

The selection of colors for fashion collections in relation to color theory: a case study from the analysis of Brazilian ready-to-wear

Gisela Costa Pinheiro Monteiro¹, Camila Assis Peres Silva²

¹ *Universidade Federal Fluminense, Niterói, Brasil, giselamonteiro@id.uff.br*

² *Universidade Federal de Campina Grande, Campina Grande, Brasil. camiaps@gmail.com*

Corresponding author: Gisela Monteiro (gisela.gisdesign@gmail.com)

ABSTRACT

This paper is a Brazilian case study that will demonstrate the relevance of the color chart in fashion management. In general, clothing creation companies usually select several specific colors to use in order to assist not only the creative process, but also to guide the purchase of inputs such as fabrics and trims for each collection. It is worth saying that the colored samples of these colors are organized on a sheet of paper and each one receives an identification. That said, the purpose of this paper is to analyze the way in which companies arrange colors on the chart in order to check if there is any relationship with the color theory in this process.

KEYWORDS Color chart, Fashion Design, Brazil, Color Theory.

RECEIVED 25/01/2021; **REVISED** 18/03/2021; **ACCEPTED** 28/03/2021

1. Introduction

“Fashion” is a cultural phenomenon that refers to the cyclical change of society in relation to language, manners, ideas, tastes, habits, choices and affects artifacts in general, such as furniture, cars, home appliances and decorative objects (Calanca, 2008, p. 11; Lipovetsky, 1989, p. 24). Usually, fashion is applied to all social arenas and clothing is one of the cases (Simmel, 2008). Although its meaning is not limited to clothing, in this research the word “fashion” will be used about clothing. And, more specifically, the creation of clothing items, which is one of the moments when color is of fundamental importance. After all, it is a striking feature in any piece of clothing: a yellow shirt, green pants, a white dress. That is, the pregnant color in the pieces is very noticeable to the public, but few notice the color of the sewing thread, the color of the zipper, the bias, the collar, the label. The garment is accurately designed by fashion designers at the time of creation.

In addition, it is possible to see in store windows that the pieces were designed to generate a series of combinations, such as the mathematical “combinatorial analysis”. Designers plan the 'mix and match' among the pieces. In these cases, the challenge is to use the same color in fabrics and materials with different lightness, textures, trim, such as jeans and cotton T-shirt. There is a margin of acceptance due to the difference in materials, but there needs to be a balance. That is why, before starting to design a clothing collection, designers select the colors they want to use and organize them in a chart called a color chart. It will serve as a source of consultation for the team from before creation to production, considering all moments of the design process.

The experience in higher education in fashion design has shown the challenge students have to deal when applying colors in their final projects. There is still a gap between theory of color teaching and the way colors are presented in fashion trend catalogs, that designers frequently use as reference. Pantone® colors are present in the daily life of this student and young professional. In an attempt to narrow the dialogue between the use of pantone colors and a theoretical basis, we began to analyze the organization and composition of the color charts of the collections, starting with four companies that we present in this paper as case of study.

2. Color and Fashion Design: how theory is used by designers

As previously mentioned, color is relevant in the fashion world and the color chart plays a fundamental role in this environment. The color chart is a showcase that gathers samples of colors used in the collection. The selected

colors will guide the creation during a project and the purchase of inputs for the manufacture of garments. It is necessary to make clear the need to describe colors accurately to avoid miscommunications. Thus, each color sample, that is, one “Small solid printed square (plated), is accompanied by a technical reference provided by a paint manufacturer” [1] (Bann, 2012, p. 193). These references are codes that will allow those involved with the project to use exactly the desired colors, even without looking at the samples.

Regarding the fashion universe, these colors reference - used to create the color charts - are usually consulted in color catalogs manufactured by Pantone®. Which is an international company recognized for selling printed and bound color guides with the purpose of allowing “designers to ‘colour match’ specific colours when a design enters production stage - regardless of the equipment used to produce the colour” (Design Face, 2020). Thus, there is greater control on the part of creation. It can be said that Pantone® conquered the market thanks to the style consultancy offices, which from 1965 began to establish guidelines to facilitate the production flow, reducing the insecurity of industrialists in the face of the need to periodically reinvent themselves - at each cycle. After all, a collection is nothing more than a landmark of ephemerality, as it reinforces the obsolescence of the old collection, as soon as the new one comes into force (Liger, 2012, p. 19). Which means that periodically these offices have had to develop new color combinations for their new collections.

In practice, according to Françoise Vincent-Ricard - one of the pioneers at the head of the French office *Promostyl* - the work of such offices has consisted of researching and providing companies with information on trends in the form of illustrated notebooks (1989, p. 58). The information offered in those notebooks was categorized in “style” indications about colors, shapes and materials related to the textile process for the industrial fashion chain, from spinning to retail (Rech, 2006). *Promostyl*, as well as the French *Carlin* and the Brazilian *Inova Moda*, provides Pantone’s reference when citing the colors of the season. Since 1963, Pantone®, under the command of Lawrence Herbert, has developed color matching systems for a variety of substrates, including fabric (Design Face, 2020). From this brief explanation we aim to present the close relationship between style consultancy offices and the Pantone® Color System. Not only that, we would say that colors for fashion designers has been synonymous with Pantone.

Regarding its application in the fashion market, the company presents the Pantone® Textile Color System which is separated in two sort of color charts - the colors

references in dyed cotton (TC or TCX) and the colors references printed on paper (TP or TPX). "The suffix 'TP' stands for 'Textile Paper' and the suffix 'TC' stands for 'Textile Cotton'" (Pantone, 2020a). The addition of letter X means that the colors belong to an extended range. As well as it is a code to differentiate the most recent editions. Another suffix can be found on Pantone® Textile Color System, launched in 2015, the eco-friendly formulations which are printed on paper is represented by TPG, which stands for Textile Paper Green (Pantone, 2015).

Finally, we understand that Pantone® is a reference widely used in the field of fashion design due to its presence throughout the 'design process' (Design Council, 2020). Since from the discovery phase (insight into the problem), when designers consult trend books developed by companies such as Carlin, until the deliver phase (the solution that work) once that Pantone® Color Guides are easily available both digitally and physically in the hands of the professionals of supply chain. What, therefore, enables communication between creation and a product? From this, we can infer that the relationship of designers with the theory of cuts tends to be influenced by the nomenclatures and organization of colors that this company uses.

3. Pantone textile system notation: the theory unknown or neglected by designers

Pantone textile system notation is based on a cylindrical solid and consists of a code of three pairs of digits. The first two digits of the Pantone code show the lightness (value) of the sample on a scale ranging from 10 (lightest, 90% to 100% reflectance) to 19 (darkest, 0% to 10% reflectance). The second pair of digits shows the hue of the sample and it consists of the section of the cylinder - a tone circle. This tone circle is divided into 64 sectors, starting with 01 for yellowish green, and ending in 64 for greenish yellow. The third pair shows the sample chroma on a scale from 00 for gray to 64, the maximum saturation assumed (Fig. 1). This system for color numbering, although not explicit on the company's website², demonstrates its relationship to the theoretical foundation considering the three attributes of color as in the Munsell System (Régula, 2004; Araújo, 1991).

In which concerns to color samples presentation in Pantone Color Guide, there is no explanation in the company website about the criteria used to organize them. So as to take the discussion to the field of theory of colors, we suggest that Pantone has been mainly organizing its colors by considering the attributes of Hue and Value.

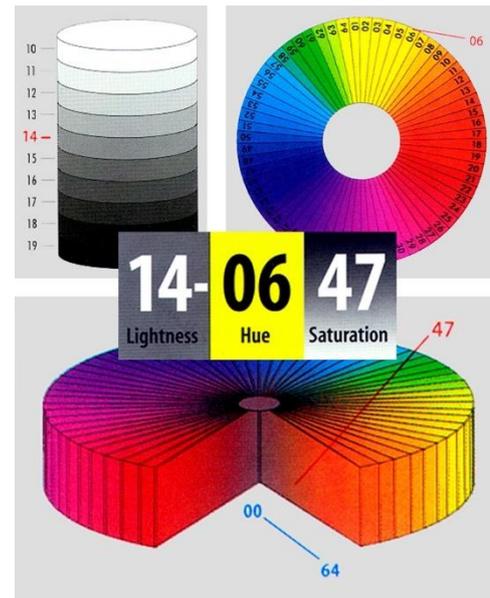


Fig. 1. Pantone textile system notation (Hirschler, 2002 apud Régula, 2004).

Differently from Munsell Book of Color, in which each sheet (page) has two axes of coordinates (vertical for value and horizontal for chroma), Pantone presents in each sheet its colors in one single vertical axis (Fig. 2). Each one of these sheets presents one Hue which varies in Value and Chroma. Despite of that, it is not easy to identify the variation of Chroma. The perception of lightness is more obvious. Even though there is no logical precision in the ordering of color attributes, Pantone Color Guide allows the user a wide view of all hues when opening the book in the form of a 'quarter circle'. As we can see in the following figures.



Fig. 2. Pantone Color Guide and The Munsell Book of Color (Pantone, 2020).

4. Design process: how fashion designers use color

The knowledge of colors has wide influence on design process. Not only the selection of color samples, but not only that, the knowledge of its attributes, its semantic aspects and the possibility of chromatic combinations are of great relevance in this process. Considering the four phases of the design process based on the double

diamond (Design Council, 2020), we can identify the role of color in each one of them.

The designer starts his process with the trend research (1. **discover**), where the color references will be analyzed especially under the meaning aspect. In the next phase (2. **define**), from the elaboration of a semantic panel to conceptualize the collection, the designer will extract the colors to assemble the charts. It is important to register the color codes and search for equivalences in the Pantone catalog that serves as a reference to facilitate communication between designers and suppliers. In the third phase (3. **develop**), the designers elaborate the collection and at that moment two questions are important. The first question is the search for color equivalence among the different materials used in garment (which evolves color applied to fabrics, metals, plastic, etc.) to maintain an acceptable harmony. The second question is how designers will organize the colors in terms of color balance (analogous and complementary, for example), contrast (hue, value and chroma) and in terms of chromatic proportion. All this care with the use of colors is due to the possibilities of interaction inherent to them, as postulated by Albers. And that will consequently affect the visual perception of the target audience. Finally, in the fourth phase (4. **delivery**), the designer must provide the solution that works. That it is, regarding the use of colors, what is feasible to make - the colors that best applies to the various items of garment. Keeping in mind the need evaluates the selection of pigments to minimize the possibilities of metamerism. As well as providing a technical sheet with

the largest possible number of equivalent references. In the case of fashion designers, it is common to specify Pantone. This reference serves as base to compare with other color catalogs of supply chain.

5. Case of study: Brazilian color charts

5.1. Methods and materials

To carry out a case study of the trendy color chart, we selected color charts from the same year and the same season (winter) of four similar companies were analyzed. It was done based in the fact that: 1) they are companies located in the state of Rio de Janeiro, Brazil (in which place the research were taken); 2) hire fashion designers on their staff; and 3) serve the young female audience. In order to facilitate observation and maintain the confidentiality of companies, the collected cards were redesigned, however, maintaining the same order and number of colors per line with their respective references (color name and color catalog reference), exactly as the original ones. In this paper we will refer to these companies as Brand 1 (B1), Brand 2 (B2), Brand 3 (B3) and Brand 4 (B4). We present next a miniature version of these color charts indicating the numbers of each color used by each Brand. These numbers preceded by hashtag are also used in the analysis boards present further. The aim is allowing an analysis of these color organization in each Brand's color charts. Note that B1 and B2 (Fig. 3) presents one single group of colors meanwhile B3 and B4 (Fig. 4) presents more than 1 group of combinations in which some colors are repeated.



Fig. 3. Miniature version of color charts from Brand 1 and Brand 2.

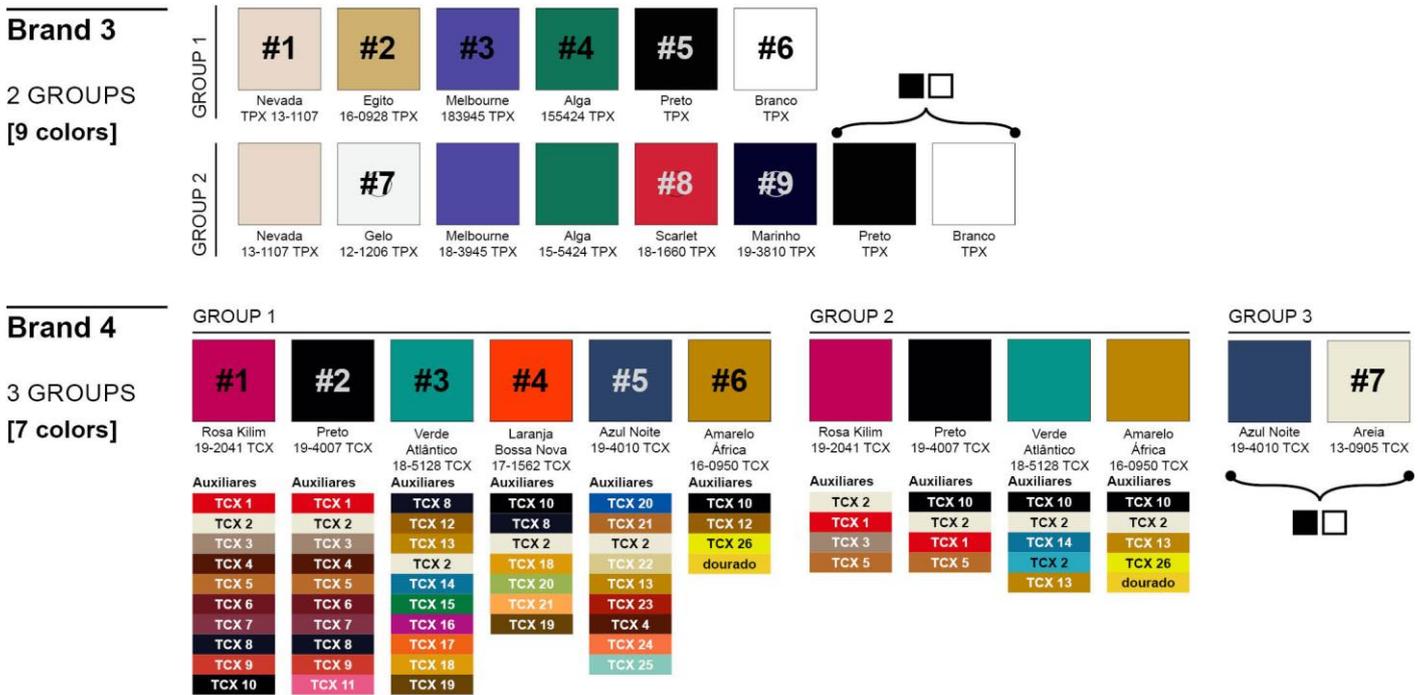


Fig. 4. Miniature version of color charts from Brand 3 and Brand 4.

It is worth mentioning that all companies use the Pantone textile reference. Brands 1, 2 and 3 use Pantone TPX on their cards and Brand 4 uses TCX. Such references were used to assist the authors in reorganizing the color charts of each one of the brands into Analysis Boards. The elaboration of such boards aims to allow an analysis of how Brands take advantages color attributes variations - hue and value. In these analysis boards, different from how companies present in their color charts, we order colors by these two attributes.

As Pantone itself does, such brands selected for this research also name their colors, as it is easier to identify than to call them by code. These names, which we will refer to here as trade names, are somehow related to the vocabulary of the target audience and to the concepts that the brand wants to communicate. We can notice three forms of nomenclature in the color charts: (1) hue name; (2) hue name + commercial name; and (3) commercial name. In this analysis we are also interested in highlighting which names are related to each of the colors. To do this we will keep the original names and translate them into English when necessary.

5.2 Analysis and discussions

When carefully analyzing the organization of colors in the charts developed by the brands studied in this paper, we observe a logic of visual organization by value (lightness) and/or hues in B1, B2 and B3. However, we chose to do a more detailed analysis considering that the first pair of digits correspond to Value, and the second pair of digits correspond to Hue. By checking the Analysis Board 1

(Fig. 5), we can observe that all the brands use light, mid and dark tones. Looking to the # color numbers, we can see that, excepted by B1, there is no logical sequence when considering lightness assortment. The same thing happens when we observe the Analysis Board 2 (Fig. 6), there is no logical sequence when considering hue assortment.

Concerning to color naming, we can notice that B3 and B4 have four colors with the same codes, but with different names. This is proof that each brand names its color according to its collection. There also the use of the same name (sand) for light tone colors (B1 and B4). In general, considering that the color references used by the designers of the four brands analyzed come from the same source, from the major trend companies, it is admissible that such colors are similar if not the same. In this case, the names of the colors play an important role in the conceptualization of the collection. These names bring an atmosphere that can relate to varied stories. Creating them is one of the possible storytelling techniques, a resource that the designer can use to convey the desired atmosphere (Lidwell, Holden, Butler, 2003, p. 230). For example, the colors of B4 are: Sand; Yellow Africa; Night Blue; Orange Bossa Nova; Atlantic Green; Kilim pink; and Black. We could deduce that the theme presented is Brazilian culture with the influence of Africa. Making the person feels like being in a mystery night to the sound of Bossa Nova on the sands of an Atlantic Ocean beach. This just to illustrate how colors and names can be related to contribute in the creative process and marketing strategies.

Value/Lightness (11-19)

11 - TPX (next to white)  19 -TPX (next to black)

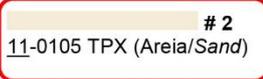
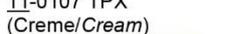
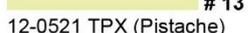
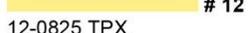
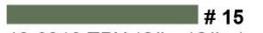
	Brand 1 [16 colors]	Brand 2 [23 colors]	Brand 3 [9 colors]	Brand 4 [7 colors]
		 # 19 Branco/White	 # 6 Branco/White	
11 - 13 Light tones	 # 2 11-0105 TPX (Areia/Sand)  # 1 12-0915 TPX (Blush)  # 10 13-5313 TPX (Sky)	 # 18 11-0107 TPX (Creme/Cream)  # 13 12-0521 TPX (Pistache)  # 12 12-0825 TPX (Amarelo/Yellow)  # 20 12-1206 TPX (Cinza/Grey) # 17 13-1107 TPX (Nude)	 # 7 12-1206 TPX (Gelo/Ice) # 1 13-1107 TPX (Nevada)	 # 7 13-0905TCX (Areia/Sand)
14 - 17 Mid-tones	 # 5 14-1050 TPX (Mel/Honey) # 3 15-1225 TPX (Camurça/Suede) # 4 16-1439 TPX (Terra/Land) # 6 17-1461 TPX (Bourbon) # 7 17-1663 TPX (Chili) # 11 17-5034 TPX (Jade)	 # 15 14-5714 TPX (Verde Piscina/Green Pool) # 10 15-1132 TPX (Cáqui/Persimmon Fruit) # 21 16-0000 TPX (Cinza Mescla/ Grey Mix) # 11 16-1364 TPX (Laranja/Orange) # 6 17-1656 TPX (Coral)	 # 4 15-5424 TPX (Alga/Seaweed) # 2 16-0928 TPX (Egito/Egypt)	 # 6 16-0950 TCX (Amarelo África/ Yellow Africa) # 4 17-1562 TCX (Laranja Bossa Nova/ Orange Bossa Nova)
18- 19 Dark tones	 # 15 18-0316 TPX (Oliva/Olive) # 8 19-1934TPX (Wine) # 9 19-2045TPX (Berry) # 13 19-3830TPX (Eclipse) # 16 19-3900TPX (Rock) # 14 19-3919TPX (Indigo) # 12 19-3951TPX (Blues)	 # 5 18-1660 TPX (Vermelho/Red) # 7 18-2436 TPX (Rosa/Pink) # 8 18-3027 TPX (Uva/Grape) # 2 18-3945 TPX (Azul/Blue) # 16 18-4728 TPX (Verde Alga/Green Seaweed) # 14 18-5425 TPX (Verde Esmeralda/ Emerald Green) # 22 18-5203 TPX (Grafite/Graphite) # 9 19-3536 TPX (Roxo/Purple) # 4 19-3810 TPX (Azul Noturno/ Nocturnal Blue) # 1 19-3952 TPX (Azul Royal/ Royal Blue) # 3 19-4507 TPX (Azul Marinho/ Marine Blue)	 # 8 18-1660 TPX (Scarlet) # 3 18-3945 TPX (Melbourne)	 # 3 18-5128 TCX (Verde Atlântico/ Atlantic Green) # 1 19-2041 TCX (Rosa Kilim/Pink Kilim) # 2 19-4007 TCX (Preto/Black) # 5 19-4010 TCX (Azul Noite/ Night Blue)
		 # 23 Preto/Black	 # 5 Preto/Black	

Fig. 5. Detailed analysis by Value.

Hue (1-64)

__ - 01 __ TPX (yellow greenish)  __ - 64 __ TPX (green yellowish)

	Brand 1 [16 colors]	Brand 2 [23 colors]	Brand 3 [9 colors]	Brand 4 [7 colors]
01 - 08 Yellow greenish to Yellowish colors	<p># 2 11-0105 TPX (Areia/Sand)</p> <p># 15 18-0316 TPX (Olive/Olive)</p>	<p># 21 16-0000 TPX (Cinza Mescla/ Grey Mix)</p> <p># 18 11-0107 TPX (Creme/Cream)</p> <p># 13 12-0521 TPX (Pistache)</p> <p># 12 12-0825 TPX (Amarelo/Yellow)</p>		
14 - 17 Orange colors	<p># 1 12-0915 TPX (Blush)</p> <p># 5 14-1050 TPX (Mel/Honey)</p> <p># 3 15-1225 TPX (Camurça/Suede)</p> <p># 4 16-1439 TPX (Terra/Land)</p> <p># 6 17-1461 TPX (Bourbon)</p>	<p># 17 13-1107 TPX (Nude)</p> <p># 10 15-1132 TPX (Cáqui/Persimmon Fruit)</p> <p># 20 12-1206 TPX (Cinza/Grey)</p> <p># 11 16-1364 TPX (Laranja/Orange)</p>	<p># 2 16-0928 TPX (Egito/Egypt)</p> <p># 1 13-1107 TPX (Nevada)</p> <p># 7 12-1206 TPX (Gelo/Ice)</p>	<p># 7 13-0905TCX (Areia/Sand)</p> <p># 6 16-0950 TCX (Amarelo África/ Yellow Africa)</p> <p># 4 17-1562 TCX (Laranja Bossa Nova/ Orange Bossa Nova)</p>
18- 19 Reddish colors	<p># 7 17-1663 TPX (Chili)</p> <p># 8 19-1934TPX (Wine)</p> <p># 9 19-2045TPX (Berry)</p>	<p># 6 17-1656 TPX (Coral)</p> <p># 5 18-1660 TPX (Vermelho/Red)</p>	<p># 8 18-1660 TPX (Scarlet)</p>	<p># 1 19-2041 TCX (Rosa Kilim/Pink Kilim)</p>
24 - 43 Pinkish to lilaceous	<p># 13 19-3830TPX (Eclipse)</p> <p># 16 19-3900TPX (Rock)</p> <p># 14 19-3919TPX (Indigo)</p> <p># 12 19-3951TPX (Blues)</p>	<p># 7 18-2436 TPX (Rosa/Pink)</p> <p># 8 18-3027 TPX (Uva/Grape)</p> <p># 9 19-3536 TPX (Roxo/Purple)</p> <p># 4 19-3810 TPX (Azul Noturno/ Nocturnal Blue)</p> <p># 2 18-3945 TPX (Azul/Blue)</p> <p># 1 19-3952 TPX (Azul Royal/ Royal Blue)</p> <p># 3 19-4507 TPX (Azul Marinho/ Marine Blue)</p>	<p># 9 19-3810 TPX (Marinho/Marine)</p> <p># 3 18-3945 TPX (Melbourne)</p>	<p># 2 19-4007 TCX (Preto/Black)</p> <p># 5 19-4010 TCX (Azul Noite/ Night Blue)</p>
44 - 57 Bluish to greenish colors	<p># 11 17-5034 TPX (Jade)</p> <p># 10 13-5313 TPX (Sky)</p>	<p># 16 18-4728 TPX (Verde Alga/Green Seaweed)</p> <p># 21 18-5203 TPX (Grafite/Graphite)</p> <p># 14 18-5425 TPX (Verde Esmeralda/ Emerald Green)</p> <p># 15 14-5714 TPX (Verde Piscina/Green Pool)</p>	<p># 4 15-5424 TPX (Alga/Seaweed)</p>	<p># 3 18-5128 TCX (Verde Atlântico/ Atlantic Green)</p>
		<p># 19 Branco/White</p> <p># 23 Preto/Black</p>	<p># 6 Branco/White</p> <p># 5 Preto/Black</p>	

Fig. 6. Detailed analysis by Hue.

6. Conclusion

Results shown us three important things concerning to: color naming, color organization and color harmonies. Regarding the identification of colors on the charts, in addition to the Pantone code, a commercial name is used. It usually comes preceded by the name of the color plus its characteristic, such as “pink kilim”, referring to the shade of pink commonly used in Indian tapestry. Alternatively, the name used alludes to a known color, such as “Scarlet” which refers to scarlet red. In this analysis, we could observe the repetition of the same color in different cards only with the change of the commercial name. As for the organization, we identified that three of the four companies organize colors according to the hue (following the sequence of colors in the spectrum) and the fourth organize them by the color harmonies. Finally, as for the color combinations, we could find that companies would better take advantage of it if they had considered dimensions of color such as hue, value and chroma. Based on what we presented in this paper, we argue that its contribution to the field of color study is to verify how color is used in professional practice. Moreover, we aim to collaborate with the teaching of color so that designers can consciously apply color theory in their projects.

7. Conflict of interest declaration

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

8. Funding source declaration

This work has been supported by funds from the State University of Rio de Janeiro (Universidade do Estado do Rio de Janeiro).

9. Acknowledgement

We wish to thank the State University of Rio de Janeiro (Universidade do Estado do Rio de Janeiro) on behalf of Professor Sydney Fernandes de Freitas, the co-supervisor of Gisela Monteiro doctoral research in the 2015-2018 period.

10. Short biography of the author(s)

Gisela Costa Pinheiro Monteiro - Design Professor at Universidade Federal Fluminense. Doctor of Science (UERJ), master in Design (UERJ) and bachelor in Industrial Design (UERJ). Conducts research and teaches in the areas of design, color, visual perception, user-centered design, history and design theories.

Camila Assis Peres Silva - Design Professor at Universidade Federal de Campina Grande. Doctor of Science (USP), master in Design (UERJ) and bachelor in Industrial Design (UFRJ). Specialist in Marketing and E-

learning (UFF). Conducts research and teaches in the areas of packaging design, color, visual perception, user-centered design, usability, history and design theories.

Notes

[1] Originally from portuguese: “pequeno quadrado impresso sólido (chapado), é acompanhada por uma referência técnica fornecida por um fabricante de tintas”.

[2] During the conduct of this research between the years 2015 and 2018, we could find in the Pantone Help Center the explanation about the relationship between its numbering and the parameters of hue, value and chroma.

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