Need For Touch and Haptic Imagery: An Investigation in Online Fashion Retail

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Resumo

E-commerce is an effective marketing tool, as it enables price comparisons, information seeking, and more convenience. However, for products such as fashion items, which require more touching and physical evaluation of features (e.g., softness, texture, and fit), online sales channels present more risks, due to the inability to convey that sense. This limits online purchase intentions. On the other hand, individuals display different degrees of Need for Touch. Thus, to sell fashion products online, firms should minimize the drawback when touching them is not possible. The aim of this paper is to identify how information presented on a fashion website influences the purchase decision process, as well as the perception of product quality. Perceived product quality may be optimized once virtual stores present sufficient pictorial and textual information for a more realistic and sensorial analysis. We also wanted to test whether the variable Need for Touch affects perceived quality and/or purchase intention. In this sense, we tested hypotheses that led to the conclusion that a product description with more sensorial (pictorial and textual) information helps generating haptic image, positively influencing perceived quality and the intention to purchase. Such results are in line with the findings of previous studies. Contrary to other studies, however, the expected moderating effect of NFT on the relationship between haptic imagery, perceived product quality, and purchase intention was not demonstrated by our analyses. Theoretical and managerial contributions are also discussed, in a contribution to the literature on e-commerce, NFT, and haptic imagery.

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ABSTRACT

E-commerce is an effective marketing tool, as it enables price comparisons, information seeking, and more convenience. However, for products such as fashion items, which require more touching and physical evaluation of features (e.g., softness, texture, and fit), online sales channels present more risks, due to the inability to convey that sense. This limits online purchase intentions. On the other hand, individuals display different degrees of Need for Touch. Thus, to sell fashion products online, firms should minimize the drawback when touching them is not possible. The aim of this paper is to identify how information presented on a fashion website influences the purchase decision process, as well as the perception of product quality. Perceived product quality may be optimized once virtual stores present sufficient pictorial and textual information for a more realistic and sensorial analysis. We also wanted to test whether the variable Need for Touch affects perceived quality and/or purchase intention. In this sense, we tested hypotheses that led to the conclusion that a product description with more sensorial (pictorial and textual) information helps generating haptic image, positively influencing perceived quality and the intention to purchase. Such results are in line with the findings of previous studies. Contrary to other studies, however, the expected moderating effect of NFT on the relationship between haptic imagery, perceived product quality, and purchase intention was not demonstrated by our analyses. Theoretical and managerial contributions are also discussed, in a contribution to the literature on e-commerce, NFT, and haptic imagery.

Key words: Need for Touch; Haptic Information; Haptic Imagery; Online Fashion Retail.

Introduction

Online channels have become an effective tool for marketers and a way to generate significant sales volumes. Online shopping allows consumers to save both time and money. Pleasant online shopping environments attract consumers and allow them to search for information more efficiently and to enjoy the shopping process (Park, 2008).

According to a report by Deloitte (2016), the use of online and mobile digital devices has had an impact not only on sales but also on consumer behavior. In 2015, 49% of in-store sales in the U.S. were influenced by digital devices used before or during shopping trips, whereas 6.5% of retail sales were online – amounting to roughly US$ 305 billion. In European markets like Germany, the Netherlands, and the United Kingdom digital influence was around 30 percent (Deloitte, 2016). In developing countries, despite their overall lower rates of digital adoption, there is a high prevalence of digital shopping. As an example, in 2014, total retail sales in China were 89% offline and 11% online (Deloitte, 2016).

Brazil is a large market, with 140 million internet users out of a total population of 207 million. According to Euromonitor, Brazil represents about 42% of all B2C e-commerce in Latin America (Pagbrasil, 2016). Around 38 million Brazilians shop online, and e-commerce revenues reached an estimated US$ 15.9 billion in 2015 (Ecommerce Foundation, 2016).

In most countries, apparel is one of the top categories in online sales, even in developing markets. On a worldwide basis, online purchases of apparel and footwear grew by around 17.5% per year between 2002 and 2015 (Euromonitor, 2015). In the US, it is the most popular e-commerce category, with about US$ 60 billion purchases annually (Statista, 2016). Apparel, fashion, and accessories are also the leading category in e-commerce sales in Brazil, with a 28% market share (Ecommerce Foundation, 2016).

Since they represent a different context and a more risky environment (Ling, Chai, and Piew, 2010), online channel attributes affect consumer behavior at the various stages of the decision-making process (Rodríguez-Torrico, Cabezudo, & San-Martín, 2017). In spite of the benefits offered by online shopping, consumers still have difficulty because they are not able to inspect products directly and evaluate their specific features. Direct product experience tends to enhance consumers' ability to process product-related information and thus to increase confidence in the purchase decision (Park, 2008).

Apparel and fashion buying is a multi-sensory experience that involves the senses, particularly touch; direct sensory contact with fabrics and garments may provide valuable product information to make an informed choice (Mooy & Robben, 2002; Peck & Childers, 2003).; Consumers who expect to touch products to experience its intrinsic sensory attributes, but are unable to do so on websites may feel uncertain about product quality (Maignan & Lukas, 1997; McCabe & Nowlis, 2003), experience negative emotions towards the product (Grohmann et al., 2007), or even avoid online shopping altogether (Citrin, Spangenberg, & Clark, 2003; McCabe & Nowlis, 2003; Shim et al., 2001).

Previous studies have shown the existence of individual differences in terms using the sense of touch to gather information before purchasing (Dholakia & Zhao, 2010; Peck & Childers, 2003; Park, 2006; Rodrigues & Silva, 2013). Peck and Childers (2003) define Need for Touch (NFT) as the preference to obtain and use information through the sense of touch, or the *haptic system*. According to Gibson (1966, apud Peck & Childers, 2003), the haptic system refers to how humans search for and gather information using essentially the hands. Offering visual and textual descriptions is a way to convey information on product quality in order to compensate for the lack of touch (Peck & Childers, 2003; Rodrigues & Silva, 2013). *Haptic information* is defined as images and texts that try to convey a sensorial, experiential sensation to users (Park & Stoel, 2002), i.e., information that users would have if they could actually touch the product (Zeng et al., 2004).

The aim of the present paper is to add to the body of research on Need for Touch in online shopping environments. We focus on the apparel category because it is strongly linked to the need for haptic information. In recent years there has been an increasing interest in research on the individual differences in touch (e.g., Citrin et al., 2003; Grohmann, Spangenberg, & Sprott, 2007; Peck & Wiggins, 2006), but further research is needed on gender differences regarding NFT, as most studies carried out so far have used mostly female participants (e.g., Nuszbaum et al., 2010; Overmars & Poels, 2015; Rodríguez-Torrico, Cabezudo, & San-Martín, 2017). Therefore, we have included in our sample both male and female respondents.

Secondly, our study investigates NFT in the context of a developing country, thus adding to research carried out in Western and Asian developed nations (e.g., Park, 2008; 2009; Rodrigues & Silva, 2013; Workman & Cho, 2013). A comparative study between online consumers from Brazil and Canada by Rocha, Ferraz, and Reinaldo (2015) has shown that Brazilians tend to trust online channels less than Canadians, and that such differences are due to cultural traits such as collectivism and uncertainty avoidance. In another study, Nakagawa, Gouvea, and Oliveira (2013) demonstrated that trust, marketer reputation, easiness to buy online, a wide product selection, peer recommendations, and the possibility to try products before buying seem to be crucial aspects for channel selection and loyalty. Therefore, we believe that our study may enrich the understanding of Brazilian consumers' behavior in online environments.

In view of the above, the aim of this article is to answer the following research question: "How is online fashion shopping influenced by haptic information and NFT in the context of an emerging market?" To answer this question, we ran a 2X2, between-subjects experiment with

264 Brazilian consumers to analyze how haptic information affects the relationship between perceived quality and purchase intention, and the role played by NFT.

The remainder of this article is organized as follows: firstly, we discuss NFT, haptic information, and haptic imagery as they influence perceived quality and purchase intention. Then we discuss our field research findings. Finally, we bring conclusions and recommendations.

1. Theoretical Background

Our review of the literature focused on NFT, haptic information, and haptic imagery, which in turn affect perceived product quality and purchase intention.

1.1 Haptic Information and Haptic Imagery

Online stores should provide as much information as possible to reproduce a sensorial and experiential situation (Levin, Levin, and Weller, 2005; Park & Stoel, 2002; Rodrigues & Silva, 2013). While it is clear that the act of touching cannot be reproduced realistically in the online store environment, consumers seem at least to expect to be able to visualize how it would be like to hold the product in their hands (Okonkwo, 2010; Overmars & Poels, 2015). For that matter, both images and sensorial, textual descriptions of the fabric and materials could help customers collecting indirect haptic cues, and thus overcome their reluctance to buy online (Rodrigues & Silva, 2013; Zeng et al., 2004). This is what Peck and Childers (2003) call *haptic information* - that, which can only be collected by touch, such as texture, hardness, weight, and temperature. Haptic refers to an active use of the hands to gather information about an object's attributes, using both tactile and kinesthetic input (James, Kim, & Fisher, 2007). Even though touch is present throughout the skin's surface, the hands are the main instrument due to their motor and perceptual abilities (Bamarouf & Smith, 2009).

In online fashion shopping environments, haptic information may come in the form of images and descriptions. Verbal descriptions of the product´s physical attributes, fabric, fit, and usage help shoppers recall memories of past experiences with wearing and touching similar items, which in turn may influence quality and risk perceptions, uncertainty, and purchase intention (Ha, Kwon, & Lennon, 2007; Kim & Lennon, 2000; Peck & Childers, 2003; Rodrigues & Silva, 2013).

Park (2006) posits a positive relation between haptic information and perceived product quality; additionally, it may be more effective than information about style or outfit combinations. Haptic information about fabric softness or hardness, thickness, weight, firmness, elasticity, etc., tends to diminish the need to touch products (Klatzky, Lederman & Matula, 1993; Park, 2006; Soufflet, Callonnier & Dacremont, 2004). Besides, it helps in leading consumers to perceive the online environment as more reliable.

Both pictorial and verbal information play a role in facilitating visual imagery, i.e., a process by which visual information is represented in working memory (MacInnis & Price, 1987), involving multisensory imagery processing (i.e., sight, hearing, touch, taste, and smell). Imagery has been found to be important in information processing, generating affect, cognition, and intention. It may even compensate for actual product experiences (Park, 2008, 2009). In general, pictures are considered to be more vivid and easier to process than words. However, researchers have found that concrete, vivid verbal information also actives mental imagery processes. High imagery words aid people in evoking images in their minds and understanding the message (Park, 2008). This is in line with dual coding theory, which posits that cognition is an outcome of two mental systems - verbal and pictorial/nonverbal (Paivio, 1975, 1986). Dual

coding theory helps to understand how pictorial and verbal information affects customers' perceived product quality and perceived risk, subsequently influencing attitude toward a product and purchase intentions (Park, 2006).

Since the amount of haptic information available to online apparel shoppers is limited, it is important to provide effective and detailed product information to help customers visualize a product, and imagine fit and fabric feel without trying it on and touching it. Park (2009) shows that detailed pictures (i.e., larger view and close-ups of a product) and detailed descriptions of fabric and style play a significant role in evoking consumers' perceived visual imagery, subsequently enhancing a positive mood and improving perceived quality. This leads to the concept of haptic imagery: the final mental perception we get after receiving a (written or oral) description and/or an image, as conveyed by somebody who has actually touched the product (Peck & Childers, 2003; Park, 2006).

Based on the discussion above, we postulate the following hypothesis:

H1: More pictorial and verbal sensory information will positively impact haptic imagery.

1.2 Impact of Haptic Imagery on Perceived Quality and Purchase Intention

Comprehensive haptic imagery (textual haptic descriptions, pictures, and multi-media features such as animation, rotation, zoom, and 3-D visualization) has been shown to hold a positive relation to attitude toward a product, perceived quality, and purchase intention (Fiore & Jin, 2003; Park, 2006; 2009; Rodrigues & Silva, 2013).

Perceived quality is the result of a perceptional process, in which a product is judged according to its visible and invisible attributes in comparison to alternatives (Aaker, 2009). Consumer perceived quality is different from objective quality, which can be measured and verified according to pre-established patterns. Perceived quality is abstract and subjective and varies according to specificities involving product consumption (Monroe & Krishnan, 1985).

Liao and Cheung (2001) posit that, as shopping online involves more risk and lower purchase intention, perceived quality suggested by the website´s features increases shopping likelihood. Such perception is built on sufficient, detailed data supported by images and textual information on the products, which in turn lead to a better attitude towards the offer (Liao & Cheung, 2001). Alba et al. (1997) suggest that the quality of the presented information is a strong predictor of product adequacy in online purchase situations.

When consumers are unable to directly examine a product in an online shopping context, high imagery information may play an important role in stimulating retrieval of haptic information (e.g., texture, weight) stored in memory (Peck & Childers, 2003). Peck and Childers (2003) found that pictorial and verbal information containing high haptic imagery (e.g., cellular telephone weight and sweater softness) influenced perceptions of product quality positively.

Based on this rationale we developed the following hypothesis:

H2: Haptic imagery will positively impact perceived product quality.

As fashion items' quality can only be totally confirmed after purchase, their online presentation is more challenging than for other products, such as books or electronics. As touching or trying on is impossible in online environments, it is necessary to find different means to approach the online and offline shopping experiences to minimize perceived risks and increase willingness to buy (Ha, Kown, & Lennon, 2007). Therefore, we propose that:

H3: Haptic imagery will positively impact purchase intention.

Liao and Cheung (2001) state that, despite the higher perception of risk in online shopping, the way the website induces perceived product quality may help increasing purchase likelihood. Such perception depends on the store presenting sufficient data, such as images and detailed verbal information on products. Based on this, we propose the following hypothesis:

H4: Perceived product quality will positively impact purchase intention.

1.3 Need for Touch (NFT) in online retail

The skin is the largest human organ, responsible for our protection and communication with the outside world through the sense of touch. Touch is conveyed through stimulation of the skin receptors; it is an interactive system, which is more accessible than other sensorial systems such as vision and hearing (Bamarouf & Smith, 2009; Agardi & Dornyei, 2011).

People show marked differences in terms of preference for using the sense of touch to collect information about products and make purchase decisions. Peck and Childers define *Need for Touch* (NFT) as "a preference for the extraction and utilization of information obtained through the haptic system" (Peck & Childers, 2003, p. 431). The *haptic system* refers to the sensorial, motor, and cognitive connection between the hands and the brain through skin receptors and electric impulses to the central neural system (Bamarouf & Smith, 2009).

NFT is a multidimensional construct with two dimensions: instrumental and autotelic. The autotelic dimension is related to touch as an end in itself, i.e., aiming only at sensory stimulation and pleasure. The instrumental dimension relates to an outcome-directed touch, whereby consumers make contact with the product in order to gather information to reach a decision about the most adequate purchase. Both dimensions result from an individual's motivations to examine products through the haptic system (Peck & Childers, 2003).

Peck and Childers (2003) developed a scale to measure the dimensions of NFT, which has been used and validated in later studies (e.g., Nuszbaum et al., 2010; Park, 2006; Peck & Wiggins, 2006). Peck and Childers (2003) showed that higher NFT individuals were more confident and less frustrated in product evaluation when they were able to touch products. For lower NFT individuals, the opportunity to touch products is not expected to influence the level of confidence or frustration. Therefore, the influence of haptic information on product evaluation may be moderated by individual differences in need for touch (Manzano et al., 2016; Nuszbaum et al., 2010; Peck & Childers; 2003; Peck & Wiggins, 2006).

Based on the above, we developed the following hypothesis:

H5: Individual differences in Need for Touch will moderate the relationship between haptic imagery and perceived product quality.

NFT is a relevant barrier to online purchasing for some customers and product categories (Peck & Childers, 2003; 2008; Park, 2006). Clothing items, which come in different materials and shapes, involve more touching to evaluate their attributes before making a purchase decision (Grohmann, et al., 2007; Jansson-Boyd, 2011; Klatzky & Lederman, 1992; McCabe & Nowlis, 2003; Park, 2009). In a product category with so much variation in quality, fit, and price, many consumers tend to see online channels as more risky than offline ones (McCabe & Nolis, 2003; Peterson et al., 1997; Grewal et al., 2004; Yu, Lee & Damhorst, 2012).This is not so strong for products with little or no variation in their material properties, such as books or DVDs – in this case, vision is enough.

Consumers who expect to touch products to experience their intrinsic sensory attributes, but are unable to do so, may experience negative emotions toward the product (Grohmann et al., 2007;

Overmars & Poels, 2015; Peck & Childers, 2003) or even to avoid online shopping environments altogether (Citrin, Spangenberg, & Clark, 2003; Manzano et al., 2016; McCabe & Nowlis, 2003). Thus, it is important to find ways to approximate the online purchase experience to the in-store one, in order to minimize risks and improve product perceived quality (Ha, Kwon, & Lennon, 2007).

Online retailers try to reduce the lack of direct experience by increasing shoppers' interactions with the content of the virtual shopping environment. Pleasant web interface designs, high-interactivity features (e.g., product rotation, zooming in or out, 360-degree views), and low-interactivity features (indirect experience reports, static information) may help to minimize perceived risk and to increase favorable attitudes and purchase intention (Kim & Lennon, 2000; Park, 2006; 2008; Park, Stoel, & Lennon, 2008). The Brazilian online store Dafiti, for example, offers a virtual fitting room, in which customers can create a 3-D model based on their body size to simulate product look and fit, and to facilitate product combinations. Another solution is to enable simulations using pictures captured by the customer's webcam (Techinbrazil, 2015). Park (2006) found out that high NFT people are more sensitive to website designs that provide more haptic imagery and interactivity, probably as a way to compensate for the lack of direct sensory exploration of a product.

Based on this discussion, we propose the following hypothesis:

H6: Individual differences in Need for Touch will moderate the relationship between haptic imagery and purchase intention.

In order to test our hypotheses, we developed a conceptual model comprising one exogenous variable (information presentation) and three endogenous variables (haptic imagery, perceived product quality and purchase intention). We assume that NFT will moderate the relationships between haptic imagery, perceived product quality, and purchase intention (see Figure 1).

The model is based on the Stimulus-Organism-Response (S-O-R) paradigm (Mehrabian & Russell, 1974) used to explain the effect of environmental stimuli (S) on consumers' evaluations (O) and responses (R) in the contexts of Internet apparel shopping.

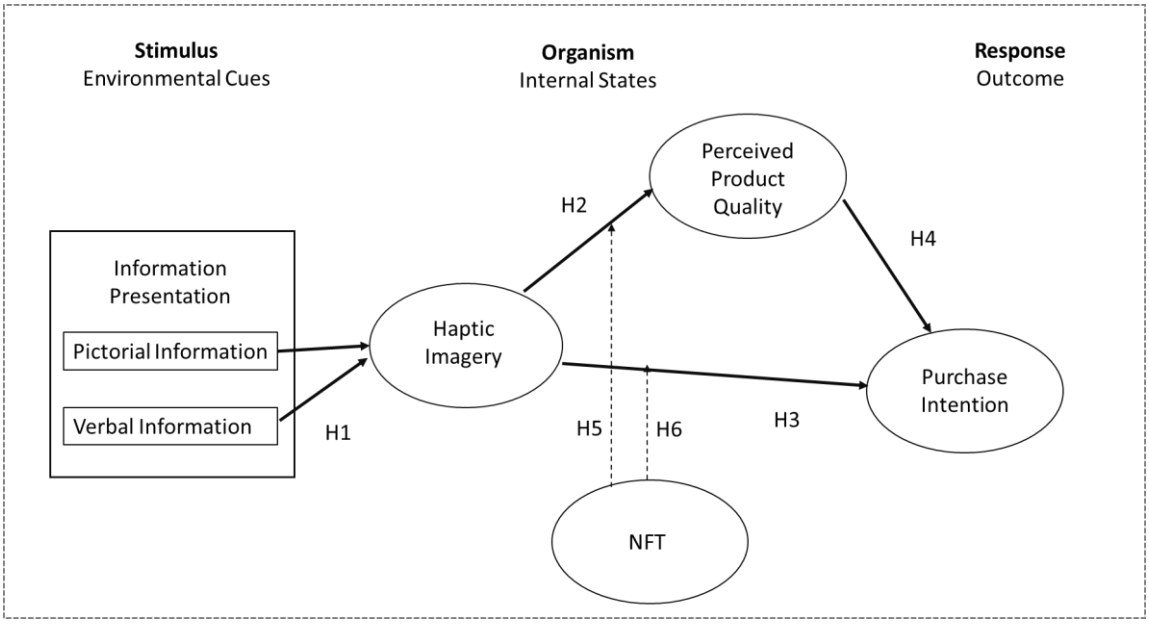

Figure 1: The Model of the Study

2. Method

The field research was conducted in two phases. The first step comprised a focus group, whose aim was to select the elements to be used in the second step – a 2X2, between-subjects experiment run with 264 respondents.

2.1 Phase 1 (Focus Group)

The focus group was conducted with 4 male and 5 female participants with average-level NFT, as measured through the NFT scale developed by Peck & Childers (2003). Six of the participants were graduate students and three were college students. Two of them had experience working with fashion and the others had only experience as consumers of fashion products.

The idea was to use their input, as a NFT-neutral group, to help selecting the clothing item to be used in the next phase, as well as its description and online presentation format. The goal was to find a basic, everyday product that could be worn by both sexes, as we wanted to include both male and female consumers in the sample. The focus group session followed previously defined guidelines to clarify the tasks proposed to the participants. The group discussion was led by two researchers and transcribed for later analysis.

The selected garment was a light grey, zip-up fleece Hoodie with two kanga pockets at the front. The participants considered this garment as more functional and adaptable to different circumstances (personal usage, gift giving). Two photographs of a male and a female model in similar poses wearing the same product (taken from the American Apparel brand website) were chosen as pictorial information. Given the item´s and the pictures' unisex, neutral quality, they helped avoiding unexpected externalities.

The focus group also helped in selecting the haptic and non-haptic descriptions. We used real descriptions by consumers found in online stores to simulate the online shopping situation better and to select the best way to convey haptic and non-haptic information about the product.

2.1 Phase 2 (Main Experiment)

The study's model and hypotheses were examined in an experimental study, which was run to verify the relationships between haptic imagery, perceived quality, purchase intention, and NFT, in line with previous studies by Park (2006) and Rodrigues and Silva (2013). The study was a 2 X 2 (product: picture x picture with zoom; description: haptic x non-haptic), between-subjects factorial design. The independent variables were pictorial and textual information; the dependent variables were haptic imagery, purchase intention and perceived product quality; NFT (high or low) was a moderator variable.

Population and sample size

Recruitment and data collection were conducted during a period of 25 days using an online survey platform. The population comprised men and women who had had at least one experience with online shopping. Subjects were randomly assigned one of the four experimental conditions: (1) product picture, non-haptic textual information; (2) product picture, haptic textual information; (3) product picture + zoom, non-haptic textual information; (4) product picture + zoom, haptic textual information.

We collected 295 answers, out of which 31 were eliminated due to procedural mistakes, resulting in a total of 264 valid answers. Respondents were 48% male and 52% female. The majority of the respondents were between 18 and 24 (45.5%), followed by the 25 – 35 (27.7%)

and 35 – 45 (26.8%) age brackets. Sixty-four percent of the sample were college graduates, followed by college students (18%) and people with a high school degree (18%).

Regarding online shopping habits, 68 respondents (25.8%) stated that they shop online once every quarter, 89 subjects (33.7%) shop at least once a month, 18 of them (6.8%) make online purchases at least once a week, 21 respondents (7.9%) had made online purchases only once, 53 respondents (20,1%) stated that they only shop online when there is no other alternative, and 15 of them (5.6%) gave other answers.

Data collection procedures and instruments

We developed two separate questionnaires, one for men with the male model wearing the hoodie, and one for women with the female model. We decided to do so in order to help respondents identify with the photographs. Except for the two different photos, both questionnaires had the same questions and scales. The variables were measured through a 7-point, Likert-type scale.

Initially, respondents were asked about their demographics and online shopping habits. Next, they were presented a webpage and the following situation: "Imagine that, surfing the internet, you win a coupon to acquire an item in a specific website. You happen to need a new hoodie. Imagine that you have selected the presented item". Subjects were then asked to complete a questionnaire including the dependent measures and NFT.

We used the following scales to measure the variables: the NFT scale developed by Peck and Childers (2003), Park´s (2006) haptic imagery scale, and Grewal, Monroe and Krishnam's (1998) scales for purchase intention and perceived product quality. The original scales were translated into Portuguese and reversed-translated for accuracy (Malhotra, 2006).

The visual stimuli used in the study, with and without zoom, as shown in Figure 2.

Figure 2: Pictorial information selected for the study

To verify whether a haptic description would influence significantly haptic imagery, perceived quality and purchase intention, two distinct descriptions were generated during the focus group discussion. The non-haptic description had only information on fabric composition and a description of the garment: "Fleece hoodie, metal zipper, and two kanga pockets at the front. White polyester hood cord. Blended fabric composition (65% cotton, 35% polyester)". The haptic description read: "Sportive hoodie, slim fit. Soft, pleasant touch ideal for cooler days. The lining has a velvety touch and soft feel. Fleece hoodie, metal zipper, and two kanga pockets at the front. White polyester hood cord. Blended fabric composition (65% cotton, 35% polyester)."

Manipulation check and scale validation procedure

After seeing the website page, respondents had to state how many product pictures they had seen – only one product picture or product picture + zoom-in picture.

As Grewal, Monroe and Krishnam's (1998) scales for perceived product quality and purchase intention have been vastly used in business and marketing research, we saw no need for further validation. We adopted the haptic imagery scale developed by Park (2006) in a Portuguese version. Its internal consistency index was 0.84. Using factor analysis, we could confirm that the items were grouped into three dimensions (imagery of haptic properties, vividness, and imagery elaboration), as predicted in the literature (Park, 2006), with factor loadings around .7 and internal consistency of .842.

We tested the validity of the Brazilian version of the NFT scale developed by Peck and Childers (2003) with a 32-subject sample. Face validity was considered adequate; averages were 5.8 for item simplicity and 6.5 for comprehension, and 1.8 for complexity and 3.2 for ambiguity. Internal reliability was also good (Cronbach´s Alpha = .88), as well as the KMO (.873) and Bartlett tests (significant at p<0.005). In the factor analysis, the NFT scale yielded two dimensions – autotelic and instrumental - as expected (Peck & Childers, 2003). Together, both dimensions explain 74.6% of total variance, indicating high internal consistency (.907).

3. Data analysis and results

Using analysis of correlation, we found a moderate, positive correlation between haptic imagery and purchase intention (.544), between purchase intention and perceived quality (.583), and between haptic imagery and perceived quality (.592). As expected, the higher the perceived quality and haptic imagery, the higher the purchase intention. However, no significant interaction between NFT and haptic imagery, purchase intention, or perceived quality was found, contrary to what was expected (see Table 1).

	PI	HI	PQ	NFT
Purchase Intention	1			
Haptic Imagery	.544**	1		
Perceived Quality	.583**	.592**	1	
NFT	-.097	.033	.027	1

**p<0.001

Table 1: Analysis of Correlation

A comparison of the correlations found in the four experimental conditions shows a gradual increase in the correlation between purchase intention and haptic imagery, and between haptic imagery and perceived product quality. This allows us to conclude that presenting more pictures and more haptic textual information has led to the foreseen result, i.e., to influence subjects' perception of the product displayed (see Table 2).

Next, we run an ANOVA to examine whether the four conditions showed differences in the means. All the comparisons of means showed significant differences. The results show that increasing textual / pictorial information and haptic imagery corresponds to an increase in the variables purchase intention and perceived quality, whereas the opposite is true for situations in which only one picture of the product and only descriptive details were available. Table 3 shows the ANOVA results.

	Cond1	Cond2	Cond3	Cond4
Purchase Intention X Haptic Imagery	.390**	.443**	.545**	.710**
Purchase Intention X Perceived Quality	.745**	.526**	.424**	.585**
Haptic Imagery X Perceived Quality	.479**	.562**	.614**	.637**

**p<0.001

Table 2: Analysis of Correlation (4 conditions)

Variable	F	Sig
Purchase Intention	5.163	0.015
Haptic Imagery	3.532	0.002
Perceived Quality	3.703	0.012

Table 3: ANOVA

We also ran an ANOVA to investigate whether gender differences had any effect, but no significant interactions were found.

Finally, we conducted two regression analyses to verify whether the independent variables really influence the dependent variables - purchase intention and perceived quality. First, we tested purchase intention in relation to haptic imagery and perceived quality, without the moderator variable NFT, as prescribed by Hair et al. (2006). Results from this test show a R^2 of .400. When we added the moderator variable, the result changed only marginally to R^2 = 40.9%. There was no significant influence between NFT and purchase intention (B=- .095, p= 0.051). This result is consistent with the correlation analysis previously done, indicating that NFT does not interfere in the model. As can be seen in Table 4, the linear regression results show that only the variables haptic imagery (B= .310, p<0.001) and perceived quality (B= .390, p<0.001) have significant influence on the dependent variable, purchase intention. Again, this is in line with findings from the correlation analysis. The influence of perceived quality on purchase intention is slightly higher. The determination coefficient (R^2 = .409) indicates that 40.9% of purchase intention in an online fashion shopping scenario is explained by the perceived quality of the product exposed, added to the haptic imagery resulting from the information displayed on the website. Residuals were examined for normality and the model was considered adequate.

	Non-stand. Coefficients		Stand. Coefficients	Significance Test of Coefficients	
	B	Stand.Model	Beta	t	Sig
Constant	.134	.477		.281	.779
Haptic Imagery	.483	.094	.31	5.125	.000
Perceived Quality	.462	.071	.39	6.481	.000
NFT	-.111	.056	-.095	-1.962	.051

Table 4: Multiple Linear Regression – Purchase Intention

The second regression analysis was conducted to verify the influence of haptic imagery on perceived product quality (Table 5). As expected, there was a positive influence of haptic imagery on perceived quality (B= .592, p<0.001); the coefficient of determination (R^2 = .351) shows that 35% of perceived product quality can be explained by haptic imagery. Thus, the

more sensorial the product information, the higher the perceived quality. Again, analysis of residuals showed acceptable results.

	Non-stand. Coefficients		Stand. Coefficients	Significance Test of Coefficients	
	B	Stand.Model	Beta	t	Sig
Constant	.984	.477		3.671	.000
Haptic Imagery	.781	.094	.592	11.904	.000

Table 5: Multiple Linear Regression – Perceived Product Quality

In view of the lack of support for the hypothesized moderator effect of NFT in the initial model, we decided to run a confirmatory factor analysis to test the alternative model depicted in Figure 3. The overall fit of the model was good fit (x^2=88.4, df=56, p<0.00, CMIM/DF= 1.58, CFI= 0.98, RMSEA = 0.04, GFI = 0.95, AGFI = 0.92). All the t-values of the path coefficients were significant (p<0.00), and CFA results revealed convergent validity.

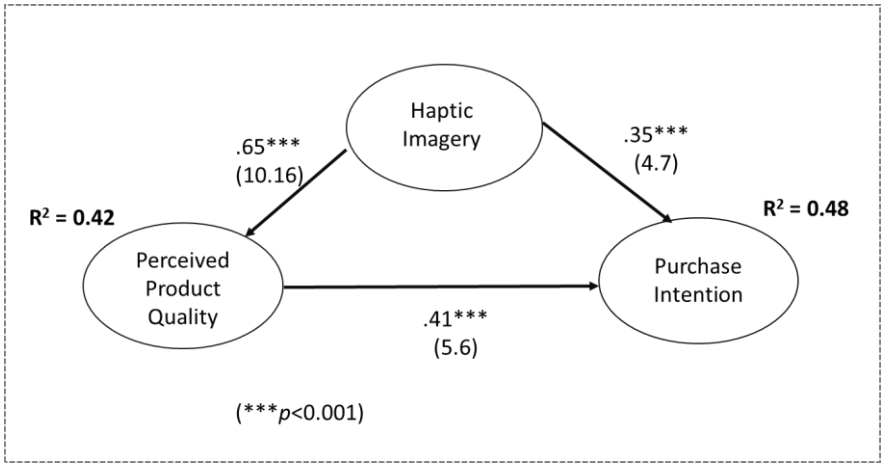

Figure 3: The Alternative Model

4. Discussion of Results

As shown in the analysis of correlation (.544, p<0.001) and comparison of means (F=3.523, p<0.05), more pictorial and textual information positively affect haptic imagery, thus supporting Hypothesis 1 (H1). Furthermore, the conditions with two pictures and haptic textual descriptions presented higher means for purchase intention and perceived product quality, supporting H2 and H3. The analysis of correlation showed that haptic imagery exerts a positive effect on perceived product quality (.592, p<0,001), thus supporting H2. The analysis of regression showed that haptic imagery (B= .483, p<0.001) and perceived quality (B = .462, p<0.001) have a significant influence on the variable purchase intention. Therefore, it is worthwhile to increase information about how a product feels to the touch on the website pages.

Further support for H2, H3, and H4 was found in the SEM analysis. The results show a significant, positive path between haptic imagery and perceived quality (β1=0.65, t=10,16, p<0.001), supporting H2. The expected positive relation between perceived quality and purchase intention (H4) was supported by the SEM results (β2=0.41, t=5,6, p<0.001). Finally, the proposed positive relation between haptic imagery and purchase intention (H3) was also supported (β3=0.35, t=4,7, p<0.001). The square multiple correlations for the dependent variables were satisfactory, implying that haptic imagery explains 42% of perceived quality, whereas haptic imagery and perceived product quality together explain 48% of purchase intention.

However, the expected moderating effect of NFT on the relationship between haptic imagery, perceived product quality, and purchase intention was not demonstrated by the analyses performed. Therefore, H5 and H6 were not supported.

5. Conclusions, implications, and limitations

With this study, we aimed to contribute to the literature on NFT and haptic imagery. Our results seem to confirm the findings of previous studies in terms of the positive impact of pictorial/verbal haptic information in the creation of haptic imagery and, consequently, on perceived product quality and purchase intention in a situation of fashion online shopping (Park, 2006; 2009; Rodrigues & Silva, 2013). Consumers are more inclined to purchase when they are offered information developed by others, who have already touched the product. In this aspect, our study adds to the body of literature on how to increase purchase likelihood in online environments (e.g., Park, 2006; Peck & Childers, 2003; Rodrigues & Silva, 2013; Levin et al., 2005). As perceived product quality is a critical determinant for purchase intention, this research shows that haptic imagery is an important factor for augmenting willingness to buy in online stores.

Our results also provide further evidence of dual coding theory (Paivio, 1975) regarding product information presentation in online shopping contexts. This theory postulates that both textual and visual information are interconnected and independent. When provided with more cues (pictorial and verbal haptic information), people are able to create more vivid imagery of the product.

Another theoretical contribution was the confirmation of the validity of our Portuguese version of the NFT scale developed by Peck and Childers (2003), adding to similar efforts carried out in Portugal (Rodrigues & Silva, 2013), and Germany (Nuszbaum et al., 2010). Our version of the NFT scale also confirmed the hypothesized two-factor structure (autotelic and instrumental NFT).

Our results did not confirm the hypothesized effect of NFT on the relationship between haptic imagery, perceived product quality, and purchase intention. This is in line with the study by Park (2006), in which no interaction effect between NFT and pictorial and verbal information was found. However, our research contradicts studies that have found significant effects of NFT on attitude and perceived quality in online shopping situations (e.g., Citrin et al., 2003; Manzano et al., 2016; Overmars & Poels, 2015; Peck & Wiggins, 2011). Therefore, we believe that further studies are needed to explore this relationship.

Finally, we did not find significant differences in NFT in men and women, in line with Workman and Cho's (2013) study with Korean consumers, but inconsistent with Citrin et al. (2003), who found that women tend to present higher levels of NFT than men.

In terms of managerial contributions, this article may help fashion online retailers to compensate for the impossibility to touch products by using more visual clues and more haptic verbal information. As shown by our analyses, when consumers are able to create better haptic imagery they tend to have perceptions that are more positive on product quality. In the Brazilian market, clothing and accessories are an important category in e-commerce; however, consumers use online channels mostly for price comparisons and information search only (e-Bit, 2015). To increase online sales, merchants have to find ways to mitigate perceived risks in this environment.

Our study is not free from limitations. The research was based on a fictitious purchase situation, which could have skewed respondents' responses. In a real shopping experience, different cues could be relevant, such as perceived risk, website quality, interactivity, and payment methods. These aspects were not accounted for. Additionally, our results showed that the variables haptic imagery and perceived product quality explained only 40% of purchase intention in our model, indicating that other variables that could affect the process were not contemplated. For example, we decided a priori not to include perceived risk in our model, but this variable could have helped in explaining the online purchase process.

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