Exposé

Influence of colour-coded nutrition labels on perceived healthfulness

Submitted by

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<tr>
<td>FoP</td>
<td>Front of pack</td>
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<tr>
<td>FSA</td>
<td>Food Standard Agency</td>
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<td>GDA</td>
<td>Guideline Daily Amount</td>
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<td>Traffic Light</td>
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ABSTRACT

Keywords: Food labelling, colour, colour perception, health knowledge, nutrition policy.

Background: In order to tackle rising obesity rate and health related diseases, in June 2013 the UK government introduced voluntary traffic light labels to help consumers make healthier food choices. The colour-coded system tells people at a glance if the product they are thinking about buying has a high (red), medium (amber) or low (green) content of fat, salt and sugar. After the label intervention, some Mediterranean European countries have objected that colours may influence consumers’ choices, harming exports of red-labelled products such as cheese, olive oil and salami.

Purpose: The purpose of this thesis is to explore whether and how the colours employed in the traffic light label –specifically, red and green– might influence consumer perceptions on product’s healthfulness. This paper will investigate whether green labels convey healthfulness perception no matter the actual nutrient content and whether red labels can dissuade consumers’ willingness to buy.

Method: A quantitative approach will be used to gather primary data by means of an online questionnaire. The survey will be spread via social media and personal contacts.
1 INTRODUCTION

1.1 BACKGROUND

‘We are what we eat’ asserted in the nineteenth century the German philosopher Feuerbach (1862), arguing that people can improve by improving their diet. In fact, although his view was more philosophical than scientific, nutritional education and its rules of a balanced and proper diet are increasingly penetrating into the common social fabric.

Over the past few decades, there has been a growing interest globally, for the relationships among lifestyle, diet and health. In developed countries, in fact, there has been a worrying spread of chronic-degenerative pathologies whose origin involves multiple factors. In this sense, diet certainly plays an important role not only as a risk factor but also as a protective factor.

The data provided by the WHO, the World Health Organization, indicate that in Europe cardiovascular disease, diabetes, cancer and chronic respiratory diseases cause 86% of deaths, 77% of the loss of years of life in good health and 75% of healthcare costs. These diseases have common risk factors such as overweight and obesity, alcohol abuse, the low consumption of fruits and vegetables, physical inactivity and tobacco smoking (Ministero della salute, 2007).

In particular, overweight and obesity are presented as emerging phenomena in Western countries: the year 2000 marked a real turning point for humanity since, for the first time in history, the number of overweight adults has exceeded the number of those underweight (Caballero, 2007). Thus, developing strategies for prevention and awareness on these issues, especially in relation to children and adolescents, is of crucial importance today. OECD (Organisation for Economic Co-operation and Development) reports that 52% of the adult European population is overweight of which an average of 16.6% is obese. The analysis of the individual countries reveals that more than 50% of the population is overweight or obese in 18 of 27 EU states. The record high is registered in Hungary (28.5%), followed by United Kingdom (26.1%) and by Ireland (23%) (2012). Obesity tends to be more common among
disadvantaged groups, particularly among women, and shows rates that nearly doubled since 1990.

In this respect, food labelling is a helpful tool to make informed food choices. However, findings from former studies evidence the urgent need to improve nutrition’s knowledge and simplify nutrition labelling (Dickson-Spillmann & Siegrist, 2011; Easton, Entwistle, & Williams, 2010; Grunert, Wills, & Fernández-Celemín, 2010; Rothman et al., 2006).

Since it has been demonstrated that consumers’ attention decreases as the complexity of information increases (Bialkova, Grunert, & van Trijp, 2013), the European Commission started to develop a standardized system of front-of-pack nutrition labelling to attract consumer’s consideration (European Parliament, 2007). Different signpost and logos have been proposed and people seem to agree on the desire for simplified front of package label but they differ in preferences for the format (Grunert & Wills, 2007).

In June 2013, UK government introduced on a voluntary basis the traffic light labelling system that proved to be the preferred and most understandable by consumers (Malam, Clegg, Kirwan, McGinigal, & BMRB Social Research, 2009). This system uses a reference value of 100 g/ml for product and classifies levels of fat, saturated fat, sugars and salt as low (green), medium (amber) or high (red) (Department of Health, Food Standards Agency, & British Retail Consortium, 2013).

1.2 PROBLEM STATEMENT

After the introduction of this scheme, some Mediterranean countries, including Spain, France, Italy and Greece, complained against the use of such labelling that assigns “red lights” to some of their regional products. They claim that the system may hinder the exports of their traditional and regional foods by biasing consumers against red-labelled products (Robinson, 2014). Under this scheme, even healthy foods like milk, whole grain bread and olive oil have red lights (Blythman, 2012) that consumer associate to dangerous or unhealthy food (Grunert et al., 2010). FSA replies stating that red does not mean “unhealthy” but stands for a high level of the respective nutrient, while green does not stand for healthy but means low level of the respective nutrient (Department of Health et al., 2013). Last 1\textsuperscript{st} October 2014, European
Commission opened infraction proceedings against the British colour-coded scheme to prevent obstacles to trade between EU countries (Roberts, 2014).

In shared knowledge, red, amber and green are not only associated to the traffic signs. Red means also danger, avoidance and warning (Elliot, Maier, Moller, Friedman, & Meinhardt, 2007) while green is linked to safety, environment and positive impressions (Schuldt, 2013).

Extensive research in medical, agro-food and psychological journals revealed only one study that explored so far the relationship between green colour on calorie labels and healthfulness perception. Results of this study suggests that products carrying a green calorie label are perceived as more healthful especially by people who place high importance on healthy eating (Schuldt, 2013). However, no study investigated if it exists any correlation between traffic light label’s colours and perceived product’s healthfulness.

1.3 PURPOSE/RESEARCH QUESTIONS AND HYPOTHESES

To answer the purpose of my thesis, the following research questions will be examined:

-What type of influence do red/green lights labels have on perceived healthfulness?

In particular, we want to investigate whether the mere presence of the green colour on a label is automatically associated to a healthier product even if the text and the numerical data suggest that the product has high level of certain nutrients. On the other hand, consumers may avoid products with red lights because they are perceived as dangerous for their health.

-How people concerned with healthy eating reacts to products labelled with green lights?

As Schuldt (2013) highlighted in his paper, consumer often associate green to bio or organic food which in turn is perceived as healthier (Harris Interactive, 2007; Schuldt & Schwarz, 2010). Results from his study suggest that people who are more motivated to eat healthily are more likely to perceive as more healthful a green-labelled food.
Over the years, several studies asserted that colour affects behaviour. Based on scientific literature, shorter wavelength colours such as green are perceived as calming and less arousing than longer wavelength colours (Elliot et al., 2007). Caivano (1998) pointed out that some meanings are associated to colours; for instance, green is conventionally accepted as the “go” traffic sign and it is related to envy and safety. In nature, organisms use colours for survival and food gathering: Birds have shown preference for green insects rather than red ones because they are adapted to associate warning-coloured preys as harmful animals (Gamberale-Stille & Tullberg, 2001).

In the food context, Schuldt (2013) suggested that colours influence healthfulness perception, specifically the participants of his survey associated the colour green to healthfulness and healthy eating. His experiment demonstrated that a candy bar was perceived healthier when bearing a green front-of-package calorie label rather than a red one. That the green colour reduces riskiness perception is consistent with psychological research indicating that the level of hazard conveyed by the signal word “deadly” decreases when printed in green ink (Braun & Silver, 1995). We thus expect that the evaluation of a high amount of some or all the four nutrients may be biased when the latters carry a green label.

**H1a:** Participants will be more likely to choose the least healthy food product in the green condition study—when all the four nutrients are labelled with green lights—than in the white or TL condition.

As stated above, red is perceived as a more arousing colour than green. Wilson was the first to demonstrate this hypothesis and the subjects used for his experiment described the colour as “more stimulating, exciting, awakening, attention-drawing, overpowering, and lively” (1966, p.948). However, red carries some negative meanings; for instance, individual in an anger state are more likely to perceive red (Fetterman, Robinson, Gordon, & Elliot, 2011). In achievement contexts, red has been shown to impair performance and to activate avoidance motivation because it is associated with danger and the possibility of failure (Elliot et al., 2007). This finding is consistent with Chapanis’ (1994) assertions that the signal word “danger” is associated with red and Braun and Silver (1995) who found that red is rated as more hazardous than either orange, black, green or blue.
Colours do not have just an aesthetic function but they work also as a sign, i.e. an icon or a symbol that substitutes something and conveys a specific meaning (Caivano, 1998). When an individual learns a colour association, its perception activates an autonomous reaction. For example, a pedestrian who encounters a stop sign knows that the sign anticipate a situation: car drivers will start moving so he has to stop. The reaction is involuntary and automatic because, in this context, the colour red is paired with the meaning “stop” (Bargh, 1992). Of course, a different combination of colours would not lead to the same attitude: probably an accident would occur because people would not recognize the colour relationship (Caivano, 1998). Based on this finding, a study proposed that the colour red might influence conscious awareness reducing food and drink consumption. The participants of the experiment avoided to drink from cups with red stickers and ate fewer snacks from red plates compared to white and blue ones. These findings suggest that the colour red affects food and drink intake evoking avoidance motivation (Genschow, Reutner, & Wänke, 2012).

As discussed above, the red colour reflects negative feelings and it has an impact at a non-conscious level. In his study, Schuldt (2013) suggests that the colour of a label, rather than the simple nutritional information, can influence healthfulness perceptions of food products. Indeed, the same calorie information was regarded differently according to the label’s colour. However, the researches that we have reviewed used unhealthy food and drinks in their studies. For this reason, the current research will investigate whether red elicits an avoidance effect on healthy food and drinks as well.

**H1b:** Participants will tend to avoid food with more red lights even when it contains nutrients recommended for a balanced diet.

Green is often associated to different meanings: safety, go, pro-environmentalism in politics, natural, organic… (Caivano, 1998; Schuldt, 2013). In the last years, purchase of organic food has increased because it is considered safer for the environment and healthier (Harris Interactive, 2007). Thus, consumers assume that it contains a lower calorie content and, hence, it can be consumed more frequently (Schuldt & Schwarz, 2010). These findings carry the implication of a halo effect:
consumers concerned with healthy eating may be inclined to judge poor food bearing a green nutritional label in a positive way (Schuldt, 2013).

**H2:** Participants who place high importance in healthy eating will be more inclined to perceive poor food as more healthful in the green condition than in the white or TL condition.

### 2 REVIEW OF LITERATURE

The following section presents an overview of the literature and theoretical material used for this paper. The sources are grouped in three thematic areas: consumers understanding of nutritional labels, efficacy of traffic light labels in healthier food decisions and influence of colures in human psychology.

#### 2.1 CONSUMER’S RESPONSE TO NUTRITIONAL LABELS

The first part of the literature review concerns the relationship between current obesity rates and consumer understanding of nutritional labels. Some scholars question consumers’ ability to understand traditional nutrition tables while others report that just some consumers look at nutritional information.

Consumers with low levels of education have difficulties in interpreting numerical data contained in nutritional guidelines (Dickson-Spillmann & Siegrist, 2011). Younger people, with higher income and education have higher nutritional knowledge while people who are old or with health problems, who are concerned with healthy eating, who are not price or time sensitive are more likely to use food labels (Drichoutis, Lazaridis, & Nayga Jr., 2005; Grunert et al., 2010).

In order to simplify nutritional label and provide information on nutrition content at a glance, the European Commission allows the voluntary adoption of front of pack nutrition labels (Official Journal of the European Union, 2011) which summarizes key information. Since then, several FoP label have been promoted, including the traffic light scheme.
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<tr>
<td>A review of European research on consumer response to nutrition information on food labels</td>
<td>Review research on consumer response to nutrition labels carried out in EU-15 countries. Findings show that consumers are interested in nutrition information also because of the relationship between health and food. They agree on the desire for simplified front of package label while they differ in preferences for the format. Generally, they believe they can understand common signposting formats (traffic light systems, GDA-based systems and health logos or rating systems).</td>
<td>Gruneret, K. Wills, J. (2007). <em>Journal of Public Health</em>, 15(5), 385-399.</td>
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<td>Attacking the obesity epidemic: the potential health benefits of providing nutrition information in restaurants Consumers’ knowledge of healthy diets and its correlation with dietary behaviour</td>
<td>Customers of diner house restaurants underestimate levels of calories, fat and sodium in less-healthful food items. After the provision of nutrition and calories information, purchase of less-healthful items decreased.</td>
<td>Burton, S. Creyer, E. Kees, J. Huggins, K. (2006). <em>American journal of public health</em>, 96(9), 1669-1675.</td>
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<td>Health in the “hidden population” of people with low literacy. A systematic review of the literature Nutrition knowledge, and use and understanding of nutrition information</td>
<td>The study verifies the knowledge of Swiss consumers on how to eat a healthy diet. Most consumers know how to follow a balanced diet; still many do not know the food pyramid. Some consumers believe that a healthy diet means eating less, rather than having a varied diet. Many consumers do not know the importance of increasing fruit and vegetable consumption in their diet.</td>
<td>Dickson-Spillmann, M. Siegrist, M. (2011). <em>Journal of human nutrition and dietetics: the official journal of the British Dietetic Association</em>, 24(1), 54-60.</td>
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<td>This research reviews literature on “hidden population”, who can communicate orally about health issues but have problems in reading and writing. Findings demonstrate that low functional or health literacy is associated with poor health in the “hidden population”.</td>
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<td>Easton, P. Entwistle, V. A. Williams, B. (2010). <em>BMC Public Health</em>, 10, 459-469.</td>
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<td>Degree of understanding of nutrition labels is higher than degree of usage. Level of usage depends on product category and interest in healthy eating. On the other hand, level of understanding is directly related to nutritional knowledge. In turn, both variables are affected by</td>
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<td>Gruneret, K. G. Wills, J. M. Fernández-Celemín, L. (2010). <em>Appetite</em>,</td>
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on food labels among consumers in the UK. Patient understanding of food labels: the role of literacy and numeracy

Despite the majority of patients claim usage and understanding of food labels, only 69% of the questions were answered correctly. Poor understanding of nutritional labels is highly correlated to low literacy and numerical skills. However, even high literate patient have difficulties in interpreting food labels.


Patient understanding of food labels:

The research explores how information density on FoP labels affect consumers’ attention to nutrition labels. Attention decreases as information density increases. Congruency of information does not affect performance. Monochrome labels capture attention better than colour-coded schemes.


The Dieter’s Paradox

According to this study, people believe that the combined calorie content of a healthy item and an unhealthy one is lower than a meal containing the unhealthy item alone. This misconception is more pronounced among weight-conscious individuals.


2.2 TRAFFIC LIGHT LABEL

The second part is dedicated to the review of studies that evaluated the FoP labelling scheme that best facilitate the correct interpretation of nutritional information. Advantages and disadvantages of different FoP schemes are presented as well as their efficacy and effects on purchasing decisions.

UK Food Standards Agency started developing signpost labelling in 2003 and in 2008 assessed the preferred FoP of consumers and the one that helped them to make healthier food choices. Two options resulted to have the highest level of
understanding: the Guideline Daily Amount (GDA) and the Traffic Light label (TL) (Malam et al., 2009). After this consultation, the FSA in agreement with the UK government recommends the TL system (Barclay, 2012) while the European Union rejected the proposal for the compulsory adoption of the TL labelling and favoured the rival scheme (Griffits, 2011).

Given that the adoption of the TL label was voluntary in UK, retailers divided into two coalitions: Sainsbury's, Waitrose, the Co-op, Marks & Spencer and Asda supported the colour-coded scheme while Tesco, Morrison, Lidl, Somerfield and some food manufacturers back the GDA system (Brindley, 2007). Opponents of the TL system argue that consumers will not buy red-coded foods while the GDA system provides information that is more detailed (Parkinson, 2007). This hypothesis is in agreement with Balcombe, Fraser, and Falco (2010) who confirm that consumers have an aversion for basket of goods containing red foods. A study conducted by the Co-operative Food (2013) found that 41% of women and 30% of men would not buy a product if it bore a red traffic light. Likewise, the results of another survey indicate that 73% of respondents interpret red as “try not to eat this product” whereas only 35% correctly choose the definition “It's fine to have this product occasionally as a treat” (Grunert & Wills, 2008). Some European countries too believe that TL scheme is too simplistic and misleading. They claim that the colour-coded label indicates only the presence of bad nutrients and fails to consider the presence of good ones such as fiber, vitamins, minerals and so forth (Parkinson, 2007). Thus, some traditional products like cheese, olive oil, red meat, fish, nuts and fruit would be labelled red for some nutrients even if they contain important nutrients for a balanced diet (Roberts, 2014). Some food processors may take advantage of this reformulating their products and substituting, for instance, fats with carbohydrates, which, however, are eventually metabolised as sugar in our bodies (Blythman, 2012). For these reasons, the European Commission was concerned that because of the UK’s voluntary scheme some foods would be perceived as inferior thus creating a barrier to the free trade that is a violation of EU law (Harrison-Dunn, 2014).

On the other hand, critics of the GDA label argue that the latter protects the financial interest of food industry (Lovell, 2007) and it causes confusion among
shoppers because they find the percentage daily intake difficult to understand (Parkinson, 2007).

The increase of sales of products with more green lights and the decrease of sales of products with more red lights, observed after the introduction of the colour-coded scheme (ECO for the European Commission & Rand Institute Europe, 2008; Games, 2012), suggests that TL labels help consumers make healthier choices.

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<tr>
<td>A 2-phase labelling and choice architecture intervention to improve healthy food and beverage choices</td>
<td>Study divided in 2 phases. In phase 1, a colour-coded labelling (red, yellow or green) was applied to food and beverages in a cafeteria. Phase 2 involved a rearrangement of food and beverages to increase the visibility of healthier items. During phase 1, sales of red items decreased while sales of green items increased. In phase 2, only sales of green beverages increased compared to phase 1.</td>
<td>Thorndike, A. Sonnenberg, L. Riis, J. Barraclough, S. Levy, D. (2012). <em>American journal of public health</em>, 102(3), 527-533.</td>
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<td>A traffic light food labelling intervention increases consumer awareness of health and healthy choices at the point-of-purchase</td>
<td>The study compares responses to survey questions and purchases made before and after the implementation of traffic light label in a cafeteria. After the labelling intervention, more customers reported to have noticed labels, to look for nutrition information and to consider nutrition as an important factor in their purchase and similarly the amount of green items bought increased while their red purchases decreased.</td>
<td>Sonnenberg, L. Gelsomin, E. Levy, D. Riis, J. Barraclough, S. Thorndike, A. (2013). <em>Preventive Medicine</em>, 57(4), 253-257.</td>
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<td>Comprehension and use of UK nutrition signpost labelling schemes</td>
<td>Consumers can understand front-of-package (FoP) labels. The level of comprehension is highest for FoP combining text (the words high, medium, low), and % Guideline Daily Amount (GDA).</td>
<td>Malam, S. Clegg, S. Kirwan, S. McGinigal, S. BMRB Social Research. (2009). <em>BMRP</em>, 1-150.</td>
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<tr>
<td>Consumer perceptions of front-of-package traffic-light food labelling</td>
<td>Results of a study conducted in Minnesota determine that traffic-light food label is perceived as visually appealing and user-friendly. The meaning of the yellow-light appears to be clearer than green and red-lights meaning.</td>
<td>Bronner, K. (2009). <em>The Graduate School University of Wisconsin-Stout</em>. 1-74.</td>
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<td>Consumer testing of the</td>
<td>According to this survey, respondents are more likely to identify healthier foods with colour-</td>
<td>Kelly, B., Hughes, C.,</td>
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<td>Topic</td>
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<td>Food choices of minority and low-income employees: a cafeteria intervention</td>
<td>The research examines whether food choices improved across different racial and socioeconomic groups after labelling intervention. At baseline, Latino and black employees and employees in low-skilled job consumed more red items than white employees or high-skilled employees. Following labelling intervention, employees across all race/ethnicity and job types decreased red purchases.</td>
<td>Levy, D., Riis, J., Sonnenberg, L., Barraclough, S., Thorndike, A. (2013). <em>American Journal of Preventive Medicine</em>, 43(3), 240-248.</td>
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<tr>
<td>Guide to creating a front of pack (FoP) nutrition label for pre-packed products sold</td>
<td>This guide provides support for the voluntary provision of FoP information in UK. It indicates how to calculate the amount of nutrient and energy present in 100g/ml of the product, how to determine the percentage reference intake information and colour coding (red, amber and green).</td>
<td>(2013). <em>Department of Health, Food Standards Agency, devolved administrations</em></td>
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<td>through retail outlets</td>
<td>Healthful food decision making in response to traffic light color-coded nutrition labelling</td>
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<td>The two studies prove that FoP traffic light labels influence actual food purchase behaviour. In particular, traffic light labels help customers with low self-control (who cannot control their eating behaviour) make healthier food decisions.</td>
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<th>Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study.</th>
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<td>Without food labelling only few individuals are able to make correct choices. The traffic light system is more efficient in helping customers identify healthier food variants. However, signpost labelling have no impact on actual food choices.</td>
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<th>Impact of front-of-pack “traffic-light” nutrition labelling on consumer food purchases in the UK</th>
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<td>This study examines change in total week product sales in a major UK retailer’s stores before and after the introduction of traffic light labels. The analysis focuses on two product categories: ready meals and sandwiches. There is no evidence of association between healthiness of products and a change in product sales.</td>
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<th>Is simpler always better? Consumer evaluations of front-of-package nutrition symbols</th>
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<td>The effects of two FoP icons (Smart Choices Versus Traffic Light–Guideline Daily Amount) on US consumers’ perceptions of nutrient levels are examined. Results evidence that TL-GDA icon offers simpler and irrefutable information on the most critical nutrients attributes.</td>
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<th>Mandatory front-of-pack “traffic light labelling” on food and beverages</th>
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<tr>
<td>In this paper, the Royal Australasian College of Physicians supports the mandatory adoption of Traffic Light labelling in Australia and New Zealand following positive outcomes of researches conducted on the label.</td>
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| Royal Australasian College of Physicians. |

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<th>Nutrient profile</th>
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<td>The Belgian and German consumers’ attitudes towards GDA and TL label are explored. In Moeser, A. Hoekfens, C.</td>
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labelling: consumers’ perceptions in Germany and Belgium

Germany consumers prefer TL label while in Belgium consumers appreciate the GDA system. However, in both countries preferences for the different labels are affected by socio-demographic characteristics.


Nutritional Information: traffic light labelling is the best way to reach consumers

This report analyses pros and cons of two nutrition labels: GDA and TL. Colour coded labelling has the advantage of being easily assimilated by poor educated consumers.


The impact of restaurant calorie labels on food choice: results from a field experiment

In an Oklahoma restaurant, the adoption of traffic light symbols on menus lead to a decrease in high calories meals ordered.


Traffic-light labels and choice architecture: promoting healthy food choices

This study analyses sales of food items over a period of 24 months to evaluate the effectiveness of traffic light labelling introduction. Results demonstrate that individuals exposed to TL labels change their purchase behaviour choosing healthier items. Largest reduction occurred in sugar-sweetened beverages.


Working paper on platform commitments in reformulation and labelling

After the introduction of TL scheme, Sainsbury’s and Waitrose reported an increase in sales of healthy products increased while sales of less healthy items decreased. This data suggests that consumers are making healthier choices but they do not avoid products with red lights.


2.3 COLOURS

The third part of the literature review examines the effects of colours on human psychology. In this part, studies on psychology of colours and the semiotic function of colour are presented.
Colour can imply concepts other than the colour itself. Red is associated to passion, danger and stop while green is related to envy, safety and go (Caivano, 1998). Several studies reported differential colour effects on physiology and psychology. Gerard (1958) observed an increase in blood pressure, palmar conductance, respiration rate, eye blink frequency and alert feeling in presence of red illumination. Red has also been shown to evoke anger (Fetterman et al., 2011) and impair performance in achievement contexts (Elliot, Maier, Binser, Friedman, & Pekrun, 2009). In contrast, green is perceived as a calming colour and less arousing, stimulating, and exciting than red (Wilson, 1966).

In the food context, researchers combined these findings and proposed that red colour could induce avoidance of food and drink intake (Genschow et al., 2012) while green may elicit positive impressions that influence the interpretation of nutritional labels (Schuldt, 2013).

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<tr>
<td>Anger as seeing red: perceptual sources of evidence</td>
<td>The result of the two experiments demonstrate that when experiencing anger, people are more likely to perceive the colour red.</td>
<td>Fetterman, A. Robinson, M. Gordon, R. Elliot, A. (2011). <em>Social psychological and personality science</em>, 2(3), 311-316.</td>
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<td>Arousal properties of red versus green</td>
<td>The experiment’s results indicate that red is perceived as a more arousing colour than green. Red is indicated as more stimulating, exciting, awakening, attention-drawing, overpowering, and lively colour.</td>
<td>Wilson, G. (1966). <em>Perceptual and Motor Skills</em>, 23, 947-949.</td>
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<tr>
<td>Colour and psychological functioning: the effect of red on performance attainment</td>
<td>Six experiments examine the link between the colour red and its influence on performance in achievement contexts. Results reveal that participants in the red condition performs worse than those who viewed green or an achromatic colour. Moreover, the influence of red in such contexts occurs without one’s conscious awareness.</td>
<td>Elliot, A. Maier, M. Moller, A. Friedman, Meinhardt, J. (2007). <em>Journal of experimental psychology</em>,</td>
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<tr>
<td>Color and semiotics: a two-way street</td>
<td>Colours work as a sign (the colour serves to represent or substitute something) or as an icon by means of an iconic association (colours and objects are linked based on their similarities). Colour associations differ according to social and cultural contexts.</td>
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<tr>
<td>Does green mean healthy? Nutrition label color affects perceptions of healthfulness.</td>
<td>Nutrition label colours influence healthfulness perceptions. When a non-healthful food item bore a green calorie label, it was perceived as more healthful than when the same item bore a red calorie label. Green labels carry a halo effect: consumers who place a high importance in healthy eating are more inclined to see foods with green nutrition labels in a more positive light.</td>
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<tr>
<td>Environmental Color, Consumer Feelings, and Purchase Likelihood</td>
<td>Colours red and blue are used in a shopping-related experiment. More positive reaction and simulated purchases occurred in blue retail environments.</td>
<td></td>
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<tr>
<td>The color red reduces snack food and soft drink intake</td>
<td>The research proves that colour red can reduce snack food and soft drink intake.</td>
<td></td>
</tr>
<tr>
<td>The effect of red on avoidance behavior in achievement contexts</td>
<td>In achievement contexts (e.g. IQ test), the colour red evokes avoidance behaviour without conscious awareness. Students in the red condition moved their body backward when the test cover was presented.</td>
<td></td>
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</table>


3 METHODOLOGY

The data needed to answer the research questions will be collected through an online questionnaire that will be spread to European consumers through both social media and personal contacts.

The questionnaire will be divided in four sections. In the first section, I will show participants two products of the same product category and their respective TL labels. One product will have lower nutrients’ content (salt, fat and sugar) than the other one. However, the nutrients will not be coloured in green, amber or red according to the amount of the nutrient. The first group of five pairs of pictures will have labels coloured in green whereas the second group of five pair of pictures will present labels coloured in white (a neutral colour). Still, the text high, medium and low of the five nutrients will be maintained. Respondents will be asked to choose the product they would buy. Doing so, we can verify:

- If food of poor nutritional quality when labelled with green lights is perceived in a more positive way than it otherwise would;

- Whether this correlation depends on the colour green or if it occurs also in the monochromatic condition;

- Whether consumers read the text in the green condition—and hence they choose the product with lower amount of fat, sugar, salt and saturates—or whether they just trust their gut.

In the second section, I will reply the above experiment with the TL labels. This time I can find out if the red light helps respondents to identify poor nutritional foods or if participant still choose them. Moreover, I can check also some of the claims made by the opponents of the TL system. For example, one of the complaints made against the colour-coded label is that it considers only the presence of bad nutrient and fails to consider the presence of good ones. Thus, I will propose one food option that appears healthier according to traffic light indicators, while the other will present more red or amber lights but it will contain more fiber, vitamins, minerals…
In the third section, I will ask participants to express their agreement or disagreement with a number of questions concerning the TL system (to understand the reasoning behind their choices in the previous section), shopping attitudes (be on diet, buy healthy items…)… The results of this section will allow me to test if “healthy” people are more inclined to see green-labelled product in a positive way.

The fourth section will measure socio-demographic variables of the participants such as age, gender, education, place of residence and nationality.
4 OVERVIEW OF CHAPTERS

Abstract

Table of content

Table of figures

Table of abbreviations

1. Introduction: presentation of the background, purpose and methodology of the Mater thesis.

2. Literature Review

2.1 Consumer response to food labelling: this section will provide an overview of the latest researches on consumer usage, understanding and knowledge of food labels.

2.2 Effectiveness of traffic light labels in healthy food choices: this section is dedicated to efficacy and influence of TL labels on consumers’ healthy food decisions and actual purchases.

2.3 The role of green and red colours on consumer behaviour: this section will examine the influence of red and green colours on consumers’ decisions.

3. Hypotheses: In this section, hypotheses will be developed on the basis of literature review.

4. Methodology: explanation of the research methodology applied

5. Analysis of results: In this section, hypotheses will be tested against statistical data.

6. Implications: implications on findings will be provided.

7. Conclusions: limitations and further research.

8. Bibliography

9. Appendix
## 5 Plan of Work

<table>
<thead>
<tr>
<th>Time</th>
<th>Phase</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>12.09.2014 – 12.10.2014</td>
<td>Exposé</td>
<td>Selection of the topic, literature review and write exposé</td>
</tr>
<tr>
<td>13.10.2014-1.12.2014</td>
<td>Literature review- Theory</td>
<td>Further literature review and write the theoretical part of the thesis</td>
</tr>
<tr>
<td>1.2.2015-15.3.2015</td>
<td>Analysis phase</td>
<td>Analysis of the online questionnaire results, evaluate results, write analysis section</td>
</tr>
<tr>
<td>16.3.2015-31.3.2015</td>
<td>Implications, limitations, conclusion</td>
<td>Finish writing implications, limitations and conclusion</td>
</tr>
<tr>
<td>1.4.2015-deadline</td>
<td>Finalisation</td>
<td>Review the work (adaptation, correction), prepare final report and presentation</td>
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</table>


Department of Health, Food Standards Agency, & British Retail Consortium. (2013). *Guide to creating a front of pack (FoP) nutrition label for pre-packed products sold through retail outlets* (pp. 1–26).


Games, O. (2012). Justin King tells us more on our position on Traffic Light Labelling.


Grunert, K. G., & Wills, J. M. (2008). *Pan-European consumer research on in-store behaviour, understanding and use of nutrition information on food labels, and nutrition knowledge* (pp. 1–83).


