The development of a color chart in conceptual fashion collections: do consumers perceive what color semantics wants to convey?

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ABSTRACT

This paper is part of a master's in design research that aims to identify whether potential fashion consumers' interpretation of the colors of clothing collections was aligned with the intention of their designers/coders. Fashion designers face the task of making conceptual and thematic choices to convey a message effectively. Within the various elements of visual language employed for this purpose, color plays a crucial role due to its symbolic significance in visual communication. Hence, this paper aims to delve into the interpretive possibilities associated with the semantic dimension of a color chart. This exploration involves assessing the extent to which the designers' intentions are realized in the visual message conveyed by the colors within a clothing collection, as perceived by potential Generation Z consumers. To achieve this, we employed the Semantic Differential (SD) and Free Word Association (FWA) methods in our research. We interviewed eight designers responsible for coding the two fashion collections under investigation and gathered responses from 108 potential Generation Z fashion consumers to gain insight into their interpretations. According to the results, the effectiveness in delivering color messages varied between medium and high. It was concluded that fashion designers employ two strategies for coding the color chart: maintaining chromatic symbologies already widespread in society and subversion of color codes. Meanwhile, potential consumers interpret colors according to their propagated sociocultural meanings.

KEYWORDS Fashion design. Semiotics. Colors. Visual communication. Information Design.

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1. Introduction

Visual elements construct information and deliver a message more effectively on products (Silveira, 2018). Therefore, visual signs that are characterized in the academic literature as elements and principles of design (Silveira, 2018). These elements will guide the observers' eyes through its development, generating the process of illumination and recognition according to their connection points (Lupton; Phillips, 2008; Pires, 2008; Sorger and Udale, 2009).

When interacting with Fashion artifacts, consumers mainly notice their colors, which are responsible for purchasing decisions (Jones, 2005; Guo et al., 2020). Quattrer (2013) explains that color perception in this context is easily hierarchical, standing out to the detriment of other elements. Pereira (2011) relates this effect to its rapid assimilation. Within fashion collections, Doris Treptow (2013) points out that colors must refer to the concept being worked on, while Farina (2006) adds that their use should not be made considering aspects of aesthetic preferences and personal tastes. With this, we understood color as a visual sign applied in the stages of a product project, enhancing possible contextual meanings (Dondis, 2003; Niemeyer, 2003).

Color symbolism is an area that deals with the meanings that colors evoke based on individuals' perceptions from psychological, cultural, and sensory perspectives. Through social conventions passed down through generations and transformed throughout history, most meanings are projected in colors (Kandinsky, 2000; Mehta; Zhu, 2009; Barros, 2011; Goethe, 2013).

Colors are one of the main communication elements in products or graphic pieces, with their dimensions linked to the most diverse symbolism, widely diffused in societies. It is known that there are correspondences between black and the senses of mourning or sadness, with red being associated with issues such as passion or sensuality or pink, with sweet and feminine symbolism. It is worth highlighting the modernity of these symbols, as from the Middle Ages, through periods such as the Renaissance, until the mid-1800s, blue was seen as a chromatic element representing femininity and purity (Silva, 2017; Jonauskaite et al., 2018).

The adequate understanding of what is intended to be communicated will vary depending on the contexts experienced, their cultural insertion, and the influences of the people and media surrounding them. Therefore, bringing geographical and cultural sections makes it possible to obtain different interpretations of the colors in the artifacts and their elements (Guimarães, 2000; Arnheim, 2011; Cardoso, 2012; Heller, 2013).

The symbolisms identified in color studies also apply to the Fashion context; however, these socially accepted meanings will not always make sense in the clothing sets produced. Designers are predisposed to develop their assertions about what a particular color represents in a composition, reflecting an idea that is sometimes arbitrary and playful, which does not directly connect with the object represented. Therefore, the color inserted in the Fashion collection will bring the narrative power of portraying new information, creating its language, and penetrating new visual codes (Pina, 2009; Treptow, 2013; Moreira, 2016).

In a fashion collection, the set of symbols projected in colors is used to model the concept that guides the theme of the work and to attract the target audience. In clothing design, we commonly work with a color palette that varies from 4 to 12 colors; these are sets of more prominent colors that will influence each other in a composition (Dondis, 2003; Jones, 2005; Treptow, 2013).

Therefore, methods of transposing the generating concept to materialize it in a color chart may not be satisfactorily applicable to all cases in Fashion Design, making it necessary to increasingly specific and innovative approaches centered on the interpretation of clothing consumers. Löbach (2001, p. 105) explains that the difficulty lies in finding an adequate set of aesthetic means to produce the intended symbolic effect, which is why Queiroz (2004) demonstrates that exploring concepts present in other sciences is done as a path promising to discover new ways of solving problems; From there, the role of semiotics in this research is elucidated.

Fashion goes beyond the pragmatic function of dressing people. These products also generate codes and laws (Lipovetsky, 2009). It is related to major global meetings for decision-making with references to fashion trends or even in a chromatic scope, prospecting the marketing colors of each season (Svendsen, 2010). Lúcia Santaella (2012) conceptualizes semiotics as the science that investigates the phenomena of the development of meaning and meaning. Charles Sanders Peirce (1998), in his studies around the year 1867, considers the sign as a relative object, just like the colors and language of fashion, thus being polysemic and moldable through time and its interpretative contexts (Lipovetsky, 2009; Holtzschue, 2011; Heller, 2013).

Using semiotics as a study method makes it possible for new possibilities to explore the production of meaning through clothing, which can consequently adhere to society and culture (Niemeyer, 2003). In this way, we start from the hypothesis that the conceptual information of clothing collections is intrinsically elaborated to its symbolic representation by the color palette, focusing only

on its emission. This reflects a semiotic process of coding a color chart. Therefore, we notice that there was no impetus on the part of fashion collection developers to identify whether there was an understanding of these color semantic visual messages regarding the aesthetic-symbolic dimension of the products when related to the interpretative extent of consumer perception.

In the same sense, Krippendorff (1989, p. 15) explains that "No one can assume that the form (the meaning objectified by the designer), and the meaning (of the user) are the same; consequently, the need for product semantics to study how they relate to each other." Based on this statement, reality is understood when discussing the experience of sharing ideas in cyberspace, such as the internet for Generation Z, where a network for sharing ideas is built. This aligns with what Cardoso (2012) states, in which groups attribute the final meanings in a sociocultural environment to products and colors.

1.1. *Color as visual information*

Visual information is one of the main factors delimiting experience when observing the relationship between human beings and the world, defining pleasures, preferences, and fears. Dondis (2003, p. 7) expresses that "seeing is a direct experience, and using visual data to transmit information represents the maximum approximation we can obtain concerning the true nature of reality." Therefore, color is responsible for carrying a great informative value, given its symbolic qualities, being one of the most profound human visual experiences (Dondis, 2003).

Among the functions of colors, they excite and awaken sensations in their observers, widely used as a marketing strategy to evoke certain impressions and guide purchases. Rathee and Rajain (2019, 210) explain that color is integral to sensory marketing tactics. It influences consumer behavior and perceptions, induces moods and emotions, and helps companies position themselves or differentiate themselves from competitors." In this sense, we observe the possibilities for fashion designers to construct visual messages. Sherin (2012) states that people's responses to colors can affect how visual information is received.

Color has a powerful relationship with sensory perception. Lima (2020, p. 40) expresses, "The visualization of colors can evoke experiences in human beings and, as a result, they are usually described with words related to emotions and sensations, such as 'vibrant' and 'relaxing.'" Therefore, the area of color psychology becomes relevant for understanding the use of colors by designers, allowing it to shape how people will relate to products (Sherin, 2012) and dealing with issues such as interpreting these messages and visuals.

Therefore, all this planning that develops around an artifact, enhanced by using chromatic elements in the design, explores an extensive visual communication endowed with creative possibilities for a visual coder (Guimarães, 2000; Arnheim, 2005; Farina, 2006). This process is closely related to the observer's cognition, exploring a visual message, or elucidating a positive emotion that will lead them to purchase the product (Nogueira, 2017).

In the fashion creative process, one of the designers interviewed in Moreira's master's work (2016, p. 110) expresses that "the collections are carriers of very colorful registers, which involve many patterns, fantasy [...]. It adds textures and scales to the color option as reinforcement to communicate and stimulate emotion." Considering the sensorial relationship that the clothing product has with people when this information is combined with color, it is observed that it influences decision-making.

According to Scully and Cobb (2012), this process is subjective. Based on the research of Tonetto and Da Costa (2011), the authors comment that the emotions products evoke are predictable and moldable. Based on this, it is argued that there is a need for an in-depth investigation into the interpretative responses of observers/consumers when they meet only the colors of a clothing collection. This will allow it to expand what is known about using colors in current fashion product designs.

The broad informative potential of color allows it to pass through different areas of the creative process, translating in a non-verbal way a speech that is intended to be transmitted within graphic pieces, industrial products, and, as a focus, clothing. Pedrosa (2007, p. 33) comments, "Information colors are visual data endowed with meaning, capable of causing the information process for the individual, which can result in the development of new knowledge." The development of clothing products is one of the first to adopt this idea, generating meaningful associations between the artifact's configured shape, color, and content.

1.2. *Content and elements of visual language in clothing: interpretation as information for design*

In the creation process, the shape of clothing products is a mediator between the visual message intended by the fashion designer and the perception and interpretation of the final receiver/consumer (Barnard, 2003; Treptow, 2013). Therefore, developing the formal configuration of these products is an activity that is carefully worked on in the design stages. Silveira (2018) explains that understanding visual elements, their organization, composition, and interrelationships, as well as the

cultural signs present in the artifacts, is at the heart of successful design practices. This relationship is in line with the process of visual literacy, addressed by Dondis (2003, p. 227), where "it implies understanding, and means of seeing and sharing meaning at a certain level of universality."

Therefore, the artifice of human decoding and visual reading is the primary way a product is understood, so symbolic and aesthetic associations can be made with the observer's cultural background. Dondis (2007) expresses that visual decisions dominate much of what we examine and identify. This process goes against the fact that we live in a society where a product's visual and aesthetic aspects make the first contact with the target audience and, therefore, guarantee the generation of emotional values (Baxter, 2000; Dondis, 2003).

When an artifact is visually read in everyday life, it has a series of communicative constructs, whether psychological, social, or cultural, that relate to how it was configured and connect to the observer's cognition. Dondis (2003, p. 131) comments that "content and form are the basic, irreducible components," where "content is never dissociated from form." Therefore, it is understood that the products that designers plan are equipped to channel a visual message. That is, it is part of what is called visual communication.

According to Pereira (2016, p. 29), "The process of observing information, decoding it, and being able to issue a response is called Visual Communication," or visual language. To be categorized as communication or language, it follows a series of rules called visual grammar. Silveira (2018, p. 33) explains that "a basic "vocabulary" of visual elements (points, lines, shapes, textures, colors) can be organized and combined in different ways, composing a kind of "visual grammar."

In more depth, these elements, which configure visual language, are brought up in the discussions by Dondis (2003, p. 22), who defines it as necessary to "recognize that everything we see and create is made up of the basic visual elements that represent the structural visual force, of enormous importance for meaning." For these visual messages, also called information, to be transmitted to their observers in their structures, visual planning takes place through these elements, called visual support, which influence each other in a composition (Munari, 1997).

Therefore, even if, within the process of visual analysis, these elements are deprived, they must be considered from the point of view of a correlation, as "the perceptions of meaning provoked by the artifact will only be effective if the formal/visual support is organized," that is, now of visual perception, the object will be read (Sanches, 2016, p. 58).

Although this research focuses on color in transposing the visual message, it is essential to identify its intersections with the other elements because, as explained previously, the construction of the composition helps deliver the visual message. The factors influence each other simultaneously in the visual composition of an artifact (Dondis, 2003; Sherin, 2012).

Concerning the sign in the interpretant dimension, these analogies will indicate certain aspects of how the target audience/user of the product will receive and decode specific visual messages conveyed through the products' technical, aesthetic, and symbolic constructs. Therefore, Crilly et al. (2008, p. 438) express, "Although the interpretation of any artifact cannot be fully predicted, in any population, some interpretations are more likely or prevalent than others." By comparing and correlating with the designers' intention, it is possible to obtain a new picture of how a given product is socially and culturally perceived within a context analyzed compared to its original intentionality. This makes it possible to generate discussions in the communication process through products.

Research has been investigating aspects related to interpretative responses in the emotional, semantic, and affective aspects of consumers in interaction with brands, labels, packaging, and other types of products, especially those in the food sector; in this universe, all research indicates the validity of obtaining this information for the design process (Celhay; Remaud, 2017). Crilly et al. (2008, p. 439) conclude that "designers must try to influence the consumer's interpretation actively, and anticipating the factors that may lead to problematic interpretations is an important part of this process." Although this information is also relevant to fashion design (Barnard, 2003), among the studies found, it was not possible to identify any that transpose the concept of identifying the relationship between intention and interpretation for fashion consumers.

In the scope of colors, Csillag (2013a; 2013b; 2017) divides the perception of chromatic elements into three dimensions, which he calls SENS (sensation), ORG (organization), and INT (interpretation). They co-occur in the human brain but can be removed for didactic purposes. In this way, the INT dimension refers precisely to the interpretation, the response, which is inferred from contact with the product, where emotional, cultural, and personality values act on one's perception of a specific color in context. Csillag (2013a, p. 42) discusses this dimension: "This aspect of perception provides personal variations and interpretations of the images that each person creates based on their repertoire." When this model is applied to product analysis, this dimension deals

with the relationships between iconic, indexical, and symbolic elements that configure the visual language of the artifact and emerge in aesthetic-symbolic interpretations primarily based on a cultural nature and subjective preferences (Csillag, 2013b; 2017).

1.3. *Characteristics of Generation Z*

Age groups typically conduct the definitions surrounding generation delimitation, a chronological order that groups everyone into their corresponding generation. However, there are deeper characteristics that mark the existence of each generation and that go beyond a simple age categorization. Oliveira (2016, p. 15) explains that "it has been more common to consider the generational classification taking into account the events collective social and cultural aspects, especially the behavioral aspects that are easiest to identify." Therefore, each generation is analyzed according to the social, cultural, and technological events surrounding them.

This information is essential and is mainly used in Marketing and product development, so an artifact, service, or advertising strategy can be targeted at a specific market niche based on their age, behavior, and preferences. According to Cruz and Lima (2020, p. 72), "The time in which people grow up can define how they interact with other individuals". Therefore, people of the same age "have common memories of cultural icons, relevant facts in history." In short, when looking at each of these generations, they are people with a similar repertoire relative to their age and who consequently interpret and perceive the world around them in different ways when compared to the generations.

Name	Periods of birth	The centre of generation	Features	Main anxiety
Belle Époque	Before 1946	75 years	Idealists Dreamers	Discipline
Baby Boomers	1946 – 1964	60 years	Structured Builders	Revolution
Generation X	1965 – 1980	45 years	Skeptics Tolerant	Facilities
Generation Y	1981 – 1994	22 years	Unstructured Contesters	Innovations
Generation Z	1995 – 2010	10 years	Online Relational	Balance?

Fig. 1. Synthesis of the generational classification. Adapted by the authors according to Ceretta and Froemming (2011), Oliveira (2016), Mindminners (2018), Cruz and Lima (2020), and Ferrari and Alvares (2020)

Although people who work with this information intuitively know how to define generations, there are a series of inconsistencies in the academic literature regarding the unification of how they could be divided chronologically. Based on this, a summary was prepared based on studies by Ceretta and Froemming (2011), Oliveira (2016), Mindminners (2018), Cruz and Lima (2020), and Ferrari and Alvares (2020), as they consider the scenario Brazilian in its demarcations (Figure 1).

Generation Z (1995-2010), in the generational context, presents a powerful characteristic for contemporary times that differentiates it from all others: its period of birth encompasses the height of the spread of globalization and the internet, consequently having a solid relationship with technological artifacts, with a worldview based on them. According to Ceretta and Froemming (2011, p. 19), "People from Generation Z never conceived of a world without computers, chats, and cellphones [...]. Since birth, his way of thinking has been influenced by the complex and fast-paced world that technology has engendered." Thus, it is observed that for this generation, the environment, relationships, people, and artifacts are volatile, inconstant, and reconfigurable and, in this sense, Generation Z has behavior that differs from the others (Schlossberg, 2016; Ferrari; Alvares, 2020).

2. Objectives

This research's main objective is to investigate the possible interpretations of the color messages in two

conceptual clothing collections from the perspective of Generation Z and whether these, in turn, are understood effectively compared to the designers' intentions.

3. Methodology

This research is based on applied research, aiming to be exploratory-descriptive. The central procedure that guided the development of this work took place through analysis, survey, and interview, relying on a quantitative-qualitative method approach (Gil, 2008; Fowler, 2014).

3.1. *Survey process*

We applied two central data collection strategies in developing this research: (i) interviews with designers and (ii) virtual surveys with potential clothing consumers. Nevertheless, we use two research techniques to construct both research instruments: (i) semantic differential (SD) and (ii) free word association (FWA).

Having initially been developed by Osgood, Suci, and Tannenbaum (1957), the SD tool aims to serve as a possible method of quantifying the possible connotations of a word or concept. According to the consumer's view, the tool can delimit the subjective semantics of artifacts (Holdschip, 2015).

More specifically, the SD method comprises the presentation of equidistant/opposite pairs of words divided into categories (also called descriptors, e.g., good-bad (evaluation), hot-cold (activation), and strong-weak (power)) in a questionnaire or experiment followed by request for classification from the perspective of the visual-interactional relationship of the respondents concerning the visual stimulus being presented (Osgood; Suci; Tannenbaum, 1957). These pairs of words are arranged in a table with diametrically mirrored or sequential numbering, using a 7-point Likert scale for classification, organized as (-3; -2; -1; 0; +1; +2; +3) (Osgood; Suci; Tannenbaum, 1957; Holdschip, 2015).

This method was adapted in this research, where categories were not considered but independent terms related to the semantic dimension of the collection. Furthermore, a 5-point Likert scale was used for better guidance, presenting an ascending order (1, 2, 3, 4, 5).

Another method this work applies is the Free Word Association. As Alves et al. (2021, p. 3) explain, word association "is one of the most commonly used methods for evaluating conceptual structures and studying beliefs or attitudes in consumer psychology and sociology, used to understand attitudes and predict the people's behavior." One of the validities of applying the method is precisely to access more spontaneous responses from its volunteers.

In short, free word association involves presenting a visual stimulus and telling respondents to express all the associations (images, sensations, emotions, ideas) that come to mind when they observe it. For data collection, we applied the strategy presented in Figure 2.

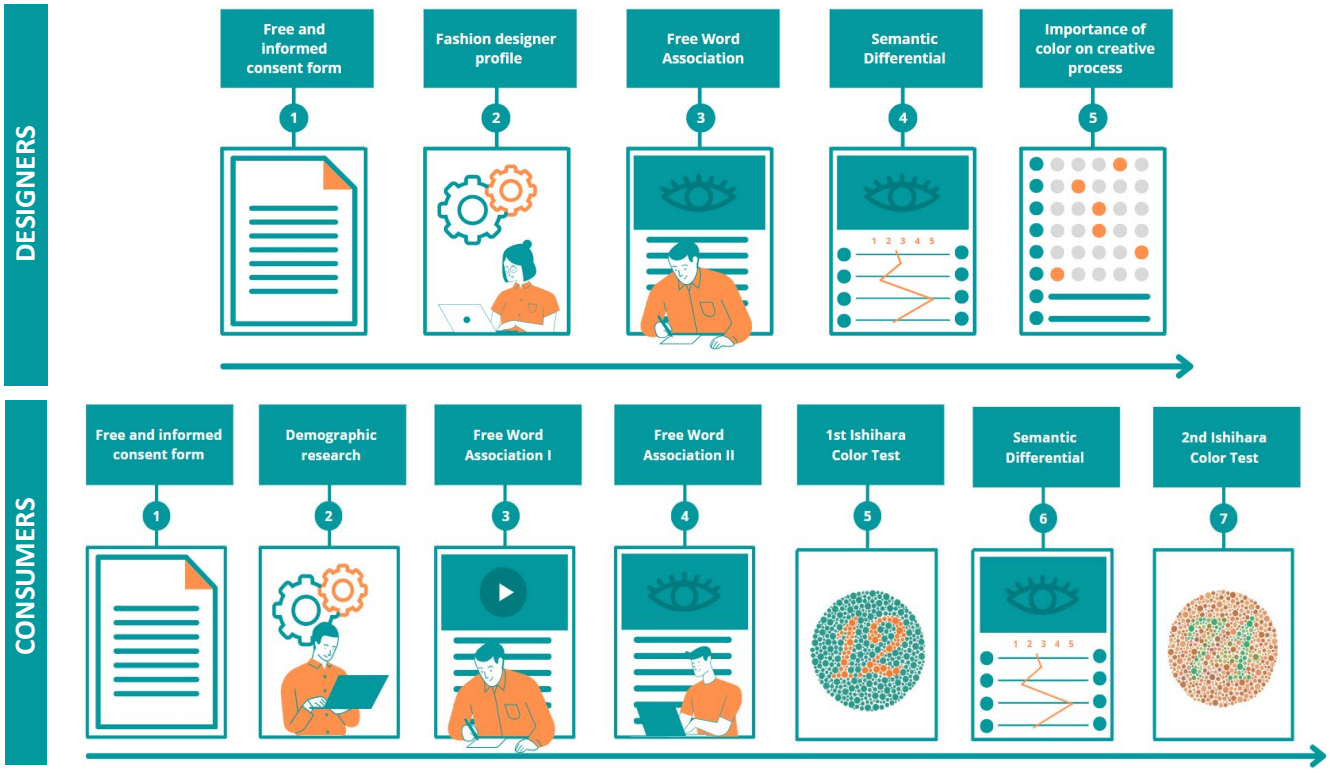

Fig. 2. Structured data collection sequence with designers and consumer

The interview and questionnaire were created using the Google Forms platform, directed individually to each designer interviewed, and disseminated on social networks seeking to reach potential Generation Z consumers. All volunteers agreed to a Free and Informed Consent Form, and Generation Z responded to 4 panels of the Ishihara test that aimed to identify deficiencies in color visualization so that the answer was eliminated and did not influence the database.

3.2. *Collections used as objects of study and preliminary semiotic analysis*

Regarding the object of study, the focus was on two conceptual collections that won the New Designers Competition of the authorial fashion event "Dragão Fashion Brasil" in the years 2017 and 2019, called "Shibipo" and "Ilha de Marajó," respectively. This competition is configured as a competition that mixes the conceptual proposal with specific commercial characteristics, such as the requirement to produce some pieces that can be reproduced on an industrial scale. This competition defines a general conceptual theme each year: Fashion schools in Brazil must send proposals to be shown in person if selected.

The first collection studied won first place in the New Competition 2017 called "Shipibo: Digital Artesania." The winning team was made up of five students (Elyenai Fernandes, Meguy Araújo, Bruna Santos, Maria Pessoa, and Giulia Lins), guided by two professors (Gabriela Maroja and Victoria Fernandez), and came institutionally from the João Pessoa University Center (Unipê - Brasil).

Concerning 2017, the base theme was *"Latin Soul of Peru,"* designers from Brazilian Fashion schools should work on their creations within this perspective (Table 1).

The second clothing collection that served as the object of study for this research was the one that held the title of first place in the 2019 New Designers Competition called "Ilha de Marajó." The collection, unlike the previous ones, was structurally presented on the Iracema beach embankment, as it comprised a unique and commemorative edition of the event, also located in the city of Fortaleza, in the state of Ceará (Basil), between the 15th and May 18, 2019. The collection was developed by a team of 4 students (Larissa Yumi, Lucas Nogueira, Raissa Marquetto, and Zuri Kennedy) from the Federal Technological University of Paraná (Table 1).

To analyze the collection's color choices and compare them with the designers' intentions, images of the clothing collection available on the DFHouse website, the organizer of the New Designers Contest, were used. In this case, the researchers did not have access to the colors of the fabrics or physical materials in the collection. Therefore, they did not have contact with the Pantone codes used initially in the color chart. Accordingly, to conduct a comparative color study between the intention and final product, the image was taken to the graphic software Adobe Color, where it was possible to extract, using the eyedropper tool, the possible colors used in the collection (Table 1).

YR	WINNING FASHION SCHOOL	TEAM	BASE THEME
2017	*João Pessoa University Center (Unipê)*	*Elyenai Fernandes, Meguy Araújo, Bruna Santos, Maria Pessoa, and Giulia Lins*	*Latin Soul of Peru*
FASHION COLLECTION/COLOR CHART			

YR	WINNING FASHION SCHOOL	TEAM	BASE THEME
2019	*Federal Technological University of Paraná (UTFPR)*	*Larissa Yumi, Lucas Nogueira, Raissa Marquetto, and Zuri Kennedy*	*Beach*

FASHION COLLECTION/COLOR CHART

Tab. 1. Fashion collections used in empirical research.

To define the pairs of descriptors that would be applied in the semantic differential, a preliminary semiotic analysis was conducted using a model presented in the research by Dantas e Silva (2020), which is constructed according to the concepts of material, syntactic, semantic and pragmatics from the semiotics of design, found in the work of Niemeyer (2003). This model focused on observing the construction of visual color messages based on possible relationships between the generating concept used in creating the collection and how this was reflected in the production of meanings in its color palette. Then, after the semiotic analysis was completed, this information was gathered into a synthetic table (Table 2).

YR	Fashion collections	Main message (the central theme of the collection)	Product characteristics, feelings, and emotions transmitted by the collection
2017	**Shipibo: Artesanal Digital** *(Shipibo: Digital Artesania)*	Peru, tribe, llamas, Panchamama (mother nature), regional, tea from the ayahuasca vine, crafts	Sky, deep seas, nature, cold, lightness, comfort, melancholy, kindness, frivolity, bitterness, supernatural, infinite, purity, resurrection
2019	**Ilha de Marajó** *(Marajo Island)*	Marajoara Ceramics, Beach, Ilha de Marajó, Carimbó, dance	Craftsmanship, dignity, modesty, endurance, earth, forest, mud, sand, joy, sunset, and strength

Tab. 2. Synthesis of the visual messages of the colors of the fashion collections studied.

The associations identified in Table 2 were used within the interviews and questionnaires, applying them as descriptors and their possible opposite pairs in the semantic differential method.

To mitigate the influence of other elements of visual language on the responses to this research, during the survey, we briefly highlighted the interest only in color. First, we present the image of the collection with squares at the bottom that highlight the color of the piece, as can be seen in Table 1. Second, the question asked to the volunteers was "*the collection below was created from x main colors, arranged below the images of the models. We want to know your opinion about these colors. What do you think they convey?*", therefore, we highlight the interest in color semantics.

3.3. *Participants*

Regarding the interview with the designers, the collections were developed by two different teams, containing 5 (2017 collection) and 4 (2019 collection) people, respectively, who in turn are not all part of Generation Z. Three of them were interviewed for the first collection, and all four for the second. We focused the interviews on those who actively participated in creating the color palette and the creative process of the fashion collection. We use intentional non-probabilistic sampling.

The virtual questionnaires were active on social media for six consecutive days, specifically between October 12th and 17th, 2021. We collected 108 responses from people with no expertise in the fashion or design area aged

between 18 and 26: 56 for Questionnaire A (Shipibo – 2017 fashion collection) and 52 for Questionnaire B (Ilha de Marajó – 2019 fashion collection). All participants were geographically from Brazil, especially from the northeast and southeast regions. No individual was identified as disabled in visualizing colors or who was familiar with the clothing collections studied, so there was no need to exclude responses due to non-compliance with the pre-established inclusion criteria.

3.4. *Data analysis and processing*

For the semantic differential, the medians of the results were considered, both for the designers' intention and for the interpretation of Generation Z respondents. This decision is based on the explanation by Reis and Reis (2002, p. 33), where "As a measure of central tendency, the median is even more intuitive than the mean, as it represents, in fact, the center (middle) of the set of ordered values." Therefore, according to the previously conducted normality test on the collected data, none of the collections presented a normal distribution. Thus, the averages do not reflect a reliable result, and medians should be used in this case (Field, 2018).

For free word association, all terms expressed by each group of respondents were considered from a word cloud. However, to obtain more robustness in the data, it was necessary to mine the responses received, translating as much as possible all the words expressed into common synonyms, which will be called the stage for developing synonym categories.

Considering the words collected, the leading researcher created synonym categories to obtain results robustness. Then, this document containing the categories was sent to three Generation Z evaluators for approval or reconstruction according to their recommendations. Thus, the categories of synonyms will be formulated and allow analyzing the words from a set.

4. Results: do consumers perceive what color semantics want to convey in fashion collections?

This topic will be organized based on the presentation and discussion of results from a comparative analysis of intention (designers) and interpretation (consumers).

4.1. *Comparative Analysis - 2017 Fashion Collection (Shipibo)*

Comparing the results mapped for the interview with the designers with the questionnaire with potential Generation Z consumers, for the semantic differential (SD), an intention centered on neutrality between traditional and modern (3.00 Md) was identified. ; neutrality between cold and hot (3.00 Md); global (5.00 Md); supernatural (2.00 Md); melancholic (2.00 Md); purity (2.00 Md); sweetness (2.00 Md); natural (1.00 Md); infinity (2.00 Md); neutrality between fauna and flora (3.50 Md); and, lightness (1.00 Md).

In turn, these intentions were interpreted by potential Generation Z consumers as neutrality between traditionalism and modernity (3.00 Md); neutrality between cold and hot (3.00 Md); globality (4.00 Md); neutrality between supernatural and physical (3.00 Md); melancholic (2.00 Md); purity (2.00 Md); sweetness (2.00 Md); natural (1.50 Md); neutrality between infinite and finite (3.00 Md); neutrality between fauna and flora (3.00 Md); and, lightness (3.50 Md) (Figure 3).

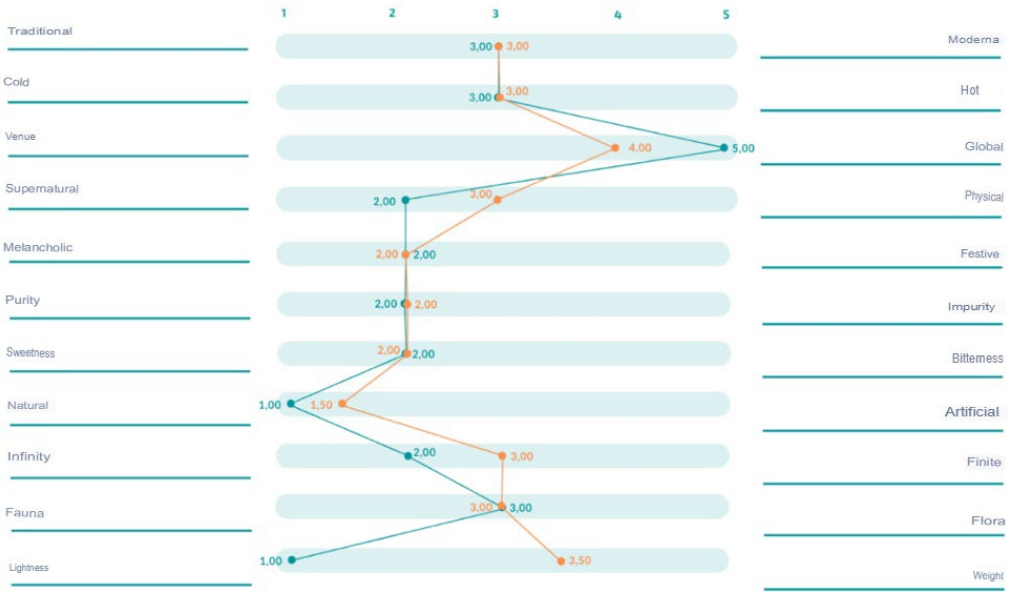

Fig. 3. Comparison between designers' intention (blue) and potential consumers' interpretation (orange) for the visual message of the 2017 Fashion Collection – Shipibo colors.

Considering the responses obtained for the SD, high effectiveness in interpreting color messages from the 2017 fashion collection (Shipibo) was identified, with most of the convergence, even at different levels of intention and interpretation. Six were detected among the 11 pairs of descriptors, where the medians of intention and interpretation met at an exact point (traditional-modern; cold-hot; melancholic; purity; sweetness; and fauna-flora). Another three pairs of descriptors showed a positive correlation between intention and interpretation, differing by only 0.50 or 1.00 in the median, but the answers were in the same direction in the SD (global; natural).

On the other hand, it was observed that the other 3 of the 11 pairs of semantic descriptors studied presented divergences in the SD, varying from 1.00 (supernatural-physical; infinite-fine) to 2.50 (lightness-heaviness) of differences in reported medians (Figure 4).

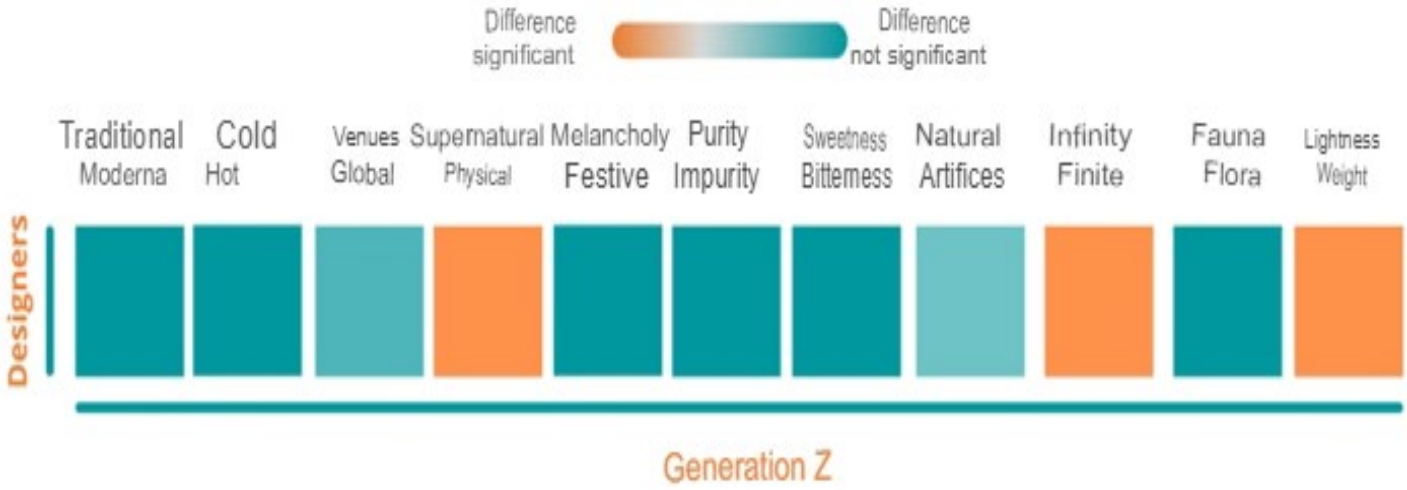

Fig. 4. Comparison between intention and interpretation – 2017 Fashion Collection – Shipibo.

Next, the associations potentially developed by potential consumers for the SD result will be briefly discussed. In the case of the Shipibo collection, it was observed that around half of the pairs of descriptors were initially interpreted as neutral (3.00 Md). For the first pair of descriptors, where it was interpreted as "neutrality between traditional and modern," and for the result that tended towards "natural," one can speculate an association with the saturation of colors present in clothing products, as well as the colors found in nature that are present in the configuration of the card. According to Clementino's master's research (2017, p. 92) for packaging design, in color, "low saturation quality [is] widely cited as indicative of sustainability," being a phenomenon also observed in clothing, such as seen in the work of Dantas et al. (2021, p. 140), where the authors conclude that "saturation, when too much, can be related to artificiality, as it is obtained using a greater amount of pigment."

Potential consumers may have developed a semantic association of clothing products from the Shipibo fashion collection, with low saturation and colors present in nature (such as blue, green, and brownish white/sand), with the natural production of pigments and, therefore, with traditional and natural techniques for materializing the color palette. Although this observation focused on the traditional/natural speculated, it was impossible to identify why semantic neutrality concentrated on the modern. There may have been an influence from the unusual shapes of the clothes, that is, the subversion of dress codes, an effect commonly seen in conceptual clothing products, considering that color and shape are interpreted simultaneously, inseparable in the observers' decoding process.

In constructing the pieces, one can find the proportional presence of colors with warm characteristics (pink and brownish white/sand), cold ones (pure white, blue, and gray), and different low saturation levels that also suggest a cold aspect. (Pastoureau, 1997; Farina, 2006; Aballí, 2010; Heller, 2013; Goethe, 2013). Based on this thought, it is observed that the association constructed for "neutrality between hot and cold" may have been derived from this set of motivations.

For the "neutrality between supernatural and physical," the supernatural may have been evoked from blue (Pedrosa, 2004) or pink with low saturation, eliciting mysticism and unrealism (Heller, 2013); on the other hand, blue also contributes to neutrality, inserting this context into the interpretation by evoking the physical, considering the low light in which it is presented in the Shipibo collection, capable of influencing the perception of a specific visual weight when approaching a sub-black color. , given its low clarity, as discussed by Pastoureau

(1994; 2011). This context is confirmed when potential consumers also interpret "weight" as one of the descriptors of this collection.

When it comes to the meaning of "melancholy" interpreted by the volunteers, it could be one of the possibilities evoked by blue, as expressed by the reference authors (Pastoureau, 1997; 2011; Aballí, 2010), as well as the sensitivity and sentimentality of the pink (Heller, 2013). Regarding "purity," this may have been mainly influenced by white (Pedrosa, 2004; Farina, 2006; Aballí, 2010; Heller, 2013), a socially familiar context for this color, but this meaning is also associated with blue, following the pointed by Pedrosa (2004) and Aballí (2010).

Although bitterness was a meaning highlighted in the semiotic analysis for the Shipibo collection, potential consumers associated the colors of this collection more with "sweetness." This context is mainly related to the meanings evoked by pink; as discussed by Heller (2013, p. 405), pink is sweet from thread to wick, the color of confectionery. No color matches desserts better. It is the color of delight, of rejoicing. Sweet and smooth, this is the flavor you expect from a rose."

Regarding the following two pairs of semantic descriptors, both evoked neutrality: "infinite-finite" and "fauna-flora." Regarding the first pair, it was impossible to identify a possible semantic relationship between the colors for the "finite" descriptor. However, authors such as Pastoureau (1994), Pedrosa (2004), Farina (2006), and Heller (2013) indicate an association between blue and the meaning of "infinity," interpreted by potential Generation Z consumers, as well as the contexts of distant and distant. For "fauna-flora," considering the plurality of colors found in the Shipibo collection chart, the interpreted meanings can be focused on the individual associations of colors with some elements of nature, ranging from animals (such as white/sand from the llamas observed as potential meaning in the semiotic analysis) to the rivers (blue), the flowers (pink) and the trees (green).

Comparing the results for Free Word Association (FWA), a total of 1104 words were cited (potential consumers + designers), of which 727 were different terms (65.85%). The designers significantly expressed seven words, "deconstruction, structure, nature, depth, sobriety, earth, and transparency." On the other hand, potential consumers mentioned "nature, comforbt, earth, lightness, calm, love, harmony, and peace" more quantitatively. The words "nature" and "earth" were the only ones that presented correspondences between intention and interpretation for the colors of the Shipibo collection.

Afterward, this set of collected words was transformed into categories of synonyms. Therefore, the 1104 terms were categorized into 72 groups. The designers cited 87 words comprising 37 categories of synonyms. On the other hand, potential Gen Z consumers mentioned 1017 words, containing all 72 categories.

Considering the results, the groups of synonyms most mentioned for the designers' intention were "nature," "transformation," "tranquil," "novelty," "intensity', "harmony," and "delicacy," respectively, in terms of frequency, with a greater focus on the first category. On the other hand, among potential consumers, the most mentioned categories were "nature," "tranquil," "affection," "delicacy" and "simple." The results can be visually compared in Figure 5.

"Nature" was the most significant category both in terms of designers' intentions and potential consumers' interpretation, indicating that there was, in fact, a compelling interpretation of this specific meaning. It is worth noticing how the designers made chromatic choices that deviate from the stereotypical Brazilian nature, for example, green and brown, moving towards a meaning-oriented construction that uses less saturated colors to refer to the colder landscapes of Peru, with low light and which, although they are found in nature, are only more interpreted in this Brazilian cultural context when the idea of a beach is seen, such as the yellowish-white of the sand, the blue of the sea and the pink of the corals. Although this scenario was observed, potential consumers could interpret the planned meanings effectively.

In addition to this, some correspondence was also identified for the "delicacy" category, possibly having been influenced by the already widespread meaning of pink used by designers, demonstrating that exploring an approximation with the pre-existing symbolic language of each of the colors can make the process of decoding intended visual messages easier.

Therefore, considering the results presented so far through the questionnaires and interviews conducted, it can be concluded that there was high effectiveness in the visual interpretation of colors for the collection Shipibo. This conclusion can be drawn from the observation that 8 of the 11 pairs of semantic descriptors investigated showed a positive correlation between intention and interpretation. As for FWA, it was revealed that the most widely significant category among the designers' intentions, the one considered most relevant to the generative concept worked among the interviewees, was also effectively decoded by potential Generation Z consumers.

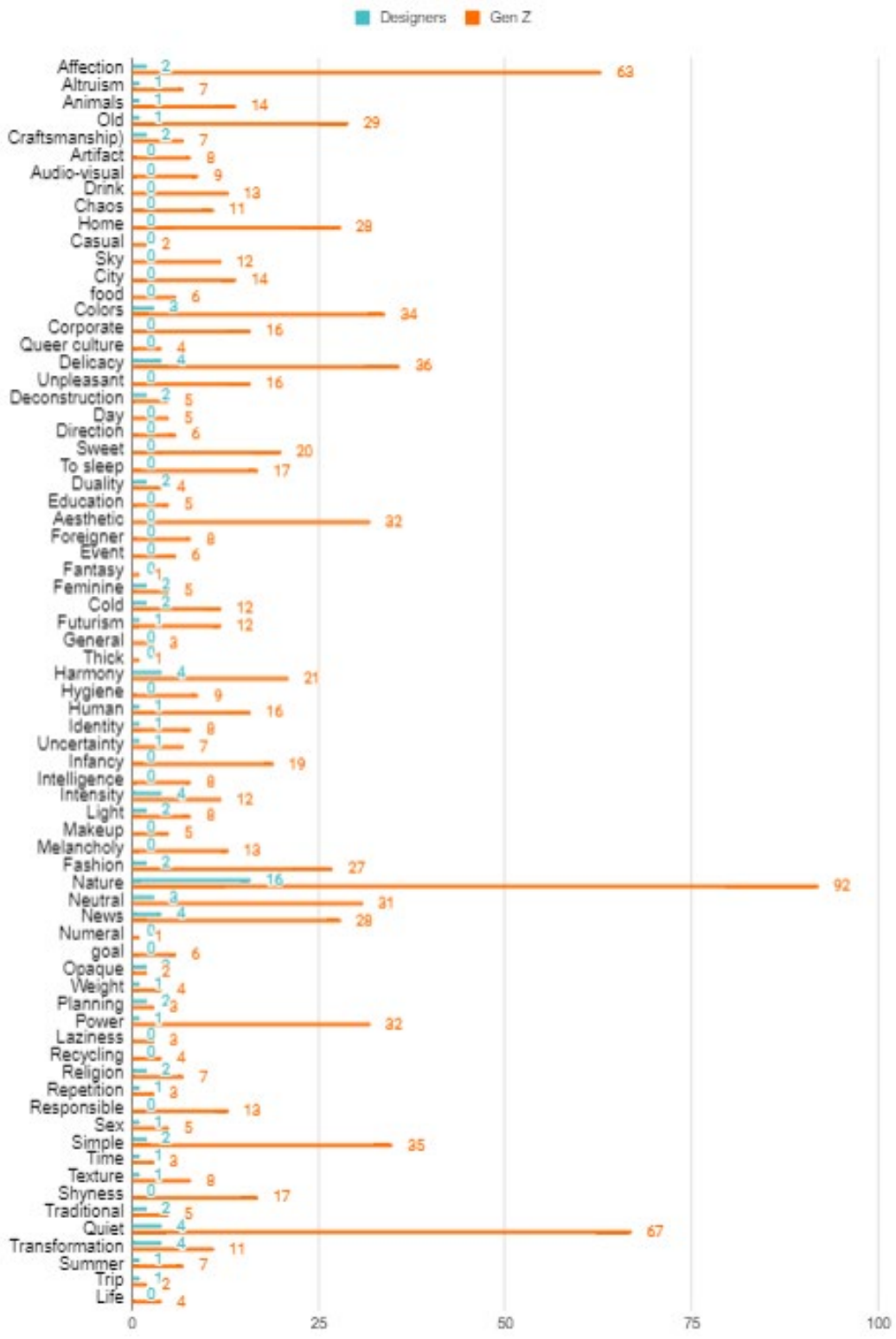

Fig. 5. Free word association intention and interpretation results for the 2017 fashion collection – Shipibo.

4.2. *Comparative Analysis – 2019 Fashion Collection (Ilha de Marajó)*

Weaving a comparative analysis between intention and interpretation for the 2019 fashion collection (Ilha de Marajó), initially dealing with SD, it was observed that the designers intended with the colors the visual messages of neutrality between traditional and modern (3, 00 MD); hot (4.50 Md); localism (1.00 Md); perseverance (2.00 Md); strength (1.00 Md); neutrality between dawn and dusk (3.00 Md); joy (5.00 Md); natural (1.00 Md); beach (2.50 Md); neutrality between modesty and vanity (3.00 Md); and, artisanal (1.00 Md).

Meanwhile, potential Gen Z consumers interpret these visual color messages as neutrality between traditional

and modern (3.00 Md); hot (4.00 Md); localism (2.00 Md); perseverance (2.00 Md); strength (2.00 Md); dawn (2.00 Md); neutrality between sadness and joy (3.00 Md); natural (1.00 Md); neutrality between beach and urban (3.00 Md); neutrality between modesty and vanity (3.00 Md); and, artisanal (1.00 Md). These results can be visually compared by observing Figure 6.

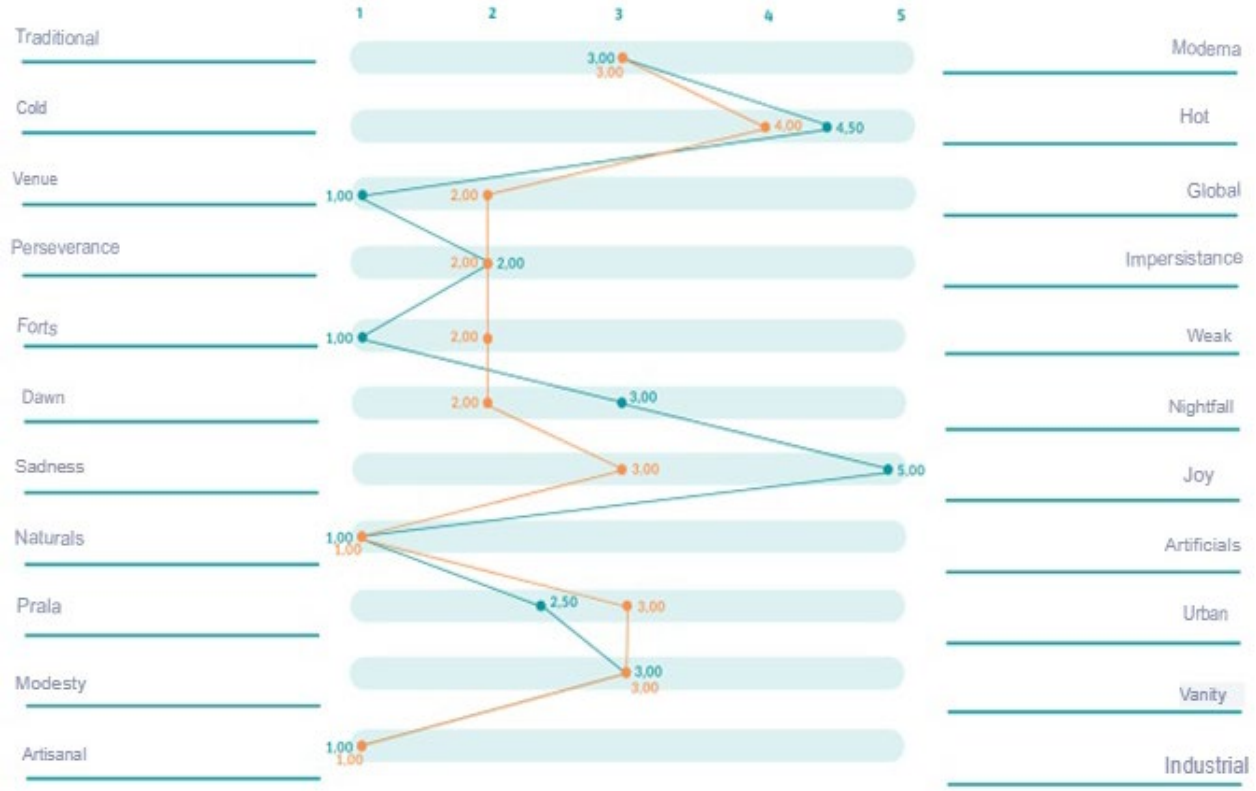

Fig. 6. Comparison between designers' intention (blue) and potential consumers' interpretation (orange) for the visual message of the colors of the 2019 Fashion Collection – Ilha de Marajó.

It was possible to observe a high correlation between intention and interpretation of visual color messages in the Ilha de Marajó fashion collection context. We identified five among the 11 pairs of descriptors studied, where the results of the median responses from both groups met at an exact point (traditional-modern; perseverance; natural; modesty-vanity; and artisanal). In addition to exact semantic matches, three other pairs of descriptors showed relative proximity in their medians (hot; local; and strong). In contrast to this dominance, three pairs of descriptors were not interpreted as intended (dawn-dusk; sadness-joy; and beach-urban) (Figure 7).

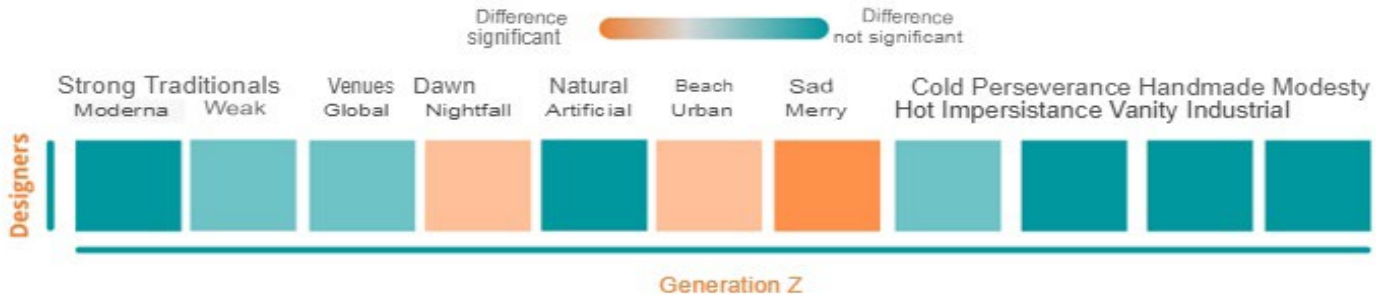

Fig. 7. Comparison between intention and interpretation – 2019 Fashion Collection – Ilha de Marajó.

Therefore, it can be concluded that, even at different levels, 8 of the 11 pairs of descriptors effectively interpreted visual color messages from the perspective of Generation Z for the Ilha de Marajó collection. Thus, a satisfactorily positive result.

In the 2019 fashion collection context, Ilha de Marajó was configured as the research object that presented the least neutral semantic association (3.00 Md). Concerning the first descriptor, interpreted as "neutrality between traditional and modern," one can explore, again, the dispute between color

and shape; for the meanings of "traditional," "local," "natural," and "artisan" interpreted by Generation Z respondents, there is a possible exploration of the different levels of saturation and lightness of brown used in the collection which, according to Heller (2013), it is the color of rustic materials, such as wood, leather and cotton.

Therefore, one of the possible associations is the interpretation of brown as a color that connotes naturalness, localism, undyed fabrics, and artisanal products. On the other hand, the meaning of "modern" is also perceived in the interpretation of potential consumers; this may have been derived from applying the colors in clothing products with unusual shapes for the repertoire of current society, consequently making them modern. Another possibility of association is the observation of dark brown present in low quantities in the collection's pieces, which can be read as black and, according to Pastoureau (1997; 2011), refers to the context of modernity.

The meanings of "warm" and "dawn" may have been related to the set of colors seen as warm by the literature in the area (Pastoureau, 1997; Pedrosa, 2004; Farina, 2006; Aballí, 2010; Pastoureau, 2011; Heller, 2013), for example red, yellow, and orange, visually, and sensorial correlated with brown (Pastoureau, 1997; 2011). Furthermore, white itself can also confer an association with the context of dawn, given its senses of awakening, clarity, daytime, active, and visual expansion (Farina, 2006; Aballí, 2010; Goethe, 2013; Heller, 2013).

When it comes to the meanings of "perseverance" and "strong," these may have been associated with the context of humility, penance, and resistance, symbolically suggested by brown, according to Pedrosa (2004) and Farina (2006). There may also have been specific associations evoked from the color white, considering the senses of hope, optimism, pity, and redemption, as discussed by Pedrosa (2004), Farina (2006), and Aballí (2010).

Regarding the interpretation of "neutrality between modesty and vanity," it was not possible to establish semantic connections between the meanings of the colors seen in the literature review and the descriptor "vanity" for the color palette of the Ilha de Marajó collection, considering since this context is more related to the different levels of clarity and saturation of pink and violet colors (Heller, 2013). On the other hand, for the meaning of "modesty," Pedrosa (2004) associates brown with humility, while Farina (2006) and Heller (2013) express that white is related, in fact, to the meaning of modesty.

Regarding the interpretation of "neutrality between sadness and joy," this result may derive from the different brightness levels in the collection's color palette. It is expected to observe colors with low clarity, such as black and dark blue, relating to sadness and melancholy (Pedrosa, 2004; Heller, 2013), while colors with high transparency, such as yellow and orange, relating to joy (Pastoureau, 1997; Farina, 2006; Aballí, 2010). Therefore, the contrast between these different levels of lightness in the color palette of the Ilha de Marajó collection may have evoked a feeling of neutrality for these two descriptors.

Finally, according to previously conducted semiotic analysis, it was observed that beach was one of the most substantial meanings for the Ilha de Marajó collection, considering it was the basis for codifying its generating concept. However, potential Generation Z consumers interpreted this set of colors as "neutrality between beach and urban."; It was not possible to establish a semantic relationship between the colors of the collection and the meaning of "urban," possibly being derived from dark brown, which refers to black (Pastoureaou, 2011), or being mainly influenced by the shapes of the clothes where the colors are used.

On the other hand, for the "beach" context, the association may have resulted from the brownish white that refers to beach sand, as well as the different levels of saturation and clarity of brown that may have been associated with mud, earth, and muddy waters (Pedrosa, 2004; Farina, 2006; Heller, 2013). Still, in this sense, these colors can be found in rocks and cliffs. Therefore, there may be an influence of these objectives involved in the process of decoding and visual interpretation.

Regarding FWA, in the collection of general data (potential consumers + designers), mentions of 718 words were identified for the colors of collection Ilha de Marajó, of which 384 were different (53.48% of the words mapped). It was observed that the designers mentioned more quantitatively words such as "Brazil, ceramics, identity, lightness, north, and earth." Meanwhile, potential consumers noted "earth, nature, colors, culture, peace, clay, warmth, beauty, comfort and skin." Therefore, only the word "earth" showed a correlation between intention and interpretation, and no other correspondence was identified for the most mentioned words between both group of individuals.

Next, all identified terms were transformed into synonymous categories. With this, the 718 words collected resulted in a total of 72 categories of synonyms for the color palette of the Ilha de Marajó collection. The four designers interviewed mentioned 126 words, comprising 39 of the 72 categories of synonyms, while the 52 potential Generation Z consumers questioned in the survey said 592 words, including 69 of the 72 categories.

Regarding the results obtained, the categories of synonyms most mentioned among designers were "regional," "identity," "earth," "nature," "affection," and

"cultural artifacts," respectively, in terms of frequency. Meanwhile, among potential consumers, the categories of "peace," "aesthetic," "earth," "nature," and "affection" were most quantitatively mentioned, respectively, in number of mentions (Figure 8).

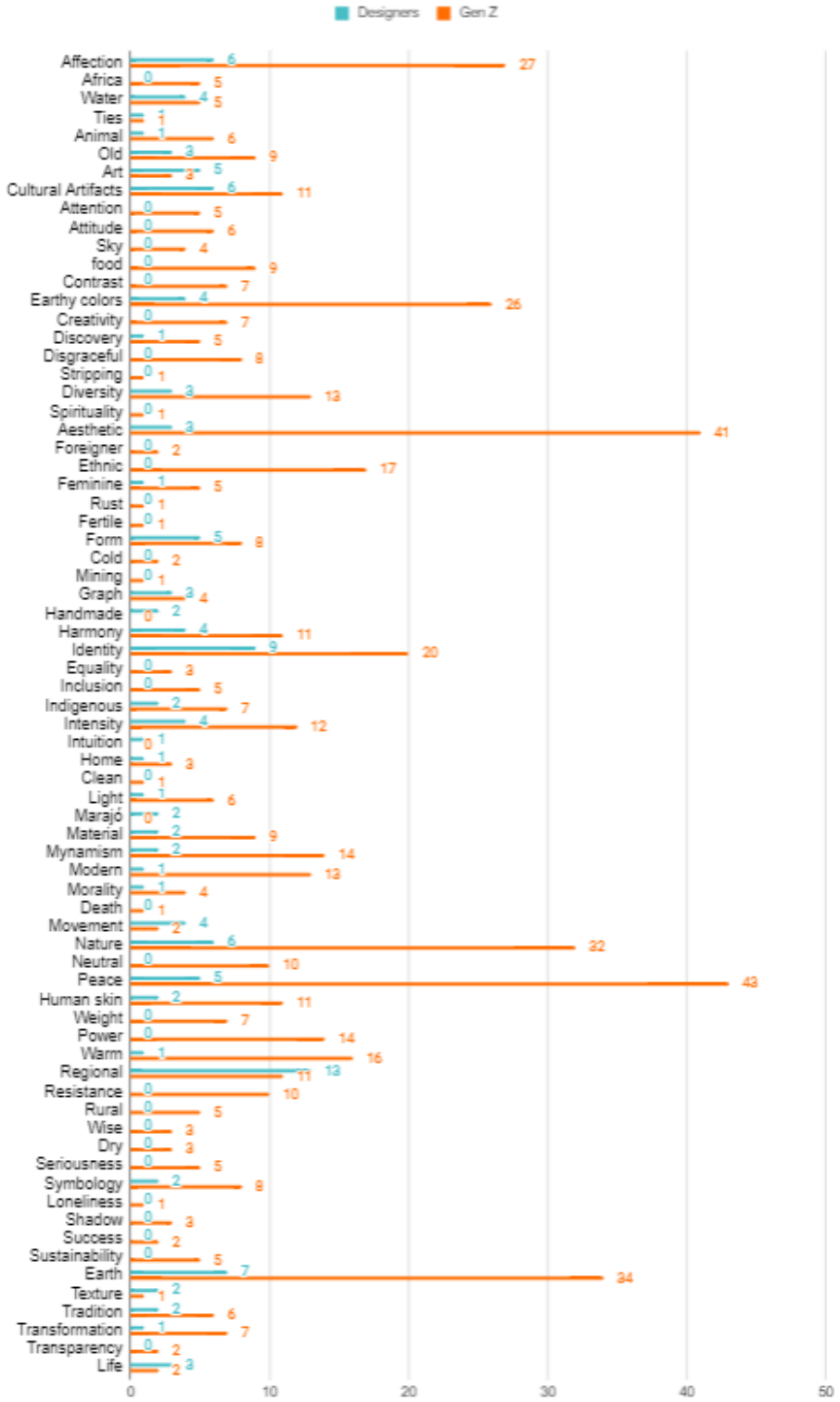

Fig. 8. Free word association intention and interpretation results for the 2019 fashion collection – Ilha de Marajó.

The categories of synonyms "earth," "nature," and "affection" showed a compelling correlation of interpretation between the designers' intention and the understanding of potential consumers, appearing among the most cited in both groups researched. The "regional" category (n = 13), widely significant for the group of four designers interviewed, presented a similar number among potential consumers (n = 11). However, in proportion to the 52 respondents from Generation Z, this was not configured as one of the most significant categories.

It was observed that both the designers and potential consumers of the Ilha de Marajó collection used the widespread cultural meanings of the colors used in the fashion collection (different levels of saturation and lightness of brown and white) to construct the semantic associations informed by the responses. It is essential to highlight the influence of color dimensions on interpreting the meanings of visual messages. With this, we notice that shades of brown with lower color lightness are decoded with intentions more focused on black, such as heavy and dark. In contrast, shades of brown with higher color lightness presented meanings close to white, such as purity, lightness, and calm, demonstrating the influence of color dimensions on the interpretation of visual messages in clothing products.

In this way, it is identified that it is not in all cases of clothing production that there is a subversion of social codes; quite the contrary, what we noticed was the maintenance of symbolic standards that are already widely used in society, as can be seen in the connection between earth, clay, nature, and the color brown chosen to compose the collection's color palette. These strategies can make it easier to understand the visual messages of colors in fashion collections, as they are senses that are already part of the color semantics of the studied public cultural vocabulary.

Therefore, considering the results presented so far, in the context of the 2019 fashion collection Ilha de Marajó, it can be concluded that there was high effectiveness in the interpretation of color messages compared to what was established by the designers, even at different levels, at certain times. This conclusion could be verified for the SD and FWA results, showing positive and satisfactory correlations between intention and interpretation.

5. Final considerations

In this research, we studied two winning fashion collections from a Brazilian fashion competition, in the years 2017 and 2019, the New Designers Competition, from Dragão Fashion Brasil, with a focus on evaluating the interpretation of color messages by Generation Z based on a survey and compared with interviews conducted with the same designers who codified the collection.

Regarding the first fashion collection (Shipibo: digital artesania), it was concluded, in general, about high effectiveness in the interpretation of color messages by Generation Z. In SD, 8 of the 11 pairs of descriptors were interpreted as intended, with levels entirely positive and accurate in almost all. The collection's color palette included white, blue, pink, green, and different saturation levels and clarity of a brownish-pink tone. Generation Z interpreted these colors as "nature," "tranquil," "affection," "delicacy," and "simple." Of these, the only meanings initially intended by the designers were "nature" and "delicacy."

In the case of the second fashion collection (Ilha de Marajó), it was concluded that, in general, there was also a high effectiveness in interpreting the color messages. For the DS results, it was observed that 8 of the 11 pairs of descriptors were analyzed according to the designers' intention, with positivity in large part. The collection's color palette included white and brown, the latter varying in lightness and saturation, going from a lower level, approaching black, to a higher level, forming a light brown. Generation Z interpreted these colors as "peace," "aesthetic," "earth," "nature," and "affection," where "earth," "nature." and "affection" were among the designers' intentions.

In general, it was concluded that different color combinations could evoke similar meanings, such as nature, having been interpreted both by brown and by the set of colors white, pink, blue, and green.

It is worth highlighting that color is not the only isolated factor responsible for interpreting visual messages in the context of the clothing collections investigated. It is recognized that the other elements of visual language, mainly shapes and textures, actively helped color achieve its communicative purpose, outlining specific meanings. This can be proven by observing how the idea of nature was interpreted in the 2017 collection (Shipibo), considering the use of colors such as pink and white in products with fur texture, which helped in an interpretation focused on animals.

The method used in this study derives from a synthesis of interdisciplinary research techniques from areas such as Food Sciences, Advertising, Engineering, Semiotics, and Design, all seeking to investigate the relationship between the production and interpretation of meanings in food, products, and graphic pieces. Regarding the semantic differential, it proved to be satisfactory for obtaining the visual understanding of color meanings more generically and superficially, considering the use of pre-defined terms that cannot access such a deep level of interpretation. Therefore, free word association adds to research by collecting responses at more subjective levels.

Moreover, the present study possesses certain limitations that merit careful consideration in interpreting its findings. Firstly, the color palette analysis relies on the extraction from the collection itself, lacking direct information from the designer. This approach introduces the possibility of misinterpretation and may not fully capture the designer's intended color choices.

Secondly, participant engagement with the collection's image, rather than isolating the evaluation of colors or textile patterns, exposes the study to potential influences from other elements such as models, outfits, and accessories. This raises concerns regarding the specificity of comments and semantic interpretations related specifically to color. It is advisable to further explore and elaborate on the extent of influence exerted by colors versus other design elements. To mitigate such impacts, we try to emphasize the specific interest only of color during the survey.

Lastly, the use of non-calibrated monitors by participants introduces variability, as monitor calibration can significantly differ. This divergence may impact the accurate perception of colors, leading to potential discrepancies in participant responses. These limitations underscore the need for a nuanced interpretation of the results, considering the inherent challenges associated with the methodology employed in this research.

For future research, we recommend replicating the method of this study but focusing on generations X and Y to determine whether there is a significant difference in the visual interpretation of colors in clothing collections between the different age groups and their coders (fashion designers).

6. Conflict of interest declaration

The authors declare that there is no conflict of interest regarding the publication of this paper.

7. Funding source declaration

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Licensing terms

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