all models with respect to superadditivity. Therefore, the results of the Welch test are reported, which, with the exception of products with four sensory stimuli ($F_{\text{Four stimuli}}$ (4, 162.12) = 3.78, p = .006, est. w^2 = .022), indicate a lack of significance in the differences related to grouping in the metacognitive pathways ($F_{\text{One stimulus}}$ (4, 178.05) = 1.43, p = .226, est. w^2 = .002), $F_{\text{Two stimuli}}$ (4, 389.43) = 2.15, p = .074, est. w2 = .005, $F_{\text{Three stimuli}}$ (4, 181.97) = .64, p = .638, est. w^2 = .000). For the soft drink product type in the fourth experiment, all the models indicate a lack of significance in both the ANOVA results with given variance homogeneity ($F_{\text{One stimulus}}$ (4, 1221) = 1. 71, p = .145, est. w^2 = .002, $F_{\text{Three stimuli}}$ (4, 660) = 1.41, p = .230, est. w^2 = .002, $F_{\text{Four stimuli}}$ (4, 648) = 1.75, p = .138, est. w^2 = .005, $F_{\text{Five stimuli}}$ (4, 1216) = 1.05, p = .379, est. w^2 = <.001), as well as within the Welch test ($F_{\text{Two stimuli}}$ (4, 299.77) = .87, p = .483, est. w2 = .000).

In the second experiment, described in Section 3.2.2, it was noted that the effect of superadditivity could not be observed. In the context of the third

experiment, whether there can be significant differences as the results are examined as a function of the metacognitive pathways will now be examined. The model investigations using ANOVA already revealed only significant differences for t-shirts with four sensory stimuli ($F_{\text{Four stimuli}}$ (4, 162.12) = 3.78, p = .006, est w2 = .022). The results of the post-hoc test demonstrated significant differences on two pairings ($p_{tukey\ \text{Pathway one vs. two}}$ = .022, 0.82, 95% CI [0.26, 1.36], $p_{\text{tukey Pathway two vs. five}}$ = .036, −0.81, 95% CI [−1.35, .24]). According to these results, it can be observed that in the sample with t-shirts with four sensory stimuli or in a situation with lack of congruence, an influence in a low involvement situation, represented by the first metacognitive pathway, leads to a significantly higher attitude than the situation of perceived influence, represented by the fifth pathway. Similarly, it can be observed that a language-based emotional persuasive prime, represented by the fifth pathway, leads to a significantly higher attitude than a low involvement situation. Even with the different numbers of sensory stimuli, no significant pairings can be observed in all other pairings. Similar to the second experiment, described in Section 3.2.2, no tendencies or connections can be derived from the mean differences for the t-shirts. Thus, the mean differences behave differently for all pairings and numbers of sensory stimuli. For instance, the mean differences in pathway one versus pathway two pairings are negative for all but five sensory stimulus counts. If pathway one is compared with pathway three, the mean difference is only negative for t-shirts with two sensory stimuli. The only pair that exhibits a positive sign in all groupings by the number of sensory stimuli is the comparison between pathways one and four. Although these pairings are not significant, it can be observed that the situation of an emotional prime and a high involvement situation versus a low involvement situation without an emotional prime has a higher but not significantly high attitude. In principle, it can be seen that no systematic connections can be recognized based on the results, and, therefore, no further knowledge gains can be generated by separation into metacognitions according to the metacognitive ELM in terms of multisensory stimuli in online stores with missing congruence.

In the first experiment, described in 3.2.2, it was observed regarding the effect of superadditivity with existing congruence based on the product type soft drinks, that a cumulative but nonsignificant increase in the mean value with an increase in sensory stimuli. The mean value matrix already showed that this did not apply to

all the products in the first experiment, and the products that are now from the first experiment do not show a cumulative increase in the mean value. Nevertheless, this experiment aims to examine whether there are any significant differences between the metacognitive pathways of persuasion to derive concrete implications for science and practice. The results of the Levene test for soft drinks with two sensory stimuli indicate a lack of variance homogeneity ($F_{\text{One stimulus}}$ (4, 1221) = .88, p = .477, $F_{\text{Two stimuli}}$ (4, 1441) = 2.52, p = .039, $F_{\text{Three stimuli}}$ (4, 660) = .27, p = .895, $F_{\text{Four stimuli}}$ (4, 648) = .73, p = .572, $F_{\text{Five stimuli}}$ (4, 1216) = 1.31, p = .264) so the Welch test was carried out for these products ($F_{\text{Two stimuli}}$ (4, 299.776) = .87, p = .483, est. w^2 = .00) and the ANOVA without homogeneity correction ($F_{\text{One stimulus}}$ (4, 1221) = 1.71, p = .145, est. w^2 = .002, $F_{\text{Three stimuli}}$ (4, 660) = 1.41, p = .230, est. w^2 = .002, $F_{\text{Four stimuli}}$ (4, 648) = 1.75, p = .138, est. w^2 = .005, $F_{\text{Five stimuli}}$ (4, 1216) = 1.05, p = .379, est. w^2 = <.001) for the other products, whereby none of the models show significant results.

The post-hoc test results based on 5,000 replicates show no significant results in any of the pairs. In all cases, the p-value was higher than .05, and the confidence intervals enclose 0. Similarly, no trends can be discerned from the mean differences, so no conclusion can be drawn as to whether the particular pathways of metacognitive persuasion might have superadditivity concerning it. In theory, it could already be observed on the matrix that this effect is not present since products with a larger number of sensory stimuli do not always have a higher attitude. Furthermore, the mean value difference cannot be observed that a path continuously shows a significant deviation in the same direction. Thus, no metacognitive pathway seems to have a significantly more potent influence on the level of attitude than others. The extension of the ELM is therefore not helpful in better understanding the results of the first experiment, since any metacognitive path cannot explain these. It can be stated that attitudes toward multisensory product presentations, as they were used in this experiment, tend to be positive with values greater than or equal to 3.

Table 8

Post-Hoc test–Superadditivity: Third and fourth study

95% bca† CI

	Mean Dif.	Lower	Upper	SE	bias	t	d	p tukey
One stimulus–T-Shirt								
Pathway, 1								
Pathway, 2	-.10	−.47	.31	.20	<−.001	−.46	−.10	.991
Pathway, 3	.01	−.28	.31	.15	−.003	.04	.01	1.00
Pathway, 4	.08	−.22	.40	.16	−.003	.55	.07	.982
Pathway, 5	.28	.01	.55	.14	<.001	1.87	.26	.337
Pathway, 2								
Pathway, 3	.10	−.33	.51	.21	−.003	.46	.10	.991
Pathway, 4	.17	−.24	.59	.22	−.003	.79	.14	.932
Pathway, 5	.38	−.04	.76	.22	<.001	1.67	.36	.453
Pathway, 3								
Pathway, 4	.08	−.29	.42	.18	<.001	.46	.06	.991
Pathway, 5	.28	−.06	.58	.16	.004	1.66	.24	.460
Pathway, 4								
Pathway, 5	.20	−.13	.53	.17	.004	1.23	.17	.736
Two stimuli–T-Shirt								
Pathway, 1								
Pathway, 2	−.19	−.47	.08	.14	−.002	−1.26	−.17	.712
Pathway, 3	−.29	−.51	−.07	.11	<.001	−2.68	−.24	.057
Pathway, 4	.01	−.22	.23	.11	<−.001	.04	.01	1.00
Pathway, 5	−.10	−.28	.10	.10	<−.001	−.98	−.08	.865
Pathway, 2								
Pathway, 3	−.09	−.40	.21	.15	.002	−.59	−.08	.976
Pathway, 4	.20	−.10	.50	.15	.002	1.24	.16	.731
Pathway, 5	.10	−.18	.38	.14	.001	.64	.09	.969
Pathway, 3								
Pathway, 4	.29	.04	.54	.13	<−.001	2.49	.22	.094
Pathway, 5	.19	−.03	.41	.11	<−.001	1.77	.16	.391
Pathway, 4								

					<−.00			
Pathway, 5	−.10	−.31	.12	.11	1	−.92	−.08	.889
Three stimuli–T-Shirt								
Pathway, 1								
Pathway, 2	−.07	−.45	.38	.21	−.008	−.25	−.04	.999
Pathway, 3	.09	−.23	.44	.17	<.001	.57	.07	.980
					<−.00			
Pathway, 4	.21	−.13	.52	.17	1	1.25	.15	.721
Pathway, 5	.16	−.17	.49	.17	<.001	.96	.12	.874
Pathway, 2								
Pathway, 3	.17	−.32	.57	.22	.009	.61	.12	.974
Pathway, 4	.28	−.18	.67	.22	.007	1.06	.22	.829
Pathway, 5	.24	−.25	.62	.22	.008	.87	.19	.907
Pathway, 3								
Pathway, 4	.11	−.25	.46	.18	−.002	.63	.09	.970
					<−.00			
Pathway, 5	.07	−.29	.42	.18	1	.38	.05	.996
Pathway, 4								
Pathway, 5	−.04	−.40	.30	.18	<.001	−.24	−.04	.999
Four stimuli–T-Shirt								
Pathway, 1								
Pathway, 2	.82	.26	1.36	.28	.004	3.02	.56	.022
Pathway, 3	.22	−.13	.59	.18	.002	1.29	.15	.698
Pathway, 4	.47	.10	.80	.18	−.002	2.66	.32	.062
Pathway, 5	.01	−.31	.32	.16	.001	.04	.01	1.00
Pathway, 2								
						−2.1		
Pathway, 3	−.60	−1.14	−.01	.29	−.003	0	−.40	.220
						−1.2		
Pathway, 4	−.36	−.91	.24	.29	−.006	5	−.25	.719
						−2.8		
Pathway, 5	−.81	−1.35	−.24	.28	−.003	6	−.66	.036
Pathway, 3								
Pathway, 4	.24	−.15	.61	.20	−.003	1.25	.17	.720
					<−.00	−1.1		
Pathway, 5	−.22	−.58	.14	.18	1	3	−.16	.791
Pathway, 4								

						−2.3		
	Pathway, 5	−.46	−.80	−.10	.18	.003	6	−.35	.128
One stimulus–Soft drinks									
Pathway, 1									
	Pathway, 2	−.06	−.51	.36	.22	.005	−.31	−.05	.998
	Pathway, 3	−.11	−.43	.21	.16	.002	−.70	−.08	.957
						<−.00			
	Pathway, 4	.09	−.23	.41	.16	1	.60	.07	.975
	Pathway, 5	.14	−.15	.42	.14	.003	1.00	.11	.854
Pathway, 2									
	Pathway, 3	−.04	−.43	.34	.19	−.004	−.18	−.03	1.00
	Pathway, 4	.16	−.23	.55	.20	−.006	.80	.12	.932
	Pathway, 5	.20	−.16	.56	.18	−.002	1.08	.16	.816
Pathway, 3									
	Pathway, 4	.20	−.05	.44	.13	−.002	1.62	.15	.486
	Pathway, 5	.24	.04	.44	.10	.001	2.43	.19	.107
Pathway, 4									
	Pathway, 5	.05	−.16	.25	.10	.003	.44	.04	.992
Two stimuli–Soft drinks									
Pathway, 1									
	Pathway, 2	−.18	−.53	.17	.18	.002	−.88	−.14	.904
	Pathway, 3	−.08	−.30	.13	.11	−.002	−.76	−.07	.943
							−1.0		
	Pathway, 4	−.12	−.34	.10	.11	<.001	7	−.09	.821
							−1.7		
	Pathway, 5	−.21	−.44	.04	.12	<.001	8	−.16	.385
Pathway, 2									
	Pathway, 3	.09	−.21	.42	.16	−.004	.51	.08	.987
	Pathway, 4	.06	−.26	.39	.16	−.002	.33	.05	.998
	Pathway, 5	−.03	−.37	.30	.17	−.001	−.13	−.02	1.00
Pathway, 3									
	Pathway, 4	−.03	−.21	.13	.09	.002	−.40	−.03	.995
							−1.3		
	Pathway, 5	−.12	−.32	.06	.10	.002	0	−.10	.690
Pathway, 4									
	Pathway, 5	−.09	−.28	.11	.10	<.001	−.93	−.07	.887
Three stimuli–Soft drinks									

Pathway, 1								
	Pathway, 2	−.07	−.77	.57	.34	.004	−.22	−.05	.999
	Pathway, 3	−.29	−.61	.03	.16	<−.001	−1.79	−.21	.381
	Pathway, 4	−.34	−.66	−.01	.17	−.001	−2.09	−.25	.224
	Pathway, 5	−.13	−.51	.24	.19	.001	−.68	−.09	.961
Pathway, 2									
	Pathway, 3	−.23	−.83	.46	.33	−.005	−.68	−.16	.961
	Pathway, 4	−.28	−.87	.45	.33	−.005	−.84	−.20	.919
	Pathway, 5	−.06	−.70	.63	.34	−.003	−.17	−.04	1.00
Pathway, 3									
	Pathway, 4	−.05	−.30	.20	.13	<−.001	−.40	−.04	.995
	Pathway, 5	.16	−.15	.48	.16	.002	.98	.12	.863
Pathway, 4									
	Pathway, 5	.21	−.12	.53	.16	.003	1.29	.16	.697
Four stimuli–Soft drinks									
Pathway, 1									
	Pathway, 2	−.37	−1.00	.35	.35	.004	−1.00	−.27	.855
	Pathway, 3	−.09	−.40	.21	.16	.001	−.61	−.07	.974
	Pathway, 4	−.24	−.56	.08	.16	.002	−1.55	−.18	.532
	Pathway, 5	−.42	−.78	−.07	.18	.002	−2.28	−.32	.154
Pathway, 2									
	Pathway, 3	.28	−.44	.88	.33	−.003	.77	.21	.939
	Pathway, 4	.13	−.60	.74	.34	−.003	.36	.10	.996
	Pathway, 5	−.05	−.79	.58	.35	−.002	−.13	−.04	1.00
Pathway, 3									
	Pathway, 4	−.14	−.40	.10	.13	<.001	−1.18	−.11	.76
	Pathway, 5	−.33	−.61	−.02	.15	<.001	−2.05	−.25	.24
Pathway, 4									
	Pathway, 5	−.18	−.47	.13	.15	<.001	−1.12	−.14	.80

Five stimuli–Soft drinks								
Pathway, 1								
	Pathway, 2	−.39	−.84	.08	.24	.002	−1.61	−.28	.491
	Pathway, 3	−.13	−.47	.18	.17	.002	−.83	−.09	.922
	Pathway, 4	−.25	−.58	.08	.17	.002	−1.54	−.18	.538
	Pathway, 5	−.23	−.52	.06	.15	<−.001	−1.57	−.17	.515
Pathway, 2								
	Pathway, 3	.27	-.20	.67	.22	<-.001	1.16	.18	.774
	Pathway, 4	.15	-.31	.54	.22	<.001	.64	.11	.968
	Pathway, 5	.17	-.25	.55	.20	-.003	.79	.13	.933
Pathway, 3								
	Pathway, 4	-.12	-.37	.15	.13	<.001	-.90	-.08	.899
	Pathway, 5	-.10	-.31	.12	.11	−.002	−.88	−.07	.905
Pathway, 4								
	Pathway, 5	.02	−.19	.23	.11	−.003	.22	.02	.999

† Bias corrected accelerated.

Note. Bootstrapping based on 5000 successful replicates.

Cohen's d does not correct for multiple comparisons.

Mean Difference estimate is based on the median of the bootstrap distribution.

P-value adjusted for comparing a family of 5

The term Pathway is considered to be an abbreviation for the manipulation based on the metacognitive pathways of persuasion.

Next, the inferential statistical results are described concerning the effect of the cross-modal correspondence. In Table 9, again in the form of a matrix, the mean values of the attitude with regard to metacognitive persuasion and the respective products or the different combinations of sensory stimuli are reported. This table aims to get an overview of the mean values, which are examined for significant differences within the framework of inferential statistics. Once again, the mean values are close together. The lowest mean value is M = 2.90 with a standard deviation of SD = 1.41 and the highest M = 4.20 with a standard deviation of SD = 1.37, whereby only two of the 55 mean values are smaller than 3. However, comparisons with previous studies can be made again based on the fifth path. Thus,

it can be noted that the mean value of the attitude for the t-shirts without sensory stimuli was higher for paths one, two, and four than for all multisensory conglomerates. Accordingly, multisensory stimuli tend to influence t-shirts negatively on these three metacognitions. This is not the case with soft drinks; however, the interactions similar to the first study can be observed. In the first experiment, it was observed that the products with the sensory stimuli, v,o and v,g, had a higher attitude than the control product with the sensory stimulus v. The conglomerate with the sensory stimuli v,g,o, however, had a lower attitude. Moreover, this interaction can now be observed in all metacognitive pathways. Since the mean of the conglomerate with all the five sensory stimuli is higher, it seems that the conglomerate v, g, o is negative for product representations of soft drinks in terms of attitude. Accordingly, the effects of the cross-modal correspondence are attributed to the olfactory and gustatory sensory stimuli.

Table 9

Mean values–Cross-modal correspondence: Metacognition

	v	v,o	v,a	v,g	v,g,o	v,o,h	v,o,h,a	v,g,o,h	v,g,o,h,a
T-Shirt									
Pathway 1	3.95	3.49	3.67	-	-	3.75	3.89	-	-
Pathway 2	4.05	3.73	3.80	-	-	3.81	3.08	-	-
Pathway 3	3.94	3.71	4.04	-	-	3.65	3.67	-	-
Pathway 4	3.87	3.48	3.67	-	-	3.54	3.43	-	-
Pathway 5	3.67	3.79	3.62	-	-	3.58	3.88	-	-
Soft Drinks									
Pathway 1	3.51	3.79	-	3.42	2.90	-	-	3.77	3.95
Pathway 2	3.58	3.90	-	3.69	2.97	-	-	4.14	4.34
Pathway 3	3.62	3.74	-	3.64	3.19	-	-	3.87	4.08
Pathway 4	3.42	3.82	-	3.63	3.24	-	-	4.01	4.20
Pathway 5	3.38	3.90	-	3.77	3.03	-	-	4.19	4.17

Note. The term Pathway is considered to be an abbreviation for the manipulation based on the metacognitive pathways of persuasion.

In Table 10, the results of the 5,000 replicate post-hoc test for all metacognitive pathways are grouped by their respective sensory conglomerates and in the studies

three and four. The nonsignificant results of the ANOVA investigations are confirmed for all possible pairings. Except for the three pairings for the t-shirts ($p_{\text{tukey T-shirt\_v,a\_three vs. fiver}}$ = .025, 0.42, 95% CI [.13, .70], $p_{\text{tukey T-Shirt\_v,o,h,a\_two vs. five}}$ = .036, −.82, 95% CI [−1.33, −.22], $p_{\text{tukey T-Shirt\_v,o,h,a\_one vs. two}}$ = .022, .83, 95% CI [.22, 1.33]), none of the other pairs have p-values below the acceptable significance level of .05. Likewise, for all the other pairings, the zero is included in the confidence interval, or one of the confidence intervals is very close to zero and at the same time exceeds a p-value of .05. For the effect of the cross-modal correspondence, it can be stated as a result of this study that the interactions observed from the first experiment could also be replicated in the fourth experiment. However, similar to the effect of superadditivity, in the third and fourth experiments related to the effect of cross-modal correspondence, the results cannot be explained by metacognitive ways of the ELM. No significant differences between the different routes could be observed. Likewise, as in the first two experiments, the mean values were positive.

Table 10

Post-Hoc test–Cross-modal correspondence: Metacognition

		95% bca† CI						
	Mean Dif.	Lower	Upper	SE	bias	t	d	p tukey
Missing congruence–Third study								
T-shirt – v								
Pathway, 1								
Pathway, 2	−.10	−.45	.30	.19	−.002	−.46	−.09	.991
Pathway, 3	.01	−.27	.32	.15	-.001	<−.04	.01	1.00 0
Pathway, 4	.08	−.22	.39	.16	−.002	.55	.07	.982
Pathway, 5	.28	.02	.57	.14	<.−001	1.87	.26	.337
Pathway, 2								
Pathway, 3	.11	−.32	.49	.21	.001	.46	.09	.991
Pathway, 4	.18	−.25	.57	.21	< .001	.79	.14	.932
Pathway, 5	.38	−.04	.76	.20	.002	1.67	.36	.453
Pathway, 3								
Pathway, 4	.07	−.28	.42	.18	−.001	.46	.06	.991

Pathway, 5	.28	−.04	.59	.16	< .001	1.66	.24	.460
Pathway, 4								
Pathway, 5	.20	−.13	.53	.17	.001	1.23	.17	.736
T-shirt–v,o								
Pathway, 1								
Pathway, 2	−.24	−.69	.19	.22	<–.001	−.98	−.20	.866
Pathway, 3	−.21	−.53	.10	.16	< .001	−1.36	−.17	.651
Pathway, 4	.01	−.30	.33	.16	−.001	.04	.01	1.00
Pathway, 5	−.30	−.60	.01	.15	<–.001	−1.88	−.25	.331
Pathway, 2								
Pathway, 3	.03	−.44	.50	.24	.001	.10	.02	1.00
Pathway, 4	.25	−.23	.70	.24	<–.001	.97	.19	.868
Pathway, 5	−.06	−.51	.42	.24	<.001	−.24	−.05	.999
Pathway, 3								
Pathway, 4	.22	−.13	.58	.18	−.002	1.29	.16	.698
Pathway, 5	−.09	−.44	.27	.18	−.001	−.45	−.08	.998
Pathway, 4								
Pathway, 5	−.31	−.67	.04	.18	< .001	−1.76	−.24	.397
T-shirt–v,a								
Pathway, 1								
Pathway, 2	−.13	−.48	.22	.18	< .001	−.68	−.12	.960
Pathway, 3	−.37	−.66	−.07	.15	.002	−2.50	−.31	.092
Pathway, 4	.01	−.32	.29	.16	< .001	<.001	.01	1.00
Pathway, 5	.05	−.19	.28	.12	< .001	.42	.05	.993
Pathway, 2								
Pathway, 3	−.23	−.63	.15	.20	.002	−1.14	−.20	.784
Pathway, 4	.13	−.26	.52	.20	< .001	.65	.11	.967
Pathway, 5	.18	−.16	.53	.18	< .001	.97	.17	.867
Pathway, 3								
Pathway, 4	.37	.02	.70	.17	−.001	2.28	.29	.152
Pathway, 5	.42	.13	.70	.14	−.002	2.97	.36	.025
Pathway, 4								
Pathway, 5	.05	−.22	.36	.15	<–..001	.37	.04	.996
T-shirt–v,o,h								
Pathway, 1								
Pathway, 2	−.06	−.46	.37	.21	.005	−.25	−.04	.999
Pathway, 3	.09	−.24	.44	.17	< .001	.57	.07	.980

Pathway, 4	.20	−.11	.54	.17	−.002	1.25	.15	.721
Pathway, 5	.17	−.18	.49	.17	.003	.96	.12	.874
Pathway, 2								
Pathway, 3	.16	−.31	.57	.22	−.004	.61	.12	.974
Pathway, 4	.26	−.18	.68	.22	−.007	1.06	.22	.829
Pathway, 5	.22	−.22	.63	.22	−.002	.87	.19	.907
Pathway, 3								
Pathway, 4	.11	−.23	.49	.18	−.003	.63	.09	.970
Pathway, 5	.07	−.28	.44	.18	.002	.38	.05	.996
Pathway, 4								
Pathway, 5	−.04	−.41	.29	.18	.005	−.24	−.04	.999
T-shirt–v,o,h,a								
Pathway, 1								
Pathway, 2	.83	.22	1.33	.28	.006	3.02	.56	.022
Pathway, 3	.23	−.15	.57	.18	.001	1.29	.15	.698
Pathway, 4	.46	.11	.82	.18	−.005	2.66	.32	.062
Pathway, 5	.01	−.32	.31	.16	.002	.04	.01	1.00
Pathway, 2								
Pathway, 3	−.60	−1.16	−.01	.29	−.005	−2.10	−.40	.220
Pathway, 4	−.37	−.90	.25	.29	−.011	−1.25	−.25	.719
Pathway, 5	−.82	−1.33	−.22	.28	−.003	−2.86	−.66	.036
Pathway, 3								
Pathway, 4	.23	−.14	.64	.20	−.006	1.25	.17	.720
Pathway, 5	−.22	−.56	.16	.18	.001	−1.13	−.16	.791
Pathway, 4								
Pathway, 5	−.45	−.80	−.12	.18	.007	−2.36	−.35	.128
Complete congruence–Fourth study								
Soft drink–v								
Pathway, 1								
Pathway, 2	−.07	−.50	.37	.22	< .001	−.31	−.05	.998
Pathway, 3	−.11	−.43	.20	.16	−.001	−.70	−.08	.957
Pathway, 4	.10	−.24	.40	.16	< .001	.60	.07	.975
Pathway, 5	.14	−.15	.41	.14	<−.001	1.00	.11	.854
Pathway, 2								
Pathway, 3	−.04	−.43	.37	.20	−.002	−.18	−.03	1.00
Pathway, 4	.16	−.24	.56	.21	< .001	.80	.12	.932
Pathway, 5	.21	−.17	.57	.19	<−.001	1.08	.16	.816

Pathway, 3								
Pathway, 4	.20	−.05	.45	.13	.002	1.62	.15	.486
Pathway, 5	.24	.05	.44	.10	<.001	2.43	.19	.107
Pathway, 4								
Pathway, 5	.04	−.16	.26	.11	−.001	.44	.04	.992
Soft drink–v,g								
Pathway, 1								
Pathway, 2	−.26	−.73	.25	.25	.002	−.94	−.20	.883
Pathway, 3	−.22	−.52	.11	.16	−.002	−1.40	−.17	.627
Pathway, 4	−.21	−.51	.11	.16	−.001	−1.34	−.16	.666
Pathway, 5	−.35	−.67	−.02	.16	−.001	−2.28	−.26	.152
Pathway, 2								
Pathway, 3	.05	−.43	.48	.23	−.004	.19	.04	1.00
Pathway, 4	.06	−.43	.48	.23	−.003	.22	.05	.999
Pathway, 5	−.08	−.57	.35	.23	−.003	−.33	−.07	.998
Pathway, 3								
Pathway, 4	.01	−.22	.25	.12	<.001	.07	.01	1.00
Pathway, 5	−.14	−.38	.11	.12	<.001	−1.11	−.11	.799
Pathway, 4								
Pathway, 5	−.14	−.40	.10	.13	< .001	−1.17	−.11	.771
Soft drink − v,o								
Pathway, 1								
Pathway, 2	−.11	−.62	.37	.25	−.003	−.38	-.09	.996
Pathway, 3	.05	-.26	.34	.15	<−.001	.32	.04	.998
Pathway, 4	-.03	-.33	.27	.15	<−.001	−.19	−.02	1.00
Pathway, 5	−.11	−.47	.23	.18	.001	−.61	−.08	.974
Pathway, 2								
Pathway, 3	.16	−.28	.62	.23	.002	.57	.13	.980
Pathway, 4	.09	−.38	.53	.23	.002	.29	.06	.998
Pathway, 5	.01	−.50	.49	.25	.004	.01	.01	1.00
Pathway, 3								
Pathway, 4	−.08	−.33	.17	.13	<.001	−.63	−.06	.971
Pathway, 5	−.16	−.46	.17	.16	.002	−1.02	−.12	.847
Pathway, 4								
Pathway, 5	−.08	−.38	.25	.16	.002	−.52	−.06	.986
Soft drink–v,g,o								
Pathway, 1								

Pathway, 2	−.07	−.79	.59	.35	.005	−.22	−.05	1.00
Pathway, 3	−.29	−.62	.04	.17	.001	−1.79	−.21	.38
Pathway, 4	−.34	−.66	−.01	.17	<−.001	−2.09	-.25	.22
Pathway, 5	−.13	−.51	.25	.19	.001	−.68	−.09	.96
Pathway, 2								
Pathway, 3	−.22	−.85	.46	.33	−.004	−.68	−.16	.96
Pathway, 4	−.28	−.90	.43	.33	−.006	−.84	−.20	.92
Pathway, 5	−.06	−.72	.67	.35	−.004	−.17	−.04	1.00
Pathway, 3								
Pathway, 4	−.05	−.31	.21	.13	−.002	−.40	−.04	1.00
Pathway, 5	.16	−.15	.50	.16	<-.001	.98	.12	.86
Pathway, 4								
Pathway, 5	.21	−.13	.53	.16	.002	1.29	.16	.70
Soft drink–v,g,o,h								
Pathway, 1								
Pathway, 2	−.37	−1.04	.37	.36	.009	−1.00	−.27	.855
Pathway, 3	−.09	−.41	.22	.16	.002	−.61	−.07	.974
Pathway, 4	−.24	−.55	.08	.16	<.001	−1.55	−.18	.532
Pathway, 5	−.42	−.79	−.05	0.19	<.001	−2.28	−.32	.154
Pathway, 2								
Pathway, 3	.28	−.46	.90	.34	−.007	.77	.21	.939
Pathway, 4	.13	−.61	.74	.34	−.008	.36	.10	.996
Pathway, 5	−.05	−.78	.60	.35	−.008	−.13	−.04	1.00
Pathway, 3								
Pathway, 4	−.15	−.38	.10	.12	−.002	−1.18	−.11	.764
Pathway, 5	−.33	−.62	−.03	.15	−.002	−2.05	−.25	.244
Pathway, 4								
Pathway, 5	−.18	−.47	.13	.15	<−.001	−1.12	−.14	.796
Soft drink–v,g,o,h,a								
Pathway, 1								
Pathway, 2	−.39	−.86	.09	.24	<.001	−1.61	−.28	.491
Pathway, 3	−.14	−.46	.20	.17	−.002	−.83	−.09	.922
Pathway, 4	−.25	−.58	.08	.17	.002	−1.54	−.18	.538
Pathway, 5	−.23	−.53	.06	.15	<.001	−1.57	−.17	.515
Pathway, 2								
Pathway, 3	.26	−.20	.67	.22	−.002	1.16	.18	.774

Pathway, 4	.14	−.30	.57	.22	.001	.64	.11	.968
Pathway, 5	.17	−.26	.55	.20	<−.001	.79	.13	.933
Pathway, 3								
Pathway, 4	−.11	−.39	.14	.13	.004	−.90	−.08	.899
Pathway, 5	−.09	−.31	.11	.11	.002	−.88	−.07	.905
Pathway, 4								
Pathway, 5	.02	−.12	.23	.11	−.002	.22	.02	1.00

† Bias corrected accelerated.

Note. Bootstrapping based on 5000 successful replicates.

Cohen's d does not correct for multiple comparisons.

Mean Difference estimate is based on the median of the bootstrap distribution.

P-value adjusted for comparing a family of 5

The term Pathway is considered to be an abbreviation for the manipulation based on the metacognitive pathways of persuasion.

4.3 DISCUSSION – THIRD AND FOURTH STUDY

The following contains the discussion of the results presented. In the beginning, the expected results are compared with the actual results, interpreted, and the possible causes discussed. Then possible limitations and consequences of the third and fourth studies are revealed and discussed. Implications for the science and practice will also be derived from the interpreted results and their limitations.

4.3.1 Interpretation

The third and fourth experiments investigated any significant differences between the metacognitive pathways of persuasion depending on complete and missing product congruence to the sensory stimuli. Knowing about the different effects on attitudes through metacognitions related to the product, congruence could enable companies to place optimized product presentations in online stores leading to higher attitudes, thereby reducing the risk of a ruinous competition.

Significant differences were expected between the first route and others. This assumption was based on the findings of the original ELM. The ELM distinguishes between the peripheral and central information processing pathways (Cacioppo et al., 1986; Petty & Briñol, 2014, 2015). The peripheral path is characterized by low involvement, which explains the superficial information processing and low motivation and the resulting low ability to deal with persuasive stimuli. In the case of the peripheral pathway, attitudinal changes can be achieved through peripheral cues, such as attractive commentators or humor. Unlike the central path of information processing, this attitude is unstable and short-lived because no elaboration occurs. This corresponds to a cognitive examination of the stimulus material, which involves the cognitive dimension of the attitude structure in the attitude formation process to a much greater extent. These basic assumptions have been empirically tested in numerous studies as described in Section 2.1.2 and verified in summary in the meta-analysis by Shahab et al. (2021). Similarly, Manca et al. (2020) suggested that persuasive stimuli benefit from strong arguments in

high involvement. Petty and Briñol (2014, 2015) described the pathway of low involvement as the first pathway of metacognitive persuasion, which was justified by affect transfer. The affect transfer in low involvement has been verified by numerous studies and was considered criticism until further development of the ELM as emotions were not the subject of this prior model (Jiang et al., 2016; Yang et al., 2021). The affect transfer was further verified by several experimental studies as described in Section 2.1.2 (Houwer et al., 2001; Jiang et al., 2016; Walther et al., 2011; Yoon & Tinkham, 2013). Similarly, the meta-analysis by Rosengren et al. (2020) based on 67 primary studies supports the direct influence of emotions. However, Petty and Briñol (2014, 2015) noted that when attitudes are changed in high involvement, emotions involve different cognitive processes and influence attitude depending on the time of awareness. Using the multicomponent model (Zanna & Rempel, 1988), a difference between attitude formation in low versus high involvement can be argued, since in high involvement, there is a cognitive and emotional elaboration, involving both dimensions (Cacioppo et al., 1986; Petty & Briñol, 2014, 2015). Thus, the cognitive dimension is involved differently from low involvement because emotions are expressed based on affect transfer. Therefore, within the framework of the fourth hypothesis, it is assumed that significant differences in attitudes should be observed between the first and other metacognitive processes. Furthermore, as part of the third hypothesis, it was examined whether these results differ in the case of extant and missing congruence. The reason behind the third hypothesis related to the congruence level can be read in detail in Sections 2.3 and 3.3.1. The following results are discussed based on the metacognitive pathways compared to the first pathway of metacognitive persuasion.

The second path of metacognitive persuasion describes the situation of the perceived attempt to get influenced. Petty and Briñol (2014, 2015) highlighted that the perceived attempt to get influenced increases involvement. According to Blanz (2021), this supports the reactance theory statements since such an aversive state is generated. According to the cognitive dissonance theory based on the reactance theory, Festinger (1957) found that people perceive aversive states as unpleasant and try to avoid them. However, Petty and Briñol (2014, 2015) also demonstrated that recipients are more attentive in a perceived influence attempt and search specifically for information. Consequently, the hypothesis assumed in the

experiment was that the attitude formed by the second path was significantly higher than that of the first path, both with existing and no congruence. Notably, within the framework of this hypothesis in Section 2.3, the direction could not be conclusively defined based on the theoretical foundations if there was a lack of congruence. Assuming that the sensory stimuli of the research material were evaluated neutrally to positively using the SPI, it was assumed in the hypothesis derivation that the attitude of the second pathway was higher than the first pathway. In all but one grouping, attitude toward superadditivity, defined by the number of sensory stimuli and situation of congruence, was higher but not significantly. Only for the products with a missing product congruence and four sensory stimuli, the attitude of the first pathway was significantly higher. It seems as if the effects assumed in the context of the hypothesis were only present to a lesser extent and are therefore not significant. An explanation could be based on the assumptions of Friestad and Wright (1994) persuasion knowledge model. Friestad and Wright (1994) revealed that recipients who actively expose themselves to a possible purchase situation are aware of the probability of attempts to influence them and use their knowledge. J. W. Brehm (1966) and S. S. Brehm (1981) found that recipients can also interpret the perceived influence attempts as interfering with their freedom to make decisions. Depending on how important the recipient perceives their freedom of choice in this situation, the endangered alternative may be revalued or even reacted to defiance. However, if the recipient exposes themselves to a purchase situation with the knowledge of the influence, as Friestad and Wright (1994) described it, and simultaneously, it is assumed that the involvement increases consequently, as Petty and Briñol (2014, 2015) found, the results could probably be explained well. Even if the assumptions of the reactance theory (J. W. Brehm, 1966; Festinger, 1957) and considerations of the persuasion knowledge model (Friestad and Wright, 1994) are not very recent, current studies support the assumptions that the consumers are also aware of influencing attempts (Afshar Jalili & Ghaleh, 2021). However, clear impulses and attempts to influence can be perceived and, with a high probability, lead to a reactive behavior, as observed by Shoenberger et al. (2021) and Hu and Wise (2021). Accordingly, it could be assumed that the participants in these experiments were more critical of the research material because of the high involvement based on the knowledge of the attempt to get influenced. Since the attempt to influence is conscious, there is

no reactive, defiant behavior; thus, the attitude is more elaborate. As suggested by Petty and Briñol (2014, 2015), the recipients perceive the sensory stimuli and serve as arguments for the formation process of attitudes. This explains the higher mean value of the attitude for the second pathway than for the first pathway. However, it must be considered that the effect of superadditivity cannot be observed. The mean value of the attitude for products with a higher number of sensory stimuli is not always higher at both levels of congruence and, with one exception, not significant. Accordingly, it can be deduced that the second path of metacognitive persuasion does not lead to a significantly higher but probably more elaborate attitude.

Within the framework of the third, fourth, and fifth path of metacognitive persuasion, the point in time and kind of emotional priming is emphasized. Within the third pathway, the information is processed initially, and subsequently the recipient is emotionally activated. Going with the fourth pathway, first, there is an emotional activation through an affective prime, and subsequently the information processing follows. The fifth pathway of cognitive persuasion corresponds to the data from the first two experiments and describes the information processing activated by a language-based stimuli and emotional activation resulting from the content. In all the three cases, there is a high level of involvement so that emotions also accompany the elaboration of the arguments, and the attitude is formed from the result. In the three independent meta-analyses by Buhle et al. (2014), Morawetz et al. (2017), and Kohn et al. (2014), it was demonstrated that the amygdala is associated with an emotional activation of the recipient and is even activated in information processing processes that are emotionally independent. In a clinical fRMI scan-based experimental study with 18 subjects, Sarkheil et al. (2019) observed that the amygdala is primarily used for emotional regulation and while protecting the consciousness from particularly negative stimuli. Based on the measurements of the basolateral amygdala neurons, Beyeler et al. (2016) verified the assumption that activation of the hippocampus through retrieval of long-term information is accompanied by activation of the amygdala and thus emotional activation of the recipient. These findings are consistent with Paivio's (1969, 2009) dual coding system theory concerning the multisensory stimuli. Each sensory stimulus is encoded independently such that each sensory stimulus is associated with higher levels of cognitive information processing and activation of the

hippocampus, and, hence, emotional activation. A new fMRI-based clinical study by Noto et al. (2021) showed that certain amygdala areas are generally activated by the olfactory stimuli. The reason for the emotional activation of the recipient with an increased cognitive information processing capacity is based on the amygdala regulation. According to this idea, supported by numerous fMRI studies, the amygdala should protect people from cognitive overload by emotionally activating people, thereby overriding the intensity of cognitive activation and inhibiting it (B. P. Acevedo et al., 2018; B. P. Acevedo et al., 2014; Jagiellowicz et al., 2011; Marxen et al., 2016; Mitchell & Johnson, 2009; Morawetz et al., 2017; Reimann et al., 2010; Schmidt & Blankenburg, 2019; Swartz et al., 2014; Yoo et al., 2003). In line with the assumption of the multidimensional attitude structure, the assumption could be argued that with an increased emotional activation, the affective dimension of the attitude structure is more influenced; thus, the attitude as a whole results in a higher mean value in the measurement than with information processing without additional emotional ones activation.

Similarly, Petty and Briñol (2014, 2015) argued, expecting more intensive elaboration by an increased emotional activation. Accordingly, the cognitive dimension of the attitude structure also increases as far as the persuasive stimulus is perceived positively. Furthermore, as part of the fourth path of metacognition, there should be a feedback of the behavior based on the smiling person on the product representations in both experiments, into the emotional world, thereby leading to an additional emotional activation. That smiling person is sufficient and can be derived from the explanations on the embodiment research in Section 2.1.1 for which the research material in Section 4.1.2 was already explained in detail. Embodiment describes the feedback of behavior into the emotional world (Strack et al., 1988). The assumption of this effect is based on the fact that humans have learned to associate certain emotions with a particular behavior (Scheier et al., 2012). As per the experiment by Strack et al. (1988), a smile stands for sympathy and can be triggered by an unconscious smile or, strictly speaking, an emotionless tensing of the muscles, which are also activated when smiling. Similarly, outstretched or bent arms influence attitudes and expectations (Förster, 2003, 2004; Förster & Werth, 2001). Seeing emotionally learned behavior or representations remind the recipient of such behavior that leads to uncontrolled cognitive processes and inevitably activates the activation or empathy of the emotion associated with

this behavior (Bargh & Chartrand, 1999; Elder & Krishna, 2012; Scheier et al., 2012).

As part of the third path of the persuasive information processing, emotional prime will occur through the persuasive stimulus. Consequently, unlike the aforementioned fourth pathway, emotions only become salient after processing the information. Based on the image superiority effect (Paivio, 1969, 2009), images are processed in preference to text; because of the product presentations in this study, demonstrate how a hand that is holding the bottle or touching the t-shirt, which should be used to retrieve haptic sensory information via imagery, which, however, have to be interpreted by cognitive processes through a top-down process. In a high involvement situation, emotions lead to a more reflective engagement with the persuasive stimulus and a stronger conviction of the formed attitude (Clark & Evans, 2014; DeSteno et al., 2004; Huntsinger, 2013; Martin et al., 1997). If the time at which emotions become salient is considered, it becomes clear that in the case of a previous cognitive activation, emotional experiences and thoughts are less strongly considered in the formation of attitudes than objective arguments. If emotions are salient before information processing, the attitude is still reflected and elaborated; however, the subjective experiences have a more substantial influence on the attitude (Briñol, Petty, & Barden, 2007; Briñol, Petty, Gallardo, et al., 2007; Briñol, Petty, Valle, et al., 2007; Cian et al., 2015; Hasford et al., 2018; Petty & Briñol, 2014, 2015; Petty & Krosnick, 1995).

In the context of the fifth path of persuasive information processing, it is described that the language-based persuasive stimuli result in a different attitude formation process in high involvement. Petty and Briñol (2014, 2015) based this assumption on the fact that the probability of an affect transfer should be significantly lower than in the third pathway of information processing, that the cognitive activity is many times higher. The rationale is that the verbal information is processed differently than the nonverbal information, as detailed in Section 2.2.2 concerning the dual coding system (Paivio, 1969, 2009). The verbal information is processed as logogens and is dependent on imogens, the nonverbal object-related information. Even if the object-related information is encoded independently from one another, these can enter into referential connections during decoding, whereby new object-related information can be enriched with emotional and sensory information (Paivio, 1969, 2009). Referring to the fifth information processing path, the verbal information is processed first and can awaken new associations through

referential connections. While in the third pathway of information processing, the enrichment of stimuli via the top-down processes is based on the retrieval of experiences and associated emotions. In the fifth pathway, referential connections are also activated by activating both systems, whereby imogens assume new identities. However, similar information can also be collated again through this connection. Moreover, this happens with the third and fourth pathways of information processing, whereby the dual coding processes are activated directly and not after sensory perception. Similarly, the information processing of verbal information is a cumulative process as it is justified explicitly by the phonetic loop in the working memory model (Baddeley & Hitch, 1974; Guazzo et al., 2020; Hitch & Baddeley, 1976). Linguistic information in the phonetic loop is repeated for several seconds and enriched with information until no more enrichment occurs. Subsequently, this information is passed on to long-term knowledge systems and, if necessary, replayed if the information from the long-term knowledge systems change; the information content through the interaction can be enriched with the current information of the environment (Baddeley & Hitch, 1974; Guazzo et al., 2020; Hitch & Baddeley, 1976). In this experiment, these language-based processes are only activated at the end of information processing because the subjects perceive the product descriptions last.

Based on these assumptions, it was hypothesized that the attitude of the participants is significantly higher for the second, third, fourth, and fifth pathways than for the first pathway, which is characterized by lower involvement. Furthermore, it was assumed to elicit—based on the embodiment—that a significantly higher attitude could arise in the evaluation based on the fourth compared with the third pathway of information processing. However, none of these assumptions could be observed either in the third experiment—with extant product congruence, or in the fourth experiment—with missing product congruence. These observations contradict the argumentation in the context of the hypothesis derivation; therefore, possible causes should be discussed.

The fact that the difference between the third, fourth, and fifth paths could not be observed either in terms of superadditivity or cross-modal correspondence could be justified because emotional activation might be present (Acevedo et al., 2014, 2018; Jagiellowicz et al., 2011; Kohn et al., 2014; Marxen et al., 2016; Mitchell & Johnson, 2009; Morawetz et al., 2017; Noto et al., 2021; Reimann et al., 2010;

Schmidt & Blankenburg, 2019; Swartz et al., 2014; Yoo et al., 2003) but does not represent a significant difference. However, this leads to a further assumption. Thus, in the third, fourth, and fifth pathways, there was an increase but not a significant affective change of attitude. In high involvement, emotions serve ostensibly as arguments and, consequently, to a more reflective attitude (Clark & Evans, 2014; DeSteno et al., 2004; Huntsinger, 2013; Martin et al., 1997; Petty & Wegener, 1993). Sensory information should have been encoded independently related to the dual coding system (Paivio, 1969, 2009) and should have led to an increased cognitive output, resulting in an increased emotional activation in terms of the amygdala regulation (Acevedo et al., 2014, 2018; Jagiellowicz et al., 2011; Krishna & Schwarz, 2014; Marxen et al., 2016; Mitchell & Johnson, 2009; Morawetz et al., 2017; Reimann et al., 2010; Schmidt & Blankenburg, 2019; Yoo et al., 2003). However, as this would now have to be perceived as arguments with high involvement, this should at least lead to a significant increase in the cognitive dimension of attitude (Petty & Briñol, 2014, 2015; Zanna & Rempel, 1988). The highest cognitive performance was associated with the fifth information processing pathway, as previously noted, following Baddeley's working memory model (Baddeley & Hitch, 1974; Guazzo et al., 2020; Hitch & Baddeley, 1976) and Paivio's dual coding system (Paivio, 1969, 2009). This effect should have been further enhanced by the cumulative effect of superadditivity (Krishna, 2011; Ruzeviciute et al., 2020). However, the results in Table 8 are not consistent with this reasoning. Again, the products demonstrate apparent differences in the mean of the attitude concerning the metacognitive and number of sensory arguments. Table 10 reports no coherent findings regarding the cross-modal correspondence, since the mean values of the attitude appear arbitrary and do not depend on the combinations of the sensory stimuli or metacognitive paths of persuasion.

According to the dual coding system by Paivio (1969, 2009), the sensory stimuli are coded independently. According to the explanations regarding the biopsychological activation with the associated emotional activation, it could be assumed that a higher emotional activation arises; however, this may not have any significant relevance for the attitude structure in association with the imaginative perception. Possibly, the additional emotional stimuli do not add any additional value compared with the multisensory stimuli as it serves as an argument for the elaboration in a high involvement. Similarly, the sensory stimuli are not perceived

physically but imaginatively, barring the visual sense. In principle, however, Elder and Krishna (2021) explained that the imaginative sensory stimuli could also influence consumer behavior. However, in this experiment, another factor occurred, that is, consumer behavior in an online store with many other stimuli, which actively interacted with the consumer perception. Perhaps, this interaction could influence the effects of the imagery; therefore, the participants did not perceive all sensory stimuli precisely. Following these assumption, the different sensory stimuli were undifferentiated receipt owing to different interactive experiences with the online store with the consequence that the sensory stimuli were no longer explicitly elaborated and integrated into the attitude structure as an undifferentiated conglomerate. Therefore, it could be that multisensory was an argument but only as one and not, for example, as four arguments, that is, four sensory stimuli in the case of product presentation. However, this seems unlikely as the online stores were used in the previous studies.

In the context of the first pathway of metacognitive persuasion, affect transfer was a crucial factor for attitude change (De Houwer et al., 2001; P. Li et al., 2020; Walther et al., 2011; Yoon & Tinkham, 2013). Since emotions serve as arguments in high involvement and lead to increased cognitive performance, there is also, however, an emotional activity through the amygdala regulation. The higher attitude was hypothesized by addressing both the affective and cognitive dimensions compared with only the affective dimension in the context of affect transfer. However, the lack of difference could also be present since emotions were not irrelevant to subjects' attitudes and purchase intentions in the experimental design. Thus, it would be an alternative to the previously discussed assumption of an undifferentiated conglomerate. Under this assumption, the restrictions of reactivity would then apply. Since the participants were aware of being the subject of an empirical survey, they could have been more critical in their purchase decision and attitude formation process as opposed to their attitude in a real situation. In addition, the influence of the brand could be considered. All products belonged to the same brand, which may have already primed the subjects leading them to perceive the products as similar. Thus, the difference between the control product—the nonmultisensory product—was no longer considered while attitude formation. However, this idea leads back to the argument with the undifferentiated conglomerate, but this is more an idea than a well-founded and probable

explanation.

Another explanation could lie in the perception of the participants. Participants were assigned to the group regarding the second path of metacognitive persuasion when the research goal was presumed to be influenced by the sensory product information. The number of these participants was several times smaller than in the other groups, as reported in Figure 12. This implies that, conversely, only a fraction of the participants focused on the sensory stimuli. It could now be assumed that an affect transfer could be concluded since these stimuli were not consciously processed then, and the fundamental assumption of elaboration concerning these stimuli would not apply. The involvement level was controlled by the cover story, and, consequently, the subjects were more motivated to put themselves into the situation. Considering the processing time of the studies, it can be observed that the processing time in a high involvement situation was at least 25% higher. Thus, the processing time for a low involvement situation was an average of 6.1 minutes in the case of missing or partial congruence and 6.4 minutes in the case of existing congruence, whereas the processing time was an average of 8.2 minutes in the case of high involvement with missing or partial congruence and 9.2 minutes in the case of given congruence. The framework conditions of the involvement were thus given, and the research material can be justified based on theoretical considerations and congruent studies. Considering that only two seconds of customers' viewing time is often given to advertisement, so far no attention is generated (Jannizweski, 1993)—six minutes seems quite a lot. However, these six minutes refer to the complete execution of the experiment, that is, including the response to all items. It could be discussed whether there was low involvement as the research material was examined because the participation time would otherwise have been even shorter. Nevertheless, it should not be forgotten that a targeted purchase also involves an active search for information. The 25% difference, however, illustrates a clear difference, and, thus, an increase in involvement can be considered probably, even if a classic low involvement situation cannot necessarily be assumed. Furthermore, this could have contributed to nonsignificant differences. However, it cannot be excluded that the subjects considered the multisensory stimuli too obvious and thus did not direct their attention to the multisensory stimuli. This perspective could again lead to the idea of the undifferentiated conglomerate. This, in turn, would have led to the

multisensory stimuli having a subliminal influence on the attitude formation process, which would again argue for reactivity but could also provide a good turnaround. Under this assumption, the multisensory stimuli in high involvement with subliminal perception would not influence the attitude structure. This again would be congruent with the previous remarks on elaboration in high involvement since unconscious stimuli are not consciously elaborated and thus cannot be included in the attitude structure in the central route of attitude change.

However, this seems unlikely, as the product descriptions explicitly describe the sensory properties as purchase arguments. Based on the successfully controlled high involvement, it must be assumed that the participants read this, thereby being aware of the multisensory influence. This leads to the last reasoning, which now seems the most likely based on the previous discussion. As previously verified by various references, highest cognitive performance in the metacognitive pathways of high involvement and its further increase through emotional activation were expected. However, this could not be observed, so it is reasonable to assume that emotions are not used as arguments. Conversely, this can allow the most likely explanation that the activated emotions were not explicit or salient enough and therefore, not consciously elaborated to function as arguments. Accordingly, the recipient must be aware of emotions for metacognitive persuasion. Considering the studies where this was examined and presented in Section 2.1.2, it can be observed that there was an explicit emotional activation in all the cases (Briñol, Petty, & Barden, 2007; Briñol, Petty, Gallardo, et al., 2007; Briñol, Petty, Valle, et al., 2007; Gross, S. R., Holtz, R., Miller, 1995; Hasford et al., 2018; R. Petty & Briñol, 2014, 2015). In the cumulative studies by Briñol, Petty, and Barden (2007) with 92 participants in the first experiment and 89 in the second experiment, by Briñol, Petty, Gallardo, et al. (2007) with 111 participants in the first and 73 in the second experiment, and by Hasford et al. (2018) with 223 and 242 participants in the first and second experiments, respectively, the differences in attitudes and confidence of the participants toward their attitude when explicit emotional information is used to form their attitudes were investigated. In the experiments, as previously noted, it can be assumed with a high probability that the participants perceived sensory stimuli differently, but the emotions associated with them did not and could, therefore, not be considered in the elaboration. In the aforementioned three studies, the emotions were not always product specific but, in any case, of high

intensity. This concludes that emotions do not have to be product specific but must be of high intensity. A further look at the study reveals that the emotions were deliberately elaborated. They had a concrete reference—a self-remembered experience. The emotional activation occurred in the third and fourth experiments by a top-down processes without having information about whether the conscious experiences were activated in the participants owing to the sensory stimuli. This conscious object's independent reference and intensity seem to be an essential factor for a metacognitional persuasion. In conclusion, it is noteworthy that the results do not correspond to the expectations that were derived in the context of the hypothesis in Section 2.3. However, these are only assumptions that can be derived as logical conclusions from the research and theory. In any case, the results offer scope for implications for possible subsequent research.

4.3.2 Limitations

This work is subjected to certain limitations. In order to identify these, compliance with the quality criteria defined in Section 3.1.1 is checked below. Mattila et al. (2021) discuss that the general quality criteria of the quantitative research, reliability, validity, and objectivity, are also fundamental to the experimental research. The quality criteria of reliability and validity can be considered to have been met since empirically tested scales were used, as described in Section 3.1.2. These include the scales for operationalizing attitude and purchase intention according to Spears and Singh (2004) and the SPI from Wiedmann et al. (2017). Objectivity was maintained by ensuring, as planned, that the researcher's subjective influences had no impact on the results. In addition to the operationalized variables, an anonymized sample survey was carried out using the Universities Hochschule für Oekonomie and Management recruiting platform and distribution via social media. The researcher did not know the participants and were not able to contact them before participating. The provider, SosciSurvey, also blocked the experiment at the survey time. Likewise, the cleanup and evaluation of the data were carried out according to objective specifications, such as the IQR distance in the outlier analysis or statistical methods. The complexity of the study is reduced by dividing it into four sub-experiments. Looking at the origins of the

data and the division of the groups according to the paths of metacognitive persuasion, the high complexity of the design cannot be denied. The division into substudies was also recommended by Mattila et al. (2021). The procedure and structure of the studies were also formulated and reflected on in advance, and the procedure was validated using primary literature. This includes the quality criteria mentioned and a review of the methodical approach of other scientists in multisensory research, whose studies were presented in detail in Section 2.1.2 and the reasoning for these methods in Section 4.1.

The importance of manipulation check has been highlighted in Section 3.1.1 (Carpenter et al., 2005; Hauser et al., 2018; Kirk, 2011; Morales et al., 2017). The manipulation was checked in several stages. In the first experiment, the SPI (Wiedmann et al., 2017) was used to validate whether the participants perceived the respective sensory stimuli and evaluated them slightly positive. This was the case described in Sections 3.2.1 and 3.3.2, and since the research material was adopted unchanged, the first manipulation could be verified. The second manipulation was carried out by controlling the level of involvement through a varying cover story, compliance with which was already discussed in unit 3.3.1 and considered to be fulfilled. In the third and fourth experiments, the cover story was removed entirely for the groups in the low involvement situation. Only the instructions were formulated. In 4.3.1, the manipulation of involvement was considered to be achieved since it could be observed that the participants in the created low involvement situation needed 25% less time for the survey. The time argument was made because, unlike those in the high involvement, participants in a low involvement situation do not actively seek information and tend to expend little to no effort in acquiring and processing information (Petty, 1986). Lastly, manipulation occurs by altering information processing in response to the metacognitive pathways of persuasion. The manipulation by changing the research material, with the sensory stimuli remaining the same, and the connection to the metacognitions was justified in Sections 4.1.1 and 4.3.1 and implemented analogously. As in the first two experiments, compliance with the ethical guidelines based on the guidelines of APA was continued unchanged. The other statistical indicators were also interpreted in addition to the p-value, as described in 3.1.1 and implemented in Section 4.2.

A more significant challenge seems to be the reality criteria of experimental

research, according to McQuarrie (1998). Because, as the interpretation in 4.3.1 clarifies, no clear reasons for the lack of the expected results could be found. Instead, it was argued and deduced that reactivity among others could cause the results. Compliance with McQuarrie (1998) reality criteria should reduce the likelihood of reactivity. This was also discussed in 3.1.1, justifying that both the products and the websites are created in-house and are intended to represent an online shop that is true to the original. Despite compliance with these criteria, it appears that the participants were aware of taking part in an empirical survey during the formation of their attitudes, and this awareness led them to answer differently than they would have done in reality, including, much more critical handling of the research material. Also, it must be noted that, as in the first two experiments, the majority of the participants were part-time students who were, on average, in their mid-20s and had a moderate income. This sample should be evaluated more critical regarding the representativeness.

4.3.3 Generalizability and implications

Even if the results of the third and fourth experiments do not correspond to the expectations derived from the theory, implications for science and practice can be derived. In the third and fourth experiments, no significant differences could be observed between the metacognitive pathways of persuasion. However, it has already been discussed that the manipulations were performed successfully so that the results were caused by reactivity or salient emotions. Assuming that reactivity was present and the assumptions derived from the theory were correct, specific recommendations for action could be derived. As thoroughly described in Section 2.2.2, numerous empirical surveys indicated that when congruence exists, the influence on consumer behavior is more significant (Huang et al., 2019; Knoeferle et al., 2015; Saluja & Stevenson, 2018; Spence & Levitan, 2021; Turoman et al., 2017). Therefore, it can be deduced that companies should focus on the congruent sensory stimuli for multisensory products so that the sensory stimuli match the characteristics of the product. Similarly, the sensory stimuli should also match consumer expectations (Eklund & Helmefalk, 2018). Multisensory products can

attract attention, influence attitude and perception, and increase purchase intention (Ghosh et al., 2021; Krishna et al., 2016). However, considering the research subject, it should be differentiated which of the metacognitive pathways of persuasion concerning multisensory products seems the most appropriate for companies.

The second path of metacognitive persuasion appears to harbor the most significant risk in terms of reactance. Petty and Briñol (2014, 2015) found that the perceived attempt to influence increases involvement while leading to increased elaboration. This, in turn, describes the central pathway of information processing and thus, the possibility of lasting and stable attitude change (Cacioppo et al., 1986). However, a perceived attempt to influence may interfere with the freedom of choice and thus increase the likelihood of reactance behavior (J. W. Brehm, 1966; S. S. Brehm, 1981; Festinger, 1957). Reactance carries the risk of product avoidance behavior and negative attitude change toward the product and brand (Hu & Wise, 2021; Shoenberger et al., 2021). Even though the consumer often suspects an attempt to influence (Friestad & Wright, 1994), a risk with negative consequences remains. Companies should avoid highlighting attempts to influence or limit freedom to make decisions. Furthermore, similar implications can be found in the practice-oriented literature (Kroeber-Riel, 2013); therefore, the second path of metacognitive persuasion should be avoided by companies.

In addition, the third, fourth, and fifth pathways of metacognitive persuasion describes the situation of high involvement. The third pathway describes the attitude formation process, where the first objective information of persuasive stimulus is processed, subsequently causing emotional activation, through information processing. Compared with the fourth pathway, emotional activation occurs first, followed by information processing (Petty & Briñol, 2014, 2015). Multisensory products already cause emotional activation, which can be enhanced by increased cognitive performance (Acevedo et al., 2014, 2018; Jagiellowicz et al., 2011; Marxen et al., 2016; Mitchell & Johnson, 2009; Morawetz et al., 2017; Reimann et al., 2010; Schmidt & Blankenburg, 2019; Yoo et al., 2003).

However, while positive thoughts have a stronger influence on attitude in the third pathway of attitude formation, emotions weigh more heavily as arguments in the fourth pathway of information processing (Hasford et al., 2018; Kranzbühler et al., 2019; Manca et al., 2020; Petty & Briñol, 2014, 2015; Shahab et al., 2021). The question of which of these two paths is now better for companies should be

addressed in the added value of the multisensory stimuli for the product benefit. If the sensory aspects also serve as an argument for the product simultaneously, the third pathway should be preferred. In the elaboration, information has an even stronger effect on attitude. For instance, the haptic stimuli for hand creams can be perceived as arguments until this hand cream is used as a product benefit to create softer or healthier skin. The fifth pathway of information processing promises the highest cognitive performance through language-based information processing (Baddeley & Hitch, 1974; Guazzo et al., 2020; Hitch & Baddeley, 1976; Paivio, 1969, 2009; Petty & Briñol, 2014, 2015). Moreover, this should be accompanied by greater emotional activation (Acevedo et al., 2014, 2018; Jagiellowicz et al., 2011; Marxen et al., 2016; Mitchell & Johnson, 2009; Morawetz et al., 2017; Reimann et al., 2010; Schmidt & Blankenburg, 2019; Yoo et al., 2003). However, the willingness of consumers to engage in a more intensive cognitive information processing when making a purchase decision should be questioned. In any case, a reference to the level of involvement should be established here, thereby making a more differentiated statement. The higher is the involvement, the more willing the recipient is to actively process and elaborate on information (Cacioppo et al., 1986; Manca et al., 2020; Petty & Briñol, 2014, 2015; Shimp et al., 1991). Therefore, the reference to the product must be established. Products with high investment costs or which are used to solve problems in a personal involvement, such as medication, are likely to determine the level of involvement (Cacioppo et al., 1986). The fifth pathway, followed by the third pathway of information processing, seems to be the most appropriate for these same products.

However, not all products are associated with a high level of involvement. Eberhart and Naderer (2017) used a mixed-method design based on 10,272,477 data sets and 21 thorough psychological interviews to demonstrate that recipients of drugstore items in a low involvement situation were motivated to buy particularly by the haptic and olfactory stimuli. Therefore, a high level of involvement is necessary to influence purchasing behavior. Concerning this, Petty and Briñol (2014, 2015) describe the first path of metacognitive persuasion, which is defined by low involvement and justifies influencing the consumer behavior by an affect transfer. As the studies by Eberhart and Naderer (2017) revealed, this approach seems suitable for products with a low involvement level. Even if the attitude is unstable and short-lived (Petty, 1986), feedback effects on attitude can be achieved.

Following the compliance force paradigm (Festinger, 1957), the behavior would be exhibited by purchasing these products. As people strive for a balance between attitude and behavior, the consumer is now inclined to justify past purchasing behaviors, and attitudes are then adjusted to behaviors with a positive effect on the product evaluation and attitude (Batra & Ray, 1986b).

As previously described, reactance was discussed being plausible for the unexpected results. Derived from this, future experiments should try to observe consumer behavior in a field setting and ensure that the attitude is formed in this situation so that it is not influenced by reactivity. There are already experimental studies that have already been presented in Chapter 2, as described by Hilken et al. (2017), Y.-C. Tan et al. (2021), and Eberhart and Naderer (2017). In the context of the present experiment, instructions could have been formulated, for example, to put the products that the participant had decided on, in the online store's shopping cart ,and then record the attitude for these products. This was not possible in this experiment for technical reasons, but represented as an essential addition in terms of reactivity for future research. However, studies such as those by Meng et al. (2021), Kivioja (2017), and Haase et al. (2020) also made it clear that, despite valid research designs, unexpected results can be observed, and it is therefore discussed as a research gap that not all variables relating to multisensory marketing are known. Based on this, qualitative research should be focused on consumer research in the future. The complexity clarifies that the recipients themselves are unaware of all influencing factors, so the implicit attitude should be recorded using computer-aided or associative methods, after discussing with the recipient. Particularly, information on related associative networks can be found through free-associative methods. In addition to concrete object-specific information, possibly unexpected connections to other associative networks are opened, and new valuable information could be uncovered. The basic idea that goes back in particular to the assumptions of semantic memory. For various information, a complex attached system is organized in associative networks and can be connected to other associative networks (Collins & Quillian, 1969).

5 GENERAL CONCLUSION AND FUTURE RESEARCH

This chapter aims to provide a coherent presentation and summary of all the four experiments' main results and findings. Concerning the hypothesis testing, exemplary results are taken up again, which were causally used to falsify or verify the hypotheses. Likewise, all the discussed results are summarized, and possible synergies are discussed, followed by a summarizing conclusion and the recommendation of possible inclinations for future research.

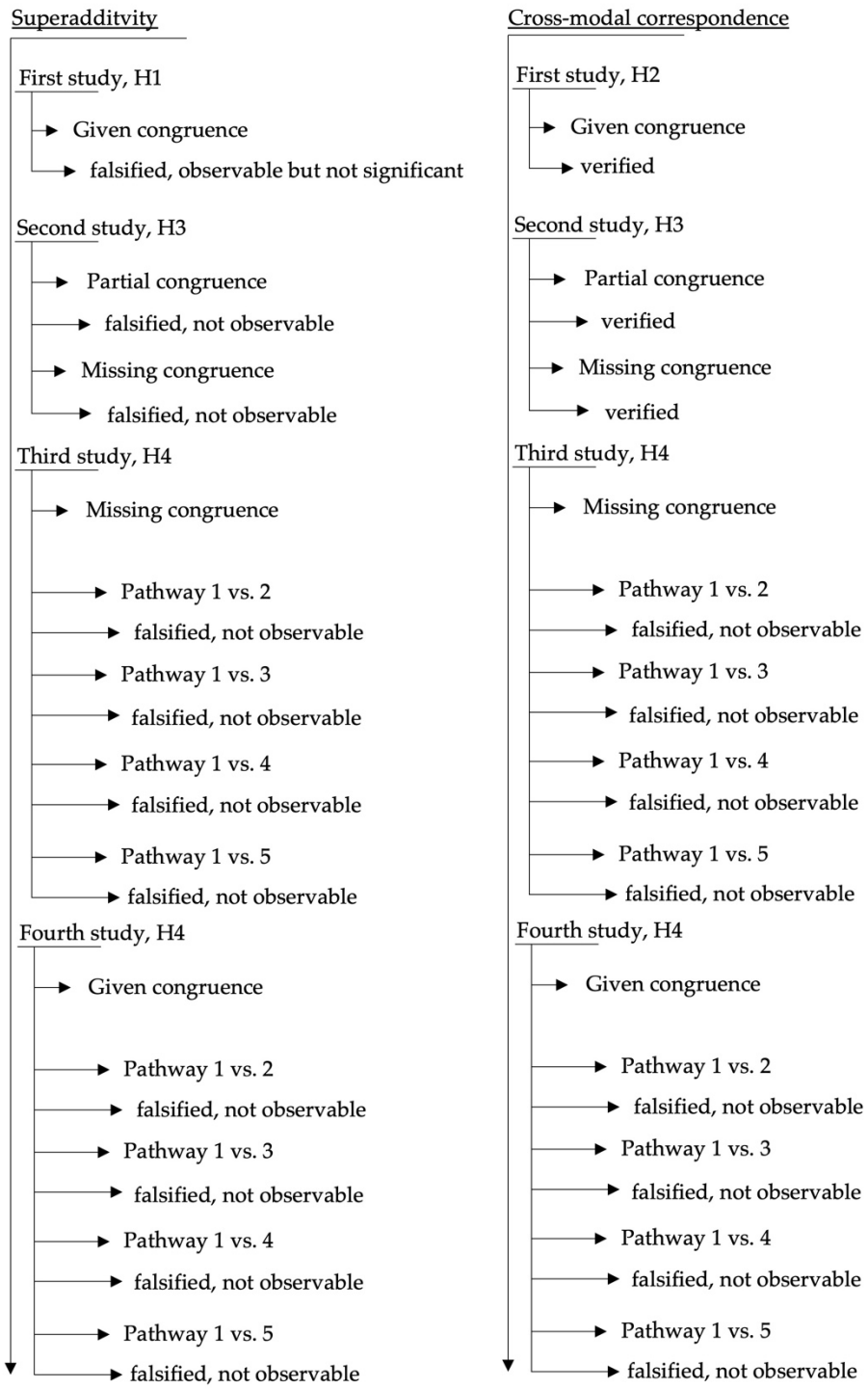
5.1 CONSOLIDATION OF ALL RESULTS AND GENERAL CONCLUSION

Within the framework of the four experiments, the extent to which multisensory marketing can influence consumer behavior was investigated. The focus of the study was on the effects of superadditivity, cross-modal correspondence, and congruence since these effects, as described in section 2.2, are the main focus of multisensory consumer research. Since research into the connection between multisensory stimuli and the formation of attitudes continues to be discussed as a research gap, it was argued in Section 2.3 to investigate whether the metacognitive information processing processes can contribute to closing the research gap (Elder & Krishna, 2021; Krishna et al., 2016; Spence, 2022). Answering the research questions successively, four cumulative experiments were conducted. The first experiment investigated whether the effect of superadditivity and cross-modal correspondence can be observed for congruent products. A total of 30 products were created, which were manipulated in their number of sensory stimuli and combination of sensory modalities. In the second experiment, additional manipulation was done for congruence. The same sensory stimuli were examined but transferred to partial and noncongruent products. While the research had discussed that congruence is a prerequisite for the influence of multisensory stimuli on consumer behavior, the second experiment must investigate what happens if congruence to the product is successively reduced. For this purpose, selected sensory product combinations from the first experiment were adopted and applied to products with partial or no congruence. The focus of all the experiments was also

the applicability for online stores and, derived from this, concerning imagery. There should have been an opportunity to draw concrete implications for practice and science following these two experiments. Irrespective of whether the observations of the first two experiments provided significant results, the third and fourth experiments were intended to examine whether attitude formation can be distinguished in terms of its formation in one of the five different metacognition pathways. It was argued and expected that a higher cognitive performance leads to higher attitudes to the extent that the products are perceived positively, and the product properties based on the sensory stimuli match those of the attitude structure. For this reason, significant differences between the first and the remaining pathways were expected. While in the third experiment, products with missing congruence were used, in the fourth experiment, products with given congruence were used. There was a manipulation of the products for the third and fourth paths of information processing, both for those with a given and those with missing congruence. The level of involvement was also manipulated with a cover story since low involvement was necessary for the first path of metacognitive persuasion in the third and the fourth experiments.

Figure 14

Consolidated overview of the study results



After a summary has been given regarding the research objectives and the connections between the four experiments, an overview of the most important results and their discussions will now be given below. Observations were also made that were not formulated in any hypothesis. While the results have already been presented and discussed in detail in Chapters 3 and 4, the most critical discussions are taken up and brought together to reach a definitive conclusion, thereby reducing redundancies. More in-depth aspects of the following conclusions can be found in the discussions in Sections 3.3.1 and 4.3.1, whereas the focus here is on consolidating the knowledge gained. Concerning the effect of superadditivity or in the context of H1, it was assumed that a significant increase follows an increase in sensory stimuli in attitude and purchase intention. It could be observed that an increase in the mean value was seen with the increase in sensory stimuli both in the case of attitude and purchase intention. However, the cumulative increase was not significant, so the H1 had to be rejected. In Section 3.3.1, four different reasons were discussed.

It was discussed that superadditivity was indeed present in the data but that the lack of significance was due to the effect being too weak. However, this was discussed as not conclusively assessable because the main difference in attitude was significantly higher for the products with two versus three sensory stimuli than for the products with three versus four sensory stimuli. According to this observation, while the products with four sensory stimuli were preferred over those with three sensory stimuli, the preference was significantly more pronounced for the products with three sensory stimuli than two. This observation suggests that the marginal utility will eventually be reached with the increase in the sensory stimuli. Consumers prefer products with more sensory stimuli, and the level of preference, represented by the increase in attitude, decreases. However, if the main differences of all the pairs are used in this argument, the observations are contradicted because the mean differences do not decrease consistently with a cumulative increase in the sensory stimuli. Another aspect discussed was that the sensory stimuli were not specific; therefore, each product was perceived as an undifferentiated conglomerate. This reasoning was rejected because the subjects could evaluate all the sensory stimuli of all products. Furthermore, the website was addressed in the discussion. This could have had an additional influence on the participants' attention, thereby influencing the results. At this point, however, the

results of the other experiments can be included. The effect of the cross-modal correspondence could be observed in both first and second studies. If the website had such confounding variables, there is a high probability that the effect of the cross-modal correspondence could not have been observed either. In addition, it was discussed that the lack of physical perception could have influenced the results. This has been refuted based on numerous studies, which have already verified it. An increasing mean attitude and purchase intention with a cumulative increase in the sensory stimuli were no longer observable concerning the decreasing congruence. This already corresponded to the expected results that an existing congruence to the product is an essential factor in online stores based on imagery. The added value of this observation lies in the fact that even with partial congruence, the cumulative increase in the mean was no longer observable.

In addition to superadditivity, the effect of cross-modal correspondence with decreasing congruence was investigated. The effect of cross-modal correspondence could be observed in both attitude and purchase intention with given congruence. For attitude, the pairs vision, gustatory (p_{tukey} = .013, −.37, 95% CI [−.56, −.17]) and vision, olfactory (p_{tukey} = .003, −.55, 95% CI [−.83, −.28]) demonstrated significant differences with moderate effect sizes to the control group (D_{Vg} = −.29, D_{Vo} = −.44). For the conglomerate of these three stimuli ($p_{tukey\ v,o,g}$ = .386, .34, 95% CI [−.06, −.62]), significant differences could not be observed. Furthermore, a positive sign was observed in the mean difference, so for the conglomerate of the three sensory stimuli, the subjects preferred the product of the control group, although the subjects preferred the products with the same sensory stimuli recombined in different products compared with the control group. Different observations were made for purchase intention. There were no significant results for vision, gustatory (p_{tukey} = .223, −.31, 95% CI [−.52, −.09]) and vision, olfactory (p_{tukey} = .357, −.38, 95% CI [−.70, .09]). The conglomerate of these three senses indicated significant differences with the control group (p_{tukey} = <.001, .66 ,95% CI [.33, .92]) with a moderate effect size d = .50. As with the attitude, a change in sign was observed, although the direction was different. In the purchase intention, the conglomerate was preferred, compared to the products where only two of the three identical sensory stimuli were combined at a time.

These observations corresponded to the expectations and verified H2. Furthermore, three aspects were discussed in Section 3.3.1. The cross-modal

correspondence effect could be observed in attitude change with the gustatory and olfactory stimuli. Both the sensory stimuli tended to be evaluated positively within the SPI and, unlike the haptic and auditory stimuli, were not unusual and thus not unexpected. An interaction of the congruent and expected sensory stimuli was related within the framework of the haptic–visual interaction model (Eklund & Helmefalk, 2018) concerning the interaction of haptic and visual sensory stimuli. Based on the observations and previously described results, this model could also be applied to the interaction of visual and olfactory and visual and gustatory sensory stimuli but not to products with more than two sensory stimuli.

Furthermore, the observations correspond to the observed consumer behavior in the experiment by Morrin and Chebat (2005), where negative interactions on purchasing behavior could be observed. However, based on these results, it can be observed that attitude and purchase intention behaved contrary to each other in the second experiment. In this context, it has been discussed that this may lie in the subjective norms or perceived behavioral control concerning the model of planned behavior (Ajzen, 1991). A controversial discussion ensued in which the reactance theory (J. W. Brehm, 1966), persuasion knowledge model (Friestad & Wright, 1994), extended-transportation-imagery model (Van Laer et al., 2014), and other group behavior theories in the absence of a subjective norm were considered. The discussion was left without clear interpretation and pointed to possible variables not considered in these models, thereby establishing the link to the third and fourth studies. The reasoning for the manipulation of congruence was similar. The cross-modal correspondence effect was observed using the combination of vision, haptic, acoustic, gustatory for attitude ($p_{tukey\ v,h,a,g} = .004$, .49, 95% CI [.19, .80]), and purchase intention ($p_{tukey\ v,h,a,g} = .002$, .68, 95% CI [0.32, 1.04]). This combination had a positive main difference since the subjects evaluated the chocolate without the multisensory stimuli better. All the other combinations in which these sensory stimuli were included, the chocolate with multisensory stimuli were evaluated better. Concerning the lack of congruence, no significant results could be observed, so there were differences with given congruence, and the assumptions of H3 regarding the cross-modal correspondence could be accepted.

The third and fourth experiments examined to what extent the attitudes that were formed depending on the respective metacognitive processes led to significant differences concerning one another. The underlying research question

was whether it is permissible to assume that one of the metacognitive pathways of persuasion leads to a significantly higher attitude than others or something else. Should this hypothesis be correct in one or more ways, concrete implications for practice could have been derived. However, as no significant differences could be observed concerning the superadditivity or cross-modal correspondence with given congruence in the fourth experiment and missing congruence in the third experiment, only theoretically justifiable implications were possible concerning the metacognitions, as described in Section 4.3.3. in Chapter 2 in more detail. The unexpected results led to the rejection of the H4 and were discussed concerning the seven possible influencing factors, which are also summarized. The seven aspects can be reduced to two essential factors assumed to be possible causes. Reactivity was discussed as a possible reason for the unexpected results. Only few participants correctly identified the research goal and were part-time students of the business psychology course at the FOM. Accordingly, it was argued that the participants were aware of, and were therefore looking for, manipulation that was not based on multisensory stimuli. The deviating focus and the probably much more critical handling of the research material are discussed as possible factors of the unexpected results. This could explain why the effect of superadditivity tended to be observed but not significant. However, the lack of continuity of the mean differences about superadditivity, as discussed in Sections 3.3.1 and 4.3.1, speaks against this. Although reactivity has been suggested as a likely influencing factor, the importance of the degree of salient emotions for metacognition has been argued to be the most crucial factor. The relationship between metacognition and emotions to attitude was made in Section 2.1.2 using numerous primary studies and reviews. In none of these references was a distinction between explicit and implicit emotions. A further look at the study showed that the emotions were deliberately elaborated. They had a concrete reference — a self-remembered experience. The emotional activation occurred in the third and fourth experiments by top-down processes have no information about whether the conscious experiences were activated in the participants due to the sensory stimuli. This conscious object's independent reference and intensity seem to be an essential factors for a metacognitional persuasion. However, this is where the difference between the third and fourth experiments lies. Emotional priming was subliminal through multisensory stimuli in conjunction with cognition and embodiment. An affect

transfer in low involvement can also occur through subliminal emotional priming (De Houwer et al., 2001; H. Jiang et al., 2016; Walther et al., 2011; Yoon & Tinkham, 2013). This appears to be one of the fundamental findings of the third and fourth experiments, the confinement of persuasive metacognition to explicit emotional priming. This assumption is discussed in more detail in 4.3.1.

The combination of the studies also allows for new findings. Contradictory observations regarding attitude and purchase intention have already been described. These occurred with the combination of gustatory and olfactory stimuli. Precisely, the same observations could be made in the third and fourth experiments. In Section 2.2.2, studies were repeatedly presented that led to unexpected results about cross-modal correspondence. Meng et al. (2021) surprisingly found that generic names positively influence purchase intention, while congruent scents decrease it, thus more variables could probably influence a positive valence. Similar observations was made by Kivioja (2017). Kivioja (2017) observed that despite congruent odors, especially for strawberry odor with congruent products, no increase in purchase intention was observed, despite the consistent conditions and a comprehensive manipulation check, so there are likely other unknown mediating variables concerning the congruence. Haase et al. (2020) did not observe any significant influence on product evaluation by adding congruent olfactory and gustatory stimuli. Similar observations from a clinical perspective were made by Noto et al. (2021), who argues that olfactory stimuli do not reach consciousness via the thalamus and thus interact much more strongly with other stimuli. An aspect that builds on this could be that the gustatory and olfactory senses often interact with each other, for example, by consuming food. It seems that olfactory stimuli could have a more significantly and influencing role concerning multisensory marketing.

5.2 FUTURE RESEARCH

The summary and conclusion revealed several findings, emphasizing possible influencing factors in the reactivity for web experiments and a limitation regarding the persuasive metacognition. Similarly, it was verified that multisensory products in online stores have the potential to influence consumer behavior. Thus, possible implications for research can be derived.

In the limitations and discussions, reactivity was recurrently discussed as a possible cause of the partially unexpected results. Although the compliance with the quality criteria and manipulation checks was discussed thoroughly and comprehensively in Sections 3.1.1 and 4.1.1 and, as in Sections 3.3.2 and 4.3.2, respectively, it was considered to be further complied with after outgoing critical appraisal and possible negative influences owing to reactivity remain. A significant factor discussed was the awareness and knowledge of most participants to be manipulated during the experiments, which probably made their perception of the research material more critical than in the case if this knowledge had not existed. Hence, the first implication for the subsequent research can be derived. To exclude the influence of reactivity, participants should be oblivious to being part of an empirical survey. This recommendation is exclusively formulated to observe and predict the purchase behavior. Several psychological constructs or variables are well suited for quantitative surveys, such as personality, which should still be measured with reliable and valid instruments for the BIG Five Inventory 2 (Soto, 2016). As a concrete implication, consumer behavior could have been additionally tracked and evaluated through a technological advancement of the online store. For instance, it could have been formulated as an instruction to add the three selected products in the online store's shopping cart, leading to an automatic return to the survey, thereby ensuring a smooth experience. It would have been concretely visible for which products the decision was made, and this, in turn, could have been further validated by recording the scales. Furthermore, it would have been interesting to know which products were observed and for how long. Concerning the effect of superadditivity, it would have been interesting to know whether products with more sensory stimuli were observed for longer or products with fewer sensory stimuli. Consumer behavior would have been observed in a typical

browsing behavior similar to other research designs, such as Hilken et al. (2017) and Y.-C. Tan et al. (2021), where the data from actual consumer behavior were evaluated. If a researcher could additionally place manipulations, assumptions about consumer behavior could be verified efficiently.

Another aspect is to verify further the assumption derived from the results and to what extent salience is to be defined concerning the priming of emotions. Based on the biopsychological processes, it was assumed that the sensory stimuli should be enriched with emotional experiences in the top-down process and thus be salient. However, it has been hypothesized that this is insufficient for metacognition. Emotional stimuli have to be elaborate, and it seems that the recipient has to be fully aware of their emotions. This assumption was confirmed by the fact that in all studies considered to derive hypotheses, an elaboration of the emotions was conducted by actively remembering and reflecting on the test subjects' emotional experiences. In terms of persuasion research, it would be essential to determine how high the degree of elaboration of emotions must be and how the degree of salience can be generated in product presentations. In this case, a qualitative research design could help test and question different variants of research material with different affective stimuli with the participants. A limited willingness to elaborate on the consumers must always be considered. Having subjects recall specific emotional experiences in the context of a product presentation, as was the case in the original studies, could be risky in a real-life situation where consumers may have limited cognitive resources or be influenced by distracting stimuli. Accordingly, affective stimuli must be found that also work in an actual situation. In qualitative research, subjects could be placed in the same situation of conscious emotional memory and a situation where only the presentation of the research material occurs. The subjects could describe how the research material was perceived compared to the concrete implications for suitable research material. Following this, field studies would again make sense, as previously written, to test the research material in an actual situation.

Another possible continuation would be further validation of the visual-tactile interaction model (Eklund & Helmefalk, 2018). It could be observed that the model's assumptions can also be transferred to the gustatory and olfactory stimuli in connection with the visual sense. Here, it is imperative to validate whether there is a moderation effect owing to the preferred perception of the respective sensory

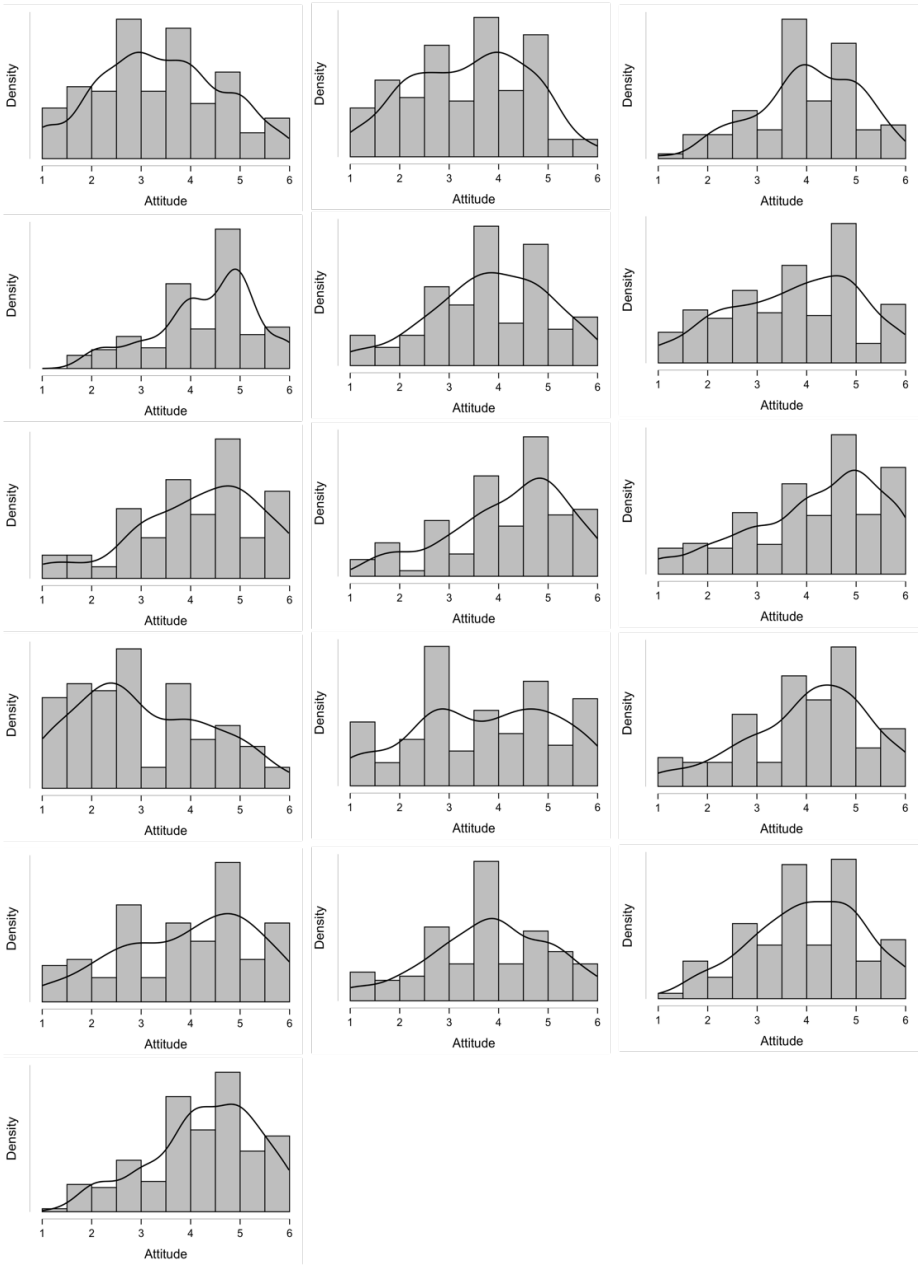
stimulus regarding the attitude. It would have to be checked whether a variable, such as the NFT (Nuszbaum et al., 2010; Peck & Childers, 2003), can also be transferred to the olfactory and gustatory sense. Whereas there is already a scale for the gustatory sense, the need to smell scale (NTS) (Dörtyol, 2020). Possible interactions as in the framework of the tactile interaction model (Eklund & Helmefalk, 2018) could be investigated based on this.

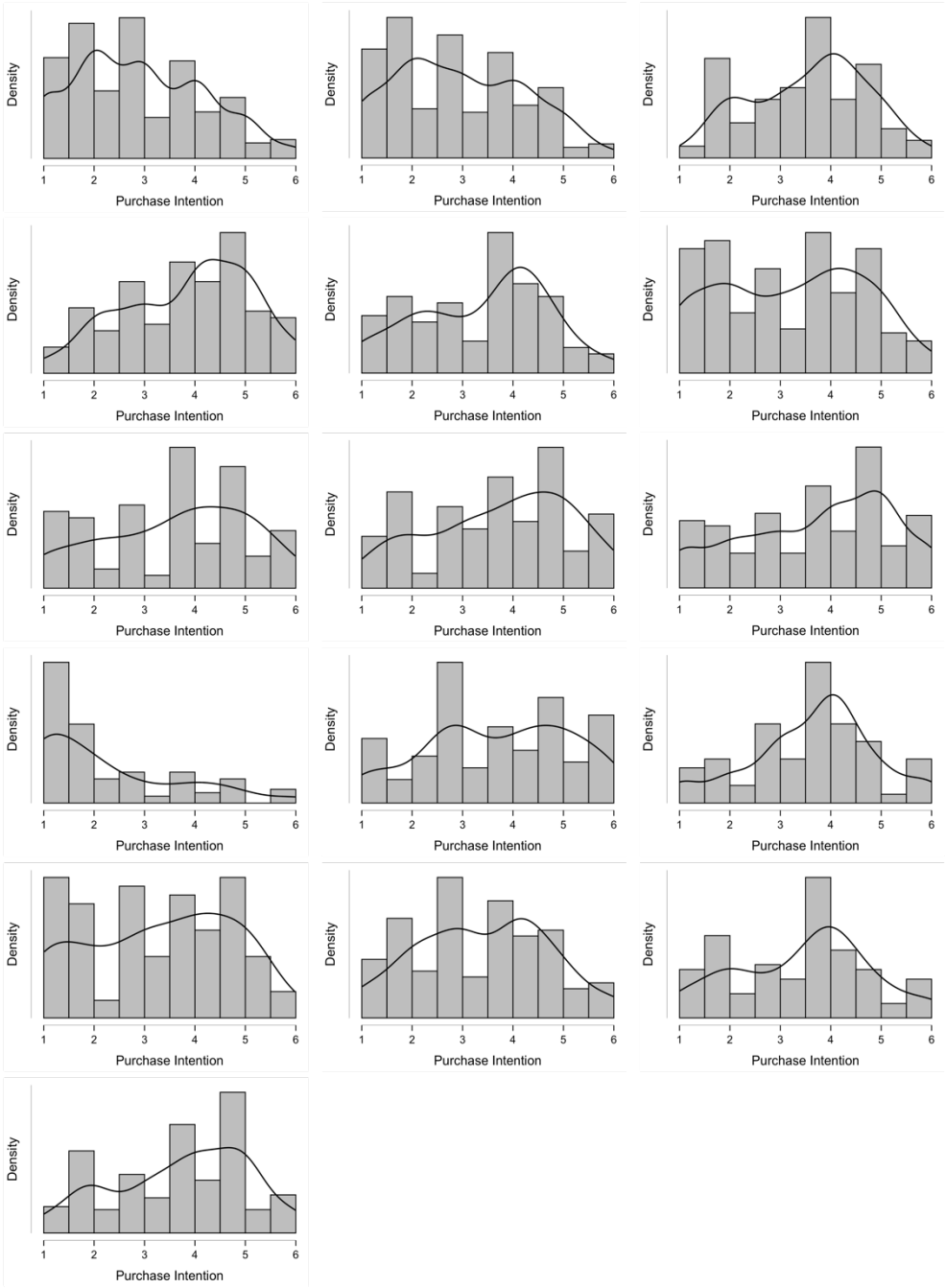
The multitude of implications of possible further studies following these experiments illustrates the added value for consumer science. Not all assumptions and effects in multisensory consumer research can be transferred to the digital context, explicitly to online stores. Furthermore, the lack of transferability may indicate that the added value of multisensory stimuli for online stores is less relevant for attitudes and purchase intentions than in stationary retail. Therefore, further research can be conducted considering this study without repeating the same scope. Thus, it was observed that the effect of superadditivity could be observed through a cumulative increase in attitude depending on the number of sensory stimuli, but the differences were not consistently significant. Subsequent studies can address the lack of significance. The effect of cross-modal correspondence can be observed, but recurrent interactions of specific sensory stimuli were found, which can also be further investigated in a subsequent study. Because a variety of interactions were examined in this study, subsequent studies should focus on the findings. Similarly, it was observed that congruency is also a relevant factor in online stores, so other researchers should skip further research; this holds true for the metacognitive pathways of persuasion. The metacognitive pathways of persuasion could not explain the differences in attitude between products. However, should other researchers wish to conduct further research, replication studies can further support the observations. Similarly, more thorough studies may be warranted, as previously described. In any case, other researchers no longer need to follow the same path and may be able to gain further insight through modified research designs.

APPENDIX

Annex 1

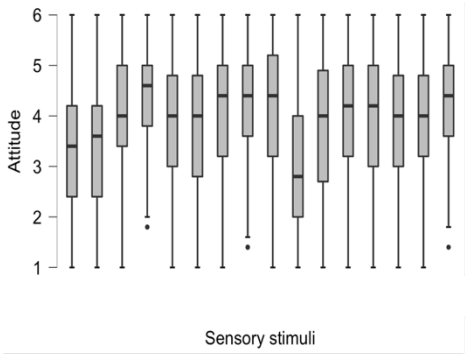
Distribution Plots – First study

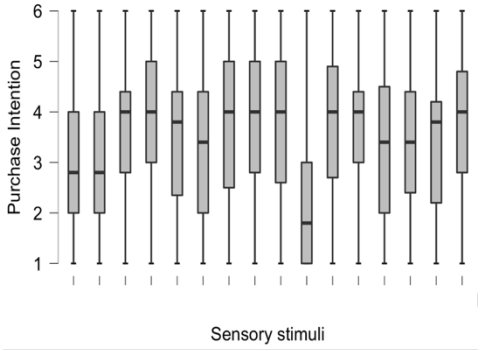


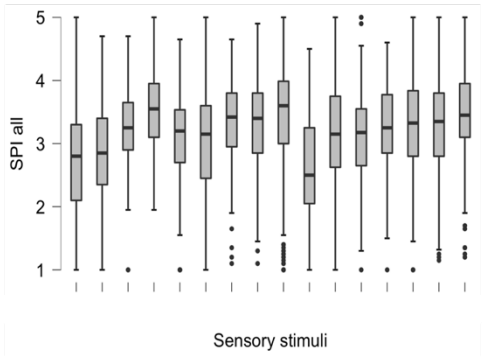

Density
Purchase Intention
1
2
3
4
5
6

Annex 2

Box Plots – First study

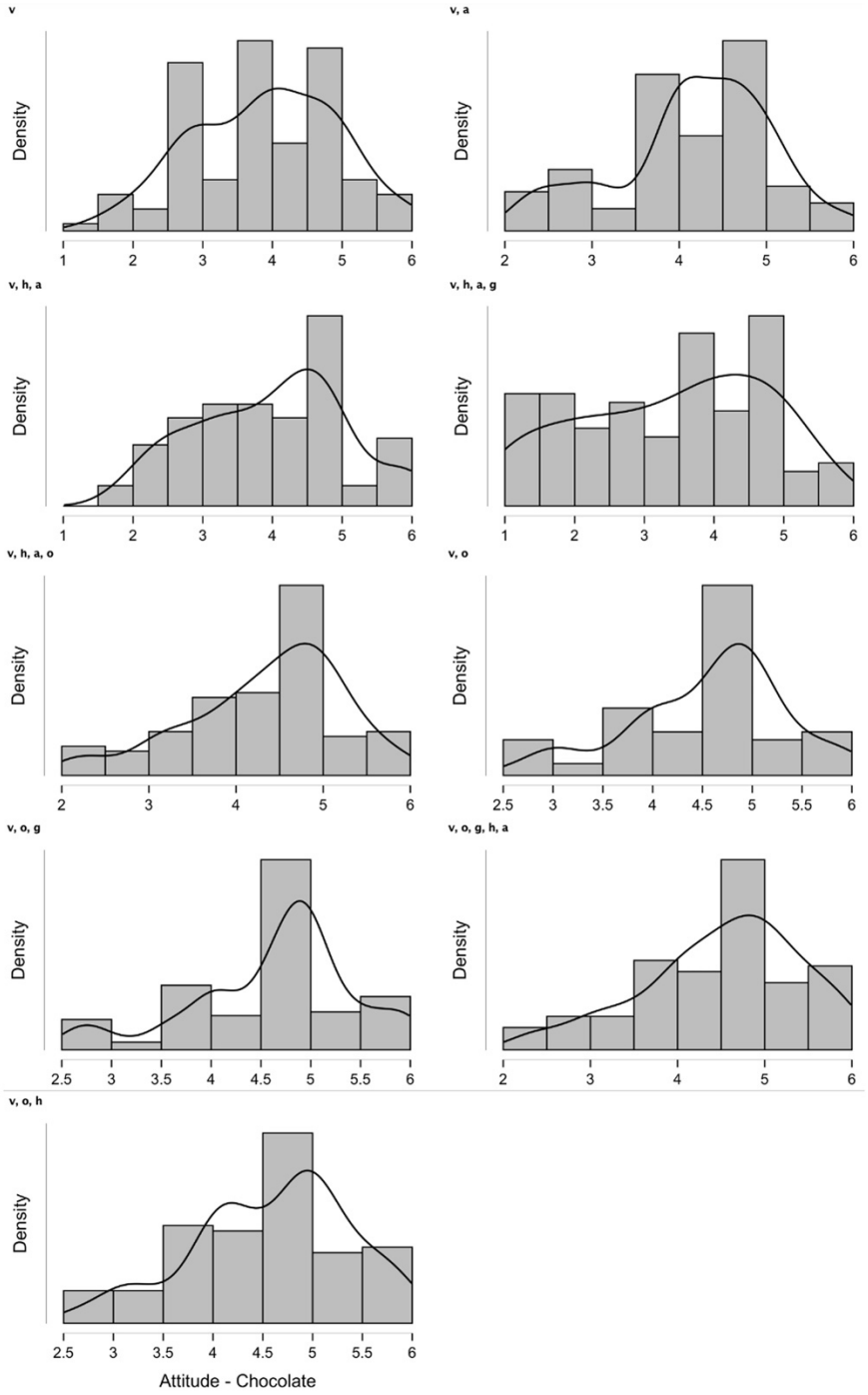






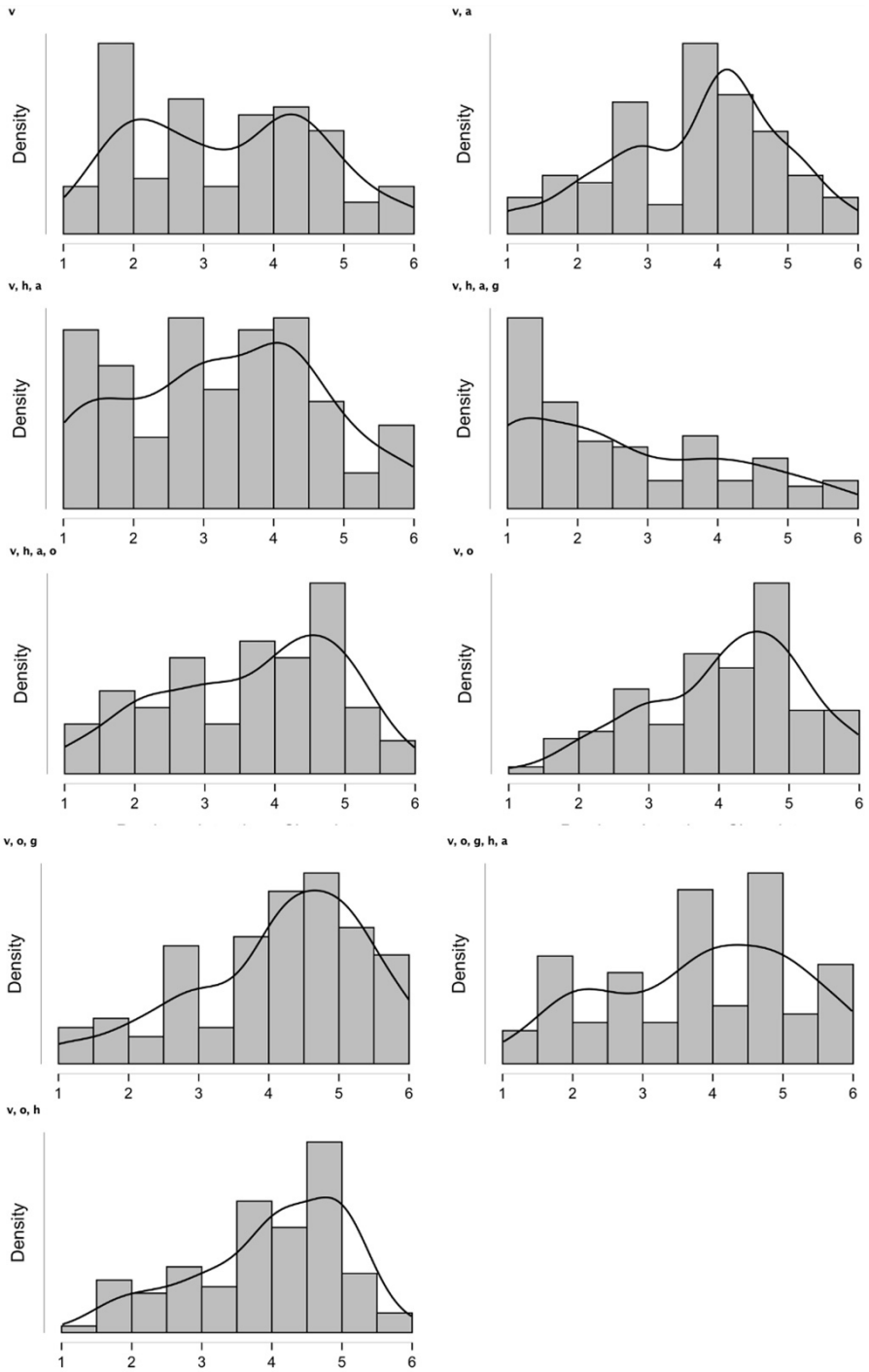
Annex 3

Distribution Plots – Chocolate – Attitude–Second study



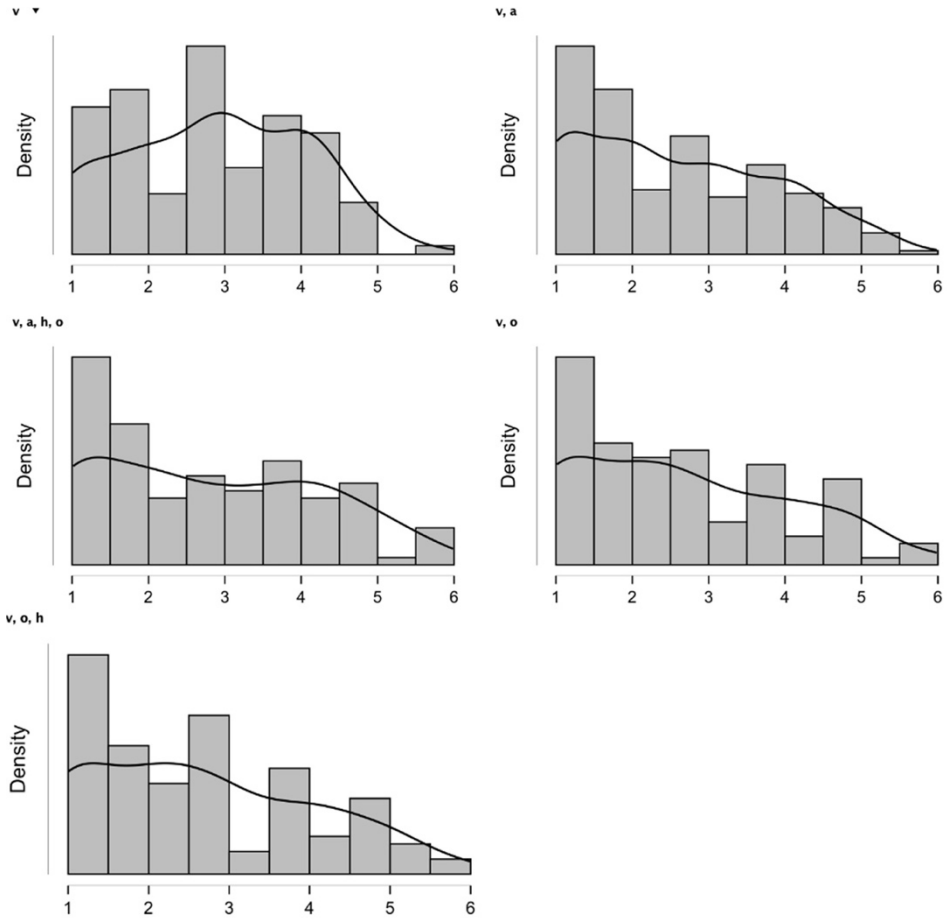
Annex 4

Distribution Plots – Chocolate – Purchase Intention– Second study



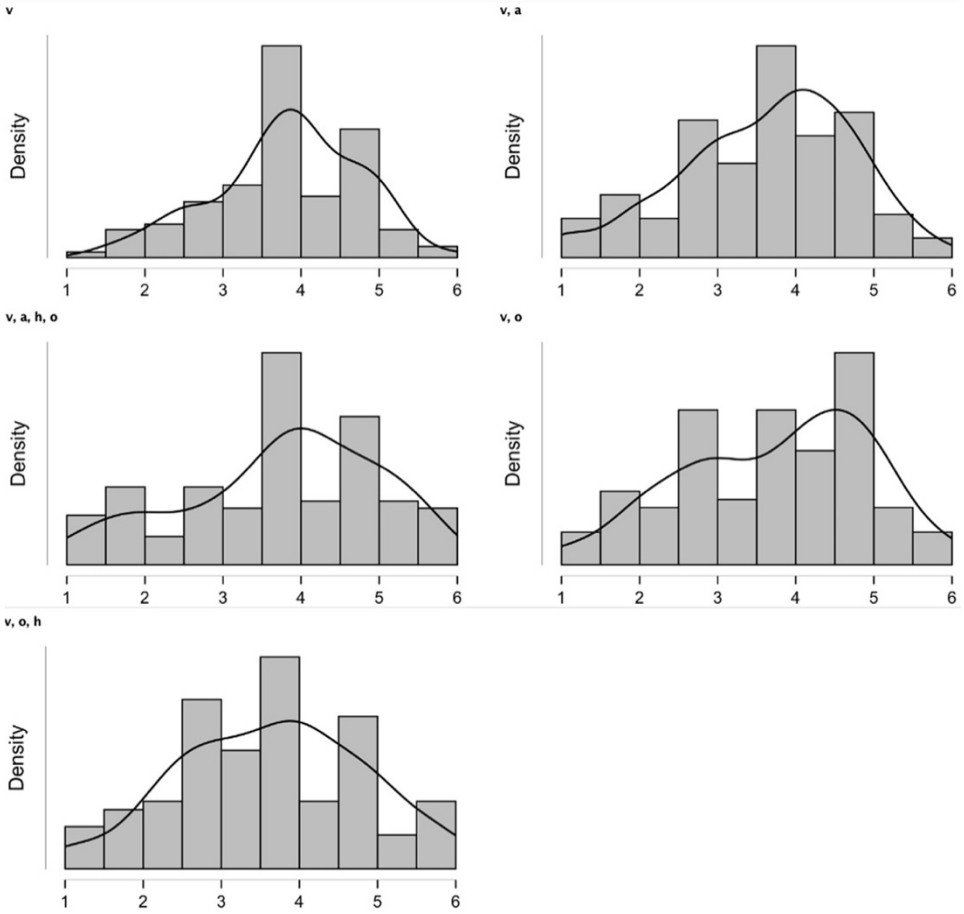
Annex 5

Distribution Plots–T-Shirts–Attitude–Second study



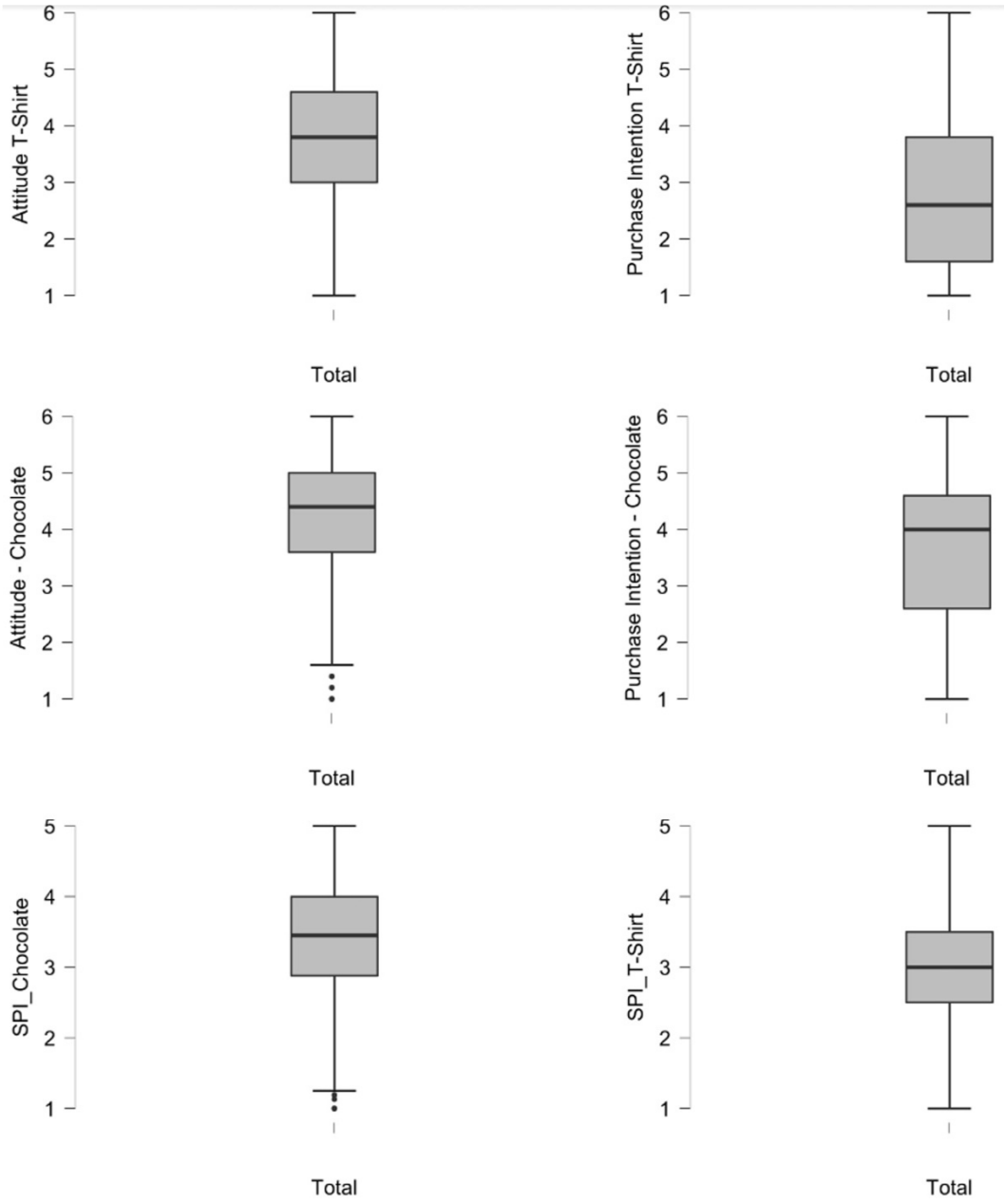
Annex 6

Distribution Plots—T-Shirts—Purchase Intention—Second study



Annex 7

Boxplots — Second study



Annex 8

Item reliability statistics: Frist and second study

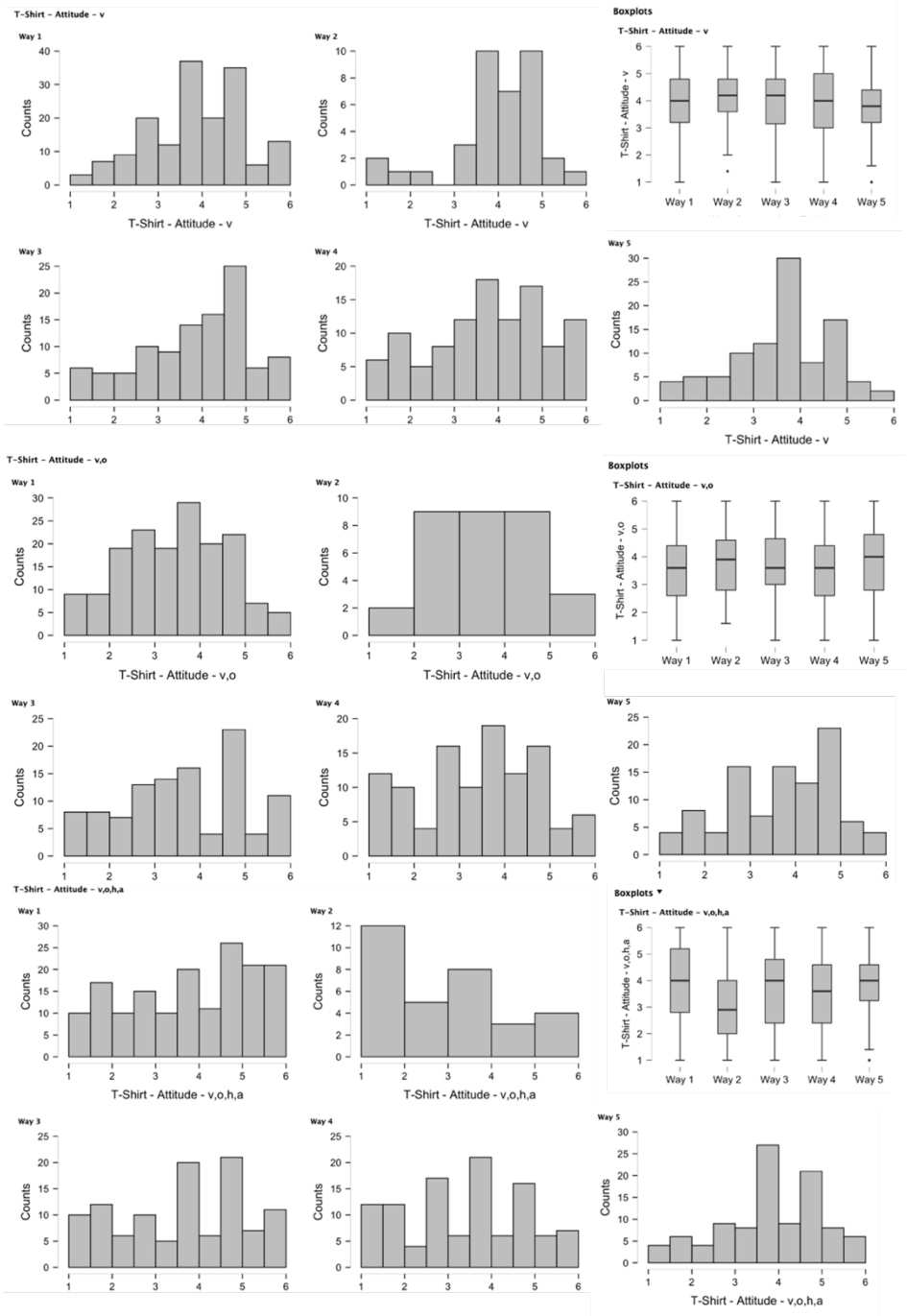
Item	If item dropped Cronbach's α	Item-rest correlation
Soft drinks–Attitude		
A01	.95	.89
A02	.94	.91
A03	.95	.89
A04	.95	.86
A05	.95	.88
Soft drinks–Purchase Intention		
PI01	.97	.93
PI02	.97	.95
PI03	.97	.95
PI04	.97	.94
PI05	.98	.93
Soft drinks–SPI		
aesthetic	.96	.72
attractive	.96	.79
beautiful	.96	.76
pretty	.96	.73
euphonic	.96	.70
good-sounding	.96	.70
melodic	.96	.69
sonorous	.96	.68
comfortable	.96	.62
handy	.96	.47
soothing	.96	.72
well-shaped	.96	.58
fragrant	.96	.78
nice smelling	.96	.77
perfumed	.96	.78
scented	.96	.73
appetizing	.96	.78

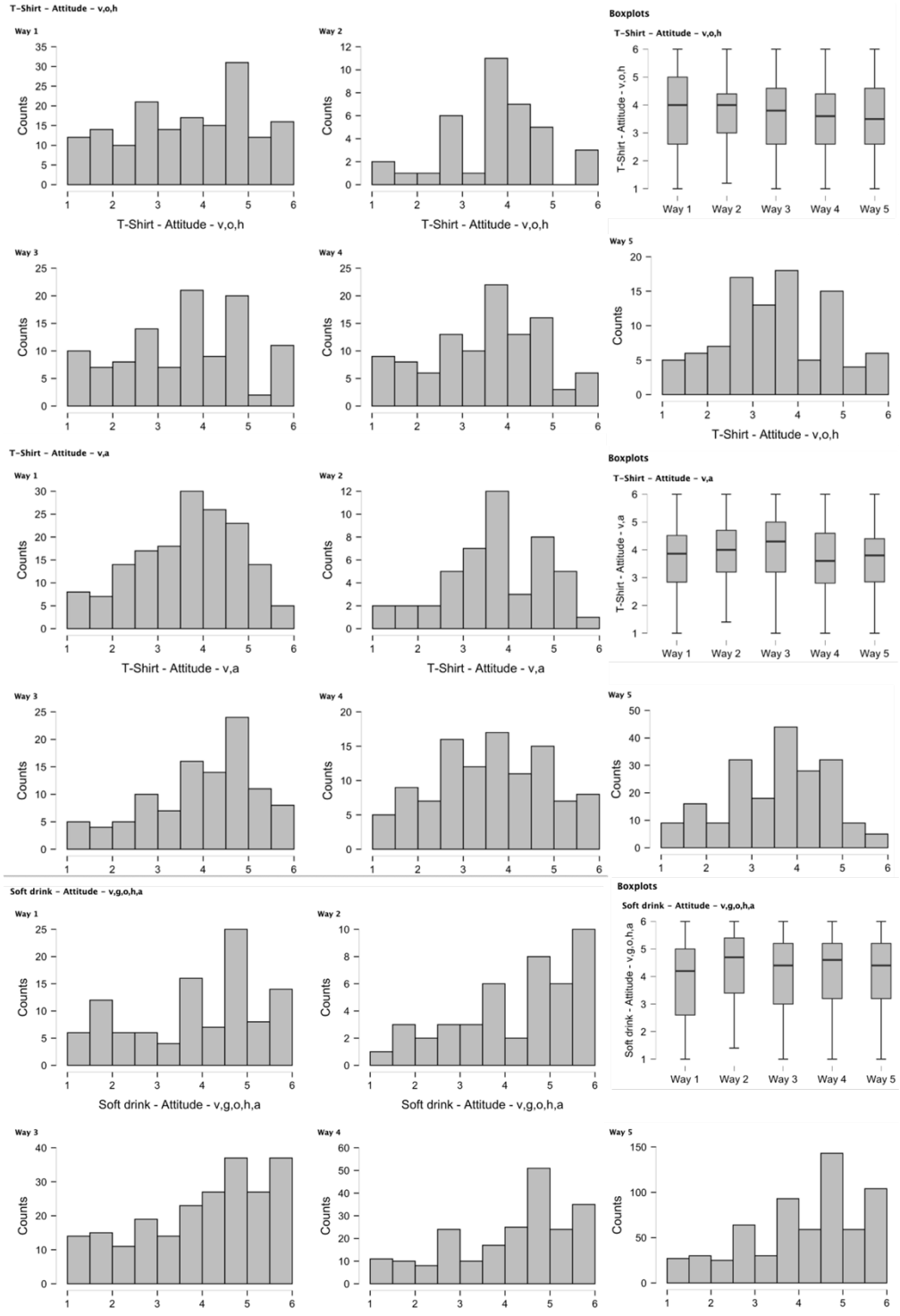
flavorful	.96	.78
palatable	.96	.78
taste	.96	.78
Chocolate–Attittude		
EG01	.92	.84
EG02	.91	.86
EG03	.92	.84
EG04	.93	.78
EG05	.92	.82
Chocolate–Purchase Intention		
KA01	.97	.92
KA02	.97	.94
KA03	.96	.94
KA04	.97	.94
KA05	.97	.91
Chocolate–SPI		
aesthetic	.93	.61
attractive	.93	.68
beautiful	.93	.69
pretty	.93	.67
euphonic	.93	.68
good-sounding	.94	.69
melodic	.94	.65
sonorous	.94	.67
comfortable	.94	.56
handy	.94	.42
soothing	.93	.67
well-shaped	.94	.49
fragrant	.94	.63
nice smelling	.94	.63
perfumed	.94	.66
scented	.94	.57
appetizing	.93	.78

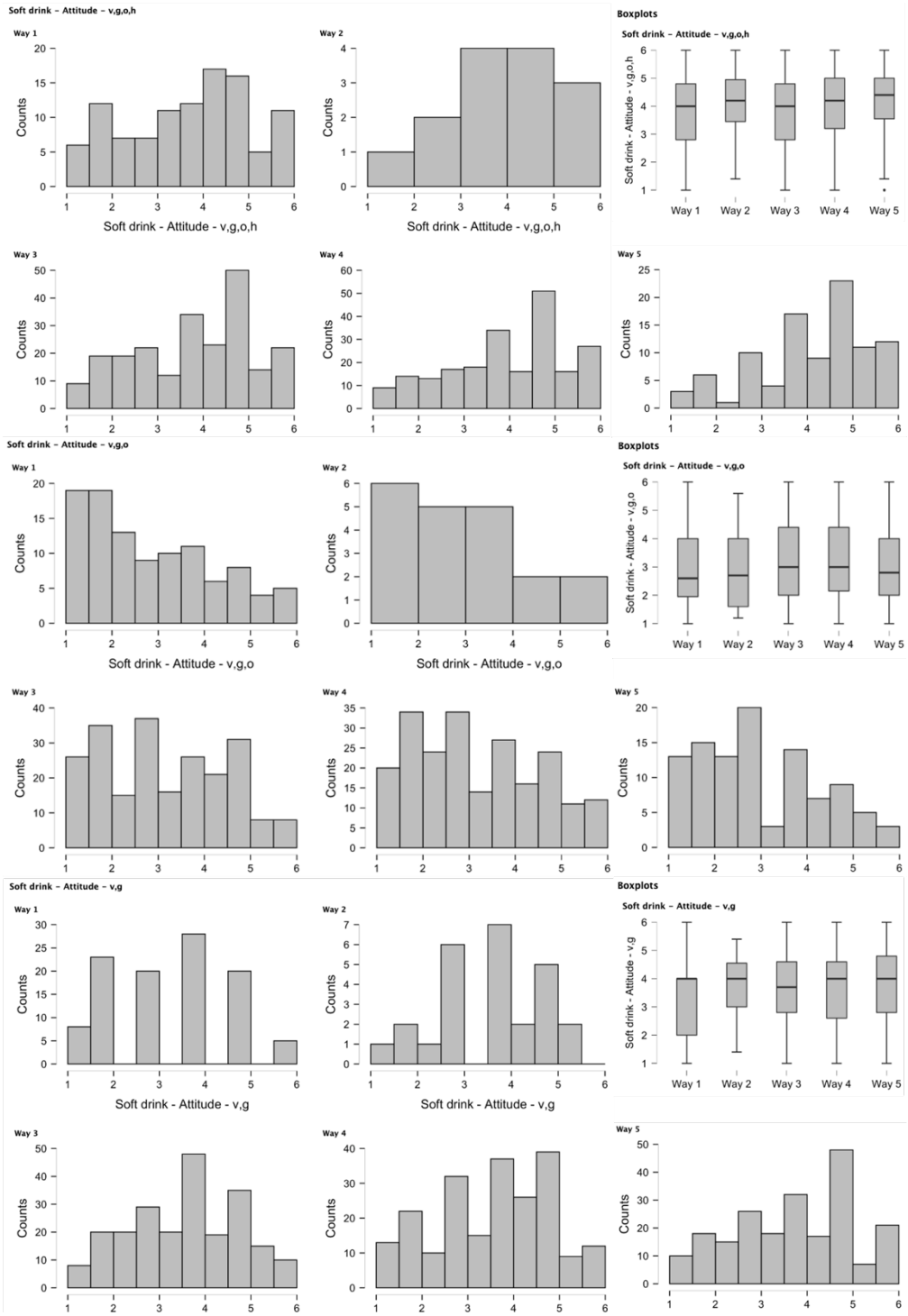
flavorful	.93	.75
palatable	.93	.78
taste	.93	.77
T-Shirt–Attittude		
EGT01	.92	.79
EGT02	.90	.87
EGT03	.91	.84
EGT04	.92	.77
EGT05	.91	.83
T-Shirt Purchase Intention		
KAT01	.96	.92
KAT02	.96	.93
KAT03	.96	.94
KAT04	.96	.93
KAT05	.97	.90
T-Shirt–SPI		
aesthetic	.91	.63
attractive	.91	.66
beautiful	.91	.61
pretty	.91	.59
euphonic	.91	.69
good-sounding	.91	.68
melodic	.91	.69
sonorous	.91	.70
comfortable	.91	.60
handy	.91	.50
soothing	.91	.61
well-shaped	.91	.50
fragrant	.91	.68
nice smelling	.91	.67
perfumed	.91	.68
scented	.91	.58

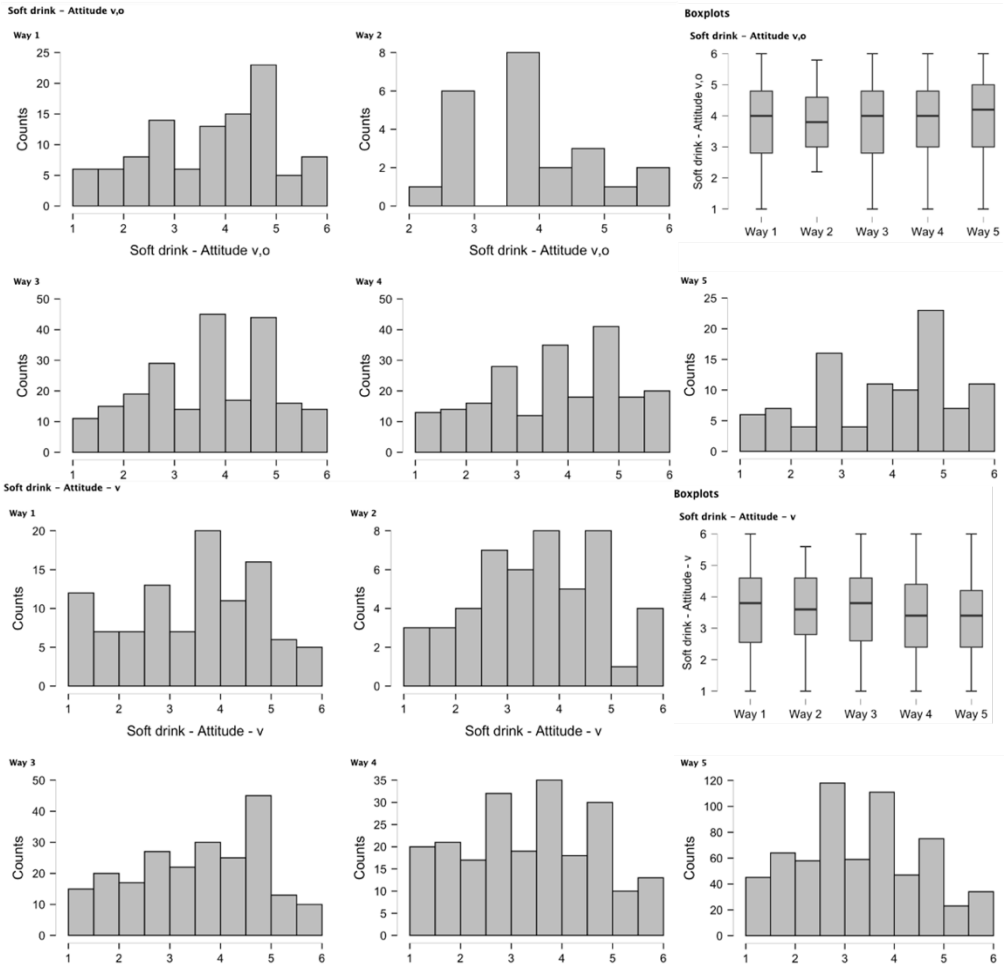
Annex 9

Distribution and Box Plots – Third and fourth study




T-Shirt – Attitude – v,o,h
Way 1
Way 2
Boxplots
T-Shirt – Attitude – v,o,h
Counts
T-Shirt - Attitude - v,o,h
T-Shirt - Attitude - v,o,h.a
Way 1
Way 2
Way 3
Way 4
Way 5
Way 3
Way 4
Way 5
T-Shirt – Attitude – v,a
Way 1
Way 2
Boxplots
T-Shirt – Attitude – v,a
T-Shirt - Attitude - v,a
Way 3
Way 4
Way 5
Soft drink – Attitude – v,g,o,h,a
Way 1
Way 2
Boxplots
Soft drink – Attitude – v,g,o,h,a
Soft drink - Attitude - v,g,o,h,a
Soft drink - Attitude - v,g,o,h,a.a
Way 3
Way 4
Way 5


Soft drink – Attitude – v,g,o,h
Way 1
Way 2
Way 3
Way 4
Way 5
Counts
Soft drink - Attitude - v,g,o,h
Boxplots
Soft drink – Attitude – v,g,o,h
Soft drink - Attitude - v,g,o,h
Way 1
Way 2
Way 3
Way 4
Way 5
Soft drink – Attitude – v,g,o
Way 1
Way 2
Way 3
Way 4
Way 5
Counts
Soft drink - Attitude - v,g,o
Boxplots
Soft drink – Attitude – v,g,o
Soft drink - Attitude - v,g,o
Way 1
Way 2
Way 3
Way 4
Way 5
Soft drink – Attitude – v,g
Way 1
Way 2
Way 3
Way 4
Way 5
Counts
Soft drink - Attitude - v,g
Boxplots
Soft drink – Attitude – v,g
Soft drink - Attitude - v,g
Way 1
Way 2
Way 3
Way 4
Way 5


Soft drink – Attitude v,o
Way 1
Counts
Soft drink - Attitude v,o
Way 2
Counts
Soft drink - Attitude v,o
Boxplots
Soft drink – Attitude v,o
Soft drink - Attitude v,o
Way 1
Way 2
Way 3
Way 4
Way 5
Way 3
Counts
Way 4
Counts
Way 5
Counts
Soft drink – Attitude – v
Way 1
Counts
Soft drink - Attitude - v
Way 2
Counts
Soft drink - Attitude - v
Boxplots
Soft drink – Attitude – v
Soft drink - Attitude - v
Way 1
Way 2
Way 3
Way 4
Way 5
Way 3
Counts
Way 4
Counts
Way 5
Counts

Annex 10

Item reliability statistics - Third and fourth study

	If item dropped	
Item	Cronbach's α	Item-rest correlation
Study 3		
EG01	.94	.88
EG02	.94	.90
EG03	.94	.90
EG04	.95	.85
EG05	.95	.86
Study 4		
EG01	.95	.90
EG02	.95	.92
EG03	.95	.91
EG04	.96	.88
EG05	.96	.87

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