DOES GREEN MEAN HEALTHY? WHEN A NUTRITION LABEL AND PACKAGE COLOUR DO NOT AFFECT PERCEPTIONS OF HEALTHFULNESS

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ABSTRACT

Studies in developed countries have shown that green energy labels increase the perceived healthfulness of a candy bar and that food in blue packaging is regarded as being healthier than food in red packaging. It is unknown whether South African subjects would respond in the same manner when exposed to green-labelled food items. The aim of the study was to investigate how a sample of South African students perceive the healthfulness of green-labelled foods. A convenience sample of art, graphic design and multimedia students from two universities of technology participated in two between-subjects design studies (n = 154 and 124). The test material consisted of visual stimuli of food items and energy labels. Participants had to rate the food items in terms of healthiness. In Study 1, students did not perceive a candy bar with a green energy label as healthier than students who viewed the same candy bar with a red energy label, even though the energy labels indicated the calorie content (p = .92). The students also did not perceive a green packaged breakfast cereal as healthier than students who viewed the same cereal in a package with shades of red (p = .68). In Study 2, students did not rate (p = .24) nor perceive (p = .92) a green packaged maize product with a green energy label as healthier when compared to students who viewed the same product in a red package with a red energy label. These results contradict earlier findings that a green energy label may increase the perceived healthfulness of a food item. Interrelated variables such as a consumer's ecological motivation, the type of product, the information presented on a label, and even the consumer's eographic location, may play a role in how consumers respond to green-labelled food products.

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ORIENTATION AND BACKGROUND

Earlier papers in South African journals examined the information on food labels of fat spreads (Wiles et al. 2009), the communicative value of food labels (Prinsloo et al. 2012), and a summary of label trends in South Africa (Koen et al. 2016). Regarding the way forward with research, Koen et al. (2016) mentioned that we need a better understanding of a consumer's knowledge and use or non-use of food labels, as most studies were conducted in developed

countries. Prinsloo et al. (2012) reported that variables such as culture, social affiliation and even the physical and content-related attributes of food labels play a role in how consumers interpret food labels. They further mention that future studies, amongst other aspects, must look at consumers' preferences and the problems they experience with existing food labels.

One of the first papers on green food labels (Schuldt 2013) reported that a green energy label increased the perceived healthfulness of a candy bar. In the first of two studies, students from an American university had to imagine that they were hungry, were in a grocery store checkout lane, and saw a candy bar displaying an energy label. One group (*n* = 47) was presented with an image of a candy bar with a green energy label, while the other group (*n* = 46) received an image of the same candy bar, except with a red energy label. They were asked to rate the product in terms of its energy content and perceived healthfulness. The second study was similar, except that it used online subjects. One group (*n* = 33) received the image of the candy bar with the green energy label, and the second group (*n* = 27) received the image of the candy bar with a white instead of a red energy label. Both the students and the online participants perceived the green-labelled candy bar as healthier than the participants who viewed the candy bar with the red and the white energy labels. Participants in the second study, who placed more importance on healthy eating, perceived the candy bar as less healthy when viewed with a colour-free (as opposed to a green) energy label. Schuldt's (2013) study thus suggests that the colour of a food label may influence how consumers perceive the healthfulness of food products, even that of a candy bar.

Not only green, but also the colour blue may influence the perceived healthfulness of food. Huang and Lu (2016) examined how package colour influences students' perception of hedonic (less healthy) and utilitarian (healthy) food, and their subsequent purchase intentions. The hedonic foods in their study comprised chips, iced tea, and ice cream, while their utilitarian foods comprised milk, yoghurt, and cereal. Canadian university students in the first study (*n* = 34) viewed the three healthy and the three less healthy food items on a computer screen and gave their impression of the various products' perceived healthfulness and indicated their purchase intentions. Their second study (*n* = 80) was similar to the first, except that the students viewed two healthy food items and two less healthy food items in respectively red and blue. The second study added food labels that indicated each product's nutritional content. The students perceived food in blue packaging as being healthier than food in red packaging. The colour effect was stronger for healthier food items than the less healthy food items. The students also showed a strong purchase intention for healthy food items in blue packages with Nutrition Content Claim (NCC) labels that classified the item as 'light' as opposed to 'regular'.

An extensive study in the United Kingdom by Vasiljevic, Pechey and Marteau (2015) produced results contrary to those reported by Schuldt (2013) and Huang and Lu (2016). Vasiljevic et al. (2015) used a national representative sample in the United Kingdom (*n* = 995) and tested the combined effects of using emoticons and coloured food labels. The emoticons employed were smiling vs. frowning, vs. no emoticon. The colours of the labels were red, green or white. The two food items were a chocolate bar and a cereal bar. The subjects rated the chocolate bar as tastier and more desirable than the cereal bar. They furthermore rated the cereal bar as a healthier food item than the chocolate bar, irrespective of the colour of the label. The frowning emoticon on a white background decreased the subjects' tastiness perception of the cereal bar but did not change the subjects' tastiness perception of the chocolate bar. Their study has shown that an emoticon is a stronger variable than a coloured label. Their results have shown that the colour of a food label does not necessarily influence how consumers perceived the healthiness or the tastiness of a food item. What stood out is that a graphic variable, in this case, the frowning emoticon, played a role in how the participants perceive the healthier food item (the cereal bar), but not the less healthy food item (the chocolate bar). As such, aptly coloured labels may not be useful in guiding consumers to make healthier choices, but a graphic variable such as a frowning emoticon may play a role. A possible reason for the frowning emoticon effect is that food graphics usually consist of positive graphic

reinforcements (regardless of the food item being endorsed) and not disapproving graphics – such as a frowning emoticon. This negative cueing device could have acted as a warning and could have contributed to its moderating effect.

Studies have also shown that red, as a warning device, moderates how consumers may respond to food items. A study with German students (*n* = 179) examined the effect of colour (red versus green) in an approach-avoidance task with healthy and unhealthy food (Rohr et al. 2015). The students had to categorise food items on a computer screen as healthy or unhealthy by moving a computer mouse towards or away from themselves. The stimuli consisted of black and white images of 10 healthy and 10 unhealthy food items. Red and green circles were placed around the images, orthogonal to the health categories. The red circles assisted subjects' automated avoidance reactions to unhealthy foods whilst the green circles weakened their avoidance tendencies. The green circles, however, did not intensify the subjects' approach to healthy foods. The work by Reutner et al. (2015) has shown a similar trend. Their two studies demonstrate that red acts as a stopping cue for unhealthy foods but nonetheless becomes less effective as the food becomes healthier. Swiss students (*n* = 82), in the first study, consumed less chocolate on a red plate than on a white plate. No similar effect was observed for grapes on red or white plates. In the second study (*n* = 111), more consumers avoided bread in a food sampling experiment that was marked with a little red flag than bread marked with a little green flag. There is strong evidence that red is associated with danger but, by contrast, green is only weakly linked to safety (Pravossoudovitch et al. 2014). Colour did play a noticeable role in these studies, but essentially it was red that acted as a warning cue.

Hahnel et al. (2015) wanted to know whether German consumers with a high ecological motivation would make positive inferences when faced with a green-labelled product. The implication – if a high ecological motivation is a dependent variable – was that green labelling, and possibly the colour green, could play a role in how consumers perceive a green-labelled product. Their study indicates that a consumer's ecological orientation is a variable that may influence them when purchasing a green or green-labelled product.

Several studies have indicated that the information on food packaging (and the colour employed on food packaging in particular) may influence consumer purchasing decisions. A broad French study (*n* = 11981) considered the effect of label information placed on the front of food packages (Ducrot et al. 2016). Participants were assigned to one of five treatment groups, namely Front-of-Pack (FOP) labels with Guideline Daily Amounts (GDA), Multiple Traffic Lights, a Five-Color Nutrition Label (5-CNL), Green Tick, or a control treatment. The participants had to select a week's food from a virtual online supermarket. Subjects in the four FOP label treatments selected more nutritious food items than the participants in the control group. It was, however, the 5-CNL that produced a selection of food items with the greatest nutritional value. Colour-coding on a package can therefore influence consumers towards making healthier food choices. A meta-analysis by Cecchini and Warin (2016) reported similar results. This meta-analysis included only nine studies and assessed the use and role of food labelling, such as traffic lights, GDA and other FOP labels, in choosing healthier food products. The study reported that food labelling is effective in steering consumers towards choosing healthier products. A study that used German and Polish consumers (*n* = 1000) investigated FOP label formats, and how these labels influence consumers' choice of food products (Aschemann-Witzel et al. 2013). The labels included the energy content, GDA, text to describe the nutritional content and colour-coding schemes. Their results indicate that the different formats did not influence the consumers' motivation to choose healthful foods. The colour-coding system, however, was effective when German consumers were asked to choose a healthful product from a selection of healthy and less-healthy products.

THE AIM OF THIS STUDY

The studies referred to above have shown that test subjects in the US, the UK, and mainland Europe are influenced by the colour of food labels, the colour-coding on food packaging, and that a consumer's ecological motivation is a

moderating variable. What is not known is whether a sample of South African students would respond in the same manner when exposed to a green-labelled food item. Would they perceive a green-labelled food product as healthy, would the type of product play a role, and would their ecological awareness moderate their perception of a food item? The project consisted of two studies where images and questions based on the study by Schuldt (2013) were used.

The aim of the study was to investigate how a sample of South African students perceive the healthfulness of green-labelled foods through two separate but interrelated studies.

STUDY 1

Method

One hundred and fifty-four willing first-year students from two universities of technology in South Africa participated in a between-subjects design experiment. The students were conveniently sampled from graphic design and multimedia courses at one university and from a general art course at the second university. Students in these study directions were chosen by virtue of their study direction, as they are more exposed to visual stimuli, including colour. These students are also more familiar with colour's role in packaging and communication material than the general public. Forty-five students came from one institution and 109 students from the other institution. Their age ranged from 18 to 24, with a median age of 20. The sample came from a population of 188 students. The margin of error is 3.37%, given a confidence level of 95%. The Research Ethics Committee at the Tshwane University of Technology (TUT) approved the project and granted permission to access students on its campus (ethics clearance number: REC/2017/08/002).

Similarly, the Research Ethics Committee at the Central University of Technology (CUT) granted ethical clearance (clearance number: HCS/17/06). Every registered student was invited and received a detailed information leaflet a week before the commencement of the study. No students were excluded, and there were no students younger than 18. There was no conflict of interest between the two authors and the participating students as they did not teach the students nor played any role in assessing their work. Study 1 was conducted on 8 March 2018 at one institution and on 12 and 13 March 2018 at the second institution.

The first study sought to replicate Schuldt's (2013) results by means of two experiments. Both experiments took place simultaneously. The test material for the first experiment consisted of three questions and a photograph of two chocolate candy bars placed next to an energy label. The label indicated an energy content of 250 calories and 13 % DV (i.e. Percent Daily Value). The candy bar and energy label image is similar to Schuldt's image of a candy bar and an energy label that depicts calories. One energy label was in green and the other energy label was in red (see Figure 1 below). Note that the label gives the energy content that is in calories and not in kilojoules. The reason for using an energy label that depicts calories as a visual test stimulus and not an energy label that depicts kilojoules is that the study seeks to repeat similar studies that used an energy label that depicts calories as visual stimuli in their test material. The study by Schuldt (2013) conducted in the USA, and the Vasiljevic et al. (2015) study conducted in the UK, used calories as their energy labels. South African legislation requires that foodstuffs must declare their energy content in kilojoules (South Africa, 2007). The first question asked the students to indicate their age bracket. The second question asked the students to rate the candy bar in terms of the number of calories (*Compared to other candy bars, how many calories do you think this candy bar contains?*). The third question asked the students to rate the candy bar in terms of healthiness (*Compared to other candy bars, how healthy do you think this candy bar is?*).

The test material for the second experiment consisted of a computer-generated graphic of a breakfast cereal pack accompanied by four questions. The students were asked to rate the cereal in terms of healthiness and nutrition (*Compared to other cereals, how healthy do you think this cereal is?* and *Compared to other cereals, how nutritious do you think this cereal is?*). The last two questions probed the students'

FIGURE 1: EXAMPLES OF THE GREEN TREATMENT (LEFT) AND THE RED TREATMENT (RIGHT), AS USED IN STUDY 1

ecological awareness (*To what extent would you regard yourself as environmentally aware?* and *How often do you consider any of these words: 'original', 'organic', 'eco-friendly', 'sustainable', 'green', 'nature', '100% Pure' when you buy food items?*).

Students rated the candy bar and the cereal box on a Likert-type rating scale of 1 to 9. The test material (the images and the questions) was printed back-to-back on an A4 sheet of white paper. The image of the candy bar with the energy label and three questions appeared on one side (the first experiment), and the image of the cereal package and four questions appeared on the obverse side (second experiment). Two treatments of the test material were generated. One treatment made use of a green energy label and shades of green for the cereal box (green treatment). The second treatment made use of a red energy label and shades of red/orange for the cereal box image (red treatment). Examples of the images for the green and red treatments are presented in Figure 1 below.

The experiments took place in classrooms at the two universities. The information in the information leaflet, given to the students a week before the experiments, was repeated verbally, and they were invited to confirm their willing participation by completing a consent form. The students subsequently received the test material with the images and questions. The experimental material was distributed in a systematic, alternating fashion: the first student received the green treatment while the second student received the red treatment; the third student again received the green treatment and so on. The students were free to exit the classroom after answering the questions. The completed questionnaires were collected and each student was thanked for his or her participation.

The results of Study 1

To arrive at the students' perceived healthfulness of the candy bar, the results of Question 2 were reverse scored and combined with Question 3. Similarly, the scores of Questions 4 and 5 were combined to arrive at

TABLE 1: THE DESCRIPTIVE STATISTICS FOR STUDY 1

	Study 1					
	Green treatment			Red treatment		
	(*n* = 78)			(*n* = 76)		
Questions 2 – 7	Means	*SD*	*Variance*	Means	*SD*	*Variance*
Compared to other candy bars, how many calories do you think this candy bar contains?	4.19	1.99	3.98	4.22	1.87	3.51
Compared to other candy bars, how healthy do you think this candy bar is?	4.33	1.88	3.52	4.25	1.98	3.92
Perceived healthfulness of the candy bar	**4.26**	**1.63**	**2.64**	**4.24**	**1.49**	**2.23**
Compared to other cereals, how healthy do you think this cereal is?	6.31	1.96	3.83	6.47	1.71	2.92
Compared to other cereals, how nutritious do you think this cereal is?	6.06	1.71	2.92	5.7	1.7	2.88
Perceived health/nutritional value of the cereal product	**6.19**	**1.57**	**2.47**	**6.09**	**1.43**	**2.06**
To what extent would you regard yourself as environmentally aware?	6.47	1.54	2.36	6.39	1.58	2.51
How often do you consider any of these words: 'original', 'organic', 'eco-friendly', 'sustainable', 'green', 'nature', '100% Pure' when you buy food items?	6.37	1.9	3.61	5.97	2.08	4.35
Environmental awareness	**6.42**	**1.4**	**1.96**	**6.18**	**1.52**	**2.32**

the students' perceived health/nutritional value of the cereal. The combined means of the last two questions provided the students' rating of their ecological awareness. Levene's test was used to check for equality of variance between the two treatment groups. The requirement for homogeneity was met for the perceived healthfulness of the candy bar, $F(1, 152) = 0.92$, $p = .34$, the health/nutritional value of the cereal $F(1, 152) = 0.9$, $p = .35$, and for the students' self-reported ecological awareness, $F(1, 152) = 0.15$, $p = .7$. The equality of variance permitted the use of an independent *t*-test for equal variance (two-tailed) to determine if there is a difference between the means of the two treatment groups and a dependent *t*-test for equal variances (two-tailed) to determine if there is a difference between the means within a treatment group. The means, standard deviations and variances of Questions 2 to 7, for the green and red treatment groups, are given in Table 1 below.

Healthfulness perception

The students did not rate the candy bar with the green label ($n = 78$, $M = 4.26$, $SD = 1.63$) as healthier than the candy bar with the red label ($n = 76$, $M = 4.24$, $SD = 1.49$), ($t(152) = 0.1$, $p = .92$).

The students who viewed the green cereal box ($n = 78$, $M = 6.19$, $SD = 1.57$) also did not rate the product as more healthy/nutritious than the students who received the red treatment ($n = 76$, $M = 6.09$, $SD = 1.43$), ($t(152) = 0.41$, $p = .68$).

Healthfulness perception of the candy bar versus the cereal product

We additionally wanted to ascertain whether students, within the same treatment group, rated the cereal to be healthier than the candy bar. This would suggest, in addition to colour, that the type of product could also play a role. The students who received the green treatment rated the cereal product ($n = 78$, $M = 6,19$, $SD = 1.57$) as significantly healthier than the candy bar ($n = 78$, $M = 4,26$, $SD = 1.63$); ($t(154) = 8.11$, $p < .001$). The effect size (Cohen's $d = 0.92$) was very large. Similarly, the students who received the red treatment rated the cereal product ($n = 76$, $M = 6,09$, $SD = 1.43$) as significantly healthier than the candy bar ($n = 76$, $M = 4,24$, $SD = 1.5$); ($t(150) = 8$, $p < .001$). The effect size (Cohen's $d = 0.92$) was once again very large.

Ecological awareness

The study wanted to establish how the students perceived their own ecological awareness and if this variable played a role in how they rated the

green or the red treatments. The students who received the green treatments (n = 78, M = 6.42, SD = 1.4) did not report a higher ecological awareness than the students who viewed the red treatments (n = 76, M = 6.18, SD = 1.52), (t(152) = 1.01, p = .31). There was no correlation between the green group's self-reported ecological awareness and their healthfulness perception of the candy bar, r(76) = -.05, p = .65, and their health/nutrition perception of the cereal product r(76) = .08, p = .5. Similarly, there was also no correlation between the red group's self-reported ecological awareness and their healthfulness perception of the candy bar, r(74) = -.01, p = .95, and their health/nutrition perception of the cereal product r(74) = .09, p = .46.

Discussion of the results from the first study

There was no significant difference between the students who received the green treatment and the students who received the red treatment for either the candy bar or the cereal product. The colour green did not influence the students, and they did not perceive the green-labelled products as being healthier or more nutritious than the red-labelled products. There was also no correlation between the students' self-reported ecological awareness and their perception of the healthfulness and the nutrition for the candy bar and the cereal product. The green and the red treatment groups, however, rated the cereal product as healthier than the candy bar. Students responded more favourably towards the cereal, a product that they rated as healthier than the candy bar. With Study 1, it was only the type of product that influenced the participants' perception, and not colour as with the studies by Schuldt (2013) and Huang and Lu (2016).

STUDY 2

The green colour in the first study did not influence the students' healthfulness perception of a candy bar and a cereal product. The students, however, rated the cereal product as healthier than the candy bar. It was thus the specific type of product that played a role in how the students perceived the healthfulness and nutritional value of that product and not the colour of an energy label or the colour of the package. The experimental stimuli for Study 2 stimuli consisted of maize meal packages, see Figure 2 below. Maize meal is a well-known healthy staple food consumed by most South Africans.

Method

One hundred and twenty-four willing first-year students participated in Study 2, also a between-subjects design experiment. Thirty-eight students came from one institution and 86 students came from the other institution. Their age ranged from 18 to 24, with a median age of 20. The sample from the second study came from a population of 184 students. The margin of error is 5.04%, given a confidence level of 95%. They were conveniently sampled from the same courses and universities as the first study. Students in the second study were also chosen by virtue of their study directions as they are more exposed to visual stimuli, including colour. The students in the second study were not the same as those who participated in the first study. Study 2 was conducted on 24 July 2019 at one institution and on 30 July and the 5th of August 2019 at the second institution. The research ethics committees from both institutions granted an extension of previously issued ethics clearance certificates. The inclusion and exclusion criteria were the same as for Study 1. The experiment of Study 1 was revised for Study 2. The questions and procedures for Study 2 were the same as the ones used in Study 1, except for the different visual stimuli. The new image consisted of a fictitious maize meal package with an energy label on the front. The obverse side displayed the same image of the maize meal package but without the energy label. Study 2 followed the same process as Study 1. Examples of the images used in the green and the red treatment are given in Figure 2 below.

The first question asked the students to indicate their age group. Questions 2 and 3 endeavoured to determine how the students perceived the healthfulness of the product (*Compared to other maize meal, how many calories do you think this maize meal contains?* and *Compared to other maize meal, how healthy do you think this maize meal is?*). Two questions probed the students' health/nutritional value perception of the product (*Compared to other maize meal, how healthy do*

FIGURE 2: EXAMPLES OF THE GREEN TREATMENT (LEFT) AND THE RED TREATMENT (RIGHT), AS USED IN STUDY 2

TABLE 2: THE DESCRIPTIVE STATISTICS FOR STUDY 2

	Study 2					
	Green treatment			Red treatment		
	(*n* = 63)			(*n* = 61)		
Questions 2 – 7	Means	*SD*	*Variance*	Means	*SD*	*Variance*
Compared to other maize meal, how many calories do you think this maize meal contains?	4.24	2.01	4.06	4.79	1.92	3.67
Compared to other maize meal, how healthy do you think this maize meal is?	5.44	1.79	3.22	5.41	1.91	3.65
Perceived healthfulness of the maize meal	**4.84**	**1.11**	**1.22**	**5.1**	**1.3**	**1.69**
Compared to other maize meal, how healthy do you think this maize meal is?	5.63	1.75	3.07	5.46	1.94	3.75
Compared to other maize meal, how nutritious do you think this maize meal is?	5.59	1.5	2.25	5.82	1.82	3.32
Perceived health/nutritional value of the maize meal product	**5.61**	**1.38**	**1.89**	**5.64**	**1.65**	**2.73**
To what extent would you regard yourself as environmentally aware?	5.75	1.8	3.26	5.85	1.88	3.53
How often do you consider any of these words: 'original', 'organic', 'eco-friendly', 'sustainable', 'green', 'nature', '100% Pure' when you buy food items?	5.86	1.77	3.12	6.08	2.19	4.78
Environmental awareness	**5.8**	**1.5**	**2.24**	**5.97**	**1.7**	**2.89**

you think this maize meal is? and *Compared to other maize meal, how nutritious do you think this maize meal is?*).

The results

As with Study 1, the results of Question 2 were reverse scored and combined with Question 3 to arrive at a perceived healthfulness for the maize meal. Similarly, the scores of Questions 4 and 5 were combined to arrive at a health/nutrition value perception of the maize meal. The combined means of the last two questions provided the students' rating of their ecological awareness. The requirement for homogeneity was met (Levene's test) for the perceived healthfulness of the maize meal ($F(1, 122) = 0.91$ $p = .34$), the perceived health/nutritional

value of the , $F(1, 122) = 1.18$ $p = .28$) and for the self-reported ecological awareness $F(1, 122) = 1.01$, $p = .32$. This allowed for the comparison of the means with an independent *t*-test for equal variance. The means, standard deviation and variance of Questions 2 to 7 for the green and red treatments are given in Table 2 below.

Healthfulness perception

The students did not rate the green maize meal package with the green energy label ($n = 63$, $M = 4.84$, $SD = 1.11$) as healthier than the red maize meal package with the red energy label ($n = 61$, $M = 5.1$, $SD = 1.3$), ($t(122) = -1.19$, $p = .24$). The students who viewed the green maize meal package ($n = 63$, $M = 5.61$, $SD = 1.38$) also did not perceive the product as healthier/more nutritious than the students who viewed the red maize meal package ($n = 61$, $M = 5.64$, $SD = 1.65$), ($t(122) = -0.10$, $p = .92$).

Ecological awareness

The students who received the green treatment ($n = 63$, $M = 5.8$, $SD = 1.5$) did not report a higher ecological awareness than the students who viewed the red treatment ($n = 61$, $M = 5.97$, $SD = 1.7$), ($t(122) = -.58$, $p = .57$). As with Study 1, there was also no correlation between the green group's self-reported ecological awareness and their healthfulness perception of the maize meal product, $r(61) = -.1$, $p = .45$, and their health/nutritional value perception of the maize meal product, $r(61) = .23$, $p = .77$. There was no correlation between the red group's self-reported ecological awareness and their healthfulness perception of the maize meal product, $r(59) = .13$, $p = .33$. There was, however, a significant positive correlation between their health/nutrition value perception of the maize meal product, $r(59) = .41$, $p < .001$ and their self-reported ecological awareness.

Discussion of the results from the second study

The response patterns in Study 2 are similar to the response patterns in Study 1. There was no difference between the students who viewed the green maize meal package and the students who viewed the red maize meal package. As with Study 1, the students who received the green treatment did not rate the green maize meal product as healthier or more nutritious than the students who received the red treatment. As such the colour green did not influence the students' perception. The significant positive correlation ($r = .41$, $p < .001$) between the red group's ecological awareness and their perception of the maize meal's health/nutritional value was unexpected given that there was no such correlation for the green group, and no correlation for both groups in Study 1. The only variable that could have played a role is the energy label. The first image in the test material comprised the maize meal product with an energy label. The image on the obverse side was not linked to the energy label. It was this image and the questions on how they rated the health/nutritional value of the product that had thus contributed to this positive correlation.

GENERAL DISCUSSION

The aim of the study was to investigate how a sample of South African students perceive the healthfulness of green-labelled foods. The students did not perceive a candy bar displaying a green energy label as healthier than students who viewed the same candy bar with a red energy label. Likewise, students who viewed a green packaged cereal product and a green packaged maize meal product did not perceive these as healthier than students who viewed the same products in shades of red. The results of these two studies contrast with the results of Schuldt (2013) who found that green labels increase the perceived healthfulness of a food product. The contribution of this study, similar to the work by Vasiljevic et al. (2015), is that the colour of a food label does not necessarily influence how subjects perceive the healthfulness of a food item.

The South African students considered the cereal product as healthier than the candy bar. The participants in the Vasiljevic et al. (2015) study showed the same tendency. They also considered a cereal bar as healthier than a chocolate bar. Both the South African students and the Vasiljevic et al. (2015) participants differentiated between the healthier and the less healthy products, irrespective of the use of the colour green. This suggests that the type of product may play a stronger role than colour in how consumers perceive the healthfulness of a product. While green had no effect in the present study – nor in that of Vasiljevic et al.

(2015) – a different colour, such as red, may nonetheless act as a strong warning or avoidance cue (Pravossoudovitch et al. 2014; Reutner et al. 2015; Rohr et al. 2015).

We did not find sufficient evidence that students' ecological orientation played a role in how they perceived the colour of the labels or the colour of the food packaging. The study by Hahnel et al. (2015), however, indicates that a consumer's ecological orientation is a variable that may influence how consumers perceive the healthfulness of a green-labelled product. Consumers with a high ecological orientation are predisposed towards green and green-labelled products. A consumer's ecological orientation may be a strong variable that may very well play a role when such a consumer is faced with a choice to purchase a green or green-labelled product. However, the Hahnel et al. (2015) study did not involve food items, so it is prudent to infer with caution.

The lack of evidence from the present study, that green means healthy, does not imply that colour in food labelling does not play a role in consumer choices. On the contrary, several front-of-pack (FOP) studies have shown that a colour-coded traffic light system can assist consumers in making a better choice (Aschemann-Witzel et al. 2013; Cecchini & Warin 2016; Ducrot et al. 2016; Hersey et al. 2013; Sinclair et al. 2014). It may therefore not be green as a single variable, but green within an array of interacting variables that determines how a consumer would perceive a green-labelled food item. A consumer's response to green-labelled food products is most likely mediated by their ecological orientation, the type of product, whether colour acts as a warning (such as red) or as an endorsement (such as green), possibly the consumer's geographic location and the congruence of information on the product's label, and the colour of the label or package.

A limitation of this study was the experimental conditions. Participants knew that they were part of an experiment, their interaction with the experimental material was simulated, and they had to respond to conjectural questions and to images on paper. The experimental results of a simulated shopping environment and a simulated decision-making process may not correlate with those obtained during a real-life shopping activity in an actual shopping environment. In addition, the Hawthorne and Novelty effects would have moderated the participants' responses.

Another limitation of this study is the small sample and the resulting low statistical power. A small sample reduces the chance to detect the phenomenon under investigation (Vadillo, Konstantinidis & Shanks 2016). The results reflect the perceptions of first-year art and design students, conveniently sampled from two universities of technology.

CONCLUSION

The lack of agreement between the present study and those conducted by Schuldt (2013) and Huang and Lu (2016) could be that students in South Africa come from different socio-economic environments and educational backgrounds than students and consumers in Canada and Germany. These differences may contribute to a different orientation towards green-labelled products. The South African students in the current two studies may be familiar with colour's role in packaging, but their setting and needs are not comparable with participants in the European, Canadian and UK studies.

The small number of studies in this field, dissimilar participants, different test instruments, procedures, and results do not allow for a unified and generalisable theory of how consumers respond to green energy labels and green food packaging. Colour, however, is a functional design element in current FOP labels. Red is a suitable warning cue, and green, in opposition to red, is an appropriate colour cue for healthiness. Furthermore, consumers' ecological awareness and the type of products may play a role in how FOP label colour influences consumers.

More work is required to determine the conditions and circumstances under which the use of the colour green in packaging and labels will produce the "health halo" effect (Schuldt 2013, p. 818). The relationship between the green-labelling of food, the type of food, consumers' ecological orientation, textual information on a label, and a consumer's geographic location also need to be considered.

In addition, more green and green-labelled food studies are needed that move away from using test subjects in an artificial test environment and focus more on real-life longitudinal studies.

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