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Consumers' physiological and verbal responses towards product packages: Could these responses anticipate product choices?

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ABSTRACT

Today, it is a priority to predict what consumers will choose at the point of sale where there are more and more competing brands. But what kind of consumers' information can be used for that purpose? This paper compares the power of physiological responses (unconscious responses) and self-report/verbal responses (conscious responses) towards product packages, as a means of predicting product choices. To this end, six different packaging designs were created by combining three different colors (blue, red and black) and two different messages (simple and reinforced). Eighty-three young consumers were exposed to each of the six designs. In one phase of our investigation, unconscious electrodermal activity (EDA) for each participant and each packaging type was recorded. In another phase, conscious verbal opinions for each packaging type were collected in a questionnaire. Our results show that the blue packaging with a reinforced message was most often selected. For this packaging consumers' electrodermal values (unconscious responses) were lower, and verbal opinions (conscious responses) were higher. Thus, both data sets could be used to anticipate product choice. However, for the other five packages, only unconscious responses were related to product choices. In contrast, higher opinions in a questionnaire did not correspond to selection of packages.

1.1 Introduction

Competition between brands in the food industry is increasing. Consumers make their decisions at the point of sale often seduced by the packaging, which have been frequently baptized as a silent seller [1]. In this scenario, it is worth asking among academics and practitioners: can conscious and unconscious responses that consumers have for a packaging anticipate if it will be chosen? Previous literature seems to answer this question affirmatively: consumer's cognitive and emotional responses lead their final elections. That is, consumers' responses can be separated into two main blocks: conscious responses (based on cognition) and unconscious responses (based on physiological reactions).

On one side, hierarchy of effects models emphasis the relevance of cognition underestimating the power of physiological responses. From this approach the sequence starts with attention (Attention) and cognitive processing (Information); this leads to affect (Desire),

and then behavior (Action). This series of events is known as the AIDA model [1]. On another side, and as Poels and Dewitte [1] suggest following recent communication models, physiological responses (unconscious responses) can dominate cognition (verbal responses). This means that the product that obtains the best cognitive reaction (i.e. the best perception/evaluation on a questionnaire) is not always the one ultimately selected.

In this scene, in the current marketing literature, little is known about the ability of packaging to stir consumers' physiological (unconscious) responses, as compared to verbal (conscious) responses [1,2]. To bridge this gap, two objectives were established as guidance for our own investigation. First, we set out to determine to what extent consumers' physiological responses (uncontrolled) and cognitive responses (as reflected in a questionnaire) towards several products might differ, depending on the color and message of the packaging. Second, we sought to analyse to what extent consumers' physiological and verbal responses towards a packaging could be used interchangeably to anticipate product choices.

In setting forth these research questions, we anticipate adding value to previous literature: we will be joining together advantages of the two measurement methods (i.e. based on unconscious and conscious responses) while, at the same time, avoiding the limitations of each. Self-report/verbal measures (conscious responses) suffer from an important limitation referred to as 'cognitive bias'. As Hurley, Hutcherson, Tonkin, Dailey and Rice [3] remark, the traditional methods for research on packaging (based solely on verbal responses collected in a questionnaire) must be expanded to include an accurate measurement of consumer's unconscious reactions to packages. Such an approach will enable a more refined assessment of how they feel. In this vein, past research has provided evidence for the existence of unconscious responses that could be quite useful in predicting consumers' choices [1]. By investigating two sources of information (verbal opinions and physiological reactions), our hope is to provide public entities and private companies insight into young shoppers' habits. This, in turn, can

enable them to have success “in promoting healthy foods” in a way that consumers will embrace” [4, p. 2]. Healthy food consumption among young people has been added to our research, because “as rates of childhood diabetes and other obesity-related health problems have increased, public policy makers have taken a closer look at marketing practices that target children with unhealthy foods [4, 30].

The rest of the paper develops, in the second epigraph, the theoretical background that supports our proposal. Then, materials and results are presented in sections third and fourth respectively. Finally, and based on our results, some conclusions and managerial implications are commented.

2.1 Background

2.1.1 *Packaging hedonic (color) and functional (label) cues: association with consumers' responses*

Packaging attributes can be separated into two main blocks: hedonic attributes and functional aspects. Hedonic attributes are those related to visual qualities of a package. Included here are such features as color which, in and of itself, can help augment aesthetic appeal and consequently affect consumers' responses [5]. Hedonic attributes are what Rosa, Zamora, Ruiz, Armenteros and Gutiérrez-Salcedo [6] term 'commercial attributes'. These help to position and communicate a product by playing a role in consumers' deliberate decision-making. Functional attributes refer to all the data provided on the package to inform the consumer. These are termed 'technical attributes' [6]. They help to assure consumers of the quality of the product and, consequently, its healthful nature.

A key factor to be considered is that visual/hedonic attributes of packaging can help promote consumption of an item. Levin and Levin [4] found that for children, depicting a familiar cartoon character on the package can improve their interest in a product. Among hedonic

attributes, color is one of the most important, having been found to have a strong effect on consumers' responses [7]. Since each color has a different meaning in individual consumers' minds, according to Baptista, León and Mora [7], different responses across persons can be expected. Typescript, color and other visuals will attract young people; this has been highlighted by Hawkes [8]. Similarly, Azad and Masoumi [5] have explained how good packaging with an appropriate color attracts more customers and increases people's intention to purchase the product. Along the same lines, Silayoi and Speece [9] remark that "marketers therefore must consider color as part of their strategies" [p. 1449]; this is particularly true if the intention is to stimulate the purchase of healthful food.

A second consideration is that, together with its visual features, good packaging must be informative: it must contain all the written information required by customers. This, as Azad and Masoumi [5] note, is a good way to express the manufacturer's concern about benefits of using the product. As these authors emphasize, the more information on the packaging, the greater the expected customer satisfaction with the product. This has been affirmed by Hawkes [8], who reviews how claims and other written cues about health are useful in garnering consumers' responses and stimulating consumption. Altogether, messages on a packaging label impact consumers' decisions relative to healthy eating behavior [9].

In sum, both groups of packaging cues (visual and informative) play important roles in affecting consumers' responses (unconscious and conscious) and, therefore, in driving purchasing behaviors [6]. When a consumer faces a product at the point of sale, the seductive power of packaging will alter his/her cognition and, as well, his/her physiologic reaction toward it. This ultimately will impact whether he/she tries the product.

Although this seems an obvious relation [11]., previous literature has remarked the need to investigate whether these measures (unconscious and conscious) provide similar results [31], and which packaging cues are more recommendable to tiger consumption. When investigating

visual cues, and more specifically the colour, it has been demonstrated that in comparison to low wavelength colours (i.e. blue, green or black), high wavelength colours (i.e. red, orange, and yellow) are more exciting and arousing, and induce euphoric mood states [11]. Regarding informative cues, it has been stated that more information (i.e. adding images) will have much greater effects on influencing evaluations about a product than other elements [11]. So, it could be stated that:

H1: Young consumers' physiological and verbal responses toward a packaging will vary depending on visual and informative cues.

H1a: Young consumers' **physiological responses** toward a packaging will vary depending on visual appearance (more stable responses for low wavelength colors) and on informative content (more stable responses when more information is shown).

H1b: Young consumers' **verbal responses** toward a packaging will vary depending on visual appearance (better evaluations for low wavelength colors) and on informative content (better evaluations when more information is shown).

2.1.2 *Usefulness of physiological and verbal responses towards product packaging to anticipate product choices*

As we have indicated, two types of packaging cues (visual and informative) can affect consumers' responses and thus determine whether consumers try a product. But, as Hurley et al. [3] remark, consumers' responses can be either unconscious or conscious. On the one side, unconscious emotion is a spontaneous low-order affective reaction, automatic and often experienced without awareness of that state. In contrast, a conscious response is a self-reportable feeling. It is based on a person's subjective assessment of what he/she sees, and is verbally expressed.

Communication researchers have underlined that self-report measures are useful to register the respondent's subjective opinions, but this information is retrospective; it can only be collected once the stimulus has been presented. Unconscious responses (emotions) are implicit measures that can be collected while experiencing the stimulus [1].

Based on the cognition-emotion school of thought [10], the two types of response (physiological and verbal) should converge, because cognition is a necessary condition for eliciting unconscious responses. In contrast, Liao, Corsi, Chrysochou and Lockshin [11] contend that the two kinds of response could differ because "compared to self-report measures, physiological measures capture additional information for the understanding of the dynamics of the emotional responses" [p. 49].

What is true is that, "contrary to traditional economic thinking, we are not trying to make decisions solely on the basis of calculating and maximising our utilities but also on the basis of emotions and what feels 'right'. If our brains were merely calculators, advertising would have little to contribute" (27, p. 152).

The role of emotions in advertising has been deeply developed by Poels, K., & Dewitte, S. (2006) [6]. As these authors state, earliest advertising models started to consider the power of emotions in consumption, but remarking that cognition precedes emotions. From these hierarchical advertising models, once the consumer has paid attention to the product (attention) a cognitive processing starts (cognition) which leads to affect (emotions) and then produces behaviour. As these authors review, from the 1980s the role of emotions changed. They acquired primacy over cognition as far as the new adverting models begin to postulate that emotions can function independent from cognition. Finally, in the last decades, the power of emotions (unconscious responses) has continually grown, thanks to the work of neuroscientific such as Damasio (1994) or LeDoux (1996) among others According to these authors, emotions

dominate cognition in the new advertising models [1], what means that conscious responses will depend on previous unconscious responses (emotions).

In sum, the way cues are processed through the maze of physiology/cognition or cognition/physiology has not remain stable [12], but it can be expected that both kind of responses (cognition are emotion) will help to explain behaviors:

H2: Young consumers' physiological and verbal responses towards several packages will anticipate which one is going to be chosen.

H2a: Young consumers' physiological responses towards several packages will anticipate which one is going to be chosen.

H2b: Young consumers' verbal responses towards several packages will anticipate which one is going to be chosen.

3.1 Materials

3.1.1 *Experiment design*

Following Levin and Levin [4], we used an experimental design in which two packaging attributes were manipulated: (i) a visual/aesthetic attribute (color of the packaging); and (ii) an informative/functional attribute (message of the packaging). A packaged healthy food was considered in our investigation. Experiments based on such products can be seen in various papers [4]. More specifically, we have followed previous literature [23, 24, 25) to manipulate the colour of the packaging because of its importance in the food industry. In this vein [23] tree possible alternatives were investigated: black, red and blue. We decide to added a second variable to be manipulated in line with the work of Levin and Levin [4], given that as prior studies in the food industry have demonstrated [9, 26], together with the colour, the use of pictures/images in a label is a key detonating factor to stimulate consumers' emotions and perceptions, and lastly consumption.

Our study involved 83 participants. Six different packages were created for our product category following a fractionated factorial experimental design. Two variables were manipulated: the color of the packaging (blue, red, or black) and the message on the label (a simple message '0% fat', versus a reinforced message '0% fat' plus a graphic feather to emphasize healthfulness of the product). We used an actual brand name, but applied it to a new product that we said required testing. An existing company prepared the six packages for the product launched; these were completed with the help of their graphic designer. The description of the product was invariant. Figure 1 shows a simplification of the six different combinations of colors and messages used to create each packaging. The product that wanted to launched was novel, so, the known brand was not showed.

(Figure 1)

The consumers' responses were documented across two dimensions. With respect to unconscious responses, electrodermal reactivity was recorded for each participant and each packaging type. As Groeppel-Klein and Baun [13] and Lajante, Droulers, Dondaine, and Amarantini [14] suggest, in contrast to heart rate, electrodermal reactivity shows even the very smallest physiological change. It thus delivers the most sensitive indicator of arousal that might potentially be relevant to behavior [13]. As Crone et al. [15] have anticipated, skin conductance will rise when preparing a disadvantageous decision. Consequently, lower dermal responses should correspond to well-chosen packages, as far as they are preferred.

Second, regarding conscious responses, data collection was completed with a questionnaire to measure participants' perceptual opinions towards packaging appearance and perceived credibility.

3.1.2 *Participants*

Eighty-three young consumers (45 women and 43 men) participated in our experiment (mean age 21.5 years old, standard deviation 2.448) (see Table 1). Participants were recruited in a public setting. They were approached by a representative from an external company at the door of five different facilities and a public hospital. Once they had confirmed they customarily bought the product category considered in our study, they were invited to take part in our experiment. If they accepted, they were taken to the laboratory.

(Table 1)

When arriving at the laboratory, the participants were asked to complete a survey. This was used to screen out inappropriate participants (i.e. persons who smoked more than ten cigarettes per day, took illegal drugs or who were on medication, or had any kind of heart or psychiatric illness).

The experiment was explained to those who passed this screening. Participants then signed an informed consent form that had been approved by the Research Ethics Committee of the University.

3.1.3 *Data collection methods*

Two kinds of responses toward each packaging type were collected: autonomic/unconscious responses (physiological responses based on skin reactions) and verbal/conscious opinions (self-report measures).

First, to collect physiological responses skin conductance was used. This is considered to be a sensitive measure of arousal, which itself is an appropriate indicator of the intensity of emotion [3]. In advertising, the use of skin conductance to measure emotions has been scarce. [1]. A PowerLab/16SP instrument (ADInstruments) was employed, and results were analysed using LabChart 5.2 software. All signals were acquired and scanned at 1000 Hz. EDA was recorded through two Ag/AgCl surface electrodes (ML116F) placed on the surface of the distal phalanx of the index and middle fingers of the non-dominant hand, which were fastened by a

velcro strip. At the same time, a range of 40 μS was established for recording. In addition, an initial baseline correction was made to take into account the zero of the participant, which was subtracted from the absolute value of the conductance of the skin recorded for that person.

Second, to complete the experiment, participants were encouraged to evaluate the packaging based on two different verbal scales (Table 2): (i) visual appearance scale and (ii) credibility of the message scale. To this end, two differential semantic scales with seven positions were used, with 1 being the worst evaluation and 7 the best. The scales had values for Cronbach's alpha higher than the 0.6 recommended by Nunnally [16], attesting to their reliability.

(Table 2)

3.1.4 *Procedure*

The structure of the experiment was a 3 (colors) × 2 (messages) within-subjects design, which resulted in six packaging concepts developed by a professional graphic designer. In line with Hurley et al. [3] and to eliminate the potential order effects that could result from the way in which the packages were presented, five treatment blocks with differing sequences of packaging presentations were prepared. Therefore, each participant was exposed to each packaging five times (modifying its place of presentation in the block: the first, the second, etc.). As previous works have supported [13], this sample size is adequate for purposes of the study.

All the experimental sessions lasted one hour. Specifically, three phases were followed to collect consumers' responses:

1. First, participants were connected to the physiological sensors. To minimize interference, they were instructed to avoid moving the electrodes.
2. Second, the task to be performed by the subjects was initiated. This consisted of viewing a series of product packages that were differentiated by their color and label characteristics. Each participant was showed the product with six different packaging

designs (Figure 1) representing each of the 3 x 2 combinations of red/blue/black packaging and a simple/reinforced message on the label. The six packaging designs were presented several times for each person (by means of five repetitions for each design in a random order) making a total of thirty presentations per person. Each packaging was presented for eleven seconds, yielding a total of 330 seconds (5.5 minutes) of exposure for the thirty presentations. After the thirty presentations, one last presentation showed the six packages in a random order. The participant was asked to select the stimulus for which he/she felt the greatest preference. Skin responses were recorded during this process, so that the reactions for each packaging and each person were computed several times.

3. Third, at the end of the assessment, the electrodes were removed and the participants continued with the last phase of the study. This consisted of evaluating the six packaging designs in a questionnaire. As in the studies by Hurley et al. [3] and Liao et al. [11], the physiological assessment was carried out first and then the self-report measures were administered. This is because physiological reactions are spontaneous and decay rather quickly.

3.1.5 *Statistical tools*

For the physiological responses, electrodermal activity (EDA) was measured. This consisted of the maximum change occurring between zero and four seconds after packaging onset was scored. Also, the minimum value between four and six seconds after packaging onset was scored [17]. Both variables were obtained for each person and each stimulus. Given that each stimulus was presented several times, an average was calculated for the maximums and the minimums. In sum, and based on Bradley [18], we obtained for each packaging:

(i) The mean EDA (above the participant's baseline) for the first two seconds;

(ii) The maximum EDA reached between one and four seconds after the product presentation;

(iii) The minimum EDA reached between five and eight seconds after the product presentation; and

(iv) The EDA peak.

Using these variables, an EDA ratio was calculated for each packaging and each subject based on the formula of Hurley et al. [3]: arousal ratio = $\frac{(\text{EDApeak}-\text{EDAmin})}{(\text{EDAmax}-\text{EDAmin})}$. This ratio is useful for measuring proportional increases in dermal responses for each package.

Two statistical tools were used to analyse physiological responses:

(i) Correlations of the EDA ratios between pairs of packages to test if two different packages provoke (or not) similar skin reactions. This was used to test H1a.

(ii) T-test to link consumers' physiological responses with product choices. More specifically, we aimed to determine if values of the skin responses of the most chosen packages are significantly lower than those obtained for the less preferred packages [15]. This was used to test H2a.

Two statistical tools were used to analyse verbal responses:

(i) ANOVA test to analyse if the six packages differ significantly in the mean values of the eight perceptual items used to measure consumers' cognitive opinions toward a packaging [17]. This was used to test H1b.

(ii) Discriminant analysis to link consumers' cognitive/verbal responses in a questionnaire with product choices. This analysis enables consideration of the degree to which perceptual opinions in a questionnaire about a packaging could be used to predict its selection [19]. Therefore, consumers' perceptual items were included as potential explanatory variables in a discriminant function in which the dependent variable was 'product chosen'. This was used to test H2b.

4.1 Results and Discussion

4.1.1 *Packaging hedonic (color) and functional (label) cues: association with consumers' physiological responses (H1a)*

To compare the physiological responses to the six package designs, we used the skin responses provided by the 83 participants. We must note that, because each participant was shown each design five times (in five different positions: first, second, etc.), we had five series of EDA responses per person. Five EDA-ratios could therefore be calculated for each person, and these were simplified to give a mean. Then, the means of the EDA ratios for the six packaging designs were compared.

As we can see from Table 3, physiological responses (EDA ratios) toward packages differ depending on the colors and messages used to design each packaging. More specifically, EDA ratios were lower for two packaging designs: blue color with a reinforced message (Max. EDA ratio = 957,15) and blue color with a simple message (Max. EDA ratio = 639,79). For both packages, the electrodermal response function oscillated significantly less than for the rest of the packages. As Figure 2 shows, the skin response function for these two packages is the least dispersed, which means that EDA values for these packages are tightly clustered in a set.

(Figure 2)

Also, if we analyse the correlations of the EDA ratios between pairs of packages (Table 3), we can observe that the values are very low (lower than 0.5 in most of the cases). The significance levels are high. Therefore, we can affirm that dermal responses for two different packages will not be the same. EDA ratios for different packages are not homogenous.

In sum, our results demonstrate that physiological responses (EDA) will vary depending on packaging cues, given that the EDA ratios are not the same.

We can therefore accept H1a, since we have demonstrated consumers' physiological responses are not the same for various packages. They will mainly depend on the visual cues (color), as far as the best physiological responses (more stable skin reactions) correspond to the blue packaging, with and without images (complex and simple message respectively). So, visual cues (color) seem to be more relevant than visual cues (message) to influence physiological responses.

(Table 3)

4.1.2 ***Packaging hedonic (color) and functional (label) cues: association with consumers' verbal responses (H1b)***

As we can see from Table 4, the ANOVA test shows that four out of eight of the perceptual variables measured in a questionnaire differ significantly across the six packaging designs: 'Good impression' (F = **1.850*; p < 0.1)**, 'Pleasure' (F = **2.018**; p < 0.05)**, 'Flattering' (F = **2.702**; p < 0.05)** and 'Trust' (F = **1.949*; p < 0.1)**. This means that consumers' cognitive responses towards different packages differ somewhat. Thus, visual cues (colors) and informative cues (messages) in a packaging can partially impact consumers' perceptions.

In sum, our results demonstrate that only some perceptual items (four items out of eight) can be associated significantly with a packaging design. For these significant items, two packaging designs have obtained the best evaluations in a questionnaire: the blue packaging with a reinforced message ('0% fat' with a graphic feather) and the black packaging with a reinforced message ('0% fat' with a feather). Both packages stand out in the average values of 'good impression', 'pleasure', 'flattering' and 'trust' (Table 4). Despite this, four perceptual variables do not differ significantly across the six packages.

So, we can conclude that perceptions and packaging design are not totally related terms. We can therefore partially accept H1b, since only some perceptual variables (conscious responses)

differ significantly among packages with different colors and messages (Table 5). The best cognitive evaluations correspond to blue and black packaging with reinforced messages (complex messages). So, informative cues seem to be more relevant than visual cues to influence cognitive perceptions.

(Table 4)

4.1.3 *Usefulness of physiological (unconscious) responses towards product packaging to anticipate product choice (H2a)*

As Table 5 shows, the preferred packaging for the whole sample was the blue one with a reinforced message (39% of participants chose this option). In second place, consumers selected the blue packaging with a simple message (22.1% of participants), and in the third place they chose red packaging with a reinforced message (19.5% of participants). By contrast, the packages chosen least often were the black one with the simple message (2.6%) and the red one with the simple message (7.8%). [i]

To connect physiological responses with product choice, we can observe from the t-test that the pattern of skin responses for the most chosen packaging (blue with a feather reinforcing the message) differs significantly from all the other EDA values (**t = 8.7; p < 0.000**).

Further, we can see that the pattern of skin responses for the second chosen packaging (blue with a simple message) also differs significantly from those of the other packages. It obtained the second most significant value **(t = 8.6; p < 0.000**).

In sum, if we analyse the maximums of the EDA values for the two most chosen packages (blue with a reinforced message and blue with a simple message), we can observe that these values are the lowest ones (blue packaging with reinforced message: Max. EDA = 957.15) and the blue packaging with a simple message, Max. EDA = 639.79). So, our results are in line with Crone et al.'s [15] findings, in that lower dermal responses were obtained for the two most

chosen packages. As previous literature has anticipated, the rise in electrodermal values occurs for undesired stimulus (undesired packages in our study, the red one with a simple message; Max EDA: 2999.16) [15].

In addition, if we focus on the responses obtained for the packaging chosen in third place (red with a reinforced message), we can see that the skin responses for this packaging differ also from those of the other packages, obtaining the third most significant value (**t = 5.8; p < 0.000**). Thus physiological responses, once again, seem to be a useful tool to anticipate the choice of this packaging. For the two less chosen packages the EDA values attain the highest values (red with a simple message: Max. EDA = 2999.16; black with simple message: Max. EDA = 1947.61).

In sum, H2a could be accepted, because the usefulness of physiological reactions to anticipate product choices has been demonstrated. EDA and product choice are totally related terms, because if dermal responses decay, the product will be chosen. In our experiment, the EDA values decay to a minimum for the two most chosen packages (blue with a reinforced message and blue with a simple message). On the contrary, higher values have been identified for poorly chosen packages.

(Table 5)

4.1.4 *Usefulness of verbal (conscious) responses towards product packaging to anticipate product choice (H2b)*

To connect perceptual responses with product choice, a discriminant analysis was performed. The dependent variable that we wanted to explain was ‘product choice’, and to this end eight independent perceptual variables were included in our function: six items concerning visual appearance (aesthetical/visual cues) and three items concerning the credibility of the message (informational cues). Results in Table 6 show that the analysis is significant as a whole.

Accuracy of the discriminant function is good, as the classification matrix demonstrates that 53.3% of cases were correctly classified using this function.

(Table 6)

The derived discriminant function has a canonical correlation of 0.58 for the first function, which explains 44% of the observed variance in the dependent variable (product choice). This means that only some explanatory variables considered for this analysis can, with certainty, contribute to predicting product choice (our dependent variable). More specifically, just three of the eight predicting variables could be used to explain product choice: 'bad'/'good impression' (Wilks Lambda = 0.88*; $p < 0.1$); 'not serious'/'serious' (Wilks Lambda = 0.84**; $p < 0.05$); 'not trust'/'trust' (Wilks Lambda = 0.82**; $p < 0.05$). This means that packages that were positively evaluated in a questionnaire will not necessarily be the selected ones.

In sum, H2b should be rejected because only a few verbal/cognitive items are useful to predict significantly preferred products. Therefore, young consumers' physiological and verbal responses do not always converge to explain a packaging choice. Only physiological responses seem to be useful to accurately anticipate product selection. On the contrary, higher evaluations in a questionnaire for a packaging do not correspond to popular packages in terms of choices. So, a convergence between physiological and verbal responses has not been found in terms of product preference.

5. Conclusions and managerial implications

Our results have demonstrated that two types of cues can affect young consumers' responses to the design of packaging for a healthy food product: visual cues (color) and informational cues (message). More specifically, we have demonstrated that packages with different colors (blue, red and black) and with different messages (simple or reinforced) will lead to different

physiological and cognitive responses, which ultimately will affect the consumer's decision to try the product.

Second, consumers' physiological responses (electrodermal values) rise significantly less for the blue packaging with a reinforced message ('0% fat' plus a graphic feather) and for the blue packaging with a simple message ('0% fat'). Both packages were the most selected ones. Additionally, the blue packaging with a reinforced message stands out significantly in some perceptual variables; the blue packaging with a simple message does not.

However, consumers' physiological (unconscious) and cognitive (conscious) responses towards a packaging do not always go hand in hand. The power of physiological responses is stronger than that of perceptions, as expressed in a questionnaire, for anticipating which packaging is going to be chosen. Consistent with Hurley et al. [3], our research has demonstrated that, when compared to self-report measures, physiological measures seem to capture more information for understanding the dynamics of consumers' responses during packaging selection. As these authors explain, this could be because physiological measures allow a real-time measurement of feelings. Koenig-Lewis, Palmer, Dermody and Urbye [20] explain how emotion can act as a mediator between cognitive evaluation and behavior, and how unconscious responses can therefore influence cognitive responses.

Based on our results, we would recommend the following lines of action for managers or public entities interested in launching a healthful product in the market. First, if marketers want to augment the choice of a healthful product by young consumers, a preferred color for the packaging would be blue and an effective message would be one that reinforces the contents of the label with images (e.g. using a light feather to convey low fat content). This combination of cues is the one that worked best in our experiment (highest chosen rate).

Second, since the second most popular packaging was also blue but with simple message ('0% fat' without a feather), packaging designers should prioritize color (visual attributes) over

content (message on the label). Visual cues seem to be relatively more relevant than informative cues to stimulate favorable consumers' responses. Therefore, in the absence of resources, the visual elements should be prioritized over the textual elements, at least when the objective is to launch a healthy product among the youth.

Third, given that consumers' physiological responses towards packages will anticipate more accurately product choices than cognitive reactions, this kind of measures should be prioritized in consumption studies. Good opinions about a packaging in a questionnaire do not always mean that the product will be chosen. So, as in the work of Koenig-Lewis et al. [20], then, another implication of our findings is that marketers should not rely solely on consumers' cognitive responses to estimate sales. Questionaries' do not always provide the right result. Rather, they should emphasize the relevance of collecting unconscious responses, such as dermal reactions. In this regard, we would recommend that managers invest in new market research procedures based on the measurement of physiological reactions, rather than relying exclusively on the measurement of perceptions. To this end, the possibilities offered by neuro-marketing should not be underestimated.

Finally, our results have not supported the cognition-physiology school of thought, because perceptions about product packaging do not always have an impact on physiological responses. On the contrary, our results give support for the new advertising models supporting that emotions dominate cognition [1]. We also follow Mehrabian and Russell's [21] 'Stimulus-Organism-Response' models (the M-R model) that dominate environmental psychology [22]. One point to draw from this model is that humans' unconscious reactions have a large influence on conscious behavioral intentions. For this reason, though designers of healthy foods packaging can modify shoppers' unconscious and conscious responses via packaging cues, we would recommend concentrating more on measuring shoppers' unconscious reactions. This is a focus Chebat and Michon [12] also have recommended.

Finally, our study has some limitations that could point to future lines of research. For one, additional physiological measures could be applied. Also, other packaging design variables could be tested to obtain the perfect packaging in terms of sales. Additionally, consumer differences based on gender or age differences could be analyzed in the future.

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Tables and Figures

Table 1. Sample profile

Gender		Age	Weight (kg)	Desire Weight (Kg)	Height (cm)
Women	N: 45	21.28	57.51	56.70	156,.7
Men	N: 43	22.07	72.2	70.91	162.69

Figure 1. Six different combinations of colors (blue, black and red) and messages (simple and reinforced with a feather)

(*) Real packages cannot be shown because they belong to a real company with a famous brand which wishes to remain anonymous

Table 2. Measurement tools

PERCEPTIONS **CONSCIOUS RESPONSES** Verbal opinions	**BEHAVIOURS**
Scale to measure visual appearance (Cox y Cox, 2002) 1. Bad-Good 2. Antipactic-Simpatic 3. Unpleasure-Pleasure 4. Non Flattering-Flattering 5. Non Style-Style	**Product choice**
Scale toe measure credibility of the message in the label (Kozup, Creyer y Burton; 2003) 1. Not Serious-Serious 2. Not Trusts-Trust 3. Not Honest-Honest	

Table 3. Correlations among EDA ratios obtained for the six packages

	RATIO EDA_BLACK	RATIO EDA_BLACKPLUME	RATIO EDA_BLUE	RATIO EDA_BLUPLUME	RATIO EDA_RED	RATIO EDA_REDPLUME
RATIO EDA_BLACK	1	**,932***	,359*	,730*	,461*	**,904***
RATIO EDA_BLACKPLUME		1	,377*	,797*	,449*	**,911***
RATIO EDA_BLUE			1	,613*	,354*	,424*
RATIO EDA_BLUPLUME				1	,511*	**,824***
RATIO EDA_RED					1	,496*
RATIO EDA_REDPLUME						1
RATIO EDA_REDPLUME						

	N	Máximum EDA ratio	Estandar deviaton
EDA_BLACK	83	1947,61	225,96840
EDA_BLACKPLUME	83	1825,85	212,69895
EDA_BLUE	83	639,79	132,08561
EDA_BLUPLUME	83	957,15	163,58806
EDA_RED	83	2999,16	388,24160

EDA_REDPLUME	83	1710,85	216,81816

*P<0,05; **p<0,01

Figure 2. EDA (electro dermal activity) for each packaging: mean and dispersion

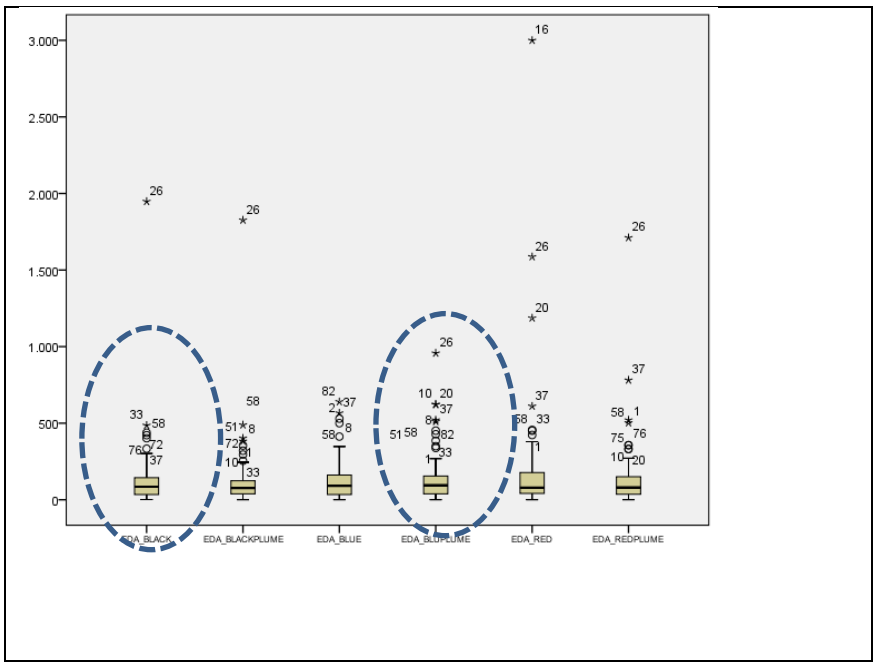

Table 4. ANOVA test: perceptual differences among packages perceptions (verbal responses)

PACKAGING							F
VISUAL APPEARANCE: HEDONIC INFORMATION (AVERAGE)							
1. Bad-good impression	**4,82**	6,00	**4,50**	5,70	**4,80**	5,14	**1,850***
2. Antipatic-Simpatic	5,29	5,83	5,50	5.63	5,46	5,28	0.224
3. Unpleasure-Pleasure	**3,70**	**3,33**	**3,00**	3,93	4,26	4,42	**2.018****
4. Non Flattering-Flattering	**4,94**	**5,00**	**4,50**	5,36	**5,00**	5,42	**2.702****
5. Non Style-Style	4,05	5,66	4,50	4,70	4,46	4,14	0.296
CREDIBILITY OF THE MESSAG							
6. Not Serious-Serious	3,05	2,83	3,00	3,43	3,40	3,00	0.365
7. Not Trusts-Trust	**2,88**	3,66	**3,50**	3,43	**2,80**	4,00	**1,949***
8. Not Honest-Honest	3,05	3,00	3,00	3,60	3,66	2,85	0.791

The items were measured through semantic differential scales with 7 points; being 1 the worst evaluation and 7 the best. (*) p<0,1; (**) p<0,05

Table 5. T- test: EDA ratios differences among chosen packages.

	Choosing percentage		**T studend**	Sig	EDA ratio Average differences among packages	EDA Minimum value	EDA Maximum value
Blue	22.1%		**8.6**	.000	126.50056	97.6589	639,79
Red	7.8%		4.3	.000	184.09611	99.3212	2999,16
Black	2.6%		5.4	.000	132.74433	83.4028	1947,61
Blue+Feather	39.0%		8. 7	.000	143.76738	108.0469	957,15
Red+Feather	19.5%		5.895	.000	140.28859	92.9450	1710,85
Black+Feather	9.1%		5.336	.000	124.58771	78.1436	1825,85

EDA ratio (arousal ratio) for each package: $\frac{(EDApeak - EDAmin)}{(EDAmax - EDAmin)}$

(Given that each product packaging was showed five times per person altering its presentation place, and average of the EDA ratio per person and packaging was used)
EDA: electro dermal activity

Table 6. Discriminant analysis: perceptual items to explain to product choice

Canonical correlation	0.580 (first function; 46% of the variance explained)
Wilks' Lambda	0.41 (first function)
Chi-square	58.997
F	2.011
Degrees of freedom	45
P<	0.00
Cases correctly classified	53.3%

PACKAGING	**Wilks Lamb.**	**F**
Visual Appearance		
Bad-good impression	0.88*	1.18*
Antipatic-Simpatic	0.98	0.21
Unpleasure-Pleasure	0.96	0.54
Non Flattering-Flattering	0.98	0.26
Non Style-Style	0.92	1.12
Credibility of the message		
Not Serious-Serious	0.84**	2.55**
Not Trusts-Trust	0.82**	2.29**
Not Honest-Honest	0.90	1.48

The items were measured through semantic differential scales with 7 points; being 1 the worst evaluation and 7 the best. (*) p<0,1; (**) p<0,05