

Analysis, conclusions and recommendations for colours applied in “5 a day” programme, Chile

Maria de la Paz Cox and Maria Rosa Domper

Estudios del Color, Escuela de Diseño, Pontificia Universidad Católica de Chile

Email: dcox@uc.cl, mdomper@uc.cl

“5 a day” is an international movement that promotes the consumption of fruits and vegetables in the world and is present in over 40 countries on 5 continents. Its name is based on the minimum daily portion of fruits and vegetables recommended by the scientific and medical communities in a healthy diet. This program exists in Chile since 2006, implemented by the “Corporation 5 a day”, having an exemplary impact in Latin America. In Chile this initiative is strongly supported by the strategy of recommending the consumption of “5 portions of 5 different colours” for a better assumption and understanding of the message. The research is based on observations and analysis of choice and colour scheme, proposed by the program in the publicity materials produced and used between 2006 and 2010. This analysis considers colour and perceptual aspects of the different graphics and digital parts that are used for promotion, publications, educational material, recipe books and other products. The objective of this study is to establish the level of pertinence of the proposed colours for each one of the analysed pieces and elements designed as bearers of the nutritional message, its degree of effectiveness and their contribution to the message that is aimed to be transmitted. Another interest is to conclude from the study recommendations and norms for the incorporation of the colours to be implemented in the future initiatives of the organisation.

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Introduction

5 a day is an international movement that promotes the consumption of fruits and vegetables in the world and is present in over forty countries on the five continents. Its name is based on the minimum amount of daily consumption of fruits and vegetables recommended by the scientific and medical community in healthy eating. This program exists in Chile since 2006, implemented by the Corporation 5 a day¹, having an exemplary impact in Latin America.

¹ The Corporation 5 a day is a non-profit organisation founded by the Instituto de Nutrición y Tecnología de los Alimentos (INTA), Facultades de Ciencias Agronómicas de la Universidad de Chile, Pontificia Universidad Católica, Pontificia Universidad Católica de Valparaíso and Universidad Mayor. And representatives of the private sector as the Asociación Gremial de Supermercados de Chile, Asociación de Exportadores de Chile, Central de Abastecimiento Lo Valledor, Comité de Hortalizas de Chile, Federación Nacional de Productores de Frutas de Chile and Sociedad Nacional de Agricultura. And the continued support of government agencies such as Ministerios de Salud and Agricultura (Ministry of Health and Agriculture), and international organisations as the Organización Mundial y Panamericana de Salud, Programa de Naciones Unidas para el Desarrollo and Organización de Naciones Unidas para la Agricultura y la Alimentación.

The advertising campaigns for "5 a day Chile" (www.5aldiachile.cl) are based on the relationship between a group of fruits and vegetables and their natural colour. For the recommendation of daily consumption they are classified in five groups, each one related to a different colour (red, green, blue/purple, white and yellow/orange). So the daily recommendation of eating five portions of fruits and vegetables is combined with the suggestion of including, if possible, all groups and therefore all colours proposed by the program.

This type of recommendation of "five portions of five colours" as researched is a peculiar feature of the Chilean organisation. In other countries, while maintaining the concept of "five a day", this is referring rather to the number of servings, without specific reference to the inclusion of the five colour groups.

In a first look of institutional websites available on the website of similar organisations in different countries, the five groups represented by five colours are in all of them present in the corporate image, with colour and tonal variations that are recorded and analysed visually and just like references of the Chilean case underlying on this paper.

This primary analysis, based only on visual observation of what is available on the web, confirms that the Chilean case, for the purposes of research and analysis from the point of view of the discipline of design, is particularly interesting.

In contact with people in charge of the organisation "5 a day Chile", especially in interviews with Mrs. Isabel Zacharias, a nutritionist at the Institute of Nutrition and Food Technology (INTA), University of Chile and developer of the program "5 a day Chile", we detected, in her and her team, great sensitivity and conscience of the relevance of careful work with the colours for the effectiveness of nutritional message and also the need of bringing in specialists to make decisions on proper handling and application of the five colour hues, and finally concluded on the importance of regulating the use of colours, by proposing a colour chart to be applied in various communication media used in the future.

This deficiency detected in the work of nutrition specialists and designers, is easily explained, since the scientific training of engineers in food and nutrition team "5 a day Chile" suffers visual parameters guiding to make design decisions. Therefore, they have to face a role in graphics and chromatics decision making in the materials of promotions, doing that without proper discipline and experiencing it.

Material of analysis

As part of this research, a variety of printed material produced in the intervening years is used, such as:

- Brochures, printed in colour that motivates the consumption of fruits and vegetables, associated with colours to be spread among customers of a major supermarket chain in Chile.
- Brochures, printed in colour with similar content of the previous case to be broadcast in favor healthy eating campaigns, undertaken by the State of Chile and funded by the Ministries of Health and Agriculture.
- Brochures printed in colour for students and their parents, including consumer recommendations and motivating the incorporation of fruits and vegetables of the different colours in appropriate portions in the usual diet. This material is distributed in government campaigns that promote healthy diet and obesity control.

- Brochures printed in colour for food school guides, to be distributed in hospitals under the control of the Ministry of Health, which offer healthy eating advices and examples of dietary patterns and physical activity tips to fight against obesity.
- Brochures with information about the “5 a day” program, its objectives, action areas, participants, founders, member’s adherent and motivation for the incorporation of the recommendations suggested by them.
- Brochures printed in colour with full information on the nutritional intake of different fruits and vegetables and information on the five recommendations and their implementation in a balanced daily diet, according to the characteristics and activities of consumers.
- Brochures with recommendations on healthy eating and its relationship to cancer prevention to be distributed in campaigns started by the State of Chile, funded by the Ministries of Health and Agriculture.
- Materials designed for schoolchildren and their parents, such as notebooks, diaries, pencils, colouring sheets, rulers, magnets, badges and calendars, to be distributed among students in the scholastic system, as part of campaigns on healthy eating, promoted by various educational establishments “5 a day Chile” and supported by the Chilean State.
- Books with healthy recipes that encourage the inclusion of fruits and vegetables through the delivery of recipes and daily feeding recommendations, easy to understand and to be applied in everyday family life.
- Compendium of the “5 a day Chile” program, reporting its importance, implementation, challenges, goals and action plans, among others.
- Textile clothing such as aprons, t-shirts and others, promoting the campaign “5 a day Chile” with the institutional logo.
- Bags for transporting fruits and vegetables, with messages and logo printed, to replace the plastic bags provided by supermarkets and sales of fruits and vegetables to their customers.
- The institutional website for the program 5 a day.



Figure 1: Image of some of the analysed material.

Method

Methodology used in capturing, register, analysis and communication of colours is made to the shades assigned to each food group, whose are called main colours. This is made through this procedure:

1. Chromatic measurements of the five main colours applied in all the graphic pieces printed from 2006 until 2010. To execute these measurements, a colorimeter Color Cue2² was used, an instrument with which alphanumeric codes were detected and expressed in Pantone, RGB, CMYK and HTML.
2. Digitalisation of all the printed material. For the carrying out of the observations, comparisons and analysis, the printed material was digitalised through an Epson 4490 scanner in a resolution of 300 dpi³.



Figure 2: Example of digitalised material.

3. The 5 main colours were detected and isolated from the graphic pieces through the eyedropper tool from InDesign CS4 software.



Figure 3: Example of 5 main colours detection.

4. Visual comparison of all main colours of the printed pieces with the Pantone Coated 2005 printed guide. The comparisons were made simultaneously to 7 people with normal vision, under the same

² The Color Cue2 is a handheld device that allows recognising, identifying and capturing colors from any material or surface and translates and matches it to the closest color Pantone makes the conversion to CMYK, RGB and HTML. It also identifies neighbor colors – lighter/darker colors, redder/greener colors, yellower/blues colors and close colors.

³ A resolution of 300 dpi is chosen, considering that it is the minimum resolution to obtain a good quality printing.

light conditions, with natural midday light northwest exposure, under proper D50-range lighting (5000k, the recommended illumination for accurate colour evaluation).

As a complement to this development, the other colours used in the graphic printed materials, fonts, backgrounds, etc. were detected with the eyedropper tool, from InDesign CS4 software, with the objective of isolating them and to be able to work with them in comparisons and analysis, allowing it to establish criteria on the final decision making.



Figure 4: Detecting other colours in use (Fonts, background, etc.) with the eyedropper tool in InDesign CS4.

It must be considerate that the colours seen on the screen of this research work are illustrative and do not pretend to be an accurate representation of the colours in the analysed material and the developed proposals, taking into account that there exist a media change, since the investigation work carried out based on printed pieces and this article is visualised on the screen.

For reliable colour visualisation, Pantone colour guides shall be consulted and for their reproduction and application in different media, the proposed alphanumeric codes must be used.

From the beginning, methodology applied for the analysis and development, had to consider the code detection that allowed it to identify clearly the colours in their printed versions as well as in the digital and digitalised ones.

Methodology used for the analysis and development of the case had to include the detection of codes which enable the clear identification of colours in printed and digital versions.

The Codes detection was done with:

- Colour measured with colorimeter;
- Visual comparison under the same light conditions with a Pantone colour collection;
- Ratification of both process developments;
- Colour registration with graphic program tools.

The record codes obtained are valid overhead the appearance of colours in different media.

To establish the level of association between the colours used for each group of food, these questions were established, whose were developing during the analysis of the pieces.

1. Do they always use 5 different colours to represent the five food groups?
2. Are there coincidences between the colour hues used for every food group and the natural colours of fruits and vegetables?
3. Is the same colour hue always used for every food group?
4. Do the colours used by the program make sensorial reference to healthy and tasty colours?
5. In the analysed material: How are the colours of each group named?
6. Which is the best colour hue for each food group?

Results and Discussion

To answer each question, different visual analysis were made and they are developed below.

1. Do they always use 5 different colours to represent the five food groups?

To answer this first question analysis and chromatic comparison were made to all the material used in the Campaign for each year, since 2005 until 2010.

2005 – The 5 main colours are detected: orange yellow, red, blue, green and white. Blue is not considered to represent fruits and vegetables.

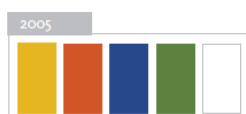


Figure 5: Year 2005 five main colours.

2006 – The 5 main colours are detected, for the first case: orange, red, blue, green and light grey. It is considered that orange does not represent the yellow for bananas, lemons and corns and grey is not associated to healthy food. Second case: reddish orange, red, dark blue, yellowish green, medium grey. It is considered that reddish orange and red are very similar, dark blue does not represent fruits and vegetables, yellowish green has a poor saturated hue, so it gives a dirty colour which is not associated to healthy food and medium grey is not associated to white fruits and vegetables well conserved. Third case: orange yellow, orange, red, green and grey. Purple hues are excluded in this case, leaving apart one of the 5 food groups. On the other hand, 3 colours for the orange yellow and red food have been established. Fourth case: orange, dark orange, red, dark blue, light grey. Green is excluded, from the green food group, leaving apart one of the 5 colours in contradiction to the objective of the campaign which is the consumption of fruits and vegetables from the 5 groups of food, of the 5 colours; the use of orange red and a very similar red is detected, confusing the consumer, and finally the dark blue does not represent any food.



Figure 6: Year 2006 five main colours.

2007 – The 5 main colours are detected, for the first case: orange, red, blue, green and White. It is considered that orange leaves apart yellow hue food and that blue does not represent fruits and vegetables. Second case: yellow, orange, red, green and light grey. Purple is excluded from the 5 main colours, discarding this group of food, in contradiction to the objective of the campaign.



Figure 7: Year 2007 five main colours.

2008 – The 5 main colours are detected: orange yellow, red, purplish blue, light green and light grey. An approximation to representative colours of the 5 food groups is considered, but it has to be checked if they are really considered as tasty and healthy colours.



Figure 8: Year 2008 five main colours.

2009 – The 5 main colours are detected, for the first case: orange yellow, red, purple, green and white. It is considered as a good approximation to the 5 food groups proposed for the consumption of fruits and vegetables. Second case: orange, pink, blue, green and light grey. Red hue food, like apples, tomatoes and strawberries have been excluded, since the colour that appears is a low saturation pink and the blue does not represent fruits and vegetables. Third case: cream, red, dark grey, green and white. This is one of the cases where there is an scarce relation between the representative colours for the 5 food groups and the 5 main colours used on the graph, orange yellow and purple food is not represented and there are 2 colours -dark grey and white- to represent one single group of food such as garlic, cauliflower, onion and mushrooms. Fourth case: orange yellow, dark blue, dark green and green. In this case, there are only 4 colours to represent the 5 food groups. The promotion of the consumption of white, red and orange fruits and vegetables is excluded, in complete contradiction to the campaign; the hues used have a very low saturation and shades that are not related to healthy food.



Figure 9: Year 2009 five main colours.

2010 – The 5 main colours are detected, for the first case: red, purple, green and blue. Only 4 colours are used, in contradiction to the campaign that promotes the consumption of the five colours. White and orange hues are excluded; 2 colours are used for the food groups that represent the blackberries, beetroots, blueberries and grapes, one of them being blue, which is not representative for the group. Second case: yellow, orange, red, blue, dark green and green. 6 colours are used in

contradiction with the promotion of the consumption of the 5 colour groups; white hues food is excluded; for the group of oranges, lemons, pineapples, etc. 2 colours are used: yellow and orange; for the group of avocados, artichokes, prickly pears, etc. 2 different hues of green are used; the idea of representing each food group with one colour is not associated. Third case: yellow, dark red, dark blue and dark green. Only 4 colours are used to represent the 5 food groups; white colour food is excluded and the hues used have very low saturation, associating them to less tasty and healthy food. Fourth Case: yellow, red, purple, green and white. It is considered as a good approximation to the hues that represent the 5 food groups exposed in the Campaign; it is estimated that the yellow used is not representative for that entire food group, for it excludes the orange fruits and vegetables.



Figure 10: Year 2010 five main colours.

2. Are there coincidences between the colour hues used for every food group and the natural colours of fruits and vegetables?

To answer that question, the 5 main colours used on all the graphic material developed for the Campaign were gathered together, separated by food groups, creating a conjoint list of colours. This list was compared visually with fruits and vegetables of their corresponding hues, with the objective of establish the degree of pertinence and colour-food relation.

In the case of the food group representative for lemons, pineapples, papayas, bananas, oranges, etc. the hues go from the luminous yellows to low saturation oranges. To represent this group, two shades are used: yellow and orange, since this food group presents those colours.

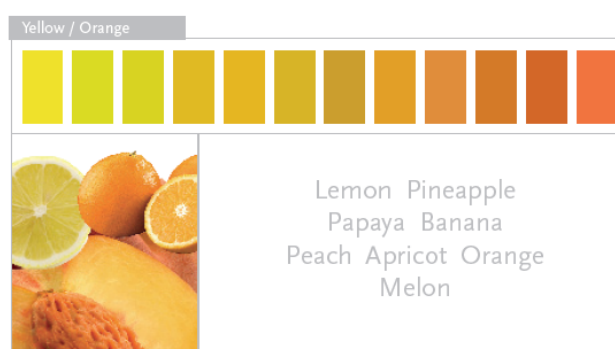


Figure 11: Five main colours for the yellow/orange food group.

In the case of the food group representative for strawberries, apples, raspberries, chili, red peppers, etc. hues go from orange reds, pinks, low saturation reds, luminous reds, and finally dark reds. To represent this group, only a red shade is used, since this colour is representative of all the foods from the group.

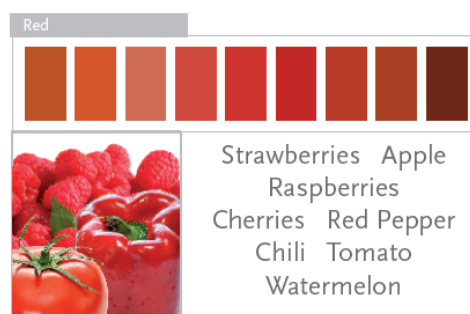


Figure 12: Five main colours for the red food group.

In the case of the food group representative for beetroots, blackberries, blueberries, etc. hues go from saturated, dark and light blues to light and dark purples. To represent this group three shades are used: blue, purple and violet; blue is not considered to be in the food group, so it is not representative for this group.

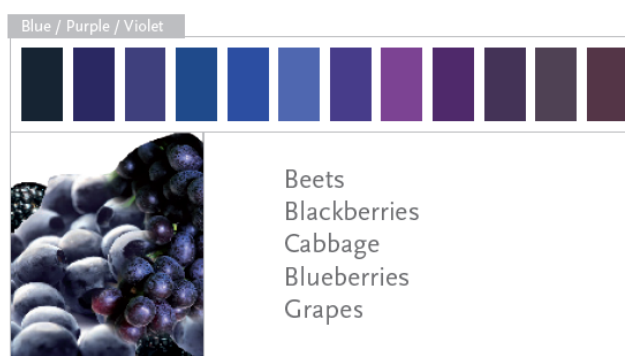


Figure 13: Five main colours for the blue/purple/violet food group.

In the case of the food group representative for prickly pears, custard apples, pears, lettuces, avocados, artichokes, etc. the hues go from light, luminous, saturated, dark and bluish greens. To represent this group, a green shade is used, for this is the representative colour of the group.

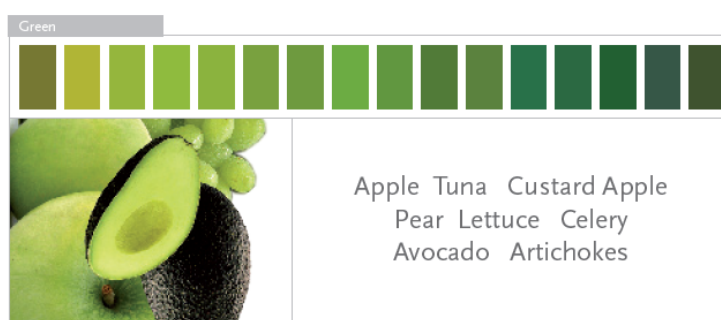


Figure 14: Five main colours for the green food group.

In the case of the food group representative for garlic, chives, leeks, mushrooms, cauliflowers, etc. the hues go from white, cream, light, dark and bluish grey. To represent this group different hues of grays, light blues, whites and a cream colour are used, being the group that incorporates the most quantity of colours to be represented.



Figure 15: Five main colours for the green food group.

3. Is the same colour hue always used for every food group?

To answer this question, all 5 main colours used in the Campaign were grouped in 5 colour groups and the hues used for each group were counted, giving a great variety of hues per group as a result.

- 12 hues for the group of orange yellow shades;
- 9 hues for red shades;
- 12 hues for blue to purple shade;
- 16 hues for the same green shade;
- 8 hues of different shades (whites, greys and pastels).

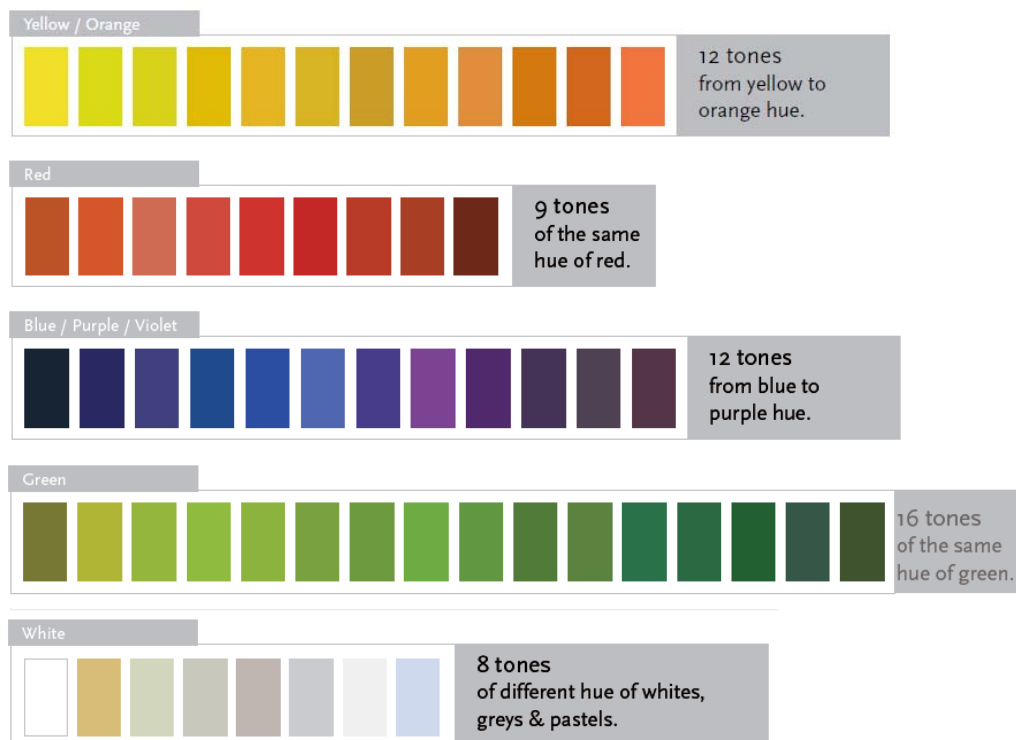


Figure 16: All Five main colours used in the campaign separated by chromatic groups.

A weakness in the message communication is detected, because the objective of the Campaign is to encourage the consumption of fruits and vegetables from the 5 food groups, relating them with 5

colours, and this does not happen since each group is represented by a huge variety of hues and shades.

4. Do the colours used by the program make sensorial reference to healthy and tasty colours?

To answer this question, a colour chart with the 5 main colours used in the Program's graphic material is produced and the a survey is made to a total of 30 people, showing them the chart and asking them which colours did they consider as less healthy or tasty and which were the healthy and tasty ones.

With the result of 23 less healthy and tasty colours, being the ones with low saturation, not related to any food. 11 healthy and tasty colours were obtained, being these hues pretty saturated and luminous.



Figure 17: Image with the chosen colours in the survey about Question 4: Do the colours used by the program make sensorial reference to healthy and tasty colours?

5. In the analysed material: How are the colours of each group named?

To answer this question, all the names used in the Program's graphic material are grouped. The result, per food group, is this:

- Yellow, Orange
- Red
- Blue, Purple, Violet
- Green
- White

The need to choose only one name for each food group is established, due to the fact of having two or more names is not delivering the correct message according to the main aim of the Campaign and

the consumer is being confused. Therefore, only one name must be selected for the group of the yellows and oranges and another for the group of the blues, purples and violets.



Figure 18: Image with the names used in the Campaign and their respective food image details.

6. Which is the best colour hue for each food group?

To answer this question, the selection of the 5 main colours is made.

The colour choice was made by visual comparison between the chosen colours and high quality images, from www.chileanfreshfruit.com, of fruits and vegetables with healthy and tasty characteristics. The choice was done with natural midday light northwest exposure, under proper D50-range lighting (5000k, the recommended illumination for accurate colour evaluation).

This development considered 7 people with sensorial appreciation over food. This is necessary because colour and appearance determinates consumer's choice when buying.

The colour hue is the one which more represents the chromatic atmosphere associated with the images of fruit and vegetable.

A harmonic relationship between brightness and saturation is also considered, so the 5 colours are seen as a related group.

Proposal

Yellow/orange food group

This colour choice was based in choosing a colour hue between yellow and orange. And the name chose for this food group is yellow.



Figure 19: Representative images for the yellow/orange food group colours.



Figure 20: Yellow/orange colours that are already in use.

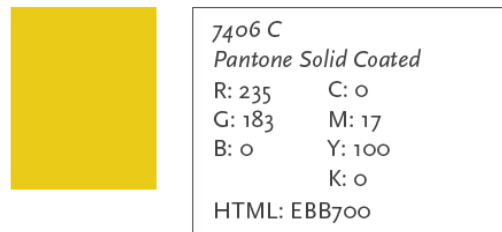


Figure 21: Proposed yellow/orange colours.



Figure 22: Chosen colour, its percentages and fruits and vegetables from the yellow/orange food group.

This colour was chosen on its maximum saturation and luminosity and in their corresponding percentages, together with a fruit and vegetable image that represent this food group.

Red food group

This choice of colour is made based on a saturated and luminous red, and the name red is conserved.



Figure 23: Representative images for colours in the red food group.



Figure 24: Red colours that are already in use.

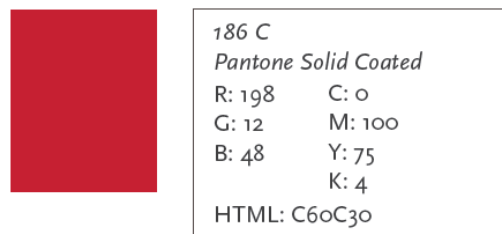


Figure 25: Proposed yellow/orange colours.



Figure 26: Chosen colour, its percentages and fruits and vegetables from the red food group.

This colour was chosen on its maximum saturation and luminosity and in their corresponding percentages, together with a fruit and vegetable image that represent this food group.

Blue/Purple/violet food group

For this case, the blue hue was not considered because of its absence in the majority of fruits and vegetables. The chosen colour is in between the darkest hue of purple and a more reddish looking one, both present in this food group. The chosen name for this group is purple.



Figure 27: Representative images for colours in the blue/purple/violet food group.



Figure 28: Blue/purple/violet colours that are already in use.

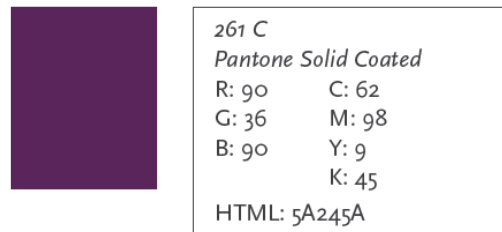


Figure 29: Proposed blue/purple/violet colours.



Figure 30: Chosen colour, its percentages and fruits and vegetables from the red food group.

This colour was chosen on its maximum saturation and luminosity and in their corresponding percentages, together with a fruit and vegetable image that represent this food group.

Green food group

This choice of colour is made based on a saturated and luminous green, and the name green is conserved.



Figure 31: Representative images for colours in the green food group.



Figure 32: Green colours that are already in use.

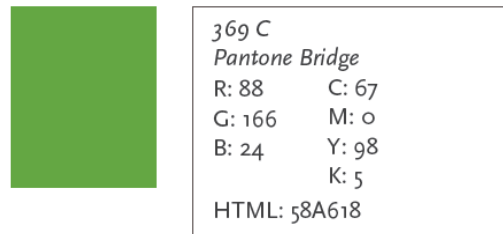


Figure 33: Proposed green colours.



Figure 34: Chosen colour, its percentages and fruits and vegetables from the green food group.

This colour was chosen on its maximum saturation and luminosity and in their corresponding percentages, together with a fruit and vegetable image that represent this food group.

White food group

The hue chosen is a middle one which is visible over white paper for printed graphics and maintains an attractive, clean and healthy look.



Figure 35: Representative images for colours in the white food group.



Figure 36: White colours that are already in use.

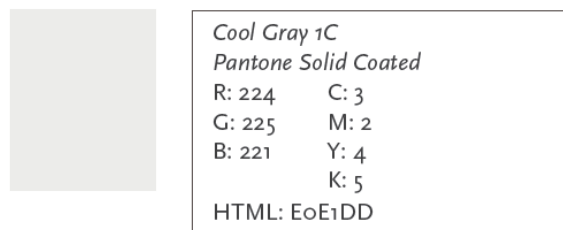


Figure 37: Proposed white colours.

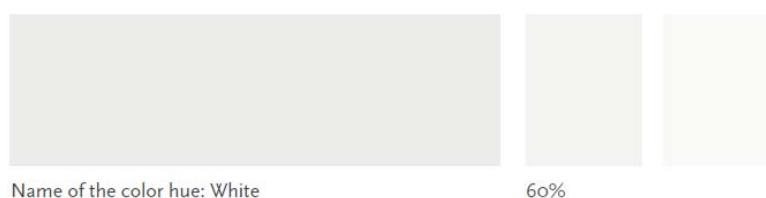


Figure 34: Chosen colour, its percentages and fruits and vegetables from the white food group.

This colour was chosen on its maximum saturation and luminosity and in their corresponding percentages, together with a fruit and vegetable image that represent this white food group.

Conclusions

During the research, sensitive colour observations were made, to decode the chromatic proposal raised by the program and to establish the degree of pertinence between colours used by the program and the food groups. It seeks to demonstrate through empirical evidence that the colours provide more than just visual information to recognise their expressive and communicative functions.

In the development of perceptual analysis, colour observations are made, leading to make recommendations, proposals and colour and visual standards, embodied in colour charts, in order to be considered in the production of graphics and digital material. The lack of specialised consultancy in the diffusion and making of graphic material for the program has created problems not only in the

design but also in the production. This happens because there are no technique guidelines that allow a homogeneous proposal in colour choices and their relation with the food recommended. As a result, the message efficiency decreases.

It is recommended to use 5 colours identified with the same names and with their codes (Pantone, CMYK, RGB y HTML) shown in the proposed Colour Palette. Using these codes, reproduction will be faithful and accurate in printed and digital products. With this method of colour coherence, the recommended fruit groups are associated and reminded by the consumer.

It has been detected that the consumer is able to deduce the taste of a food by their chromatic aspect rather than by their written information. This is why the choice of the 5 colours used in each group must have direct relation with the foods natural appearance, taste and healthy look.



Figure 39: Complete proposal colour palette.

Further research

1. Is it possible to establish a sensorial relationship between flavor, texture and smell of fruits and vegetables and their proposed group colour?

Focus group and other tests will be done with consumers to verify the right election of the 5 proposed colours and its coincidence and accordance in their sensorial experience with the fruits and vegetables they represent.

The objective is to adjust the proposal so it is accepted by the majority as colours with the most synesthesia and chromatic coincidence with nutritional, health and taste concepts.

2. How is the visual relationship between the 5 main colours and the other graphic elements used in the program?

The analysis of backgrounds, textures, photographs, illustrations, fonts and other elements in printed and digital documents will enable the elaboration of special colour norms and other elements application. This will highlight the five main colours and their message separating them from other secondary colours and elements.

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