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MDDM

Master Degree Program in

Data-Driven Marketing

The Impact of Haptic Imagery on Art Supplies:

Evaluations and Need for Touch

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Dissertation

presented as partial requirement for obtaining the Master Degree Program in Data-Driven Marketing

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Instituto Superior de Estatística e Gestão de Informação
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THE IMPACT OF HAPTIC IMAGERY ON ART SUPPLIES

By

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Master Thesis presented as partial requirement for obtaining the Master's degree in Data-Driven Marketing, with a specialization in Digital Marketing and Analytics

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November 2022

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Lisbon, 2022

ACKNOWLEDGEMENTS

This dissertation is a great achievement in my career as a Digital Marketeer, and it is extremely important for my professional experience and knowledge. It would not be possible for me to accomplish this without the help of my family (my mother, my father and my sister), who have always supported me during the research, implementation, analysis and conclusion of the whole process, and have always encouraged me to overcome every problem I had to face throughout the full Master's experience.

Moreover, I must thank Professor Diana Orghian for helping me keep on the right path with this study, for answering all my questions and concerns, and for the passion she constantly demonstrated in studying the topic that I chose and always wanting to find out more about it.

Finally, I'm also grateful to Professor Nuno António for all the support provided. Professor Nuno António is an excellent professional, who is extremely patient and always aims to provide the best knowledge and advice to his students.

ABSTRACT

We live in a fast-paced world, where information is instantaneously consumed through the speed of the internet, and where brands need to stand out from the others to get their customer's attention, which incentives the constant evolution of technologies and marketing strategies. Sensory Marketing has proven to be an effective way of capturing the consumers' senses, and to provide unexpected shopping experiences that attract the attention of new consumers. The exploration of sensorial stimulation has been increasingly used in physical stores, but has been quite left behind when it comes to the online sales environments, especially if we focus on the touch sense. However, it is possible to stimulate the tactile sensation through images, videos and even text descriptions. It is called Haptic Imagery, and it triggers the memories of previous touch experiences, by stimulating the brain to tactile sense, and which can be used to overcome the lack of physical stimulation in digital stores. The aim of this study is to investigate how digital stores can take advantage of Haptic Imagery, to influence the buyer's product judgement and purchase intention. Moreover, the present research uses the Need for Touch scale (NFT), developed by Peck and Childers (2003), to understand the individual differences between participants' necessity for touching a product before buying it, and to study its relation to the artists' willingness to buy their art supplies online. For this purpose, a survey was constructed and distributed among art students from two Art Universities, who are believed to be the right target consumers for art supplies. The main findings of the present study contradict the overarching literature, since the results in relation to product quality perception and purchase intention were not different between the group that saw Haptic Imagery and the one that saw Non-Haptic Imagery. Nevertheless, it was possible to verify that individuals with high NFT felt more frustration for not being able to touch the product, and therefore were less probable to buy it in online stores than individuals with lower NFT values, which confirms the previous findings on the subject and validates the use of Peck and Childers' NFT scale.

KEYWORDS

Haptic Imagery; Consumer Behavior; Art Supplies Marketing; Need for Touch; Product Judgement.

Sustainable Development Goals (SGD):

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1. INTRODUCTION

The current dissertation focuses on Consumer Behavior research and aims to understand the effects of Sensorial Marketing in a fully digital environment, analyzing how the consumer behavior is influenced by it in terms of willingness to buy a product. More specifically, the present study explores in which ways art supplies' digital stores can take advantage of tactile stimulus, like haptic imagery, to reach the buyer's touch sense, and investigates whether it influences positively or negatively the consumer's behavior in relation to the use of common non-haptic imagery.

In a not too far from now reality, online stores didn't exist, and commercial actions were made exclusively in physical stores. With the rise of the World Wide Web, and the constant increase of the internet usage, e-commerce emerged and has become an extremely important part of the revenue for most stores. Moreover, in the last two years, the world faced an unexpected pandemic situation, and for several months most people had to adapt to being in a quarantine, loosing most social interactions. Stores weren't open and costumers weren't able to visit their favourite markets. Therefore, brands had to find other ways to get to consumers, Explaining the growth in numbers and functionality of online stores. As people couldn't leave their houses, they embraced the digital environment and online shopping became inevitable (Sinha et al., 2021).

As the pandemic situation starts to recede, and people gradually visit physical stores again, online marketplaces couldn't be left behind and brands needed to find a way to reach consumers in both channels.

In the fast-paced world we live in, constantly changing and bombarding the consumer with information, it is not enough for brands to send a message anymore. It is demanded that companies evolve and increasingly innovate with original ways to communicate to their consumers. There has been a growth in the desire for new experiences, and nowadays, more than reading the message, consumers urge to feel, as they want to have a whole experience. Sensorial Stimulus have proven to be effective and original in causing an impression on consumers.

Visual stimulation is expected to cause the most spontaneous reactions on the general population, and is believed to affect art supplies' consumers even more, since they have an interest in the visual arts field, and as so, are commonly attentive to detail and seduced by visual attractions. But other sensorial stimulus, like touch, an underexplored factor in literature to this date, should also affect consumers' behaviours positively and is expected to reach promising results.

However, in the digital world it is not always achievable to cause original sensorial feelings, other than audio-visual ones. A lot of Sensorial Marketing campaigns have been implemented in several physical spaces and shop environments, but not many online stores provide sensorial experiences. This seems to be a not overly explored area of the e-commerce possibilities that could be efficient in attracting new buyers and appealing to the regular ones.

Therefore, an experimental study was developed in order to understand the impact of the use of Haptic Imagery in evaluation and attitudes towards products, which might have an influence on shopping behaviours in online stores. This, so called, Haptic Imagery refers to every type of image, video, text or audio, that documents or describes a tactile sensation without the actual touch action happening, as the one when we see a hand touching a soft blanket in a commercial. The use of this

type of stimulation allows the brain to remember the tactile sensation of previous experiences, and to replicate the memory of its feeling, which can create similar reactions to the actual touching experience.

According to Alba et al. (1997), Citrin et al. (2003) and to Quelch & Klein (1996), these reactions might depend on the situation, the product in evaluation, or even the personal characteristics of each shopper. This last topic is what Peck and Childers (2003a, 2003b) refer, when they stablish the Need for Touch scale (NFT). Each consumer has its own way of shopping, and this scale infers how much they need to touch the products in a store environment, associating each consumer with a NFT value. There have been some studies developed using the NFT scale, that have found that consumers with high NFT values feel frustrated when they are not able to touch a product before buying it, as it negatively affects their product quality perception, and therefore, their purchase intention. Whereas individuals with low NFT values don't feel as much affected by the lack of tactile information, and therefore are more likely to shop online.

Having this in mind, the present research aims to apply these marketing techniques to the art supplies online sales and understand if consumer behaviour changes positively or negatively towards the use of Haptic Imagery. Choosing different paint brushes and multi-technique types of paper as the most touch-desired art supplies, participants are inquired about their purchase intention, product quality perception and frustration for not being able to touch the product before buying it, comparing answers from consumers stimulated by haptic imagery to answers of consumers that faced no-haptic imagery of the same products.

As so, the aim of this dissertation is to investigate whether Haptic Imagery strategies lead to better product evaluations and purchase intentions, when compared with Non-Haptic Imagery strategies.

Investigating this research question could result in the improvement of the e-commerce experience of several artists when shopping for their supplies, as well as, for many art supplies stores, the increase of the digital sales' metrics, commonly used to measure the success of the online store, such as conversion rate or total revenue.

Moreover, the present study aims to validate the use of the NFT scale in this specific subject, providing insights of how individuals with different NFT values are influenced by it in terms of their purchase intention, product quality perception and the frustration levels while purchasing art supplies online. By doing this, it will be easier to understand the artists community, since we'll be studying their behaviour towards art supplies sales, as well as their NFT levels.

In the following sections, the subject will be further explored and consistently described. Starting with a literature review of the theoretical backgrounds and previously developed studies on these topics, concluding with the formulation of the hypotheses of the current study. Then, a brief description of the methodologies used to implement the study, the data in analysis and an overview of the results obtained. Finally, there will be a discussion about these results, as well as a description of the implications and the limitations of this study, closing with the recommendations for future advances on this subject.

2. LITERATURE REVIEW

2.1. SENSORY MARKETING

Marketing strategies are in constant development and evolution in order to keep up with the world's technological advances and the consumers' increasing demand for original products and experiences. Sensory Marketing has been quite explored and documented, as we will see in the studies referred below.

According to Aradhna Krishna, the concept of Sensory Marketing, as the name itself, refers to the combination of a Marketing strategy with the senses' stimulation, which means that by appealing to the consumers' senses, we can influence their buying behaviour (Krishna, 2012).

The exploration of sensory stimulus is relatively recent in the marketing field (Krishna, 2010).For a long time, the consumers' decision-making process was exclusively based on the efficiency of the product and, specially, on its price. Accordingly, the Marketing team's function was focused on helping to reduce the costs of production while still developing high quality products (Krishna, 2010).

Throughout the years, traditional advertising methods, like posters, radio ads and television ads, emerged and consumers started to understand and be influenced by the brand values, as they began to choose their brands according to the values they identify with. At that point, the marketing teams were expected to direct all the customers' attention to the brand, and to choose the most attractive values to reach their consumers' preferences (Krishna, 2010).

Currently, due to the rise and wide access of the internet (Krishna, 2013),consumers are constantly being bombed with every kind of advertising, such as video ads popping up on every social media channel, audio ads interrupting our favourite songs on Spotify, several images we see on every website we enter, posters all over the way to work, television jingles every 10 minutes, and many others. All this continuous exposure to advertising has transformed it into a part of the daily routine, which is leading to a devaluation attitude from the consumers towards these kinds of advertisement (Krishna, 2012).

Having in mind the goal of earning the consumers' attention back, it is not enough to develop a good advertising that shows the brand's purposes and values anymore, but it is rather necessary to get to the consumers' subconscious and drive their attention to the product (Krishna, 2012), implying the use of the senses to influence the consumers' choices by Marketing companies (Krishna, 2013).

Moreover, companies have been increasing their sensory research and development efforts, as they are craving for more than a good product, they want to provide their consumers with a good experience. Sensory experiences have become an important influence on the buying process (Krishna, 2013), as consumers prefer the softness blanket, or the most perfumed rose. Therefore, sensory exploration is a possible answer to their demands for original experiences (Krishna, 2010).

2.1.1. Sensation vs Perception

In order to develop an effective sensory marketing campaign, it is important to understand the unconscious process of the mind after a sense is trigged. As Krishna explains on her book "Customer Sense", when we come across a sensory stimulus, such as the smell of a fresh-baked pie you feel, that sensation is a feeling registration. It means that our nose is registering the warm sweet smell in the air. Then, almost instantaneously, we have the perception of that sensation, that is our brain's interpretation of the information that was sensed, and we have the perception that the smell is coming from the kitchen and that someone is cooking a pie (Krishna, 2013).

Perceptions are based in our previous experiences and awareness of the world, which our brain assumes as underlying truths. Giving the previous example, we have been trained to understand that when we feel the smell of a pie it means it has just been cooked, and as so, when we encounter this smell, we don't need to see someone in the kitchen cooking the pie to know that it has happened (Krishna, 2013).

On her studies, Krishna uses the "Molyneux's problem" as a good example of a situation that helps us understand these two concepts. It was firstly wondered by Molyneux himself regarding his blind wife but has also been discussed by the well-known philosophers John Locke and George Berkeley. The problem describes the hypothetical situation of a man who has been blind all his life and has learned to distinguish a cube from a sphere by touching them with his hands. However, if suddenly the same man started to see, whether he would be able to tell the cube and the sphere apart just by looking at it would be uncertain (Park, 1969).

Although neither Molyneux, nor Locke, nor Berkeley had the same perspective and thoughts regarding the arguments that led to an answer to this problem, they all deny the possibility of such thing happening, achieving the agreement that the blind man would not be able to distinguish the cube from the sphere just by looking at it (Park, 1969).

The explanation to this is quite simple if you have in mind the previously discussed concepts. This man has always had the experience of touching the two different objects and has been told which one is which. And as we have learnt earlier, every time he has the sensation of touching these objects, perception comes right afterwards, as the brain registers that sensation and interprets it, associating the sensation of a round surface with the word sphere, and the sensation of the flat surface with those vertices and edges with the word cube (Park, 1969).

When this man unanticipatedly recovers his vision and looks at the same two objects, without touching them, what happens is that he has the sight sensation, but when it comes to the perception, it does not relate to the tactile perception of the objects he already has, because he had never associated the image of these objects with either their name or tactile sensations before, and as so, his brain cannot interpret which object is which (Park, 1969).

Furthermore, we can also use the concepts of sensation and perception to explain some illusions. Let's take the example of images 1 and 2 (Krishna, 2013).

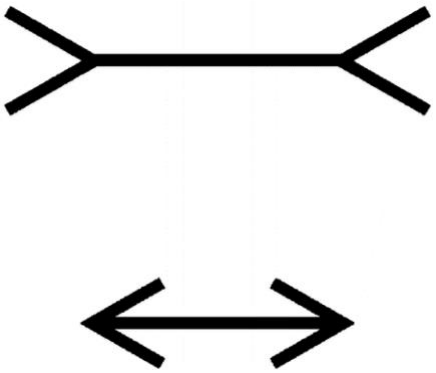

Figure 1 – Illusion: Perception of the lines' length

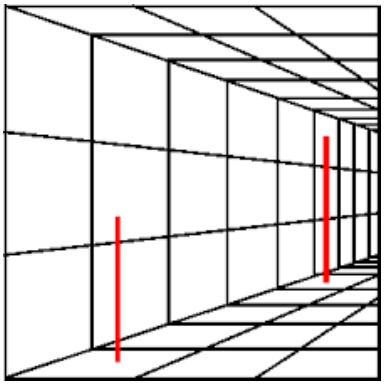

Figure 2 – Illusion: Perception of the lines' height

In the first case we can see that there are two lines with harrows on its edges. Our perception of the lines makes us believe that the one on the top is larger than the one at the bottom. However, they are the exact same size. Our sensation of them is correct, as we see two equal lines, but our perception of what's around them, creates the illusion that one is larger than the other (Krishna, 2013).

While observing the second image, we see two lines on top of a background. Although the sensation is that we see two equal lines, our perception of the background's perspective makes us believe that the red line on the right is longer than the one on the left (Krishna, 2013).

We can't ignore our previous knowledge when we have the perception of our sensations, because it works unconsciously, without our command, and that's what causes those illusions (Krishna, 2012), an important factor to consider as the marketing world evolves.

2.1.2. Digital Sensory Marketing

The world as we know it is in constant evolution. Nowadays everyone is familiar with the term "Digitalization". The Internet has brought a variety of opportunities, and our lives have been embracing the digital elements more and more into our daily basis (Sinha et al., 2021). Marketing teams are aware of this shifting trend and had no choice but to follow their consumers and explore the digital possibilities of their business (Pristl, 2020).

This change in behaviours leads to the expected problem that in the online world, there is the lack of sensory experiences (Pristl, 2020). The bidimensional features of a screen don't allow a great exploration of sense stimulation. As not every sense can be stimulated through the digital equipment (such as taste, smell, and touch), there is only the possibility to use the reachable senses (audio-visual features), which hampers the use of the other senses' marketing (Pristl, 2020).

Over the last few years there have been a lot of technological advances that allowed experts to investigate solutions to the most common problems of the daily basis, and every day they take steps towards new discoveries and devices. Nowadays, there are already some technological

developments, that were created with the purpose of overcoming the physical gap existing in digital environments, that can be useful to explore in the field of sensory marketing (Petit et al., 2019).

Devices like noise-cancelling headphones and virtual glasses aim to be innovative and aspire to deliver to their customers a complete "web-environment" that users can experience in a more immersive way. Other devices, like the ones that create an augmented reality experience, and even digital taste and smell interfaces, are being developed and upgraded all around the globe (Petit et al., 2019).

However, this kind of equipment is still very expensive, and cannot be accessed by most of the population, which means that companies' marketing teams are not able to rely on these devices, at least for now, to deliver good sensory digital experiences to their customers(Pristl, 2020).

Nevertheless, a possible solution that Elder & Krishna (2010); Krishna et al. (2016); Petit et al. (2019) and Pristl (2020), among others, present us, is the use of sensory imagery.

We have previously seen that our sensations turn into perceptions when the sensed information is unconsciously processed by the brain (Elder & Krishna, 2010). Those perceptions are then stored, and become memories (Petit et al., 2019). These memories become what we call knowledge, and they help us understand better the world around us. Giving a practical example of this, when we see a bag of chips, we don't need to touch it to know that the chips will be crispy, because we have memories of our previous experiences that reminds us of their texture (Petit et al., 2019).

Having this explanation in consideration, we can understand that in online environment it is not easy to use sensorial stimulus, so, brands cannot provide new sensations to their consumers. However, they can take advantage of the audio-visual features that the online provides in order to reach the rest of the senses. This is possible if marketing teams use images, audios and videos that trigger their consumers' memories of perceptions they have had before and let them remember of how those other sensations felt (Pristl, 2020).

When using sensory imagery, we must explore how consumers react to different types of stimulus, like different types of pictorial imagery, which relates to the visual features choices in an ad or a packaging, and different verbal imagery, that has to do with the writing style, tone, and language chosen, and finally different audio imagery, regarding different types of music, tones, rhythms, voices, timber, accent (Pristl, 2020).

2.2. TOUCH

The sense of touch is crucial to the human experience. Touch allows human beings to acknowledge their surroundings (Racat & Capelli, 2020).

It might be clear that touching a product increases our physical perception of it, and as we understand it better, it is more common to have a higher product quality perception (d'Astous & Kamau, 2010). Marketing teams have, therefore, made use of tactile stimulation, for example, using a texture-rich packaging, or creating thermal-manipulated shopping environments, with the main goal of increasing their consumers' purchase intentions (Racat & Capelli, 2020).

As previously referred, the constantly life changing world has evolved, and the digitalization of most shopping channels has created a problem for the sensory marketing exploration. However, this doesn't mean touch can be left behind. The sense of touch remains important for customers as it still influences their evaluation. In fact, as nowadays most things are digital, consumers might value tactile experiences even more (Racat & Capelli, 2020).

Presently, the digital world is becoming globally accessible, as there are less people who do not own a smartphone, and who aren't familiar with online shopping. The increase of mobile phone use has also contributed to the rise of the online shopping (Deloitte, 2016). As so, companies are focusing their resources on improving the digital experience of their online shops. The online experience is evolving to become as close to the in-store experience as possible, so that consumers feel more and more familiar and comfortable with it (Ha et al., 2007).

In order to compensate for the lack of physical interaction, companies make use of good high-quality images in their online shops, so that the sensory information of the products continues to be delivered to their consumers (Racat & Capelli, 2020).

2.2.1. Haptic Imagery

In this context, the concept of haptic imagery comes up. It refers to the type of sensory imagery that conveys tactile information, in this case, of a product. It is one of the few available resources that allows the online touch stimulation of the products' material properties and textures (Racat & Capelli, 2020).

As consumers come across haptic imagery online, it stimulates their memories, and they start picturing the feeling of touching what they are watching (Peck et al., 2013). As customers feel that they have more information about the product, there's less anxiety because there are more chances of reaching the expectations, which leads to a confidence boost and trust on the process of online shopping (Racat & Capelli, 2020).

Moreover, touching experiences stimulate the feeling of ownership over a product. This means that, when we touch a product, we feel physical control over it, and we start imagining possible future situations where it belongs to us and we are using it, as if we owned the product already (Peck et al., 2013). This attitude towards the product increases the purchase intention as it is harder for the customer to give up on it, once he has already felt it as his own, and it would imply losing it (Mattos et al., 2017).

Thus, if it was also possible to stimulate this ownership perception through the online experience, it would increase the value of the product, and consequently, increase the purchase intention as well, which would improve the online conversion rates and the total revenue from digital sales.

2.2.2. The Importance of the Hand

Throughout the history of Human Evolution, Human beings have always counted on their hands. Whether they have used them as a transportation auxiliary, or as a tool to get food and to eat, hands had always played an important role in Human life (Luangrath et al., 2022). Nowadays we are still relying on our hands to do most of our everyday tasks, regarding our basic activities, our jobs, communication, and even to show affection. We use our hands to reach any object and pick it up, as well as to feel its texture, temperature, or its weight (Postma et al., 2008). They are our mean to interact with what surround us, to have a better understanding of the world we live in, and to manipulate it at our favour (Luangrath et al., 2022).

Tactile stimulation can be triggered in every part of the human skin (Postma et al., 2008). We have receptors all over the body and they are constantly active, even unconsciously (Luangrath et al., 2022). So, we associate the hand as "a door" to the world, allowing us to feel, understand, control, and transport the objects around us (Postma et al., 2008).

The act of touching is considered active because we perceive our hands as capable of changing the objects we encounter, for example, we are able to pick up flowers or to break little sticks using our hands (Luangrath et al., 2022).

When it comes to online environments, it is believed that watching a product being touched is also assumed as active, rather than passive, since we recognize the same controlling capability. Moreover, while watching images and videos of products being touched, consumers are likely to feel that the virtual hand is their own hand, as if they were the ones touching the items themselves, hence demonstrating how haptic stimulation works on their minds (Luangrath et al., 2022).

This is extremely useful in the Marketing field, as the use of product touch imagery can be used to increase the consumers' psychological feeling of ownership towards the observed product, and consequently, increase product valuation and purchase intention (Luangrath et al., 2022).

2.2.3. Need For Touch (NFT)

As demonstrated above, the sense of touch is essential for consumers in a shopping environment, since it allows the acknowledgement of information about the products they wish to buy (Peck and Childers, 2003 b). Moreover, the tactile attributes of these products are important in shopping decisions, as they influence consumers' preferences, confidence about their purchase, trust in a brand and overall satisfaction (Peck & Childers, 2003b).

Peck and Childers have investigated and explained this subject in their work, and have come up with three perspectives of the impact of touch in the consumers' behaviour. The first aspect, and the most evident one, is the product tactile characteristics. This means that the materials used in the products influence their sales, as well as their texture, temperature, wight and softness. It is understandable that, for example, consumers would prefer a soft, warm sweater rather that a cold rough one (Peck & Childers, 2003a, 2003b)

The authors also refer that another way that touch indirectly influences shopping attitudes is the situational factor. As we notice, it is recognizable that handling products in stores support the

consumers with extra exploration of the product's attributes with their hands (Racat & Capelli, 2020). Accordingly, the shopping environment selected is crucial, as it may not allow this interaction with the products, and therefore might deprive tactile stimulation and exploration (Peck & Childers, 2003a).

Online stores and catalogue sales are clearly non-touchable channels that influence consumers in their purchase decisions, but there are also in-store situations when consumers face obstacles that restrain their touch ability, whether it is an unfavourable retail display, or even a shoddy packaging (Peck & Childers, 2003a).

On top of everything, there's the individual personality traits of each one, that are also relevant in tactile influence. These are personal characteristics, based on ones' particular ability to feel, sensitivity to touch, motivations of action-taking and preferences for certain textures, materials, or haptic sensations (Peck & Childers, 2003b).

Baring this in mind, Peck and Childers found useful to acknowledge the tactile differences of the consumers and to relate them with each other. Thus, they have created the Need For Touch scale (NFT), which allows the classification of consumers in terms of their preference for the acquirement and application of information obtained by the hands and their tactile system (Peck & Childers, 2003a).

The meaning of the word "haptic" refers to the active seeking and picking up information by using the hands (Peck & Childers, 2003a), which is why we use it to describe the tactile system and every touch experience we have or wish to have. Therefore, the NFT scale focuses on finding the haptic desire level of each person, classifying each level with a value of NFT.

The process of developing this scale has been extensive, and Peck and Childers have developed a series of questions that would infer the individual haptic traits of their consumers. As they describe in their work for the Journal of Consumer Research (Peck & Childers, 2003b), the scale started with 50 questions, and they tested them continuously until they reduced it to 14 items. It finally reached the 12 items that are currently in use as they found out that the 2 extra questions were not necessary, and the 12 others could assure the same conclusions.

Each question would be answered in a 7-point scale, with the first option being -3, meaning "I don't agree", and the last one being +3, representing "I agree". The results would then be obtained by adding the 12 values of the responses of one individual, which means it could either go from -36 to +36. This value, when inserted in the NFT scale, allows the comparison of individuals with different NFT values and their attitudes towards different shopping situations.

What Peck and Childers concluded in their several studies was that individuals with higher NFT values feel more frustrated when they face situations in which they are not able to touch a product before buying it, whereas low NFT individuals might feel satisfied in the same situations, for example, in online shopping environments (Peck & Childers, 2003a, 2003b).

Additionally, Individuals with high NFT values have more memory space dedicated to haptic information storage, which means they search for it more frequently and use it earlier in product judgement when compared to individuals with low NFT values (Peck & Childers, 2003b).

One remarkable aspect of the NFT scale is that the authors have categorized it into two different dimensions. These two different touch types are in accordance with what Holbrook and Hirschman define as the two consumers' task definitions and are related to the intrinsic aim of acquiring and processing information.

There are consumers that have a problem-solving perspective and deeply goal-directed way of thinking, whereas others have a more hedonic and pleasure-oriented consumption (Holbrook & Hirschman, 1982). Peck and Childers had this in mind, and respectively divided the NFT scale into two dimensions, the Instrumental touch, and the Autotelic touch.

On the one hand, the first one refers to the use of touch with the aim of seeking for haptic information for making a better shopping decision (Racat & Capelli, 2020), which means that consumers are consciously engaging the touch sense with a defined out-come, which is making a purchase, and they usually explore the texture, temperature, weight, and hardness characteristics of the product (Peck & Childers, 2003b).

On the other hand, the Autotelic touch refers to the activity of touching that is motivated by the sensory experience itself, regarding the tactile aspects of the product exclusively for hedonic purposes (Peck & Childers, 2003b). It is the arousal of the touch sense for fun and pleasure, as an end itself, regardless of whether there is a purchase intention or not (Racat & Capelli, 2020).

Correspondingly, the 12 questions of the NFT scale represent both dimensions of touch, having 6 questions regarding the Instrumental touch and the other 6 related to the Autotelic touch presented in the table bellow (table 1).

Table 1- *12 Questions of the NFT Scale*

Autotelic Touch	Instrumental Touch
When walking through stores, I can't help touching all kinds of products.	I place more trust in products that can be touched before purchase
Touching products can be fun	I feel more comfortable purchasing a product after physically examining it
When browsing in stores, it is important for me to handle all kinds of products	If I can't touch a product in the store, I am reluctant to purchase it.
I like to touch products even if I have no intention of buying them	I feel more confident purchasing a product I have touched first because I can determine its quality
When browsing in stores, I like to touch lots of products	The only way to make sure a product is worth buying is to actually touch it
I find myself touching all kinds of products in stores	There are many products that I would only buy if I could handle them before purchase

The authors also suggest that written descriptions can help compensate for the lack of touch interaction in online environments or in catalogue sales. The written descriptions presented are part of what we call Haptic Imagery, and can help overcome the gap of haptic stimulation for Instrumental touch, as it allows the acknowledgement of haptic information without the need of the actual touch activity. However, it is harder to compensate for the lack of Autotelic touch because reading or seeing images and videos of touch does not provide the pleasure of the sensation of touch (Peck & Childers, 2003a).

2.3. ART SUPPLIES MARKETING

The field of marketing dedicated to art supply companies and brands has been quite unexplored, hence the literature available on the subject is scarce.

However, it is a promising area with remarkable growing expectations in close future years. It is possible to find on the *Fact.MR's* Market Research Report (2022), a prediction of the Art Supplies Market growth between 2020 and 2030.

The COVID-19 pandemic situation has impacted every country and every industry. The lockdown has caused a lot of companies to lose their costumers and lower their sales (Fact.MR, 2022). Moreover, with the shutdown of most schools, the art supply market sales have considerably decreased.

Despite this decline, the art supplies market is now rising, and this growth is anticipated to keep escalating more and more throughout the decade. It has been verified an increase in the number of households with children, which may contribute to it, since children are high consumers of art supplies which stimulate their imagination, cognition, and mobility skills (Fact.MR, 2022).

Besides the normal education demand for art supplies, there has also been confirmed an expansion of the art practice as an extracurricular exercise, and as a leisure activity, which helps strengthening the anticipation of the expansion of this market (Fact.MR, 2022).

Additionally, the pandemic also supported the dominance of the e-commerce platforms, that are becoming trendy as they keep products always available (Fact.MR, 2022). Moreover, as smartphones are becoming an everyday object for almost everyone, digital purchases are possible in just a click away, turning the shopping experience into a constant, anywhere, anytime activity (Fact.MR, 2022). The shift to the digital world made companies to invest in their online services, and the improvement of the post-purchase assistance has been promoting consumers' trust in online sales and worldwide shipping (Gaillard, 2015).

Having all this in mind, it is evident that COVID-19 had a short-term impact on the art supplies industry, meaning the consequences will be rapidly overcome, which establishes this industry as one good opportunity to commit and invest (Fact.MR, 2022).

In order to create good marketing strategies for the art supplies marketing field, it is crucial to consider the marketing trends that companies are using to make an impact on the industry and on their customers. The brand values are becoming an impactful part of the marketing strategy for most brands, as consumers are more aware of the world's problems, and have more appreciation for brands with compatible principles (Gaillard, 2015). For example, nowadays people are more concerned with the global warming and the world's pollution (Laçin, 2014), which encouraged brands to become environmentally friendly. This successful change in most brands' ecological footprint has

been one of several examples of when brand values, like female empowerment or gender equality, are recognized and admired by their consumers (Gaillard, 2015).

Another trend that is becoming recurrent in several brands' strategies is the use of experience marketing. The aim of this marketing field is to provide their consumers with unforgettable events that will reach their satisfaction and brand recognition, leading to a competitive advantage against other brands (Petkus Jr, 2004). This customer-centred approach promotes the use of Sensorial Marketing to stimulate the consumers' different senses and create more impactful experiences (Gaillard, 2015), as it aims to support consumers with emotional, imaginational, and sensorial arousal, resulting in hedonic pleasure (Boorsma, 2006).

Art Supply brands and companies should take advantage of these marketing strategies to improve their consumers' experiences. Considering Caran d'Ache as an example of an art supply brand, leader of the Swiss market, that is making remarkable sales in more than 90 countries all over the world (Gaillard, 2015). This brand's purpose is to generate and produce writing and drawing materials with high-quality sources and the most cutting-edge techniques. They recognize the importance of the brand values, as they promote the harmony between the supremacy of their products' quality and the environmental ethics regarding the sustainability of those products (Gaillard, 2015).

They believe it is important to engage the customers in creative ways, providing them not just products, but complete experiences (Gaillard, 2015). Conscious of the present reality's digitalization, Caran d'Ache believes that a brand experience should include multiple channels, as consumers are constantly in contact with the brands' digital presence and the virtual experience is also an important part of the buying process (Gaillard, 2015).
The multi-sensorial marketing is noticeably one meaningful approach to create good brand experiences. The touch ability of the products is recognized as a significant product characteristic (Boorsma, 2006), however, there is not much exploration of these marketing strategies on the art supplies market yet, and there is the need to research and document knowledge advances in this field.

2.4. Research Objectives

The main goal of this study is to investigate how the use of Haptic Imagery affects product evaluation and purchase intention on art supplies' consumers. This research explores the use of sensorial marketing inside the digital world, since using Haptic Imagery may be a possible solution to trigger the touch sense of the consumer in e-commerce environments, and therefore, impact their shopping behaviours.

2.5. Hypotheses Formulation

In the following section, the main focus of the research will be defined, based on the previously analysed literature. As mentioned before, the digitalization of the societies has promoted the online shopping trend, as it has grown incredibly in the last years, and is expected to keep growing (Sinha et al., 2021). In e-commerce environments it is not possible to use Sensory Marketing to explore the different senses of the consumers, as the electronic devices have only audio and visual features, leaving touch, smell, and taste out of the equation (Pristl, 2020). The tactile properties of the products, such as their texture, weight, and temperature, are important characteristics that influence

consumers in their purchase decisions, and this type of haptic information is not always easy to transfer into digital platforms. Findings in previous studies have indicated that Haptic Imagery may help overcome the gap created by the lack of physical interaction of online shopping channels. Haptic Imagery includes every type of information, like descriptive text, audios, videos, and images, that convey the tactile characteristics of the products in order to stimulate the consumers' memories of their previous touch sensations, for them to feel as if they were having the tactile experience at the same moment that they come across the Haptic Imagery (Racat & Capelli, 2020).

Haptic Imagery was found to influence the consumer behavior online, as it provides the missing tactile information, and helps consumers making a more informed purchase decision, as well as it helps them feel more confident on their buying (Peck et al., 2013).

In addition to this, there is the need to explore the Art Supplies Marketing field since there is no literature on the subject. The Art Supplies Market is expanding and expected to grow up to 1.6 times during this decade (Fact.MR, 2022), and, as so, the present research will focus on this subject.

The main purpose of this dissertation is to understand if the type of image, regarding Haptic Imagery or Non-Haptic Imagery, when presented to the art supplies' consumer, impacts its shopping behavior, in terms of their buying preferences. According to previous studies on Haptic Imagery, it is expected to improve the consumer experience, which leads to the first hypothesis:

H1: The use of Haptic Imagery will improve customers' purchase intention ad perceived product quality.

Since we are studying the impact of the lack of touch interaction in Art Supplies digital stores, it appears to be important as well to understand the frustration felt during the product evaluation process. The use of Haptic Imagery is expected to moderate the levels of frustration felt in these platforms, so, the second hypothesis was defined.

H2: The use of Haptic Imagery will decrease customers' frustration for not being able to touch the products when interacting with them in online environments.

Moreover, according to Luangrath et al. (2022), the hand requires a special attention when it comes to the touch sensation, since it is our instrument to interact with the objects around us, and we use it to complete most of our daily tasks (Postma et al., 2008). Having said that, it's important to explore whether its use on Haptic Imagery influences consumers purchase preferences. Expectations are that when consumers come up against the image of a hand interacting with the tactile characteristics of a product, they have the sensation that it is their hand, and feel their touch sense stimulated by it. Therefore, the construction of the third hypothesis concerns this subject.

H3: The use of Haptic Imagery that includes hands interacting with the products in e-commerce environments will perform better than the use of common product Haptic Imagery.

Finally, it is important to consider the Peck and Childers' NFT scale (Peck & Childers, 2003a, 2003b). The authors have defined the NFT as a scale that helps categorize consumers according to their

needs for tactile exploration of products while buying. Its use allows a more user-specified approach in sensory marketing strategies, improving the brand's relationship with consumers.

Previous research (Peck & Childers, 2003a, 2003b) have come upon the conclusion that consumers with high NFT values, since they have higher needs for tactile interaction, might prefer shopping in-stores, whereas consumers with low NNFT values might choose online purchase, as they are less affected by the lack of touch stimulation. In the present study, it is important to understand if the Need for Touch value of a consumer impacts its online shopping behaviors, as well as the frustration levels felt during product judgement. Accordingly, hypotheses four and five were developed.

H4: Individuals with higher Need for Touch will have lower purchase intention and product quality perception when compared to individuals with lower Need for Touch.

H5: High NFT individuals will have higher frustration values, for not being able to touch the products before buying them, when compared to low NFT individuals.

Table 2- *Study Hypotheses*

Study Hypotheses
H1: The use of Haptic Imagery will improve customers' purchase intention ad perceived product quality
H2: The use of Haptic Imagery will decrease customers' frustration for not being able to touch the products before buying them in online environments
The use of Haptic Imagery that includes hands interacting with the products in e-commerce environments will perform better than the use of common product Haptic Imagery
H4: High NFT individuals will have lower purchase intention and product quality perception when compared to low NFT individuals
H5: High NFT individuals will have higher frustration values, for not being able to touch the products before buying them, when compared to low NFT individuals

3. METHODOLOGY

3.1. SURVEY CONSTRUCTION

The purpose of this study is to test the previously defined hypotheses. Therefore, to analyze the impact of Haptic Imagery on product judgement and purchase intention, the chosen method was to conduct an experiment, simulating the e-commerce environment of an art supply store, and conducting a survey as a tool for collecting the experimental data.

A presential survey allows a more flexible and user-centered data collection, as well as a bigger control of the environment. However, in order to stimulate the e-commerce environment, the device used to collect the answers was an iPad. This way, participants have a better sense of privacy and security as they are answering over an electronic device rather than facing an interviewer. Moreover, it prevents participants from having different experiences while answering the survey, because all of them look at the same interface using the same device, while there is still the possibility to have a more personal, in-dept feedback on the answers given.

During the survey answering process, the users' privacy was preserved, as it was not collected nor shared any personal information. Furthermore, the Consent form was signed, as well as the main goal of the study, in the beginning of the survey and it was made sure that all the questions were impartial and easily understood, so the participants would feel free to select any of the answers.

After a pre-test that identified possible question format malformations and wording errors, the survey was conducted in two separate art universities, the Fine-Arts Faculty of Lisbon University and the Superior Institute of Arts and Design in Caldas da Raínha.

This process led to 131 participations, from which 24 were eliminated due to survey incompleteness, resulting in a total of 107 valid participations.

3.2. PRODUCTS

With the purpose of finding the art supplies with the highest tactile properties to be used in the experiment, a small online survey was distributed among 20 recent art graduates and professional artists. The survey consisted of a list of art supplies, and participants would rate their level of agreeing, from one to five, with the question: "Do you feel the need to touch this product before buying it?".

Regarding the answers, there were two types of products of which results have overcome the expectations. The paintbrush appears to have the most tactile properties due to its filaments component that create a soft sensation when being touched, as well as the art-specified paper, that is usually textured and thick in order to be able to support several art techniques and materials.

Having these two products highlighted from the others, two types of paintbrushes and two types of paper were selected to be evaluated in the survey.

The first brush was a rounded watercolor big brush, usually used to paint backgrounds and landscapes. The second brush was fan-shaped, usually used to create details and textures of acrylic and oil paintings.

The papers were both suitable for multi-techniques, but one of them was black and had a satin texture, while the other one was white and had a rough texture. Both were waterproof and quite smaller than the A4 size.

The selected products can be found on the Appendix (j).

3.3. HAPTIC IMAGERY

This survey aims to determine whether the type of information about a product that is given to consumers in an e-commerce environment affects their product judgement. Therefore, three different versions of the questionnaire were constructed, from which the type of information provided about the products in evaluation differed.

However, the form of the information was decided to be preserved within all surveys. The video format was selected, and three different videos were recorded in the same background and with the same lights, and edited to similar durations, in order to prevent answers to be influenced by whether participants were facing a video or an image, and by other differences aside from the information type.

Accordingly, while developing the questionnaire in the Qualtrics software, provided by NOVA IMS, the survey flow was managed to assign the participants randomly to one of the three versions created, that corresponded to the three types of information displayed.

Each group would watch a video of a product before answering some questions about it, then would move on to the next product's video, and answer the same questions about the new product, and so on, for the 4 types of products chosen to be evaluated.

The videos built for the first group would show the product's non-haptic qualities, such as its dimensions, shown by placing a ruler next to the object. It will be called NON-HAPTIC Condition (n=30).

The second type of information displayed was Haptic Imagery. Here, the videos would show close-up shots of the product's surface and materials, as well as the texture of its usage. Defined by HAPTIC (n=40).

Finally, the third group would be presented Haptic videos that show the human interaction with the product. The videos were recorded from a perspective that suggests that the hand appearing in the images would be the observer's hand, which would stimulate their touch memories and would, therefore, evidence even more the product's Haptic characteristics. This group was defined by HAPTIC-HAND Condition (=37).

All the videos were reported and registered in the Appendix (m,n,o,p,q,r,s,t,u,v,w and x).

3.4. DEPENDENT VARIABLES

After agreeing to be a part of this study, participants are shown one of the videos. Then, they are asked to answer some sets of questions, divided into three groups. The first group of questions is meant to infer the consumer's purchase intention, and it consists of questions about its utility, the probability to use and to buy this product. Afterwards, questions were focused on the perceived quality of the product, and consumers would rate the physical and tactile characteristics of the product, as well as the overall quality of it. Finally, participants were asked whether they felt the need to touch the product before buying it, and also if they felt frustrated for not being able to touch the product before buying it.

All the questions were repeated in the 4 products in every questionnaire's version and were answered in a 1 to 5 scale. The data chosen to be analyzed was the arithmetic mean of each of the three groups' answers.

The full questionnaire is reported in the Appendix (c,d,e,f,g and h).

3.5. NFT SCALE

In the final section of the survey, participants answered the Need For Touch scale, developed by Peck and Childers (Peck & Childers, 2003a, 2003b). These questions were either in their original format (English), or translated into Portuguese, as in the table below, accordingly to the selected language of each participation. The answers were given in a 7-point scale, where 1 means totally disagree, and 7 means total agree.

Table 3- *Portuguese Translation of the 12 Original NFT Questions*

ORIGINAL VERSION	PORTUGUESE VERSION
When walking through stores, I can't help touching all kinds of products.	Ao andar pelas lojas, não consigo evitar tocar em todos os produtos
Touching products can be fun	Tocar nos produtos pode ser divertido
When browsing in stores, it is important for me to handle all kinds of products	Quando passeio pelas lojas, é importante para mim manusear todos os tipos de produtos
I like to touch products even if I have no intention of buying them	Gosto de tocar nos produtos mesmo que não tenha intenção de os comprar
When browsing in stores, I like to touch lots of products	Quando passeio pelas lojas, gosto de tocar em muitos produtos
I find myself touching all kinds of products in stores	Dou por mim a tocar em todos os tipos de produtos nas lojas
I place more trust in products that can be touched before purchase	Confio mais em produtos que podem ser manuseados antes da compra
I feel more comfortable purchasing a product after physically examining it	Sinto-me mais à vontade para comprar um produto depois de o examinar fisicamente
If I can't touch a product in the store, I am reluctant to purchase it.	Se não posso tocar num produto numa loja, fico relutante em comprá-lo
I feel more confident purchasing a product I have touched first because I can determine its quality	Sinto-me mais confiante ao comprar um produto no qual toquei primeiro, porque posso determinar a sua qualidade
The only way to make sure a product is worth buying is to actually touch it	A única maneira de ter a certeza que vale a pena comprar um produto é tocando nele
There are many products that I would only buy if I could handle them before purchase	Existem muitos produtos que eu só compraria se pudesse manuseá-los antes da compra

To interpret the results of these 12 questions, NFT will be considered as a binary variable, which means participants will either have high or low NFT values, and will be analyzed using an ANOVA, regarding the purchase intention. Another ANOVA will be performed to analyze NFT scores and product quality perceived. Finally, a MANOVA will be used to analyze participants' frustration levels and their necessity for touching the product before buying it. An ANOVA will also be performed to focus on, and better understand, the frustration levels.

Moreover, NFT will also be considered a continuous variable, which means participants will have different NFT values within the defined scale and will be tested using a correlation between the NFT scores of the participants and all the other dependent variables.

3.6. DEMOGRAPHICS

After answering the previously analyzed questions, participants were asked the last demographic questions. The most common questions were used, as the age, gender, education level, and field of studies.

Finally, and to better debrief, an optional e-mail field was created for those who wish to have some feedback on the results of this study.

Out if the 107 valid participations, the majority was female (66,9%), while only 26,9% was male, and the other 6,2% of them didn't want to share their gender.

The ages vary between 18 and 40. Only 4,67% of them were above 23 years old, and the most common ages of the participants were between 18 and 19 years old. Having said so, it is not hard to imagine that out of these 107 University students, 95,33% of them is currently in a bachelor's degree, and only 4,67% is on a master's degree or other type of course.

Participants were in a quite big variety of courses, but all of them were from the Arts' field. There is information to take an inside look on a more detailed description of the demographics data in the Appendix (y and z).

4. RESULTS

There are two goals in this analysis, and as so, it was divided in two parts. The main objective of this study was to investigate the impact of using Haptic Imagery in Art Supplies' online stores, which represents the first part of the analysis.

Accordingly, the use of Haptic Imagery (HAPTIC and HAPTIC-HAND Conditions) on the e-commerce of art supplies was expected to affect positively the purchase intention (H1) and the product quality perception (H1), compared to the use of Non-Haptic Imagery (NON-HAPTIC Condition). However, when using Haptic Imagery (HAPTIC and HAPTIC-HAND Conditions), it was expected that the need for touching the product before buying it (H2), and the frustration of not being able to touch the product (H2) would decrease comparing to the use of Non-Haptic Imagery (NON-HAPTIC Condition). Moreover, expectations are that using Haptic Imagery of a hand interacting with the products (HAPTIC-HAND Condition) would perform better than Haptic Imagery of the products with no interaction (HAPTIC Condition) (H3).

The second part of the analysis refers to the NFT scores of the individuals that participated in the survey and deliberates its impact on their attitudes towards the products. More specifically, individuals with high NFT scores were expected to be more negatively impacted by the lack of touch stimulation than individuals with low NFT scores. Subsequentially, high NFT scored individuals would have lower purchase intention and lower product quality perception levels (H4), but higher frustration levels, for not being able to touch the product, compared to low NFT scored individuals (H5).

4.1. HAPTIC IMAGERY

As previously discussed in the methodologies, participants were divided into three groups, according to the type of imagery visualized (NON-HAPTIC, HAPTIC and HAPTIC-HAND Conditions). The first group of participants has seen Non-Haptic videos of the products, while the second group has observed Haptic videos of the products, and the third one has watched Haptic videos of a hand interacting with the products. The groups were defined as first, second and third groups, and this is the independent variable (or fixed factor) of the following analysis.

-(H1) Purchase Intention

An ANOVA was performed, having used purchase intention as its dependent variable. The mean purchase intention slightly increases with the escalation of the condition of visualizing Haptic Imagery. The mean from the first group shows a lower value (NON-HAPTIC: M=3.97; SD=0.56) than the ones from the second group (HAPTIC: M=4.03; SD=0.61) and from the third group (HAPTIC-HAND: M=4.03; SD=0.50). Nevertheless, the mean purchase intention difference between groups is not found to be significant at the 5% level (F (2, 104)=0.13; p=0.876).

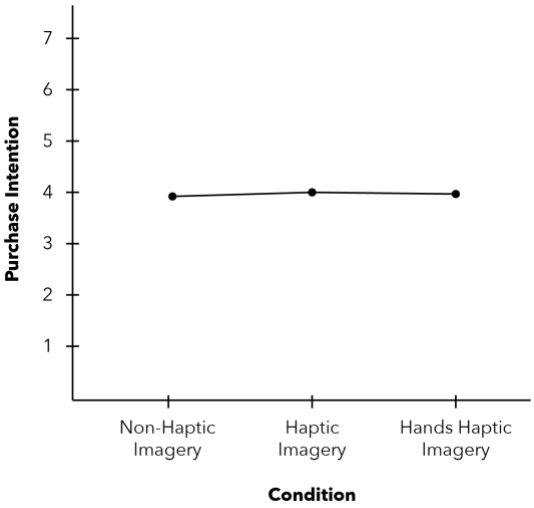

Figure 3 – Data Analysis: Purchase Intention vs Condition (NON-HAPTIC, HAPTIC or HAPTIC-HAND)

-(H1) Product Quality Perception

Regarding perceived product quality, used as the dependent variable of an ANOVA, the obtained results do not show a statistically significant difference at the 5% level (F (2, 104)=0.43; p=0.649). Along with the purchase intention results, the first group's mean product quality perception (NON-HAPTIC: M=3.90; SD=0.50) was not different from the second (HAPTIC: M=3.98; SD=0.48) and the third (HAPTIC-HAND: M=4.01; SD=0.42) groups.

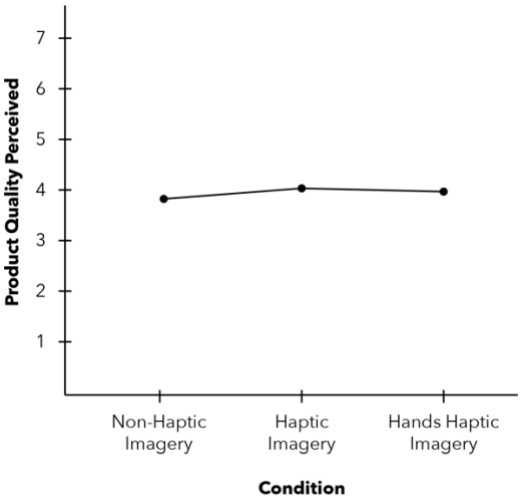

Figure 4 - Data Analysis: Product Quality Perceived vs Condition (NON-HAPTIC, HAPTIC or HAPTIC-HAND)

-(H2) Frustration

The frustration of the participants for not being able to touch the products was expected to be reduced by the visualization of Haptic Imagery (HAPTIC and HAPTIC-HAND Conditions). Two different dependent variables were considered, wanting to touch a product before buying it and feeling frustrated for not being able to do so. Therefore, a MANOVA was performed, and the results indicated no significant difference between the three groups at the 5% level (p=0.360). In relation to ANOVA values of each separated dependent variable, the results confirmed that neither feeling frustrated for not being able to touch a product before buying it (F(2, 104)=0.75; p=0.475), nor wanting to do so (F(2, 104)=2.24; p=0.112), had significant differences among the three different conditions. However, the analysis of the 'wanting to touch the product' dependent variable showed a quite lower p value, which means that the difference between the three groups' answers was more accentuated than for the other dependent variables (NON-HAPTIC: M=4.66; SD=0.48; HAPTIC: M=4.52; SD=0.77; HAPTIC-HAND: M=4.80; SD=0.38).

-(H3) Hands

With regards to Hypothesis 3, the previously performed analysis (first two ANOVAs) had shown the comparison between the HAPTIC and the HAPTIC-HAND Conditions. There is no considerable difference at the 5% level between the mean purchase intention (F(2, 104)=0.13; p=0.876) of the HAPTIC (M=4.03; SD=0.61) and the HAPTIC-HANDS (M=4.03; SD=0.50) conditions, as well as between the perceived product quality mean (F(2, 104)=0.43; p=0.649) of the same two conditions (HAPTIC: M=3.98; SD=0.48; and HAPTIC-HANDS: M=4.01; SD=0.42).

The main effects of the proposed hypotheses were not established in this study, as the differences between the three groups of participants were not significant to draw conclusions.

The type of imagery visualized did not impact theirs purchase intentions, as it was expected. Moreover, the difference between product quality perception of the participants from different imagery type groups was not confirmed, resulting in the inconclusiveness of the first hypothesis (H1).

Regarding the second hypothesis (H2), there were no conclusions drawn concerning the implication of the Imagery type in the frustration of the participants for not being able to touch the products they were to evaluate, since the results between groups were not significantly different.

Nonetheless, there is no evidence that the use of a hand in the Haptic Imagery videos improves either the purchase intention, or the product quality perceived by the participants, as the results were inconclusive as well for hypothesis three (H3).

The detailed analysis of the ANOVAs and MANOVA performed is described in the Appendix (aa,ba,ca,da and ea).

4.2. CONDITION VS NFT

In order to understand if the Need for Touch values of the participants were significant for the different conditions previously analyzed, a new MANOVA was performed, having the Condition (NON-HAPTIC, HAPTIC and HAPTIC-HAND) as an independent variable, as well as the NFT binary variable (high=2/low=1). Purchase intention, product quality perception, wanting to touch a product before buying it, and feeling frustrated for not being able to do so were the used dependent variables.

The results demonstrated no further conclusions, as there were no significantly different values at the 5% level while considering the two fixed factors (F(2, 101) =0.60; p=0.780). Regarding the analysis of each dependent variable, ANOVAs were performed. The Product Quality Perceived was not influenced by the condition and NFT variables combined (F(2, 101)= 0.65; p=0.525). The same conclusions can be drawn from the Purchase Intention analysis (F(2, 101)= 0.25; p=0.782), as well as for the Frustration felt for not being able to touch the product before buying it (F(2, 101)= 0.43; p=0.655) and Wanting to Touch the product before buying it (F(2, 101)= 0.26; p=0.774).

The results are fully detailed and can be accessed in the Appendix (fa and ga). In the following section of this dissertation, the impact of the single NFT variable on the discussed dependent variables will be explored. To better analyze the data collected, the NFT scores were translated into two different scales, the NFT scale as a binary variable, and the NFT scale as a continuous variable.

4.3. NFT AS A BINARY VARIABLE

In several studies, including the work developed by the authors Peck and Childers (2003 a, b) the NFT scale was analyzed as a binary variable. This technique of transforming the individual values of NFT into high vs low is possible by using the median value of all answers to divide the individual values. If a participant has a lower value than the median, it becomes a 1=low NFT, whereas a higher than the median value becomes a 2=high NFT. For the next steps of this study, the median obtained was 5,83 (in a 1 to 7 scale). As so, all NFT values lower that 5,83 were considered low NFT (1), while all values equal and higher were considered high NFT (2).

This NFT binary scale was used as the independent variable of the following analysis.

-(H4) Purchase Intention

For determining whether purchase intention was influenced by the NFT value, an ANOVA was performed using purchase intention as the dependent variable. Results indicated that low NFT individuals (M=3.99; SD=0.47) had similar purchase intention than high NFT individuals (M=4,04; SD=0.63), since the difference is not statistically significant at the 5% level (F(1,105)=0.19; p=0.662).

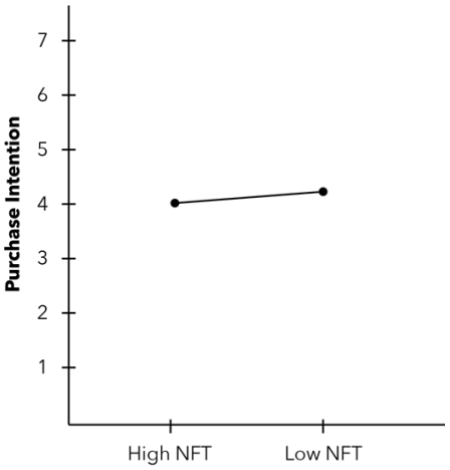

Figure 5 – Data Analysis: Purchase Intention vs Binary NFT (high or low)

-(H4) Product Quality Perception

Another ANOVA was performed using product quality perception as the dependent variable in order to investigate if the NFT influences the perceived quality of the products by the participants. Repeatedly, the results did not show a significant difference at the 5% level (F(1,105)=0.28; p=0,601), although it is possible to verify a minor increase of the high NFT individuals (M=3,99; SD=0.46) perception of product quality when compared with the low NFT individuals (M=3,94; SD=0.47).

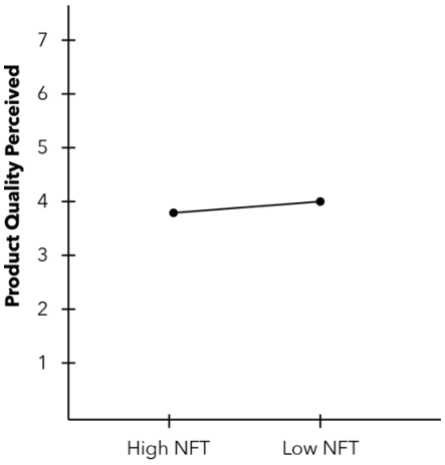

Figure 6 – Data Analysis: Product Quality Perceived vs Binary NFT (high or low)

-(H5) Frustration

Finally, a MANOVA was performed to analyze the lack of touch stimulation impact on the participants, using two different dependent variables, wanting to touch a product before buying it and feeling frustrated for not being able to do so. This analysis' results showed a significant difference between high and low NFT participants at the 5% level (p=0.011). Having said that, one-way ANOVAs were performed separately to both dependent variables, and the first variable (Wanting to touch a product) did not continue to show a significant difference ate the 5% level (F(1,105)=2.11; p=0.149). However, the second dependent variable demonstrated a strong correlation with the NFT value (F(1,105)=9.35; p=0.003), showing that high NFT individuals (M=4.36; SD=0.93) feel more frustrated for not being able to touch a product before buying it than low NFT individuals (M=3.83; SD=0.86).

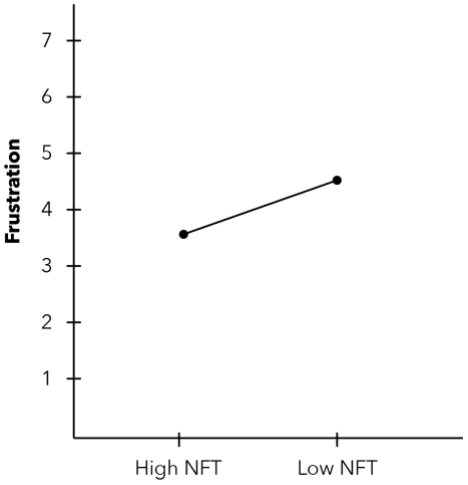

Figure 7 – Data Analysis: Frustration vs Binary NFT (high or low)

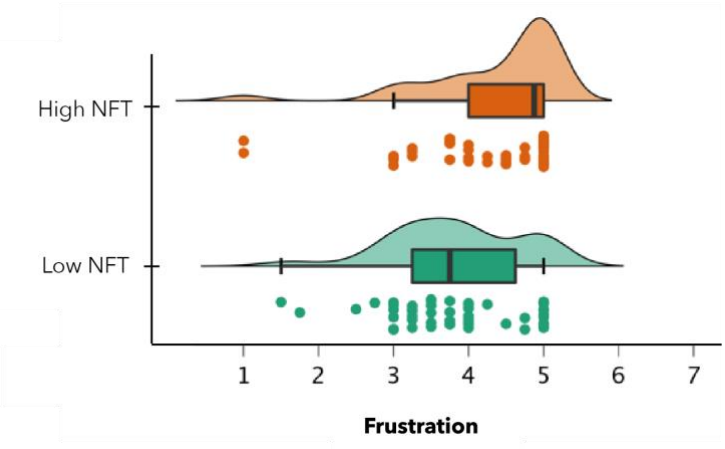

Figure 8 - Raincloud: Frustration vs Binary NFT (high or low)

When encoding the NFT values as a binary variable, using the median to establish the separating value, we end up with the value 1 representing low NFT individuals and the value 2 for high NFT individuals. Unlikely the former analysis, by using this scale to analyze the Hypotheses earlier developed, it is possible to draw a conclusion from the obtained results.

Having high or low NFT values was not found to influence either the purchase intention, or the product quality perception of the participants, which means we did not validation of the fourth hypothesis of this dissertation (H4).

Furthermore, the NFT individual value of a participant was also not found to impact their wish to touch a product before buying it. However, it has been shown that it influences their feeling of frustration for not being able to touch products before buying them, which confirms previously discussed literature. As expected, this means that high NFT individuals feel more frustrated than low NFT individuals. The complete analysis can be seen in the Appendix (ha,ia,ja,ka,la and ma).

4.4. NFT AS A CONTINUOUS VARIABLE

The second approach to analyze the data collected is to use the NFT scores as a continuous variable. This translation of the NFT scale was used by Cho & Workman (2011), and it transforms the 7-point scale from 1(strongly disagree) to 7(strongly agree), into a 7-point scale from -3 to +3. As the NFT scale authors explain (Peck & Childers, 2003a, 2003b) that we have to make correspondence between the 1 and -3, all the way until the 7 corresponds to +3, which means that, by adding all the values from each of the 12 answers, we will have the NFT score of each participant. It can go from values from -36 to +36, creating a more detailed and specified scale than when using the binary variable.

In the current study, the minimum NFT value obtained was -12 and the maximum was +36. Next, the correlation between the continuous NFT variable and all the other variables was calculated.

-(H4) Purchase Intention

The relationship between the continuous NFT individual scores and the purchase intention of the participants was not established, as it did not show a significant difference at the 5% level (p=0.266).

-(H4) Product Quality Perception

The continuous NFT variable was not found to influence the perceived product quality by participants at the 5% level (p=0.464).

-(H5) Frustration

The frustration levels are shown to be influenced by the continuous NFT individual values. Accordingly, to the previously discussed literature, high NFT individuals have higher levels of wishing to touch a product before buying it than low NFT individuals (p=0.002). In addition, high NFT individuals feel more frustration levels for not being able to touch the products before buying them than low NFT individuals (p=<0.001).

The differences between the analysis of the NFT scale as a binary variable were not, as expected, much different than the analysis as a continuous variable. The two variables have an extremely strong correlation (p=<0.001), and the small differences we encounter are a result of the different level of detail and categorization between them.

As previously analyzed, the NFT values did not impact the purchase intention, nor the perceived product quality of the participants, which, once more, does not allow to draw any conclusions regarding the fourth hypothesis (H4). However, it has been found to influence the frustration levels of the participants, confirming the fifth hypothesis (H5) again.

As a result, we conclude that high NFT individuals wish to touch the products before buying them more than low NFT individuals. They feel more frustrated than low NFT individuals as well, for not being able to touch these products. However, this does not seem to affect the way they evaluate the products in the three experimental conditions.

The complete table of this analysis' correlation is available and described in the Appendix (na).

5. DISCUSSION

Some of the studies developed by Aradhna Krishna (Krishna, 2010, 2012, 2013; Krishna & Morrin, 2008) have shown that consumers have greater reactions to products when their touch sense is being stimulated, rather than to regular non-haptic products. In order to reach that touch sense stimulation in online shopping environments, the use of Haptic Imagery has been quite explored in previous studies, as it has been verified that the more tactile properties of the products which are being displayed in online shopping environment, the more consumers feel haptic stimulation, as if the sensation of touching the product was being held, at the moment, by them (Racat & Capelli, 2020).

As Mattos et al. (2017) present in their studies, the online fashion industry is one example that is currently taking advantage of the use of Haptic Imagery to show the product's textures and materials to increase sales. By interacting with this type of images, consumers' memories of previous similar touch experiences are stimulated, and they seem to have the sensation of handling the products, but in fact, they are watching someone handling them (Peck et al., 2013). For example, if we observed an advertising for a soft sweater, and the product was being touched, our brain would recall the sensation we had experienced once we touched a similar material, and our perception of the product's softness would feel real, as if we were touching the soft sweater at the same moment that we are seeing the commercial.

Moreover, Joann Peck and Terry L. Childers have shown on their studies (Peck & Childers, 2003a, 2003b) that, as well as "product tactile characteristics" and "shop situational aspects", "consumers´ personal need for touch" also influences their reaction to the products and, consequently, their willingness to buy them. By classifying consumers with the Need For Touch scale, it becomes easier to understand our consumers, having acknowledged that people with high need for Touch feel disappointed with the lack of tactile information in online shops, whereas consumers with low NFT feel less frustration while evaluation products without access to haptic information. The authors distinguish between Autotelic and Instrumental NFT. On the one hand, Autotelic NFT stands for the touching action that happens during the shopping process for exclusively pleasure and fun purposes, for example, when consumers touch a soft blanket only to feel the pleasure of its softness' sensation. On the other hand, Instrumental NFT refers to touching actions made with the aim of acknowledge the tactile characteristics of a product, such as when consumers handle a package to feel its dimensions, materials, or weight, in order to make a better purchase decision.

Having this in mind, the present study aims to contribute to the development of the studies previously held, by investigating whether the use of Haptic Imagery influences the reaction of the consumers (in this case, artists) to the chosen products (art supplies) in the digital e-commerce. Moreover, it intends to support the validation of the use of the NFT scale developed by Peck and Childers. The relation between the use of Haptic Imagery and the individual Need for Touch Value of a consumer is expected to be strong. As so, the influences of Haptic Imagery on different NFT-valued consumers are researched in this study. Therefore, the consumers' purchase intention, perceived product quality, and frustration felt with the lack of physical touch in online stores, were measured and compared regarding the use of Haptic Imagery vs Non-Haptic Imagery in high and low NFT consumers.

5.1. DISCUSSION AND CONCLUSIONS

The results of this research will be discussed and explained in the section below.

Each of the proposed hypotheses will be analyzed, identifying whether they do or do not correspond, to the expected outcome according to the formerly reviewed literature.

PURCHASE INTENTION AND PRODUCT QUALITY PERCEPTION

1st Hypothesis: The use of Haptic Imagery will improve customers' purchase intention ad perceived product quality.

As demonstrated in the previous section of this dissertation, the impact of the use of Haptic Imagery in online environments was measured and analyzed. For this part of the study, participants of the survey were divided in three groups. Each group visualized a different type of information, in the form of videos, about the same products: Non-Haptic Imagery; Haptic Imagery; and Haptic Imagery with hand interaction.

The relationship between the visualized imagery type and the participants' willingness to buy was not established, as the answers about consumers' product evaluation and purchase intention did not differ between the three groups.

This means that participants' opinions about the products in evaluation in this study were not influenced by the different type of information provided in the watched videos, which restrains the possibility of making any conclusive outcomes from this premise.

Therefore, as none of the expected effects proposed in Hypothesis 1 were established, H1 was rejected.

FRUSTRATION FOR LACK OF TOUCH POSSIBILITY

2nd Hypothesis: The use of Haptic Imagery will decrease customers' frustration for not being able to touch the products before buying them in online environments.

There are references, in previous studies (Peck et al., 2013), that the use of Haptic Imagery in online shopping websites would stimulate the consumers' memories of touching similar products, and would decrease the lack of tactile interaction and, therefore, the frustration that comes with it. Yet, this effect is not verified in this study.

Even though visualizing Haptic Imagery provides tactile stimulation online, the answers participants gave about the frustration felt due to the lack of touch interaction were not different from group to

group, the one that saw Non-Haptic Imagery and the groups that had access to Haptic Imagery. The similarity between the three groups' answers determined the inability to draw conclusions on Hypothesis 3, resulting in its rejection.

OBSERVATION OF THE HAND

3rd Hypothesis: The use of Haptic Imagery that includes hands interacting with the products in e-commerce environments will perform better than the use of common product Haptic Imagery.

Regarding Haptic Imagery, this study explores two different types of it, that correspond to the second and the third groups of participants. On the one hand, the second group of participants have experienced the visualization of product Haptic Imagery that consisted in short videos that evidenced the product's tactile characteristics, such as its softness or its texture. On the other hand, the third group of participants had the chance to see short videos of a hand, touching and testing the tactile characteristics of the same products, feeling its softness and texture. Although this last type of Haptic Imagery is expected to arouse the impression that the visualized hand is the participant's hand, creating the feeling of ownership and control over the product, which increases purchase intention levels, this effect is not verified in the obtained results.

In fact, as previously seen in Hypotheses two and three, there is no significant difference between the answers of these two groups in relation to their purchase intentions, perceived product quality and frustration levels caused by the lack of touch stimulation online.

Accordingly, Hypothesis 3 was, as well, rejected.

PURCHASE INTENTION AND PRODUCT QUALITY PERCEPTION

4th Hypothesis: High NFT individuals will have lower purchase intention and product quality perception when compared to low NFT individuals.

According to Peck and Childers (Peck & Childers, 2003a, 2003b), and to other former studies that validate the author's work, the NFT scale measures the individual differences in the consumers' need for tactile stimulation, and scales them, assigning a NFT value for each consumer. This measure allows the personalization of e-commerce services, differentiating high from low NFT consumers and presenting the products according to their touch preferences.

Previous studies have shown that high NFT individuals value tactile interactions and are negatively impacted by the lack of online haptic stimulation, which results in a preference for in-store purchases and product evaluation.

Still, the findings in this study do not support these premises, as the answers regarding purchase intention and product evaluation have shown no significant differences between high and low NFT individuals, revealing inconclusive results. Therefore, Hypothesis 4 is, as well, rejected.

FRUSTRATION FOR LACK OF TOUCH POSSIBILITY

5th Hypothesis: High NFT individuals will have higher frustration values, for not being able to touch the products before buying them, when compared to low NFT individuals.

Considering the literature already discussed in this dissertation, it has been demonstrated that the personal different needs for tactile input influence consumers' channel preferences, for in-store shopping, online stores, or catalogue orders. Since the individual NFT scores define the consumers' level of touch desire while shopping, it is expected that high NFT consumers feel more frustrated when the touch option is not available, while low NFT individuals have less frustration feelings about the lack of tactile interaction with the products.

Appropriately, the findings in this study support the previous acknowledgements on this subject, showing accordance to the authors point of view.

It has been verified that frustration levels, derived from the lack of physical haptic stimulation, are more elevated in individuals that acquire higher NFT scores. Consequently, low NFT individuals show less frustration for not being able to touch the products in evaluation, which validates the relation between the NFT scale and the tactile-requirement frustration measurement in online environments and product judgements.

Conclusively, the Hypothesis 5 was confirmed.

6. IMPLICATIONS AND LIMITATIONS

As we have seen, the current study fails to replicate the general findings of the reviewed literature concerning the use of Haptic Imagery to improve the online consumer experience, as the main research questions were not confirmed. However, it was possible to verify that high NFT consumers feel more frustration while shopping online for not being able to touch the products before buying them that low NFT consumers. These results support the previous findings on the NFT scale and contribute for the validation of its use, providing an example of its application to the Art Supplies' Marketing field. Regarding Haptic Imagery, the present investigation has not been able to confirm the initial hypotheses with the obtained data.

One possible explanation for the unexpected unconclusive results might be the lack of attention from the participants, who were not always much focused on the survey-answering task. Moreover, the size of the sample analyzed might not have been large enough to take generalized conclusions.

Furthermore, there is the possibility that the chosen target group might not have been the best option for this study. Although it might seem like artists and art students are the best possible option, as they are the evident consumers of art supplies, the art students that participated in this research have shown familiarity with the presented products. Since they have already interacted and used some of the pencils and papers shown, they are likely to have responded the questions regarding their previous knowledge of these products, rather than the product videos shown. One possible answer to this obstacle might be to choose a different target audience, like science students or engineers, or to change the art materials chosen, in order to create a non-familiarized relationship between the products analyzed and the participants of the study.

Moreover, the questions chosen to infer the purchase intention, product quality perception and the frustration felt, might not have been adequate to this audience. The language used may not have been age-appropriate as well, and the digital experience might require a different type of questions compared to the in-store contact.

Nevertheless, there is the chance that the reviewed literature might not be advanced enough, as it mostly refers to in-store experiences in Sensorial Marketing, and to pre-pandemic research. With the COVID-19 situation, digital sales have taken over, and consumers shifted their habits to the online world, which resulted in a growth of the trust given to e-commerce purchases. Therefore, touching the products might not be as important for consumers as it was before, and it might not influence their choices of consumption as much as previously.

Alternatively, the act of touching the art supplies in order to evaluate them before buying, might not be essential for this specific industry, as artists usually are goal-oriented buyers, as they generally have a project in mind and they know what they wish to buy, so they might make less impulsive art supplies purchases than other type of products' consumers.

7. RECOMMENDATIONS FOR FUTURE RESEARCH

With the aim of deepening the knowledge regarding the use of Touch Stimulation in the Marketing of online stores, some further research needs to be carried out. There is extremely little literature available on Art Supplies Marketing, which means that there has not been any exploration on this subject, or it has not been documented. Either way, there is the need for investigating ways to improve this area of sales using Marketing, for example, studying how other senses' stimulation might impact consumers, or understanding how art supplies consumers might react to in-store Multi-Sensorial Marketing. This would not only provide art supply store owners and marketing teams with original ideas to dynamize their business, but also provide better insides on their consumers.

Regarding Peck and Childers' NFT scale (Peck & Childers, 2003a, 2003b), a missing research opportunity was found during this study. As the scale was developed exclusively for in-store experiences, there is the need to investigate whether it maintains its accuracy when shifting the situation to a digital environment, and if not, it is important to delineate a new scale with online-suitable questions to investigate consumer's needs for the tactile experiences and characteristics of the products.

Finally, it has been demonstrated that the binary analysis of the NFT results is not as reliable as desired. It distinguishes consumers between high and low NFT values based on the median. Since this median value varies between different studies (because it depends exclusively on the obtained answers from the NFT questions). For example, one person with the value of 5 NFT can be considered high NFT in one study and low NFT in the other. In order to provide more precise analysis, there is the need to create a more general measure to compare and report the NFT scale. The current study results have suggested that the use of the NFT values as a continuous variable, as seen in Cho and Workman's study (2011), might be a solution for the generation of more accurate results. However, further research needs to be developed in order to test and validate this hypothesis.

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9. APPENDIX

A. METHODOLOGY FRAMEWORK

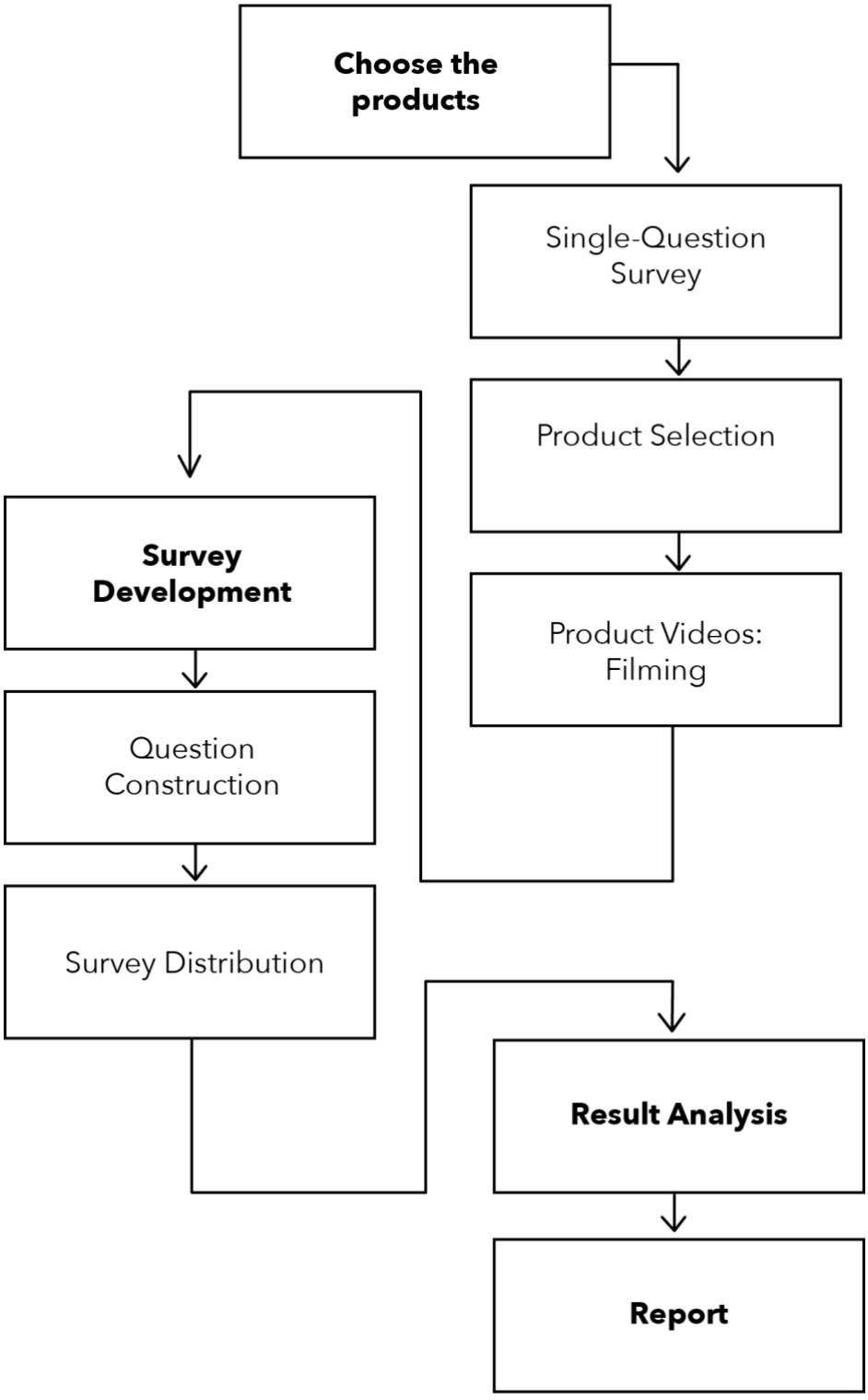


Figure a- Methodology Framework Scheme

B. SURVEY

The survey was constructed using the software Qualtrics, provided by the University.

Show Block: Intro

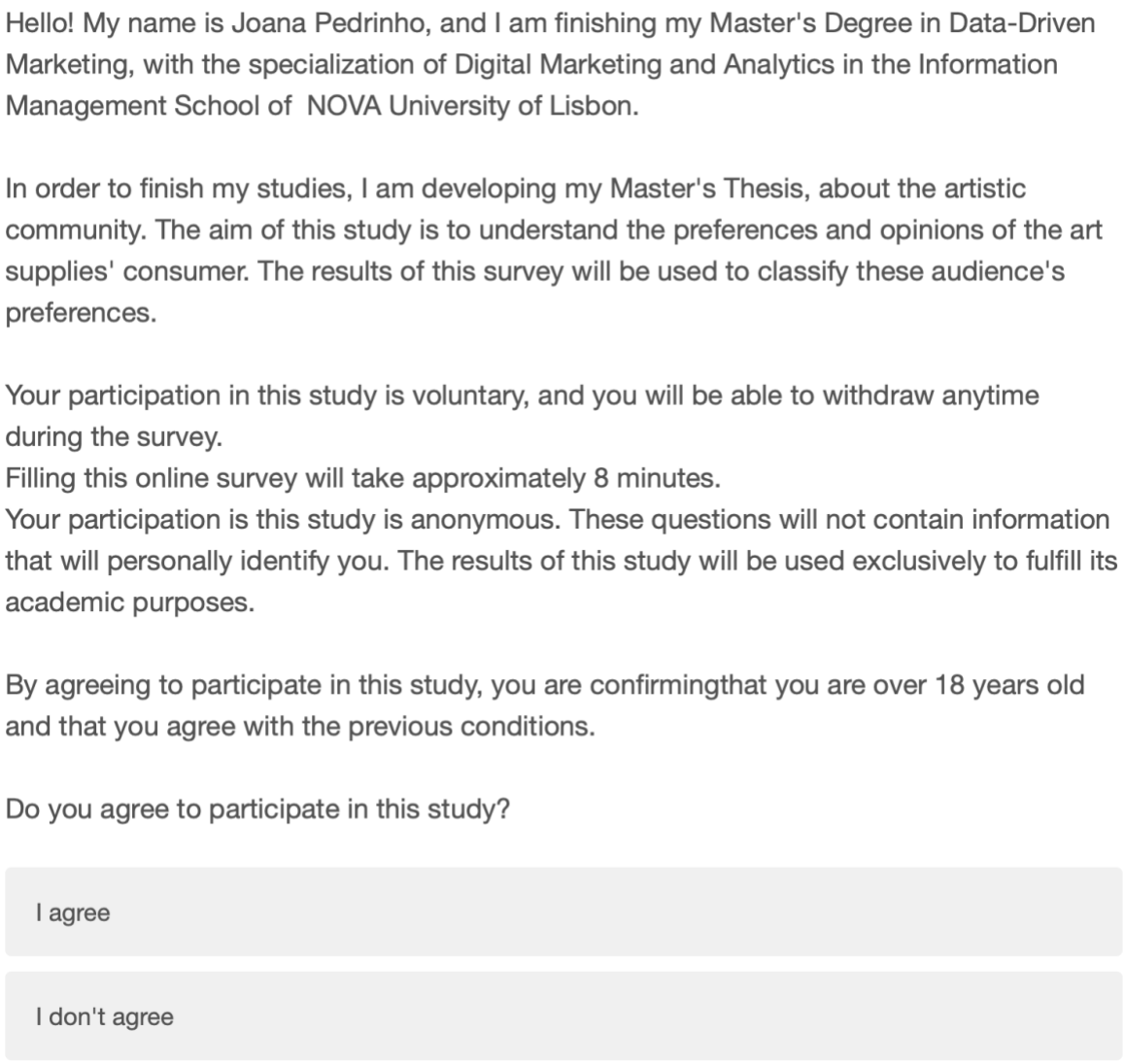


Figure b- Introduction Block of the Survey

Show Block: 16 product evaluation questions (same questions for every imagery type and every product).

Evaluate the following statements:

	Totally Disagree	Partially Disagree	In the Middle	Partially Agree	Totally Agree
This product is appealing to me	○	○	○	○	○
This product reveals good quality	○	○	○	○	○
This product appears to be easily handled	○	○	○	○	○
I would like to use this product	○	○	○	○	○
I would buy this product	○	○	○	○	○

How suitable for the product do you consider its following characteristics?

	Totally unsuitable	Partially Unsuitable	In the Middle	Partially Suitable	Totally Suitable
Quality	○	○	○	○	○
Weight	○	○	○	○	○
Length	○	○	○	○	○
Softness	○	○	○	○	○
Texture	○	○	○	○	○

Indicate your level of trust in these affirmations

	None	A little	Some	Enough	A lot
This brush will last a long time	○	○	○	○	○
This brush is resistant	○	○	○	○	○
This brush fulfills its aim	○	○	○	○	○
This brush is an useful tool	○	○	○	○	○
This brush would improve my artistic techniques	○	○	○	○	○

Figure c- Product Evaluation Questions- Part 1

Indicate if you agree with the following statements:

	Totally Disagree	Partially Disagree	In the Middle	Partially Agree	Totally Agree
I would like to touch the brush before buying it	○	○	○	○	○
I feel frustrated for not being able to touch the brush before buying it	○	○	○	○	○

Figure d- Product Evaluation Questions- Part 2

Show Block: NFT and Demographics

Please indicate your level of agreement with the following statements. (-3 = Strongly Disagree and 3 = Strongly Agree).

	Totally Disagree	Partially Disagree	Slightly Disagree	In the Middle	Slightly Agree	Partially Agree	Totally Agree
When walking through stores, I can't help touching all kinds of products.	○	○	○	○	○	○	○
Touching products can be fun.	○	○	○	○	○	○	○
I place more trust in products that can be touched before purchase.	○	○	○	○	○	○	○
I feel more comfortable purchasing a product after physically examining it.	○	○	○	○	○	○	○
When browsing in stores, it is important for me to handle all kinds of products.	○	○	○	○	○	○	○
If I can't touch a product in the store, I am reluctant to purchase it.	○	○	○	○	○	○	○

Figure e- Demographic and NFT Questions- Part 1

I like to touch products even if I have no intention of buying them.	○	○	○	○	○	○	○
I feel more confident purchasing a product I have touched first because I can determine its quality.	○	○	○	○	○	○	○
When browsing in stores, I like to touch lots of products.	○	○	○	○	○	○	○
The only way to make sure a product is worth buying is to actually touch it.	○	○	○	○	○	○	○
There are many products that I would only buy if I could handle them before purchase.	○	○	○	○	○	○	○
I find myself touching all kinds of products in stores.	○	○	○	○	○	○	○

Indicate your age (numbers):

Indicate your gender

- Female
- Male
- Other
- Rather not answer

Figure f- Demographic and NFT Questions- Part 2

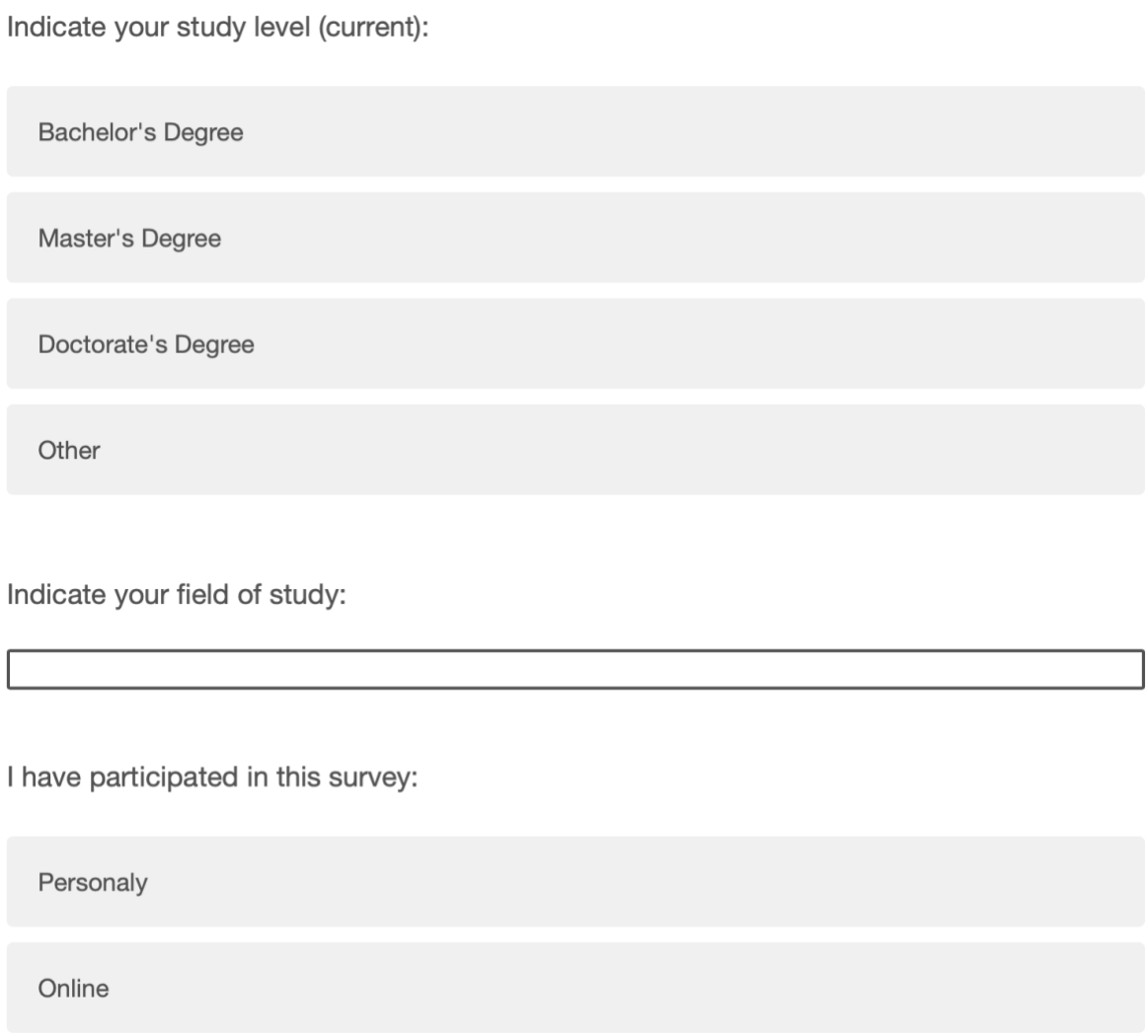


Figure g- Demographic and NFT Questions- Part 3

Show Block: Debriefing

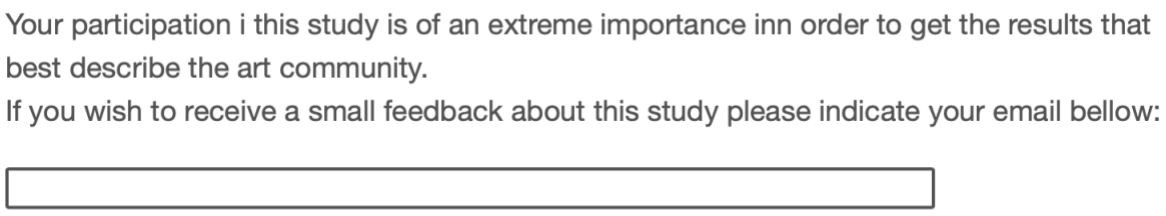


Figure h- Debriefing Question

The Survey flow was manipulated, in order to assign the participants, randomly, into one of the three condition groups.

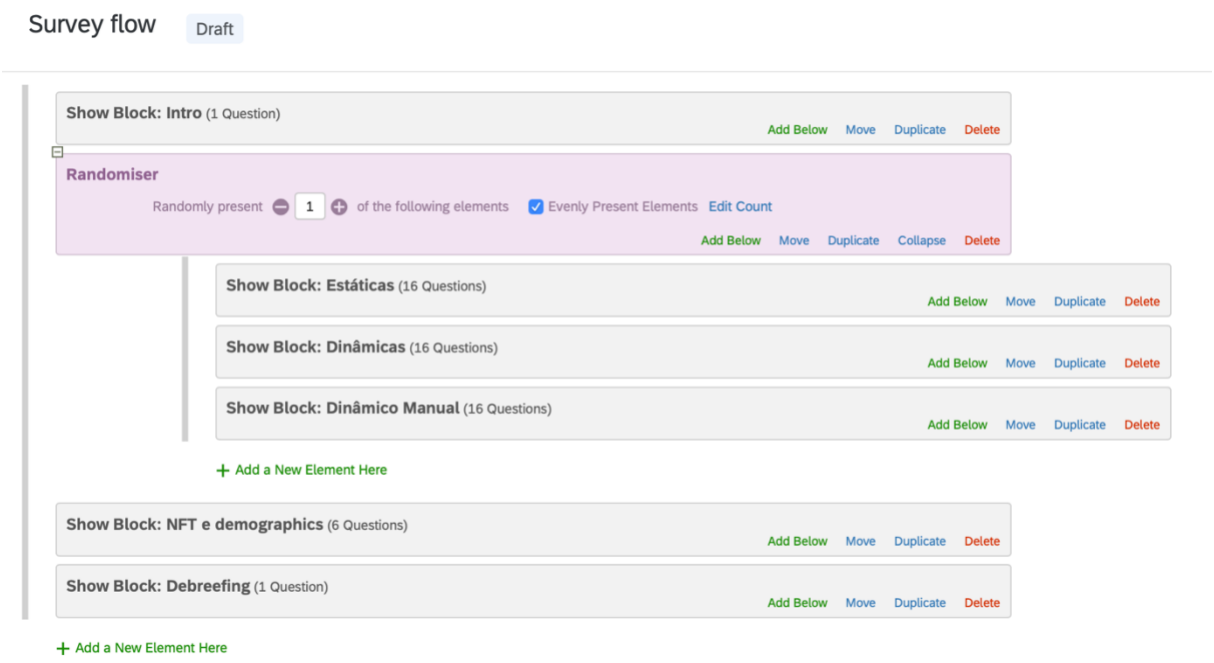


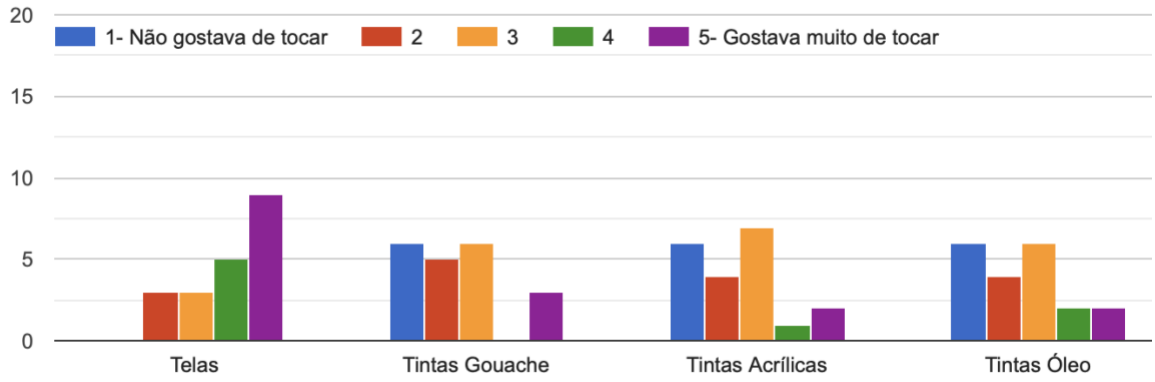
Figure i - Survey flow

C. PRODUCT SELECTION

In order to make a better product selection, a single question survey was made and distributed among artists. The question was: “When online shopping for art supplies, would you like to touch the products before buying them? (To feel its texture, weight, size, materials, temperature, etc) For each product, answer with 1= I would not like to touch, and 5= I would really like to touch.”

The following Images show the results among the corresponding products: canvas; gouache paint; acrylic paint; oil paint; paint brushes; spatulas; paint roller; color pencils; markers; oil pastels; chalk; different types of paper; watercolors; watercolor paper

Quando compram materiais de arte on-line, gostariam de poder tocar nesses materiais antes de os comprar? (para sentirem com as mãos o seu tamanho, textura, matéria prima, temperatura, etc) Em que 1=Não gostava de Tocar, e 5=Gostava muito de Tocar.



Quando compram materiais de arte on-line, gostariam de poder tocar nesses materiais antes de os comprar? (para sentirem com as mãos o seu tamanho, textura, matéria prima, temperatura, etc) Em que 1=Não gostava de Tocar, e 5=Gostava muito de Tocar.

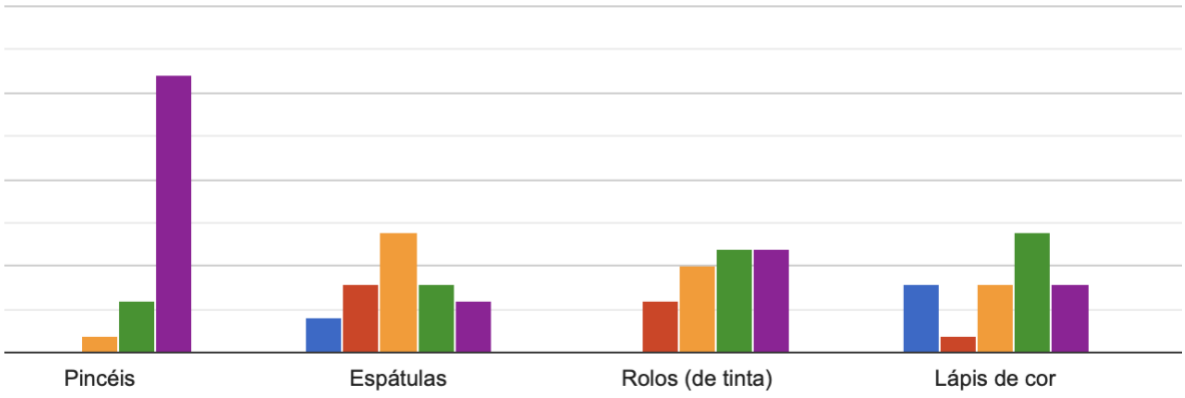


Figure j- Product Selection Survey- Part 1

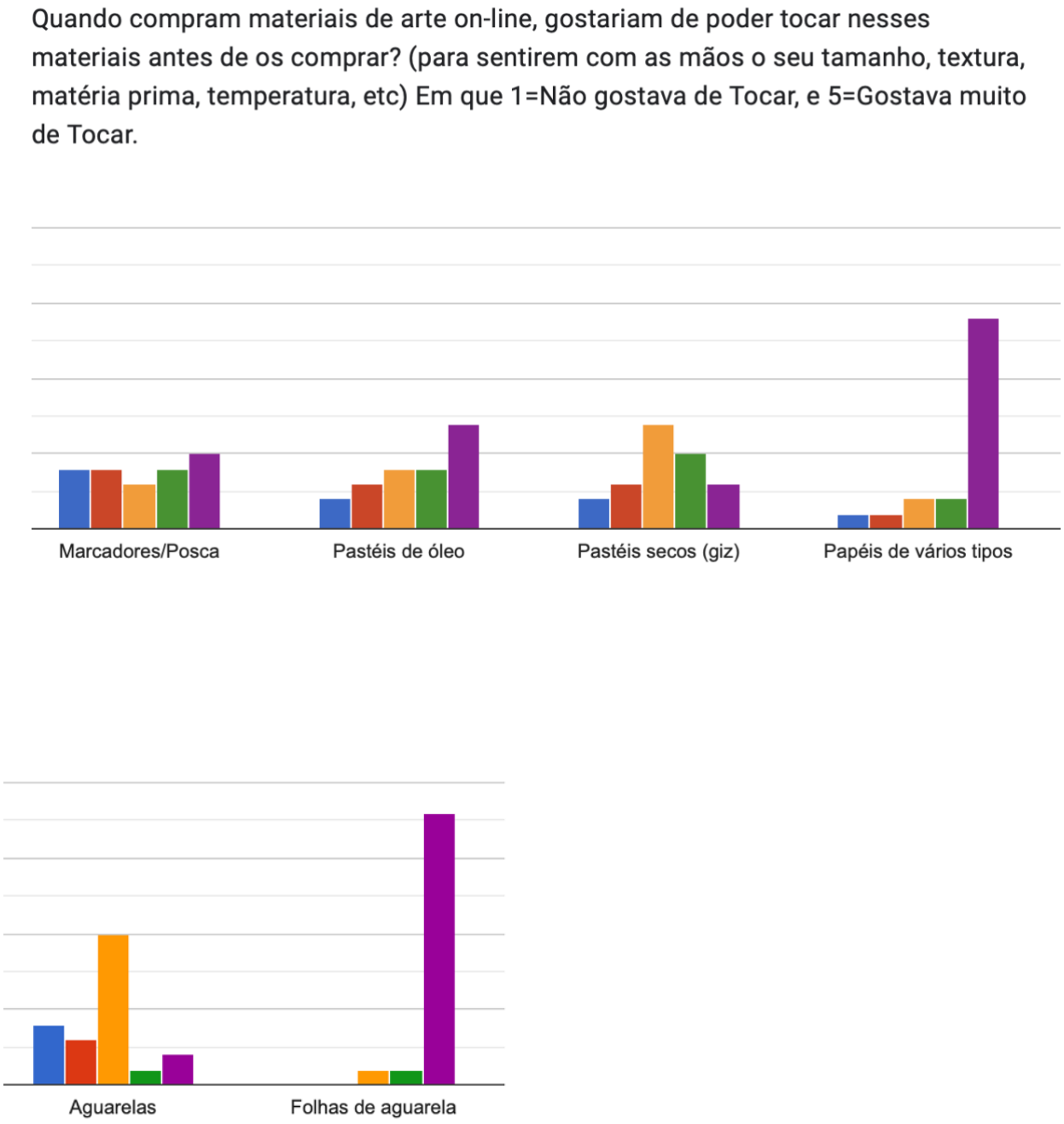


Figure k- Product Selection Survey- Part 2

C.1. Selected Products

As seen above, the selected products were paint brushes and papers. For each type of product, two examples of materials were chosen, which means two different types of brushes and two different paper types (one multi-technique black paper, one watercolor paper). The chosen materials are represented in the following images.

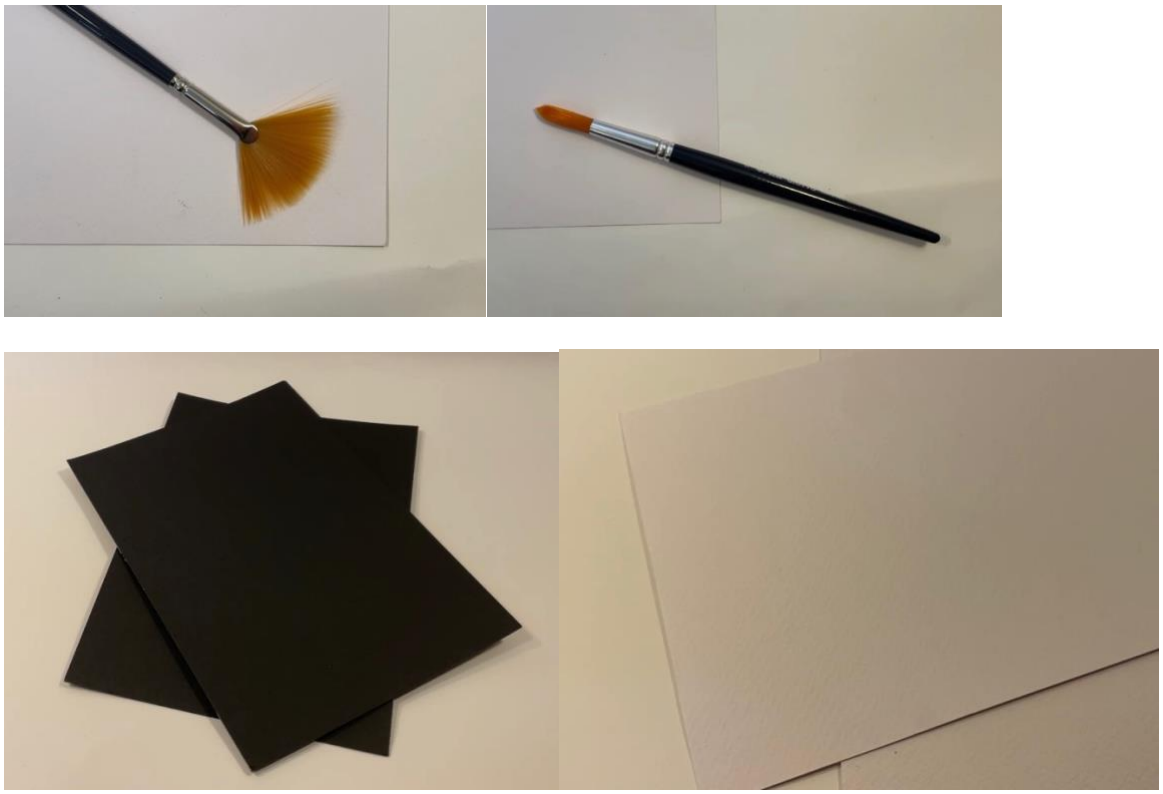


Figure l – Selected Products- Black paper, White paper, Two Different Paintbrushes

D. IMAGERY TYPES

For each of the four selected art supplies, three videos have been recorded and edited. The next images represent some of the frames from each of those videos.

Following Images: Non-Haptic Imagery of the first paint brush

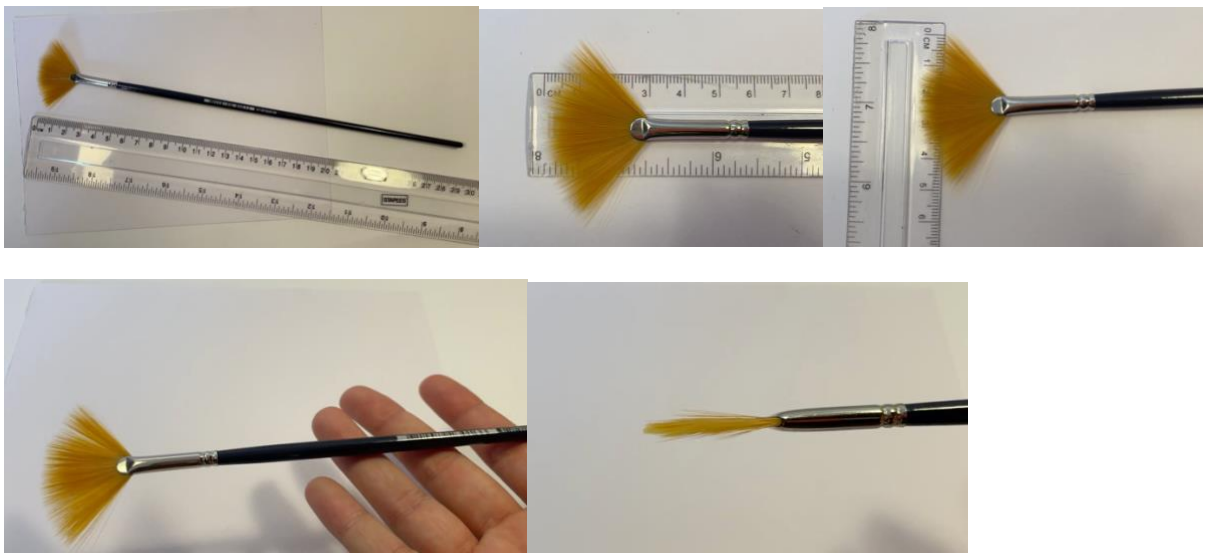


Figure m- Non-Haptic Imagery of the first Paintbrush

Following Images: Haptic Imagery of the first paint brush

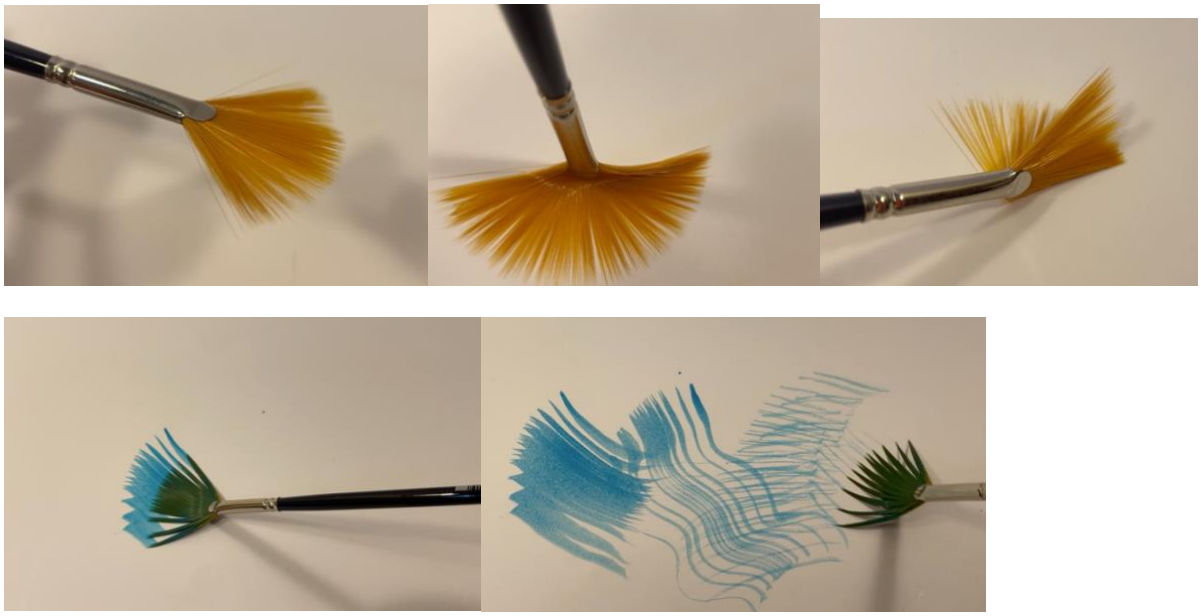


Figure n- Haptic Imagery of the first Paintbrush

Following Images: Hands Haptic Imagery of the first paint brush

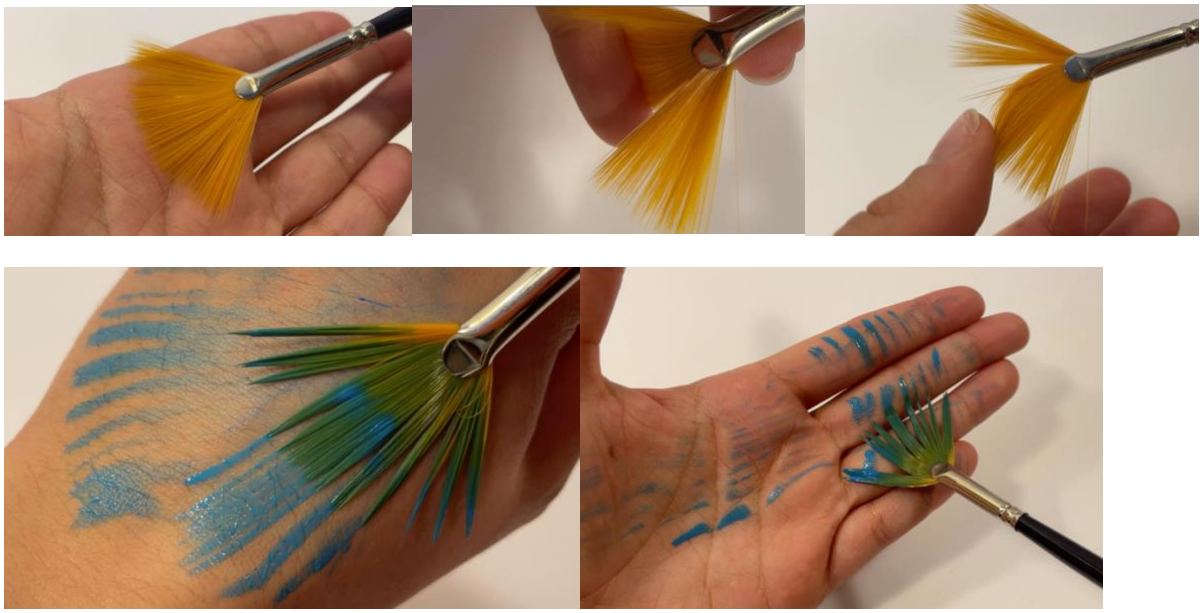


Figure o- Haptic-Hands Imagery of the first Paintbrush

Following Images: Non-Haptic Imagery of the second paint brush

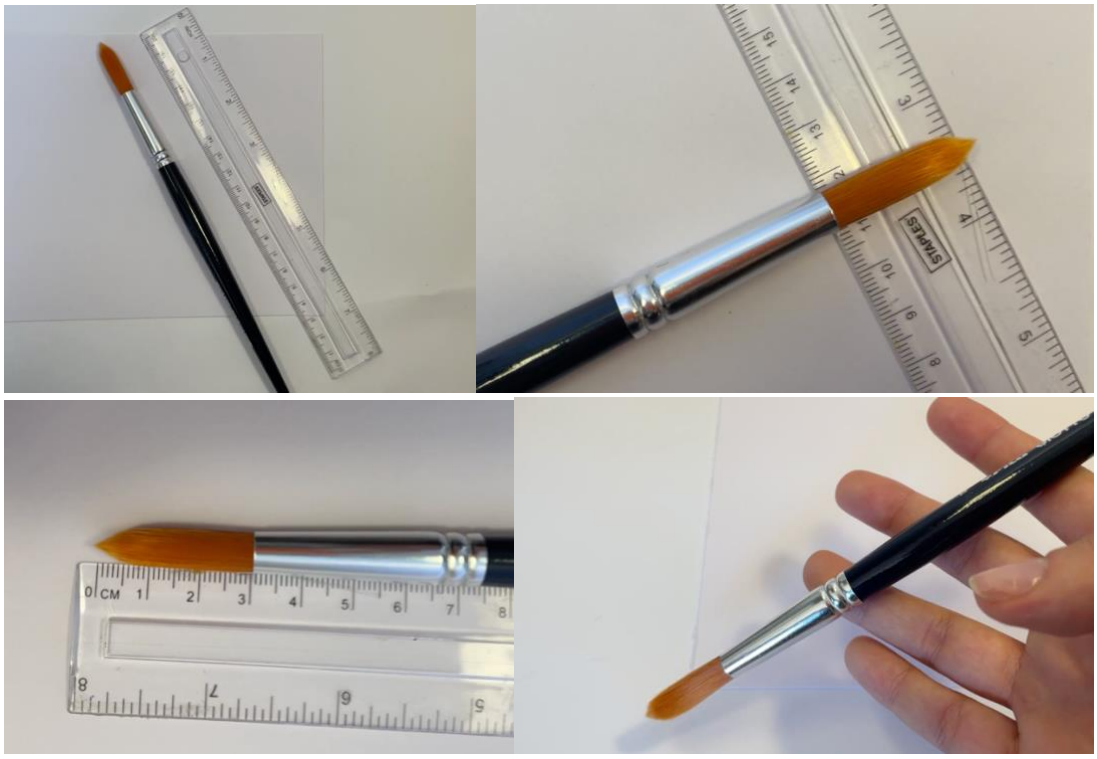


Figure p- Non-Haptic Imagery of the second Paintbrush

Following Images: Haptic Imagery of the second paint brush

Figure q- Haptic Imagery of the second Paintbrush

Following Images: Hands Haptic Imagery of the second paint brush

Figure r- Haptic-Hands Imagery of the second Paintbrush

Following Images: Non-Haptic Imagery of the first paper

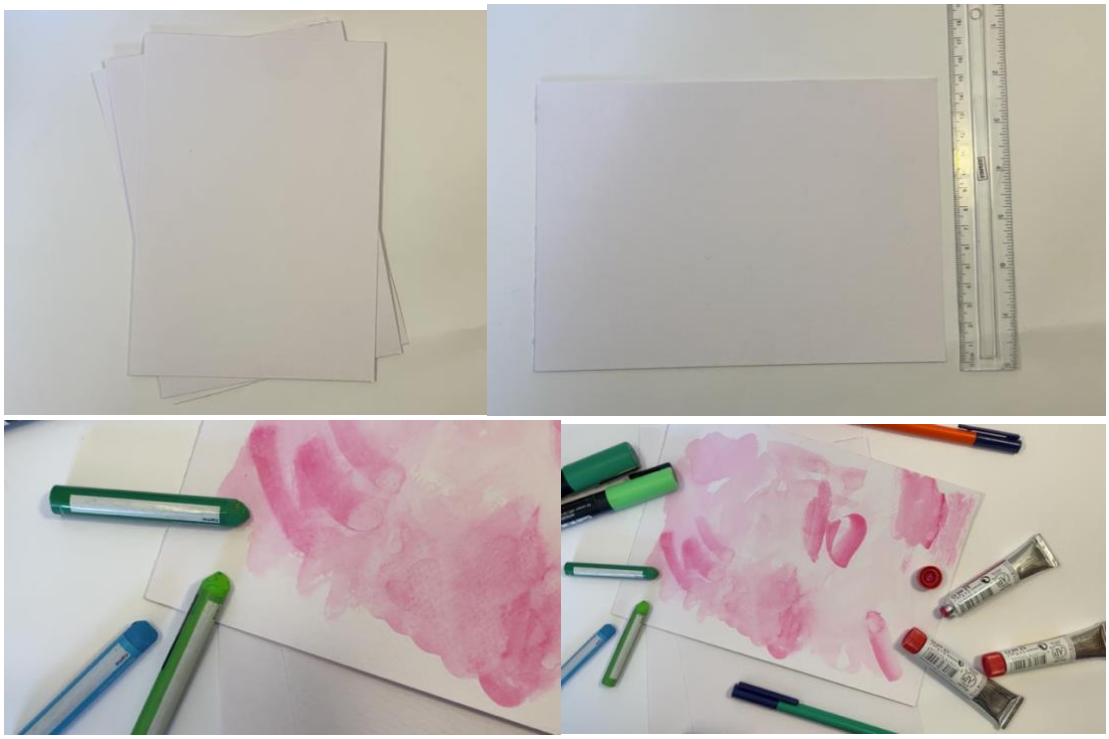


Figure s- Non-Haptic Imagery of the White Paper

Following Images: Haptic Imagery of the first paper

Figure t- Haptic Imagery of the White Paper

Following Images: Hands Haptic Imagery of the first paper

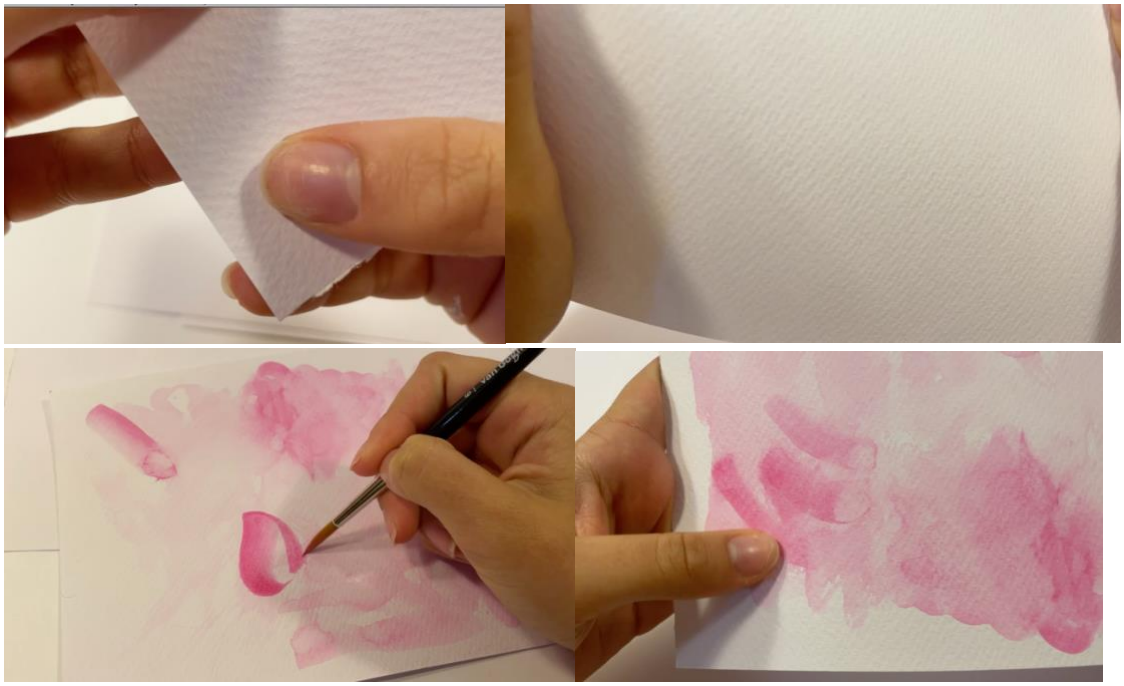


Figure u- Haptic-Hands Imagery of the White Paper

Following Images: Non-Haptic Imagery of the second paper

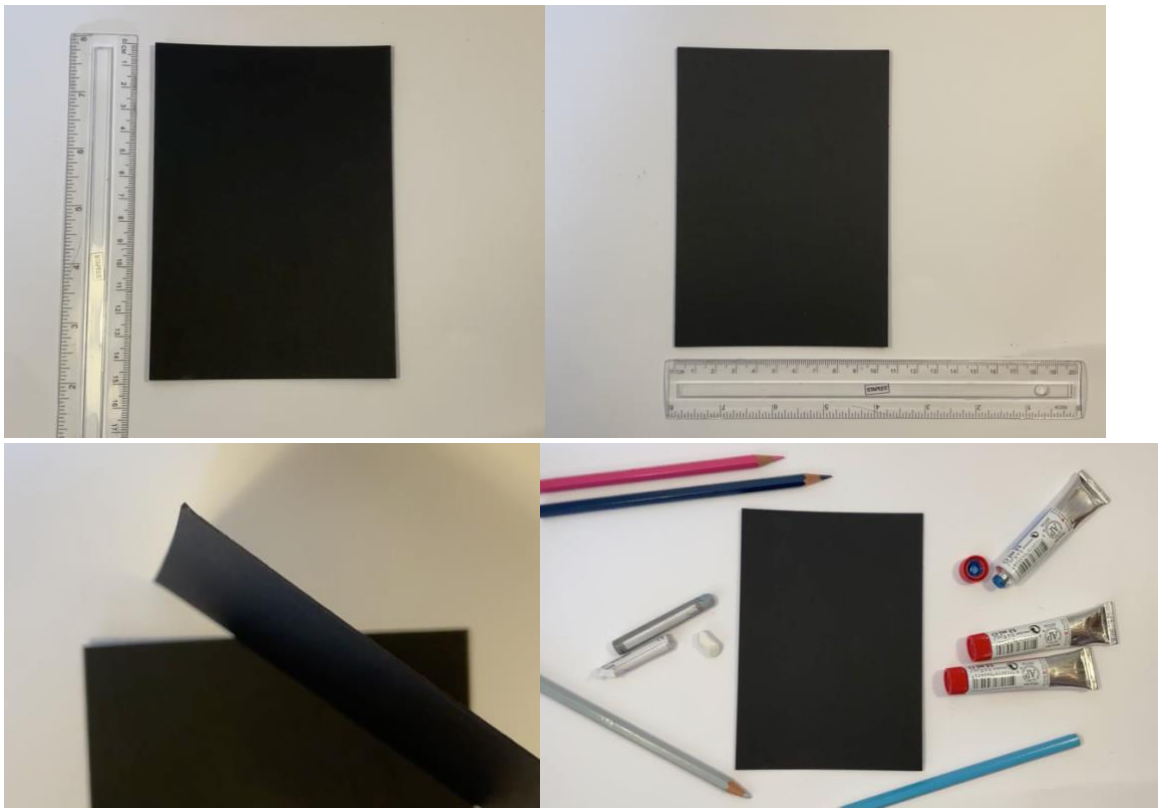


Figure v- Non-Haptic Imagery of the Black Paper

Following Images: Haptic Imagery of the second paper

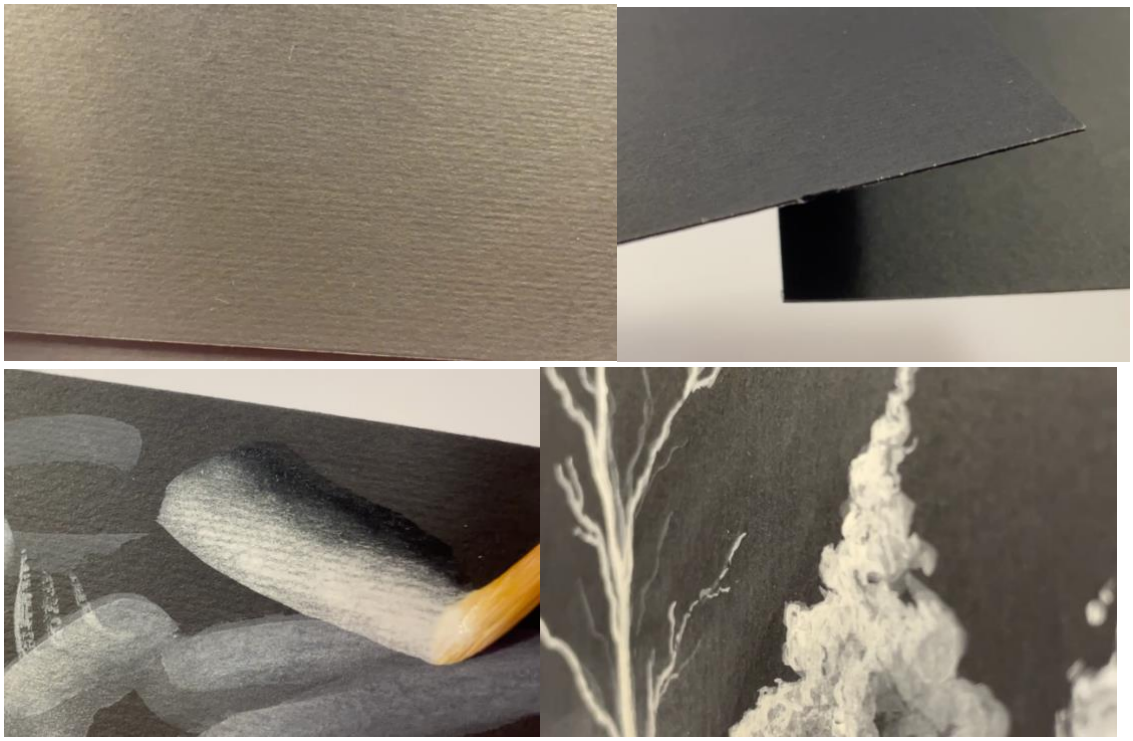


Figure w- Haptic Imagery of the Black Paper

Following Images: Hands Haptic Imagery of the second paper

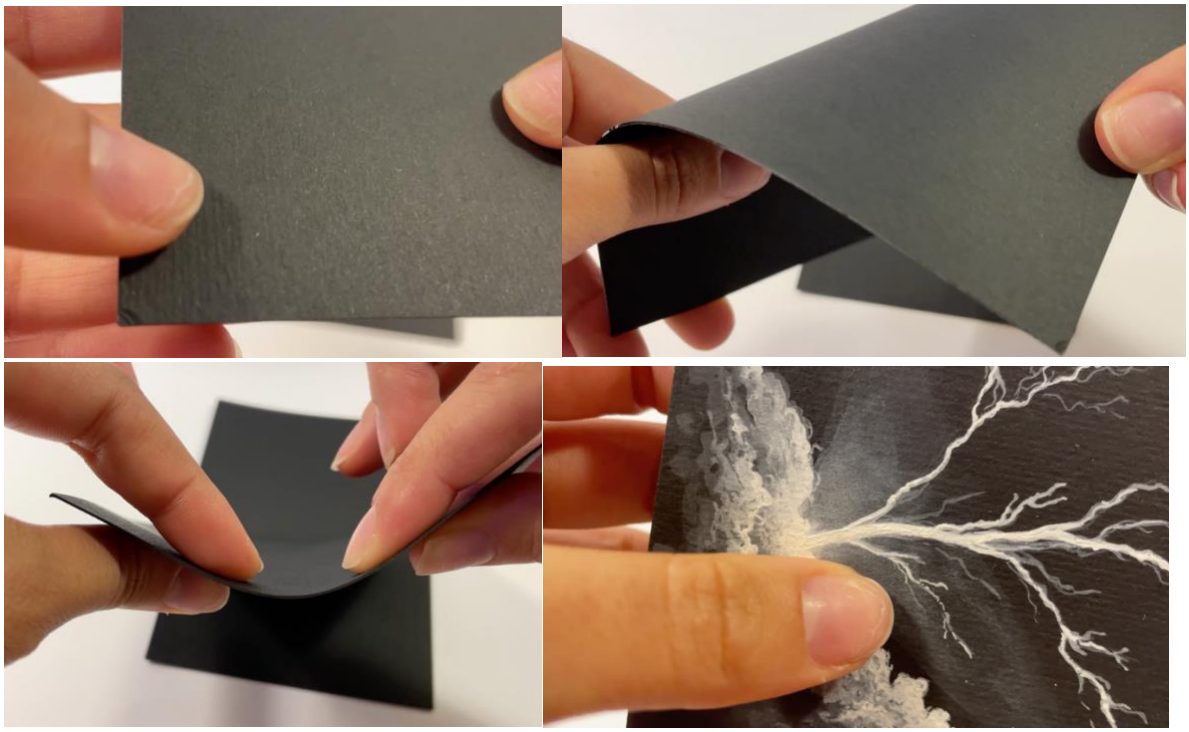


Figure x- Haptic-Hands Imagery of the Black Paper

E. DEMOGRAPHICS

Participants of this survey were all art students, either from Fine-Arts Faculty of Lisbon University or from ESAD Caldas da Raínha. They were all 18 and above years old.

The gender distribution of participants can be seen in the following graphic.

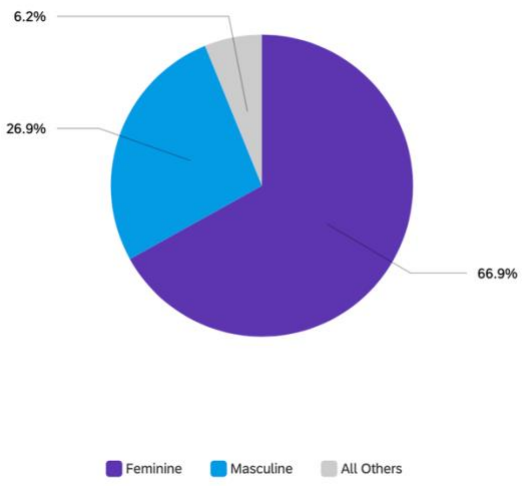


Figure y- Demographic Distribution of the Sample in Analysis.

Moreover, most of the participants were taking their bachelor's degree.

Figure z- Academic Experience of the Sample in Analysis

F. Analysis of the Results

Here is the detailed analysis performed on the collected data.

F.1. Condition

To measure the influence of the condition (Non-Haptic/Haptic/Haptic-Hands) on purchase intention, an ANOVA was performed.

ANOVA

ANOVA – purchase intention

Cases	Sum of Squares	df	Mean Square	F	p
Condição	0.084	2	0.042	0.133	0.876
Residuals	32.758	104	0.315		

Note. Type III Sum of Squares

Descriptives

Descriptives – purchase intention

Condição	Mean	SD	N
1	3.968	0.563	30
2	4.031	0.612	40
3	4.030	0.500	37

Figure aa- ANOVA Analysis- Purchase Intention vs Condition

Post Hoc Tests

Standard

Post Hoc Comparisons - Condição

		Mean Difference	SE	t	p_{tukey}
1	2	−0.063	0.136	−0.464	0.888
	3	−0.061	0.138	−0.445	0.897
2	3	0.002	0.128	0.012	1.000

Note. P-value adjusted for comparing a family of 3

To measure the influence of the condition (Non-Haptic/Haptic/Hands Haptic) on product quality perceived, an ANOVA was performed.

ANOVA ▼

ANOVA - Product quality perceived

Cases	Sum of Squares	df	Mean Square	F	p
Condição	0.188	2	0.094	0.434	0.649
Residuals	22.520	104	0.217		

Note. Type III Sum of Squares

Descriptives ▼

Descriptives - Product quality perceived ▼

Condição	Mean	SD	N
1	3.902	0.501	30
2	3.979	0.480	40
3	4.005	0.417	37

Post Hoc Tests

Standard

Post Hoc Comparisons - Condição

		Mean Difference	SE	t	p_{tukey}
1	2	−0.077	0.112	−0.686	0.772
	3	−0.104	0.114	−0.907	0.637
2	3	−0.027	0.106	−0.251	0.966

Note. P-value adjusted for comparing a family of 3

Figure ba- ANOVA Analysis- Product Quality Perceived vs Condition

To measure the influence of the condition (Non-Haptic/Haptic/Hands Haptic) on frustration felt, a MANOVA was performed.

MANOVA

MANOVA

MANOVA: Pillai Test

Cases	df	Approx. F	$Trace_{Pillai}$	Num df	Den df	p
(Intercept)	1	3455.821	0.985	2	103.000	< .001
Condição	2	1.095	0.041	4	208.000	0.360
Residuals	104					

ANOVA

ANOVA: Mexer antes de comprar

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	2317.794	1	2317.794	6943.985	< .001
Condição	1.492	2	0.746	2.235	0.112
Residuals	34.714	104	0.334		

ANOVA: Frustrado

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	1805.236	1	1805.236	2053.095	< .001
Condição	1.319	2	0.660	0.750	0.475
Residuals	91.445	104	0.879		

Figure ca- MANOVA Analysis- Frustration vs Condition

Finally, to better understand these two variables, separate ANOVAs were performed.

ANOVA

ANOVA – Mexer antes de comprar

Cases	Sum of Squares	df	Mean Square	F	p
Condição	1.492	2	0.746	2.235	0.112
Residuals	34.714	104	0.334		

Note. Type III Sum of Squares

Descriptives

Descriptives – Mexer antes de comprar

Condição	Mean	SD	N
1	4.658	0.480	30
2	4.519	0.765	40
3	4.797	0.381	37

Post Hoc Tests

Standard

Post Hoc Comparisons – Condição

		Mean Difference	SE	t	p_{tukey}
1	2	0.140	0.140	1.000	0.578
	3	−0.139	0.142	−0.979	0.592
2	3	−0.279	0.132	−2.114	0.092

Note. P-value adjusted for comparing a family of 3

Figure da- ANOVA Analysis- Wanting to Touch a Product vs Condition

ANOVA

ANOVA – Frustrado

Cases	Sum of Squares	df	Mean Square	F	p
Condição	1.319	2	0.660	0.750	0.475
Residuals	91.445	104	0.879		

Note. Type III Sum of Squares

Descriptives

Descriptives – Frustrado

Condição	Mean	SD	N
1	4.108	1.112	30
2	3.981	1.012	40
3	4.243	0.660	37

Post Hoc Tests

Standard

Post Hoc Comparisons – Condição

		Mean Difference	SE	t	p_{tukey}
1	2	0.127	0.226	0.561	0.841
	3	−0.135	0.230	−0.586	0.828
2	3	−0.262	0.214	−1.225	0.441

Note. P-value adjusted for comparing a family of 3

Figure ea- ANOVA Analysis- Frustration vs Condition

F.2. Condition vs Binary NFT

To measure the influence of the condition (Non-Haptic/Haptic/Hands Haptic) and the NFT (high/low) on purchase intention and product quality perceived, a MANOVA was performed.

MANOVA

MANOVA

MANOVA: Pillai Test

Cases	df	Approx. F	$Trace_{Pillai}$	Num df	Den df	p
(Intercept)	1	2781.173	0.991	4	98.000	< .001
Condição	2	0.946	0.074	8	198.000	0.480
NFT H/L MEDIANA	1	2.456	0.091	4	98.000	0.051
Condição ✳ NFT H/L MEDIANA	2	0.597	0.047	8	198.000	0.780
Residuals	101					

Figure fa- MANOVA Analysis- Condition vs NFT Binary

In order to better understand the different dependent variables, an ANOVA was performed for each of them.

ANOVA ▼

ANOVA: Product quality perceived ▼

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	1683.321	1	1683.321	7664.670	< .001
Condição	0.188	2	0.094	0.428	0.653
NFT H/L MEDIANA	0.053	1	0.053	0.241	0.625
Condição ✳ NFT H/L MEDIANA	0.285	2	0.142	0.649	0.525
Residuals	22.182	101	0.220		

ANOVA: purchase intention

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	1723.218	1	1723.218	5348.081	< .001
Condição	0.084	2	0.042	0.130	0.879
NFT H/L MEDIANA	0.056	1	0.056	0.174	0.677
Condição ✳ NFT H/L MEDIANA	0.158	2	0.079	0.246	0.782
Residuals	32.543	101	0.322		

ANOVA: Mexer antes de comprar

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	2317.794	1	2317.794	6915.123	< .001
Condição	1.492	2	0.746	2.226	0.113
NFT H/L MEDIANA	0.689	1	0.689	2.055	0.155
Condição ✳ NFT H/L MEDIANA	0.172	2	0.086	0.256	0.774
Residuals	33.853	101	0.335		

ANOVA: Frustrado

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	1805.236	1	1805.236	2190.654	< .001
Condição	1.319	2	0.660	0.801	0.452
NFT H/L MEDIANA	7.513	1	7.513	9.117	0.003
Condição ✳ NFT H/L MEDIANA	0.701	2	0.351	0.425	0.655
Residuals	83.230	101	0.824		

Figure ga- ANOVA Analysis- Dependent Variables vs Condition and NFT Binary

F.3. Binary NFT

To measure the influence of the NFT (high/low) on purchase intention, an ANOVA was performed.

ANOVA

ANOVA – purchase intention

Cases	Sum of Squares	df	Mean Square	F	p
NFT H/L MEDIANA	0.060	1	0.060	0.193	0.662
Residuals	32.782	105	0.312		

Note. Type III Sum of Squares

Descriptives

Descriptives – purchase intention

NFT H/L MEDIANA	Mean	SD	N
1	3.988	0.472	51
2	4.036	0.627	56

Post Hoc Tests

Standard

Post Hoc Comparisons – NFT H/L MEDIANA

		Mean Difference	SE	t	p_{tukey}
1	2	−0.047	0.108	−0.439	0.662

Figure ha- ANOVA Analysis- Purchase Intention vs NFT Binary

To measure the influence of the NFT (high/low) on product quality perceived, an ANOVA was performed.

ANOVA ▼

ANOVA – Product quality perceived

Cases	Sum of Squares	df	Mean Square	F	p
NFT H/L MEDIANA	0.059	1	0.059	0.275	0.601
Residuals	22.648	105	0.216		

Note. Type III Sum of Squares

Descriptives

Descriptives – Product quality perceived

NFT H/L MEDIANA	Mean	SD	N
1	3.942	0.470	51
2	3.989	0.460	56

Post Hoc Tests ▼

Standard ▼

Post Hoc Comparisons – NFT H/L MEDIANA ▼

		Mean Difference	SE	t	P_{tukey}
1	2	−0.047	0.090	−0.525	0.601

Figure ia- ANOVA Analysis- Product Quality Perceived vs NFT Binary

To measure the influence of the NFT (high/low) on frustration felt, a MANOVA was performed.

MANOVA

MANOVA

MANOVA: Pillai Test

Cases	df	Approx. F	$Trace_{Pillai}$	Num df	Den df	p
(Intercept)	1	3400.201	0.985	2	104.000	< .001
NFT H/L MEDIANA	1	4.742	0.084	2	104.000	0.011
Residuals	105					

ANOVA

ANOVA: Mexer antes de comprar

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	2317.794	1	2317.794	6857.004	< .001
NFT H/L MEDIANA	0.714	1	0.714	2.111	0.149
Residuals	35.492	105	0.338		

ANOVA: Frustrado

Cases	Sum of Squares	df	Mean Square	F	p
(Intercept)	1805.236	1	1805.236	2225.384	< .001
NFT H/L MEDIANA	7.588	1	7.588	9.354	0.003
Residuals	85.176	105	0.811		

Figure ja- MANOVA Analysis- Frustration vs NFT Binary

Therefore, an ANOVA was performed for each of these dependent variables. The results of the Wanting to touch the product variable analysis are documented in the table below.

ANOVA ▼

ANOVA – Mexer antes de comprar

Cases	Sum of Squares	df	Mean Square	F	p
NFT H/L MEDIANA	0.714	1	0.714	2.111	0.149
Residuals	35.492	105	0.338		

Note. Type III Sum of Squares

Descriptives

Descriptives – Mexer antes de comprar

NFT H/L MEDIANA	Mean	SD	N
1	4.569	0.552	51
2	4.732	0.607	56

Post Hoc Tests ▼

Standard ▼

Post Hoc Comparisons – NFT H/L MEDIANA ▼

		Mean Difference	SE	t	p_{tukey}
1	2	−0.164	0.113	−1.453	0.149

Figure ka- ANOVA Analysis- Wanting to touch a Product vs NFT Binary

Finally, having verified a significant p-value on frustration felt, an ANOVA was performed in order to better understand these results.

ANOVA

ANOVA – Frustrado

Cases	Sum of Squares	df	Mean Square	F	p
NFT H/L MEDIANA	7.588	1	7.588	9.354	0.003
Residuals	85.176	105	0.811		

Note. Type III Sum of Squares

Descriptives

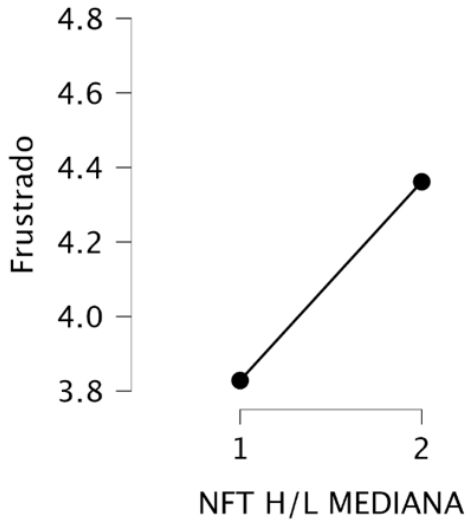
Descriptives – Frustrado

NFT H/L MEDIANA	Mean	SD	N
1	3.828	0.862	51
2	4.362	0.934	56

Figure la- ANOVA Analysis- Frustration vs NFT Binary-Part 1

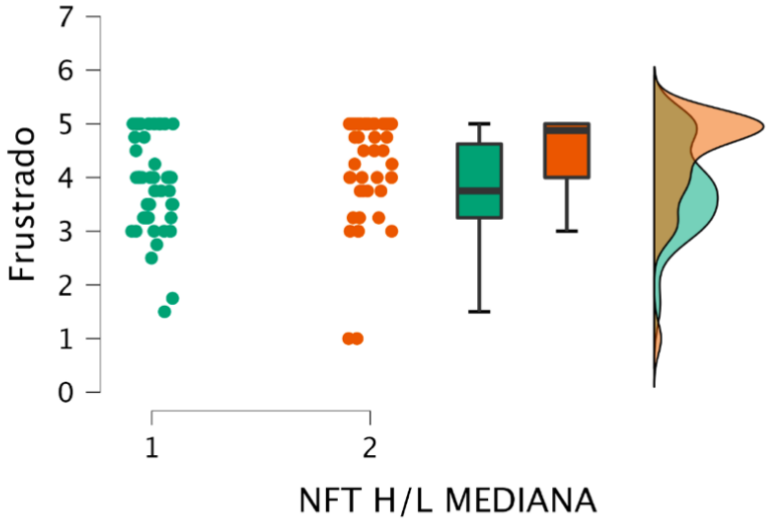
Descriptives ▼

Descriptives plots ▼



Raincloud plots

Frustrado



Post Hoc Tests ▼

Standard

Post Hoc Comparisons – NFT H/L MEDIANA

		Mean Difference	SE	t	p_{tukey}
1	2	−0.533	0.174	−3.058	0.003

Figure ma- ANOVA Analysis- Frustration vs NFT Binary-Part 2

F.4. Continuous NFT

Regarding the Continuous NFT, a Correlation to all the dependent variables was made.

Correlation ▾

Pearson's Correlations

Variable		purchase intention	Product quality perceived	Mexer antes de comprar	Frustrado	NFT H/L MEDIANA	NFT Contiuous
1. purchase intention	Pearson's r	—					
	p-value	—					
2. Product quality perceived	Pearson's r	0.665	—				
	p-value	< .001	—				
3. Mexer antes de comprar	Pearson's r	0.547	0.291	—			
	p-value	< .001	0.002	—			
4. Frustrado	Pearson's r	0.382	0.193	0.673	—		
	p-value	< .001	0.046	< .001	—		
5. NFT H/L MEDIANA	Pearson's r	0.043	0.051	0.140	0.286	—	
	p-value	0.662	0.601	0.149	0.003	—	
6. NFT Contiuous	Pearson's r	0.109	0.072	0.302	0.331	0.835	—
	p-value	0.266	0.464	0.002	< .001	< .001	—

Figure na- Correlation Analysis between Continuous NFT and the Other Variables