REVISTA DESIGN & TECNOLOGIA
ISSN: 2178-1974
2020, Vol. 10, No. 20
DOI 10.23972/det2020iss20pp95-105

PGDESIGN
www.pgdesign.ufrgs.br

Perception and fabrics: A preliminary investigation about the responses patterns by the stimulation of vision and touch

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ABSTRACT
During the interaction of the individuals with the products, the sensorial channels are activated and begin to receive various information. In the Design exercise, the properties of the materials are responsible for giving the objects personality. In the case of fashion product, the aesthetic features, as well as the physical and mechanical characteristics of the fabrics promote varied perceptions that generate subjective and affective responses in the individual. In this sense, the present study presents a preliminary investigation about the responses patterns obtained through the simulation of two sensorial channels – vision and touch - in front of some varied fabrics. For this purpose, five different samples of fabric were evaluated through a semantic scale completed with bipolar adjectives to identify the response patterns. Comparing the individual perceptual of each fabric, it was observed that there were no substantial differences between the responses obtained by the different sensory channels. Fabrics with irregular surface, grainy and a voluminous fit, such as crepe, presented more negative perceptual responses, such as discomfort, hardness, and synthetic. It is noted that aesthetic qualities, such as repulsiveness, simplicity, ugly and coarse were more accentuated when considered the perception through vision.

KEYWORDS
Textile Perception
Sensorial Channels
Fabric Assessment
Clothing

Percepção e tecidos: Uma investigação preliminar sobre os padrões de respostas pela estimulação da visão e do toque

RESUMO
Durante a interação dos indivíduos com os produtos, os canais sensoriais são ativados e começam a receber várias informações. No exercício Design, as propriedades dos materiais são responsáveis por dar personalidade aos objetos. No caso do produto da moda, as características estéticas, bem como as características físicas e mecânicas dos tecidos promovem percepções variadas que geram respostas subjetivas e afetivas no indivíduo. Nesse sentido, o presente estudo apresenta uma investigação preliminar sobre os padrões de respostas obtidos através da simulação de dois canais sensoriais – visão e toque – na frente de alguns tecidos variados. Para isso, cinco amostras diferentes de tecido foram avaliadas por meio de uma escala semântica completada com adjetivos bipolares para identificar os padrões de resposta. Comparando-se o perceptivo individual de cada tecido, observou-se que não houve diferenças substanciais entre as respostas obtidas pelos diferentes canais sensoriais. Tecidos com superfície irregular, granulado e um ajuste volumoso, como o crepe, apresentaram respostas perceptivas mais negativas, como desconforto, dureza e sintético. Nota-se que qualidades estéticas, como repulsividade, simplicidade, feia e grosseira foram mais acentuadas quando consideradas a percepção através da visão.

PALAVRAS-CHAVE
Percepção Têxtil
Canais Sensoriais
Avaliação de tecidos
Roupa

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1. INTRODUCION

Fashion Design is characterized by the process of clothing development in which different factors are equated. In accordance with Ashby and Johnson (2010), the interaction between users and products occurs by means of materials; and it is in clothing that this established more directly.

Materials determine form, function, durability, costs and, mainly, the interaction between user and product (Kesteren et al., 2007). Thus, the application of materials is one of the most influential strategies that designer can use to engender deep and emotive connections between products and users (Gant, 2005).

Zuo et al. (2016) comment that the perception of a product may be based on sensory properties such as color, texture, sound, smell, and taste. Due to this, the authors explain that a better understanding of information about human sensory perception of materials plays an increasingly important role in the selection and combination of materials within manufactured products.

Schifferstein (2006) emphasizes that designers must use the sensorial channels to transmit messages in such way that the user immediately comprehends the product and its characteristics. The author proposes that focusing on the most important modalities of interaction (e.g. tactile and/or visual) is a robust strategy for the development of products. Indeed, this condition is properly applied in the development of textile artefacts. Alcántara-Alcover et al. (2014) refer about the factors that involve the emotional and subjective perspective of interaction, using expressions such as “sensory design”, “experience design” and “sensory marketing”. In fact, the “tools” and strategies inherent to these concepts can attribute characteristics to the products that, when properly applied, provoke experiences and emotions which contribute to the affectivity and hedonism of the individual.

About this process, Jordan (2000) suggests that, over time, the individuals started demanding products that offer attractions and experiences that can stimulate satisfaction and pleasure, and not only the functional quality of them.

Regarding the fashion product, especially clothing, the experience between the individual and the product is essentially mediated by the textile artefact, the fabric. The direct and prolonged contact that the textile artefact maintains with the body promotes the user evaluation of the aspects of usability and comfort, overcoming the aesthetic and symbolic variables.

Schacher et al. (2011) emphasize that the perception of textile materials can be defined by human sensory responses through interaction with the fabric and, naturally, involves not only mechanical and physical factors, but also physiological, psychophysical and social factors. The author explains that the physiological responses derive from sensory channels, especially tactile, visual and olfactory; whilst psychophysical responses are related to the user’s mood and emotional state.

Hekkert and Karana (2014) declare that in the first moment there is a difficulty in analyzing separately the materials of the product itself. The authors explain that the first evaluation (appearance - usually visual) produces a “aesthetic answer”, what it is defined from the meaning attributed by the appearance of the material. When this evaluation starts to involve other sensorial channels (e.g. tactile), new meanings, more complete, help to the effective material understanding. If this process is positive, the emotions generated are satisfaction, fun and/or happiness. This condition shows up the importance perception of the user as for the physical, mechanical and aesthetic qualities of the products textiles employed in the design of clothing, which promotes subjective and affectionate answers in the individual.

For Bishop (1996), the tactile manipulation of fabrics is the attribute most appropriate to if a product textile is adapted or not to a given use or finality, which contributes to the aspects realized through this sensory channel. The same argument also is used by Pan (2007), who defends that the success of any fiber, finish, or textile product substantially depends on its acceptance after the tactile handling of the product.

From the 1930 years, Peirce (1930) proposed that the quality of the finish of a cotton fabric was related to the judgement of an individual on basis of the evidences of his senses. In a pioneering way, the author began to investigate the sensations tried from the tactile contact with the mechanical properties of different cotton fabrics. In the following decades, new studies began to be developed focusing the understanding about the correlation between the tactile contact and the mechanical properties of fabrics.

In 1970s, Sueo Kawabata developed studies with this purpose, applied in male garment. The method developed was characterized by two stages: "Primary Hand Value (PHV)" and "Total Hand Values (THV)" (Harwood et al., 1990). The values determined by the first evaluation (PHV) were those attributed by the handling of the material. These were used in the subjective evaluation about the perceived quality and, normally, were related to terms used to specify the characteristics between different fabrics, such as softness and stiffness. The values of the second evaluation (THV), however, were related to a general analysis of the fabrics in terms of their suitability for a particular use. Both values were used to establish common terminologies, which could describe the properties and qualities of the fabrics (Hardwood et al., 2008).

Kawabata and Niwa (1991) explain that the performance of the quality of a fabric regarding the mechanical comfort, normally is valued by a subjective method that creates judgments on basis of the handling of the material (fabric handle judgment). In this case, the judgment occurs through the perception of the individual while touching the textile artifact with the hands. To these feelings are assigned terms and expressions that the authors call "Primary hands".

From these studies, Sueo Kawabata developed four instruments of mensuration of the mechanical properties of fabrics, which measure properties related to stress, shear, flexing, compression and friction and surface roughness (Harwood et al., 1990). The meeting of these instruments characterizes the KES-F method (Kawabata Evaluation System for Fabric), which was developed along with the Hand Evaluation and Standardization Committee (HESC), and serves the purpose of applying scientific principles in the investigation of how the mechanical properties of fabrics were correlated to the subjective evaluations, on basis of the sensations perceived through tactile channel (Kayseri et al., 2012; Harwood et al., 1990).

Zuo et al. (2016) argue that sensory perception plays an intrinsic role in aesthetic experience and human responses to any product from the physiological, psychological and cultural level. Therefore, the authors explain that, although the consumer is initially attracted by the aesthetic (visually) characteristics of a product, they expect to feel its quality and potential, and state that “the product should have suitable sensory properties to satisfy both consumers’ perceptual needs and emotional expectation via channels beyond vision” (Zuo et al, 2016, p.408).

In this sense, the present study aims to compare the perceptive responses on basis of two different sensory channels: vision and touch. For this purpose, an experiment

was developed in which a group of people reported the perception attributed to different products, more specifically fabrics samples, through vision and touch. It should be noted that the process of comparative analysis outlined in two manners: the first one had the purpose of comparing responses obtained individually in each fabric, and the second one, comparing responses together.

2. METHODOLOGICAL ASPECTS

2.1 Materials and procedures

The textiles can be characterized, among other aspects, for their anisotropic quality, non-homogeneity and porosity, as well for their distinct viscoelastic and malleability properties (Vassiliadis et al., 2011). These characteristics are determined by complex structures that include the combination and the interlacement of fiber and yarn units (or groups) with different physical and mechanical properties.

In this study, the selected fabrics were plain, i.e., they had a structure constructed through the interlacement of a set of warp yarns (longitudinal/ fabric length) and another set of weft yarns (transverse/ fabric width), forming angle of 90 º (perpendicular weft) (Figure 1). The fabrics were differentiated by their fibers (natural, artificial and synthetic), as well by their yarn titration and fabric composition (purity or mixture of fibers).

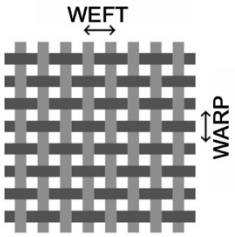


Figure 1 Warp and weft pattern: plain weaving fabrics. Two components that are interlaced forming angle of 90 degrees.

Five types of fabric were selected: (A) crepe – 100% polyester (PES); (B) viscose – 100% (CV); (C) *failete*/lining – 100% PES; (D) *tricoline* – 65% PES, 35% cotton (CO); (E) mousseline – 100% PES (Figures 2,3).

From these fabrics, rectangles of 30 by 40 centimeters and 30 by 90 were made to serve as samples for the experiment. All samples were of white color. The choice for white happened due to the uniformity of the color between the different fabrics, since in the process of selection of the materials for the experiment, it was observed a substantial variation between the dark and colored colors. This variation can be a result of the composition of the fiber of the textile as well as to their dyeing. Since the colors affect considerably the emotions and the human feelings (Na, Suk, 2014), this variation in the tones between the different fabrics might influence the perceptual response of the vision; therefore, a color with less variability was chosen.

Before beginning the experiment, all the participants were informed about the procedures to be performed and signed the Term of Free and Clarified Commitment (Resolution 196/96-CNS-MS; Código de Deontologia do Ergonomista Certificado – ERG BR 1002 – ABERGO).

The experiment was performed in an air-conditioned environment with artificial lightning. It was carried out in two stages. In the stage of vision, the subject was placed seated at two meters from an apparatus in which was fixed one of the fabric samples (30x40cm) (Figure 4).

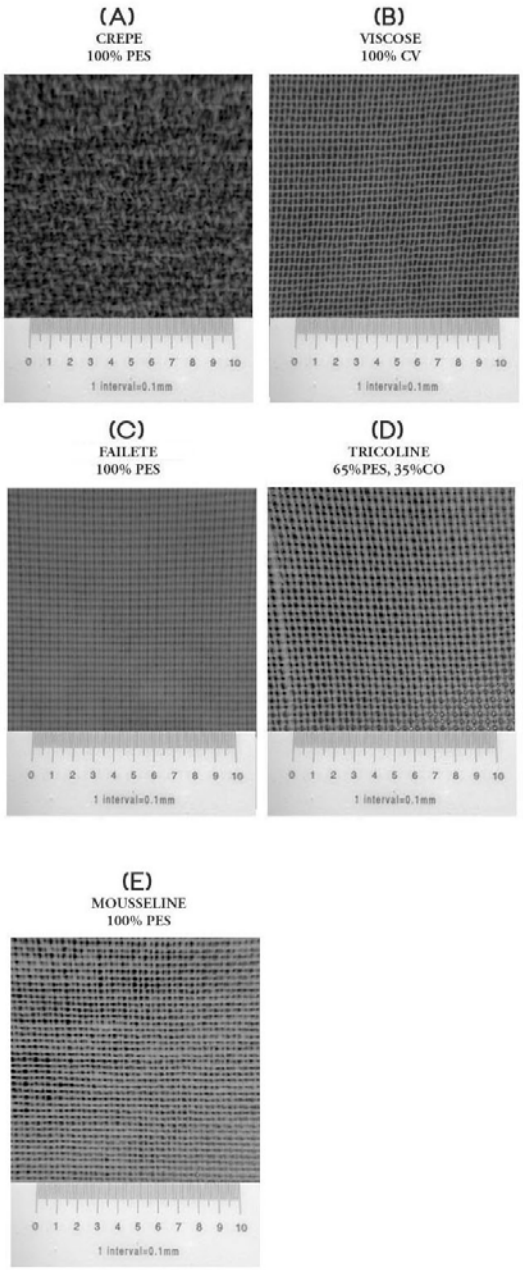


Figure 2 Fabrics structures (Images were taken by positioning a magnifying glass in front of the lens of a Canon PowerShot SD780 IS digital camera. For better viewing, the colors of the images were inverted (black and white) with the help of an image manipulation software (Photoshop CS6)).

The subject had 20 seconds for observation, and after this time, the sample was removed. Soon after, a DS (Semantic Differential) protocol with 13 pairs of bipolar adjectives was presented to the subject. This procedure was performed for all five fabric samples. The fabric sequence was randomized to try avoiding biased results.

In the stage of touch, the vision was blocked with a blindfold. Blindfolded, the subject received one of the five fabric samples (30x90cm) to touch it (Figure 5). In this stage, the handling of the textile samples was restricted only to the hands, and the subject was instructed not to use arms or other parties of the body, such as the face. As the fingers scan the textile surfaces, the skin deformations and vibrations, induced by friction force, stimulate the sensor receptors of skin (Chen et al., 2015). The time of physical contact was of 20 seconds. After this time, the fabric was collected, and the blindfold was removed.

Next, the subject responded to the DS protocol. The fabric sequence was also randomized.

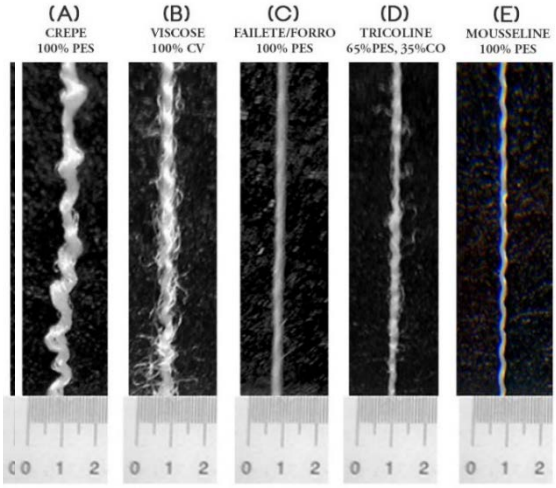


Figure 3: Yarns structures (*Images were taken by positioning a magnifying glass in front of the lens of a Canon PowerShot SD780 IS digital camera. For better viewing, the colors of the images were inverted (black and white) with the help of an image manipulation software (Photoshop CS6).

The DS protocol consists of a combination of association and scaling procedures that serve to give an objective measure of the connotative meaning generated by the subject after an experience with a particular product (Osgood, Luria, 1954). The connotative meaning is associated to the expressions of subjective and affectionate values generated in an individual because of his integration with an object, which meaning is directly influenced by cultural, psychological and social factors of the context of the subject. In summary, the process consists of describing or judging through the allocation of a concept to a set of experiential continuums defined by pairs of bipolar semantic terms, such as thick and thin, hot and cold, high and low, among others (Osgood, Luria, 1954).

2.2 Subjects characteristics

The experiment was performed by 16 subjects, between 19 and 28 years old (s.d. 2,27; average age: 21,31 years old), of both genders (08 females and 08 male). All the participants declared do not have any lesion in the palmar region. The majority (68,75%) indicated having some vision problem, which was corrected using glasses.

When questioned if they consider the fabrics during the purchasing process, a little more than half of the subjects (53,25%) declared to consider sometimes; other 37,5% affirmed to consider, and just 6,25% said do not consider.

2.3 Data Analysis

To extract information about the perception of the subjects, similarly to the methodology of Likert scales, seven levels (illustrated by small squares), rated between 1 and 7 (non-explicit values in the questionnaire), were attributed between the two bipolar adjectives. The terms, positive and negative, were randomized, not only in the sequence presentation but also in the columns.

In this way, the participant could indicate, by proximity, the adjective that best terminologically represents his perception about the object analyzed. Subsequently, with all answers obtained, an average was computed and presented in a graph.

Because it was a small sample of subjects and the experiment was experimental, the results were obtained through simple descriptive statistics.



Figure 4: Viewing stage: the subject was placed seated about two meters of the apparatus in which one of the fabric samples was attached.

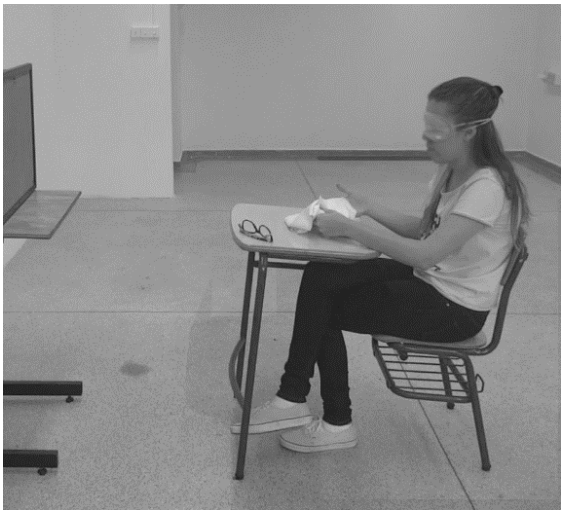


Figure 5: Touching stage: the subject was placed seated and the view was blocked with a blindfold; Then, the fabrics were presented.

2.4 Bipolar adjectives: considerations about the characteristics of fibers

In agreement with Pezzolo (2007), the textiles fibers have some properties that distinguish them and, consequently, when woven as textile material, stimulate varied perceptions. These properties include:

- *Fineness* - this property is related to the diameter and thickness of the fibers. The finer the fiber, the nicer the touch of the fabric;
- *Elasticity* – is related to the capacity of the fiber to returns to its natural state after being elongated by a traction force;
- *Resistance* – is related to the fibers ability to return to their original state after being crumpled;
- *Touch* – property related to the feeling of comfort, and is linked to the characteristics of the fabric;
- *Hydrophilicity* – It is associated to the capacity the fibers of absorption and retention of water;

Chataignier (2006) also emphasizes about the visual finish, which is characterized by some aspects such as brightness, relief, transparency, and dimensional stability.

From these considerations, thirteen bipolar semantic pairs were selected and assigned to the DS protocol. These adjectives were defined due their capacity of specify some perception and sensations attributed to the physical and mechanical characteristics of the sample fabrics. With this focus, the semantics terms indicated in the research of Picard et al. (2003) were important to define the adjectives pairs of this study.

3. RESULTS

3.1 Analysis 1

The perception and sensation received and generated by the sensorial channels were associated with the texture properties of the textile surface. However, in general, there were no substantial differences between visual and tactile perception. Many of the perceived characteristics were similar when compared to the responses obtained by both visual stimulation and tactile contact with the fabric. Yet, some aspects can be discussed to contribute with the understanding about the affectionate behavior of potential users in relation to the differences of the textile materials. In this way, the following aspects can be evidenced (Figure 6):

Fabric A – Considering the visual perception, it was noted that the crepe was perceived as hotter, rougher and thicker. This factor may be related to the granulated texture of the fabric as well its voluminous fit. By touch, the fabric was considered heavier, repulsive and synthetic.

The crepe fabric results from the twist of the yarns - in this case, the polyester yarn. This twist is usually quite high, which increase the titration of the yarn as a result, mainly, of the shrinkage of the yarn (Htike et al., 2015). This process gives the fabric an opaquer, grainy and dry touch, factors that can justify the perceived attributed by both vision and touch.

On the other hand, the polyester is a synthetic fiber composed of terephthalic acid and ethylene glycol, both products derived from petroleum (Araújo, Melo and Castro, 1984; Wingate, 1942; Albers, 1986). The fibers are the result of the combination and the twisting of several polyester filament yarns; the number of filaments and how much they are twisted determine size and texture of the yarns (Wingate, 1942).

Polyester fibers have high resistance to the tension as well to compression. The polyester fabric dries quickly and presents some characteristics such as wrinkle-resistant, good durability, good dimensional stability and easy maintenance (Celanese Acetate, 2001). However, the low humidity absorption of the yarns (hydrophobicity), the low heat transmission and the dry touch, generally, generate some discomfort for the user, especially when the individual is settled in regions with hot weather.

Comparing touch and vision, it was noticed that the synthetic characteristic was more perceived when evaluated by the physical contact with the product. The same was true for repulsion. Given this and considering the direct and prolonged contact of a fabric on the body, it is possible to consider that the synthetic fibers, in this case, associated with the granulated surface of the crepe, promote more negative sensations.

Besides, the vision seems to be more associated with the negative adjectives related to aesthetic appeal, such as ugly, simple, repulsive, and rough. That is, through vision, the subjects perceived the fabric aesthetically less qualified than by touch.

Fabric B – Viscose was perceived as more uncomfortable, hard, unpleasant and repulsive when considered visual perception. Through touch, the subjects emphasized the comfort, the softness and the pleasantness of the fabric.

Viscose consists of a chemical fiber that comes from a method that comprises dissolving the cellulose in caustic soda (Pezzolo, 2007). It has good humidity absorption, is resistant to traction, and has soft touch and fitting (Pezzolo, 2007). These characteristics corroborate with the perceived by the subjects when they had tactile contact with the fabric. The softness perceived in the sample also is associated with its woven structure that presents a certain distance between warp and weft yarns, which gives greater flexibility and fluidity to the fabric. The negative aspect perceived through visual may be associated with some marks and creases in the fabric, since the viscose creases easily.

Fabric C - The lining fabric had similar answer patterns regarding both sensory channels. Through vision, the fabric was perceived as a little more fragile, smooth and coarse. Through touch, it was perceived as a little more resistant, rough ad smooth.

The *Failete* (name adopted in Brazil for this kind of fabric) is a thin fabric widely used as lining and in some artefacts for home decoration. Its textile structure consists of the interweaving of several groups of filaments that little or nothing twist with each other. These features promote a smoother and firmer surface.

The perception of the fabric as fragile and delicate after viewing may be associated, possibly, to the low titration of the yarns that, when interlaced, form a thin textile base with slight transparency. Through touch, on the other hand, the polyester contributed to the fabric being perceived as rough, since it has a dry touch. The resistance may be associated to the good dimensional stability of the synthetic filament, what confers some stiffness to the fabric.

Fabric D – The mixed cotton and polyester fabric also showed similar patterns in both evaluations. By vision, the subjects perceived the fabric as finer, softer, fragile, and synthetic. Through the touch the subjects attributed it greater resistance and evaluated it as warmer and harder.

The cotton is a natural fiber widely employed in garment industry due to its low costs of production, resistance, use flexibility and several possibilities of beneficiation and improvements. When woven, the cotton differs in its hydrophilicity characteristics as well in its breathability. Usually, regarding fabric for clothing production, the beneficiation and improvements of the cotton yarns give the fabric a smooth, soft and resistant surface.

The advent of synthetic textile fibers, such as polyester, and the lack of cotton production into the global context over the years contributed to the introduction and the increase of mixed cotton fabric. In the present case, the polyester stands out from the cotton and represents 65% of the sample, what may have contributed to the hottest thermal sensation perceived by the subjects when in tactile contact with the fabric. This is due the low absorption capacity of this kind of fiber. In addition, through the touch the subjects perceived the fabric as more synthetic, which can also be related to the polyester dominance in the fabric.

Fabric E – Because it has open weave and thinner polyester yarns, the mousseline fabric has flexibility and fluidity. In this case, when hung on the apparatus, the fabric could be perceived as thinner and smoother. However, through tactile contact, the subjects perceived it as more resistant, natural, thick and rough.

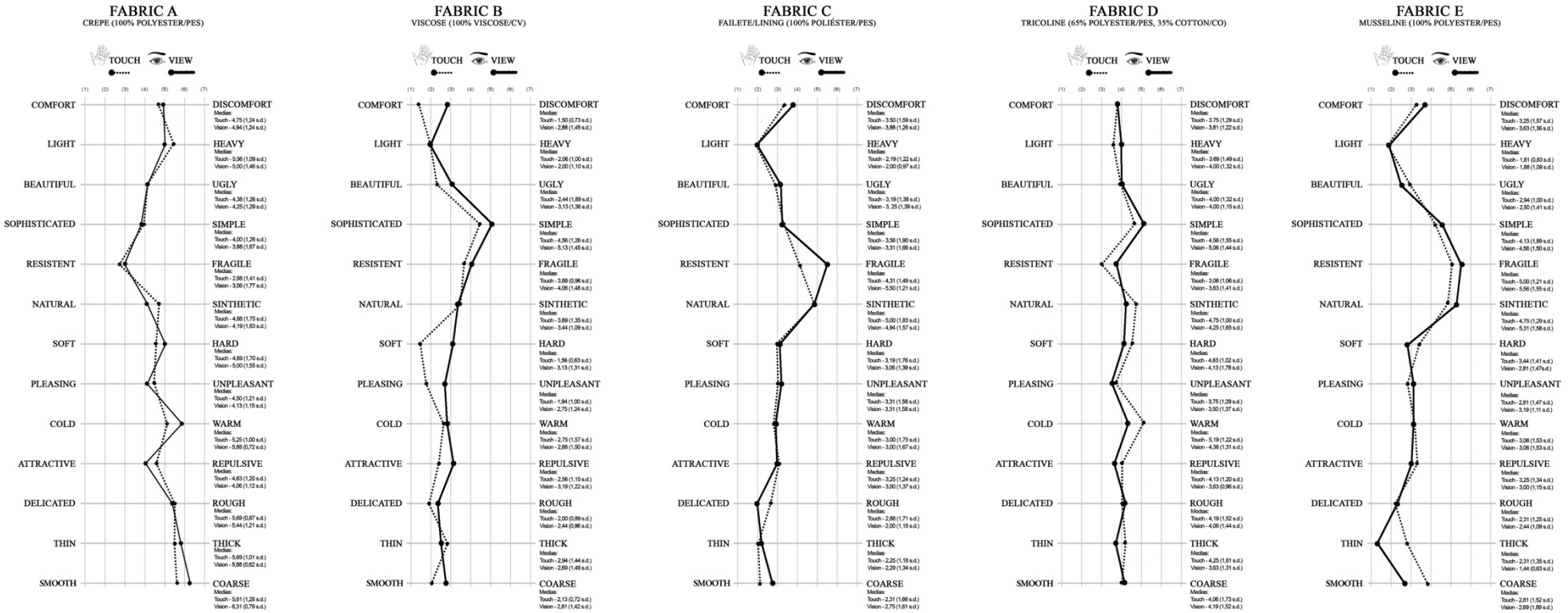


Figure 6: Analysis 1/ Graphic: Different perceptions through touch and vision of each fabric.

3.2 Analysis 2

The following analysis (Figure 7) compared the terminology standards indicated by the subjects on basis of the integration that they had with the two sensory channels and the fabrics.

Regarding the tactile experience, the Fabric A (*crepe*) was associated with the negative terms, being perceived as uncomfortable, heavy, ugly, unpleasant, hard, repulsive, thick, rough and warm. Barker et al. (1990) state that crepe is perceived as warm due the non-homogeneity of its yarn surface and its thicker thickness (fabric). In general, this response pattern is probably associated to the granular surface of this kind of fabric as well as due the "dry touch" of the polyester. Despite this, the fabric was perceived as resistant, since it is woven with yarns that are strong tensioned and tightly compacted.

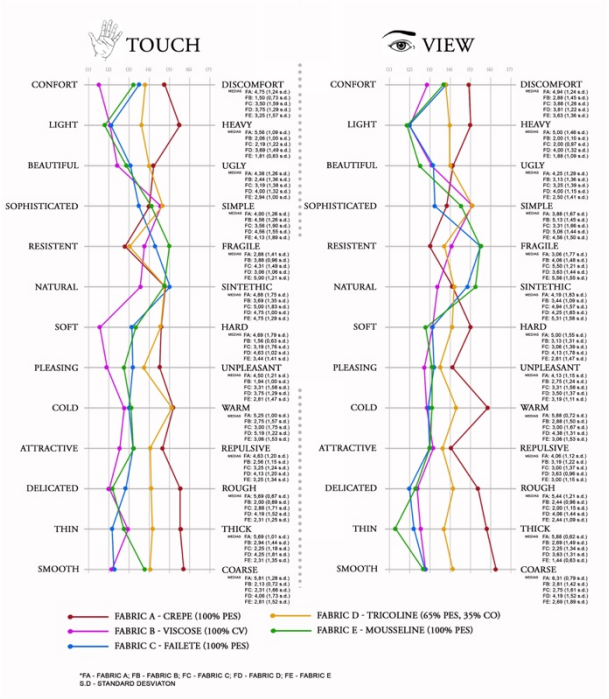


Figure 7 – Analysis 2/ Graphic: Comparation of different perceptions through touch and vision.

Fabric B (viscose) was perceived as comfortable, beautiful, natural, soft, pleasing, cold, attractive, soft and smooth. These characteristics may be associated to the fiber properties such as good absorption and touch.

The mousseline (Fabric E) was perceived as lighter, fragile and synthetic, which is natural considering the small titration of the yarns and the gaps present in the fabric weave. Despite this, the *faillete* (Fabric C) was indicated as thinner and more sophisticated, which should be correlated to its longiline filament and compacted woven, as well as the glossiness of the polyester fibers. Fabric D (cotton and polyester) and the Fabric A (crepe) have stood out as simple and hard, which can be justified by their basic structure and mixed composition.

About vision, as occurred in tactile experience, Fabric A (crepe) was associated with negative terms such as uncomfortable, heavy, ugly, unpleasant, hard, warm, repulsive, rough, thick and coarse. In this way, the granulate surface of the fabric as well as its volume also interferes in the visual perception of the subjects, contributing to the association with negative concepts.

Also, as occurred in tactile experience, Fabric B (viscose) stood out for comfort, beauty, naturalness, softness and attractiveness. This response pattern may be associated with the fluidity and malleability of the fabric, that could be perceived through vision. The Fabric C (*failete)* was also indicated by vision as being thin and sophisticated. Despite being a polyester fabric, the compact, translucent and glossy structure of the textile, once again, leaded the subjects to positive perception.

Fabric D was noted for its simplicity. Fabric E (mousseline), both in vision and tactile experiences, was perceived as fragile, light and synthetic, which is probably also associated with its fluid and translucent appearance. Through vision perception, it had greater prominence with respect to the beauty, softness and fineness than when handled.

4. DISCUSSION

4.1 Discussion about perception

Individually comparing the perceptual patterns of each fabric, it was observed that there were not substantial differences between the responses obtained by the different sensory channels. Fabrics with more irregular and granular surface and a robust volume fitting, such as crepe, presented more negative standards of perceptual responses, such as discomfort, hardness and synthetic. It is observed that aesthetic qualities such as repulsivity, simplicity, being ugly and rough were more accentuated when considered the perception by vision.

In the case of *failete*, despite the fabric normally be used as lining, the brightness of the polyester yarns and, consequently, of the fabric surface, probably contributed to be perceived as thinner and sophisticated. Regarding the mousseline, the low titration of the yarns and its open woven give the fabric greater fluidity and contributed to be perceived as lighter, fragile and synthetic, in both sensorial modalities.

Considering the tactile perception, the viscose was associated with softness and beauty, which implies in the understanding that the tactile property of the viscose conferred more positive qualities than the visual.

In previous study, Laughlin (1991), through a multidimensional scaling technique, investigated what attributes of the fabric contributed to visual and tactile perception of fabric surfaces as perceived by adult women and older women. It was observed that discomfort assessment was associated with some textures characteristics as well as with some weights and thermal qualities of fabrics. Similar situation can be analyzed in the present study, once the fabric with a more prominent texture and weight (crepe) was associated with "negative" adjectives such as hot, rough, thick and repulsive, either through vision and touch.

It is noted that, here, the "negative" adjectives are understood as qualities that may negatively influence the relationship of the fabric and the body. However, it is important to highlight that individuals may perceive the characteristics of a fabric quite differently and yet use similar words to name these qualities, which reveals a problem with semantical application in this kind of investigation. Besides that, some properties are assessment as negatively or positively regarding previous knowledge and experience as well as by the environment that the individual is inserted. For example, the adjective "hot" and "heavy" may be here associated as negative since the individuals involved in this investigation are in a region of the world that presents high temperatures for much of the year: Brazil. Therefore, fabrics, and consequently, clothing, which are perceived as heavy and warm, are negatively evaluated because they are not suited to the climate of the region.

4.2 Discussion about online shopping x fashion

It is already known the increasing number of people using Internet to access all kind of information, research, communication, online banking and, specially, purchasing. This technology advance promoted along the time the expansion of shopping options beyond the traditional methods, bringing consumers closer to all types of products and services, mainly overcoming geographical barriers such as long distances. Shanthi and Kannaiah (2015) expose that online shopping is a growing reality that helps consumers to reduce the search time for products and services.

EMarketer report (2016) previewed that the total retail sale across the globe in 2016 would reach $22.049 trillion, up 6% from the previous year. The same report also estimates that sales will top $27 trillion in 2020. According to Statista report (2018) the growth of the digital retail is strongly connected to the constantly improving online access, especially in developing countries.

Among the segments of the products offered online, the apparel segment has presented over the last years a steady annual growth rate. In 2016, USA retail e-commerce revenue from the sale of fashion apparels, footwear and accessories amounted to an estimated 63.3 billion U.S. dollars and is projected grow over 90 billion U.S. dollars by 2021 (Statista, 2017). The organization also indicated that the worldwide revenue of US$ 447.3 billion in 2017 is expected to increase to US$ 790.5 billion by 2022 (Statista, 2018).

In Brazil, fashion is the most representative segment among virtual stores (30%), followed by home and decoration (13%); computing technology (12%) and beauty (10%) (Sebrae, 2016). The Ebit report (2018) indicates that in 2017 a total about 55 millions of e-consumers made at least one virtual purchase. An increase of 15%, if compared to 2016.

The online shopping experience involves several factors such as purchasing time reduction, ease in comparing prices, access to product and technology news, and other. However, while e-commerce can help consumers, some aspects inherent in this type of shopping may be obstacle, especially regarding the experience of contact with the product. Lester at al. (2005) argue that one of the reasons that online shopping may be seen, is because the shoppers can not touch the products. Specially with clothing, Citrin at al. (2003) explain that the need to touch products is negatively related to the online purchasing.

It is generally difficulty to obtain enough information about the product in online shopping, mainly when there is a lack of information about the function or properties of the product as well as when happens a lack of consumer information about some materials or construction aspects of the product.

Online shopping involves mainly visual perception, when, usually, the consumer perceives and processes some information about shape, texture, volume and color, for example, mainly when the virtual platform offers technology that allows the consumer to move the product to visually inspect it from different angles (as a 3-D virtual environment). With this simulation technology, the consumer can freely examine, zoom-in/out and rotate the product for more information and details. By 3D interactive technology, consumers can perceive the “presence” of the product, which can influence their cognitive, affective and emotional aspects during the shopping experience (Biocca, Daugherty, Li, 2001)

Still, regarding the apparel e-commerce, the shopping experience (and buying decision) can be impaired because of the desire that consumers must try on, touch, and feel the clothing (Jeong, et al. 2008). Park, Lennon and Stoel (2005) highlight that is common that consumers perceive some risks associated with apparel shopping, especially because the lack of directly contact with the product and the difficulty in understanding all product proprieties.

Because apparel products may present some risks to shopping online, it is important that the e-companies develop strategies and solutions that reduce this risk. It’s already known that an appealing visual display of products increased consumers’ intention to purchase product (Swinyard, 1993; Parke, Lennon, Stoes, 2005), which is naturally due the nature of appeal products that involves appearance, aesthetic and self-steam. This is also noted by Napompech (2014) that argues that online apparel sellers should post realistic pictures of clothing from different angles on their website, helping the shopper imagine how it would fit in his own body.

The web platform may be also used to provide consistent and comprehensive product and customer service information, because this benefit the consumer by providing more non-sensory information than is possible to provide in brick-and-mortar retail store (Park, Stoel, 2002). Information such as color, size and fit were found to be very important information that decrease perceived risk of apparel purchase, especially when offer information about sensory and experiential aspects (Park, Stoel, 2002).

Such information is useful to the understanding of the shopper about style, fashionability, fabric construction, coordination, and texture/fabric hand (Park, Stoel, 2002; Kim, Lennon, 2008). However, verbal information about the appeal products evoke an imagery information processing that can be induced by several external sources, which, added with the image available convey to the understanding of the shopper.

In this sense, understanding differences in consumers as well as their knowledge and perception regarding appeal product and, consequently, fabrics, can be maximize their purchase intent. In this sense, how the product is presented in the online platform virtually is essential to feed the interpretation and the perception of the consumer about the appeal product. This strategy may be able to answer consumer questions about: how comfort is it on the body?; how does it fit?; Is it a good material?; Is it good to touch?.

This kind of information will rely on the consumer’s purchasing decision and, consequently, on his future decisions. This is because of purchasing online should not only cover the act itself, but also how this product will be evaluated when the real interaction (contact) with the consumer happen. The reception of the product as well as the use of it goes through several stages of perception, which will be part of the judgment of the consumer about future purchases. This means that each of the stage may be stimulated more prominently by a sensory channel.

This is studied in more depth by Fenko et al. (2010), that assume that the dominance of a sensory modality depends on the period and context that the product presents itself to a particular individual. According to the authors, for example, at the moment of a purchase, the information received by the vision stands out, while during the use of the object, other modalities may gain more importance. The research, that involved the analysis of 93 products, also indicated the alternation of predominance among the sensorial modalities during a certain period. The result indicated that after a month of use the touch overcome the vision, and after a year the hearing begins to be evaluated with the same degree of importance. From this perspective, the designer should create and insert elements and symbols into the product that may promote positives feelings that are long enough to be perceived during the stages of use by the user.

5. CONCLUSION

In the contemporary scenario, materials are increasingly endowed with properties that make them capable of performing complex functions. As analyzed, within the textile universe, these functions, besides covering the body, are associated with the perceptual responses of the different sensorial channels. Considering the contact that the garment keeps with the body and its aesthetic importance, the touch and the vision are important regarding the generation of information about certain textile material. Stimulation from both channels provide evidences generated by the perceptual system that are consequently judged by individuals.

Therefore, the designer shall understand the sensory responses that each textile material can stimulate in the individual, since this can be determinant in the choice of a piece of clothing as well as in the well-being of the individuals. As an example, the universe of ecommerce, in which textile characteristics are usually analyzed exclusively by vision, generates perceptual responses that will be influenced by the knowledge, memory and experience of the subject. Thus, the contact, expected after the product delivery, will complete the information acquired by the vision, and will enable greater detail on weight, roughness, temperature, among others. Indeed, in the "e-era" this understanding corroborates the fact that the apparel products are taking an outstanding place on the world scenario of online transaction.

In the fashion perspective, sensations and perceptions acquired during the use of a particular textile are strongly associated with the constructive properties of the garments. This reality stands out the importance of the modeling that make possible the fitting of the garments on the body. In addition, it is worth noting that, although the present study has developed on the context of the textile and clothing industry, the fabrics are present in various objects of everyday life, such as sofa, sheet, car and public transportation seat coverings, chairs, among others. This scope of application exposes the representative contact that individuals possess daily with this type of material and reinforces the importance of the investigations on its physical and mechanical properties as well as its relationship with the emotional and psychological responses of the users.

This study was carried out in an experimental way, being performed as a basis for the development of deeper investigations related to the perception of the individuals about the textile material used in the clothing through the different sensory channels. In this way, it is suggested the deepening of such questions encompassing a greater variety of tissues as well as a greater sample of individuals.

ACKNOWLEDGMENTS

This study was developed with the support of CAPES (Proc. nº 88881.132058/2016-0) and CNPq (Proc. 309290/2013-9).

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