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## **The influence of colour contrast in packaging on consumer behaviour**

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## **Abstract**

Marketers and package designers have been wondering how to combine colours in order to create positive aesthetics feelings towards a product. The main purpose of this paper is to study the impact of colour contrast in packaging on consumer behaviour, for both complementary and analogous colours, in two different product categories: cookies and milk. To examine this relationship, the following measures were applied: purchase intent, product attractiveness, healthfulness and calories perception. Two experimental studies collected via an online questionnaire show that packaging with contrast of analogous colours is perceived as more likely to be purchased and as more attractive, healthier and less caloric than packaging with complementary colours. We identify that there are differences across specific colour conditions, which highlights the need for exploration of colour interactions. Finally, this paper provides theoretical and marketing implications not only for package designers, but also for marketers in food industry.

**Keywords:** Complementary colours, analogous colours, packaging, consumer behaviour.

## **1. Introduction**

Colour plays a vital role in attracting consumer attention and influencing their perceptions, emotions and behaviours. Past research on colour theory focused on three main dimensions (Hagtveld & Brasel, 2016; Labrecque, Patrick, & Milne, 2013) – hue, saturation and value. However, there is a gap in colour research literature on other perspectives, in particular on colour contrast (Labrecque & Milne, 2012). Colours barely exist in isolation and they are viewed together. Recent publications (Hagtveltd & Brasel, 2017) indicate that few researches have been conducted on combined colour effects.

In addition, product packaging has been proven to be a key factor for product success, having a significant impact on consumers' purchase decisions (Simms & Trott, 2010). Packaging, which is regarded as a function to enhance marketing, has two main components which potentially exert an effect on consumer behaviour, visual and informational elements (Silayoi & Speece, 2007). Colour is a one of the main visual aspects of packaging. However, there is still not enough research to analyse and measure its influence on packaging effectiveness. Additionally, researchers have overlooked the role of colour contrasts, mainly focusing on colour harmony and the impact and effects of single colours (Mohebbi, 2014).

The purpose of this study is to fill this gap by focusing on colour contrast effects, specifically on complementary and analogous colour, and in how complementary colours can influence consumer purchase intent, product attractiveness and attributes (calories and health perceptions) compared to analogous colours. Yet, complementary and analogous colours in the context of product design is perceived as an underexplored area of marketing and the recent publication express the necessity of further research (Bix, Seo, & Sundar, 2013; Rico, 2015).

For the purpose of this work, two experimental research studies were conducted on a sample formed mainly by young generation individuals – “Millennials” (aged between 18 and

40 years). Our predictions revealed that packaging in analogous colours compared to ones in complementary colours are perceived to be more attractive, healthier and less caloric, and reflect a higher purchase willingness.

The subsequent parts of this paper are organised as follows. Section 2 reviews the main results found in the literature about colour research and packaging in marketing, evaluating the relevant variables and theories about complementary and analogous colours. In the end of Section 2 the hypotheses are presented. Sections 3 and 4 describe the empirical methodology used, presenting the data and results of the Study 1 and Study 2. To finalise, Section 5 focuses on the general discussion, limitations and further research suggested on the subject of study.

## **2. Literature Review**

### **2.1 Colour research in Marketing**

Recent literature has pointed out the necessity for more studies in colour-related dimensions (Labrecque et al., 2013; Hagveldt & Brasel, 2017; Kareklas, Brunel, & Coulter, 2014). Not only is colour recognised to have a mainly functional role, but it has been also recently examined as an aesthetic tool (Birren, 1988; Gage, 1993). Marketing researchers have demonstrated colour influence in the following areas: (1) package design (Garber, Burke, & Jones, 2000); (2) advertisements (Gorn, Tracey, & Dahl, 1997; Lohse & Rosen, 2001; Meyers-Levy, & Perrachio, 1995); (3) product customisation and design (Deng, Hui & Hutchinson, 2010; Moreau & Herd, 2010); (4) logos (Bottomley & Doyle, 2006); and, (5) store atmospherics (Kotler, 1973) in order to attract consumers attention (Schindler, 1986) and distinguish brands from competitors.

Indeed, colour has been increasing its role in marketing, as technological advances in colour modifications allow to enlarge the products offerings and more innovative usage of

colour (Labrecque et al., 2013). The availability of colour palette has evolved over the years. As a result, more research should be done on colour contrast, not only considering individual dimensions of colour.

Colours are seldom processed individually, as customers are affected by different colours at the same time. However, scarce research has been conducted in the area of colour contrast and its marketing implications (Hagtvedt & Brasel, 2017; Labrecque & Milne, 2011). Marketers are often reluctant to explore the use of different colours (Rawsthorn, 2010). However, interactions of colours may produce significantly different perceptions in contrast to the effects of single colour.

One of the most recent publications in this area was presented by Deng et al. (2014), who focused on aesthetic colour combinations in self-design task. This was the first study to examine colour relationship in a realistic consumer activity, in spite of mentions to examine colours in their natural entourage (e.g., Shevell & Kingdom, 2008).

There were also several studies on colour contrast related to product size and emotional state of consumer. Prior work has showed that colour contrast may affect size perception (Van Ittersum, & Wansink, 2012). Indeed, further research demonstrated that emotional state may boost contrast sensitivity irrespective of attention (Phelps, Ling, & Carrasco, 2006).

## **2.2 Colour and Packaging**

Marketers highlighted the importance of packaging in affecting clients' point-of-purchase decisions (Underwood & Ozanne, 1998). Since the 1950s', when self-service retailing started to emerge, packaging gained more significance. However, many researchers like Simms and Trott (2014) have mentioned that packaging did not get enough attention in marketing. Moreover, Kauppinen-Raisainen (2014) have argued that multiple functions of packaging colours need further investigation in the field of packaging and marketing.

Packaging is a critical factor in consumer decision-making process, as it sends to consumer at the moment that are actually deciding in the shops (Silayoui & Speece, 2007). Colour has been a paramount visual aspect of packaging. Product shape or design, as well as product aesthetics are crucial tools to get a competitive advantage over the competitors (Kreuzbauer & Malter, 2005). It has been argued that strategic use of visual cues is perceived as one of the most efficient to capture attentions of consumers (Kauppinen-Raisanen, 2014).

Visual scheme on packaging catches clients' attention, in that way consumers form expectations of different products. As a result, these perceptions have a vital impact on clients' purchase decisions (Venter, van der Merwe, de Beer, Kempen, & Bosman, 2011). Consumer expectations are pre-purchase beliefs or assessed beliefs of a product (Oliver, 1980; Olson & Dover, 1979). In the field of food products, colour (including colour of food itself and colours of packages) may evoke and affect expectations, such as sweetness, pureness, refreshing, freshness, naturalness, flavour, intensity, liking, healthiness, calories perception (Clydesdale, Gover, Philipsen, & Fugardi, 1992; Deliza, Macfie, & Hedderley, 2003; Schutz, 1954; Wei, Ou, & Luo, 2007; Zellner & Durlach, 2002, 2003; Dong & Qian, 2013; Schuldt, 2013).

Graphics and colour are one of the most significant aspects in influencing consumers' buying decisions. In the literature, graphics have been regarded as image layout, colour combinations, typography and product typography (Silayoui & Speece, 2007). Among them, packaging colour was found to have a determinant effect on purchase intention, particularly for consumers who are in a hurry, such as the Millennials (Kauppinen-Raisanen, 2014). The same author has created the framework which presents the functions of packaging colour at the point of sale. This research concluded that there are three primary functions, voluntary or involuntary attentions, aesthetics and communication.

Bix et al. (2013) also underlined the need for further investigation of product-package colour contrast that can have potential influence on consumer behaviour, as well as the perception of quality, visual appeal and purchase intention, especially in the category of food snacks. Hence, packaging of food snacks will be examined in this study.

In sum, the influence of colour contrast in packaging is under-researched in marketing (Labrecque & Milne, 2012; Hagtveldt, Brasel, 2017; Mohebbi, 2014; Bix et al., 2013; Kauppinen & Raisanen, 2014; Deng et al., 2010).

Marketing researchers have applied different measures, as willingness-to-pay, product size, quality, visual appeal, sweetness, pureness, refreshing, naturalness, flavour intensity, and taste perception (Hagtvedt & Brasel, 2017; Wei, Ou, Luo, & Hutchings, 2014; Bagchi & Cheema, 2012).

As previously mentioned, the role of colour, especially in packaging, has been proven to influence the consumer behaviour at the point of sale. On one side, product of positive aesthetics is more probably considered and further be purchased (Eckman, Damhorst, & Kadolph, 1990; Morganosky, 1984). Product aesthetics and product design have been widely claimed to exercise influence on consumer purchase decisions (e.g. Venter et al., 2011; Kreuzbauer & Malter, 2005).

Purchase intention is one of the most commonly used variable to measure effects of colour in marketing. Babin, Hardesty and Suter (2003) indicated that interaction of colour (orange, blue) and light affected purchase intention and price fairness. Consumer expectations created by the impact of colour influence purchase decision making (Hutchings, 2003). Indeed, purchase intent has been recently used in exploring colour impact in: advertising (Fajardo & Townsend, 2014), atmospherics (Babin et al., 2003), branding – logo design (Labrecque & Milne, 2012), branding – product colour naming (Skorinko, Kemmer, Hebl, & Lane, 2006), Internet (Kaltcheva & Weitz, 2006; Bagchi & Cheema, 2012), packaging –

product size (Hagveltd & Brasel, 2017), package design (Wei et al., 2014). Overall, it has been agreed that colour determines the likelihood of purchase of the products. There are several methods to measure consumers purchase intention and this will be explained in the next section of the study.

Packaging colour captures attention of the consumers at the store and leads them to build perceptions about multiple products. Especially in the food marketing, colour (of the food itself and packaging) could provoke and stimulate various perceptions, visual appeal, freshness, flavour, intensity, naturalness. Consequently, product attractiveness (i.e., product liking), is the second measure applied in this research. Colour, as a dominant visual aspect of packaging, influences how consumers perceive visual appeal of products (Deliza et al., 2003; Wei et al., 2014).

In the food marketing, consumers' expectations towards healthiness and calories estimation have recently become more important topics due to a growing popularity of healthy lifestyle based on a well-balanced diet. Moreover, Millennials (who formed the target group of this study) are allegedly the most concerned generation about healthy diet. Research on consumer research indicates that visual cues can influence calories perception and other health-related expectations. (Andrews, Netemeyer, & Burton, 1998; Chernev & Gal, 2010; Wansink & Chandon, 2006).

Wei et al. (2007) studied the effect of package colours on judgements and discovered that product was expected to be healthy if product was designed in light and dark colours. Additionally, another study suggests that green nutrition labels increase perceive healthfulness, especially among customers who place high importance on healthy eating (Schuldt, 2013). Also, Dong and Qian (2013) have examined the effect of package colour on consumers cognitive processing and food calorie perceptions. Accordingly, we believe it is necessary to include these variables in the first study – in which packages of cookies will



examined. Nowadays, confectionary producers are pushed to change their product base and design to satisfy consumer interests in healthier snacks. In sum, this study will consider the following dependent variables: purchase intention, product attractiveness, healthfulness and calories estimation.

### **2.3 Complementary colours, analogous colours and hypotheses development**

Studies about colour combinations tend to examine colour preferences and colour harmony (Rico, 2015). Colours that are seen together, creating a pleasing affective response are considered to be harmonious (Burchett, 2002). In contrast, colour preference is considered to be as the tendency of preferring or liking one colour over another. Researchers have been trying to identify appealing and unpleasant colour combinations, however there is no consistency in the results (Livitz, Yazdanbakhsh, Mingolla, & Eskew, 2011).

It is critical to mention the most well-known colour theories of art: (1) analogous colour theory of Eugene Chevreul, and (2) complimentary colour theory of Goethe and Range's (Holtzschue, 2011; Fraser & Banks, 2004) "Theory of Colours", written by the German poet Johann Wolfgang von Goethe in 1810, who presented the concept of colour wheel, being one of the first books studying the phenomenon of human colour perception. There are two basic ways how colours can be combined in the colour wheel, by grouping them in analogous and complementary colours. The analogous colours are those colours which lie next to each other on colour wheel, sharing a common colour (for example red and orange). An analogous colour scheme usually is perceived harmoniously in contrast to complementary colours. Complementary colours are those colours which are located directly opposite from one another on the colour wheel. Furthermore, they are creating the feeling of distinctive contrast (e.g., yellow and violet, or red and green). Interrelationship among colours have been studied since Chevreul (1855) and Moon and Spencer (1944). More recently,

Chuang and Ou (2010) also concluded that analogous and complementary colours in terms of hue, lightness or chroma could produce harmonious combinations.

Prior colour theories in art proposed many principles regarding which colour combination was creating the feeling of harmony. On the other hand, there is limited number of empirical studies which examined the colour preferences based on analogous and complementary colours theory (Rico, 2015; Hurley, Randall, O'Hara, Tonkin, & Rice, 2016). From a psychological perspective, Schloss and Palmer's publication (2010) differs colour preference into two conditions: seeing an entire combination (similar hues are selected), or seeing a colour combination as a figural colour on its background colour (complementary hues are selected). Moreover, there were also several marketing studies exploring impact of colour harmony on consumer behaviour. But if consumers perceive positive aesthetic feelings of a product, there is higher probability that the product will be considered and purchased (Eckman et al., 1990; Morganosky, 1984).

It is worth to mentioned that colour harmony has been acknowledged as an important aspect of package design, influencing consumer perception on product attractiveness and attributes – quality and freshness (Wei et al., 2014). Additionally, this study concluded that there are four main rules of colour harmony: hue – related, chroma – related, lightness – related and conjoint rules.

In the scope of limited studies about complementary and analogous colours regarding consumer behaviour, the results have been mutually exclusive. Deng et al. (2010) suggested that consumers generally prefer to combine colours that are relatively close or exactly match. However, they also mentioned one exception, as some people emphasise one signature product component by using contrastive colour.

One of rare publication examining the influence of colour contrast on consumers' behaviour indicates that the simultaneous contrast of colour has a significant impact on the

attentive behaviour of clients, their expectations of quality of the product, visual appeal and purchase intent (Bix et al., 2013). Indeed, this study was exploring simultaneous colour contrast (i.e the produce viewed by a mesh bag) on attentive behaviour, measured by eye tracking. Six different types of products (red apples, oranges, lemons, green apples, purple onions and white onions) were showed with four differently colour mesh treatments: the same (as the good), complementary, complementary-analogous and analogous. Bix et al. (2013) discovered that product packaged in the same or analogous mesh were perceived by participants to be of higher quality, more visually appealing and evoked a higher level of purchase intention than those packaged in complementary or complementary-analogous mesh. To sum up, based on the literature review, we hypothesise that products of analogous colours packaging would be perceived as more attractive, healthier, less caloric and more likely to be purchased. Specifically, we propose the following research hypotheses:

***H1.** A product in analogous colours is perceived to be more likely purchased than a product in complementary colours.*

***H2.** A product in analogous colours is perceived to be more attractive than a product in complementary colours.*

***H3.** A product in analogous colours is perceived to be healthier than a product in complementary colours.*

***H4.** A product in analogous colours is perceived to be less caloric than a product in complementary colours.*

We conducted two experimental studies in order to test the impact of complementary and analogous colours in the packaging. Study 1 tested whether participants evaluating a pack of cookies would be more willing to buy the ones in analogous colours than in complementary colours. Additionally, in Study 1 we examined whether a package of cookies in analogous colours was perceived as more attractive, healthier and less caloric than a package in

complementary colours. Study 2 was designed to test if the conclusions from Study 1 were relevant in a different product category: milk.

### 3. Study 1

#### 3.1 Method

The experiment was conducted on personal computers or mobile devices by a questionnaire, using Qualtrics. One hundred fifty – two participants (82 females and 70 males,  $M_{age} = 24.30$ ,  $SD = 3.44$ ) from various countries participated and were randomly assigned to the analogous ( $n = 74$ ) or complementary colours packages of cookies ( $n = 78$ ). Sixty – two participants were excluded due to incomplete answer. The condition in the analogous colour contained three packages of cookies in yellow – orange, blue – green and blue – violet. On the other hand, the condition in the complementary colours consists of packages in red – green, violet – yellow and blue – orange. Participants were informed that the purpose of the study was to understand implications of colour in marketing.

The questionnaire consisted of two parts. Firstly, all the participants were asked to answer eight questions about what they see on the picture, in order to complete a colour blindness test. One of the most well-known tests for colour blindness, invented by Dr Shinobu Ishihara (1917) was used in this study. Participants were showed a set of eight coloured dotted plates, each of them showing a number. In order to proceed further in the questionnaire, they need to answer with a right number to all the questions. The analysis excluded six participants who appeared to be colour - blinded.

In the second part of the survey, participants were first presented with the following instructions: “*Imagine that you are in the shop and you are seeing the following package of cookies*”. Under these instructions, the participants were presented a picture of the cookies either in yellow – orange, blue – green, blue – violet, red – green, violet – yellow and in blue

– orange, depending on which condition. In terms of properties, using RGM model we used: orange (R: 252, G: 138, B:14), yellow (R: 255, G: 216, B:0), blue (R: 45, G: 64, B:132), green (R: 105, G: 194, B:26), red (R: 217, G: 30, B:51) and violet (R: 95, G: 6, B:132).

Besides the colour manipulation, all conditions were identical in every aspect. In both conditions, participants saw the packages of cookies in a particular colour combination and in random order.

Next, participants were asked to rate the purchase likelihood using the measure adopted from Mullet and Karson (1985) on a 5 - point scale (1 – definitely will buy and 5 – definitely will not buy). They also indicated on a 7 – point scale how strongly they feel this product is attractive (1 = less attractive and 7 = more attractive). The similar measure of product attractiveness was used by Yan, Sengupta and Wyer (2014). The participants were also asked two questions about healthfulness and calories perception, how strongly they feel these cookies are healthy or caloric (1 = less healthy and 7 = more healthy; 1 = less caloric and 7 = more caloric). Similar comparative measures of healthiness and calories estimation have been previously employed in research of McCroskey, Pricitard and Arnold (1967). Furthermore, for the manipulation check, the study implied that the questions mentioned above were shown in random order. Finally, all participants answered demographic questions (age, gender, nationality and education level).

## **3.2 Results**

### *3.2.1 Purchase intent*

Analysis of purchase intent revealed significant differences between analogous and complementary colours on purchase intent. As predicated, the cookies in packages of analogous colours ( $M_{anal} = 3.15$ ,  $SD_{anal} = 1.157$ ) were perceived as more likely to be purchased than in the packages of the complementary colours ( $M_{comp} = 3.53$ ,  $SD_{comp} = 0.968$ )

(  $t(454) = -3.78, p = .00$ ). An ANOVA yielded significant differences across colours ( $M_{orange - yellow} = 3.07, M_{blue - violet} = 3.33, M_{blue - green} = 3.05, M_{orange - blue} = 3.53, M_{red - green} = 3.46, M_{violet - yellow} = 3.59, F(5, 450) = 3.573, p < .004, \eta_p^2 = .038$ ). Post-hoc test Tukey's HSD revealed significantly less likely to be purchased when the package was yellow – violet than yellow – orange ( $p = .032$ ) and blue – green ( $p = .025$ ). There were no significant differences among yellow – orange, blue – green, blue – violet, red – green, violet – yellow and blue – orange conditions (all  $ps > .05$ ). These results support hypothesis 1.

### 3.2.2 Product attractiveness

Analysis of a product attractiveness as the dependent measure and type of colour contrast as a predictor revealed that cookies packages of analogous colours ( $M_{anal} = 3.61, SD_{anal} = 1.46$ ) are perceived to be more attractive than cookies packages of complementary colours ( $M_{comp} = 3.18, SD_{comp} = 1.42$ ) ( $t(454) = 3.207, p = .001$ ). An ANOVA revealed that there are significant differences between colours ( $M_{orange - yellow} = 3.66, M_{blue - violet} = 3.39, M_{blue - green} = 3.78, M_{orange - blue} = 3.05, M_{red - green} = 3.24, M_{violet - yellow} = 3.24, F(5, 450) = 2.815, p = .016, \eta_p^2 = .03$ ). Post-hoc test Tukey's HSD reported significantly that the package of blue – green is perceived more attractive than package of blue – orange ( $p = .023$ ). There were no significant differences among yellow – orange, blue – green, blue – violet, red – green, violet – yellow and blue – orange conditions (all  $ps > .05$ ). These results support hypothesis 2.

### 3.2.3 Healthfulness perception

Analysis of healthfulness estimation revealed that packages of cookies in analogous colours ( $M_{anal} = 3.99, SD_{anal} = 1.37$ ) is perceived to be healthier than the ones in complementary colours ( $M_{comp} = 3.37, SD_{comp} = 1.39$ ) ( $t(454) = 4.817, p < .001$ ). Furthermore, similar ANOVA as for previous variables reported that there are significant differences among specific colour combinations ( $M_{orange - yellow} = 3.88, M_{blue - violet} = 3.64, M_{blue - green} = 4.46, M_{orange - blue} = 3.41, M_{red - green} = 3.73, M_{violet - yellow} = 2.96, F(5, 450) = F10.374, p < .001, \eta_p^2 =$

.103). In addition, the packages were considered healthier in blue – green condition than in blue – violet, red – green, violet – yellow and blue – orange conditions (all pair wise  $p_s < .05$ ), but not the orange – yellow condition ( $p = .094$ ). It is also essential to mentioned that package with violet - yellow condition appeared to be less healthy than yellow – orange, blue – violet, blue – green, red – green ( $p_s < .05$ ), but not blue – orange ( $p = .299$ ). It is remarkable to noticed that the package of red – green condition was perceived to be healthier significantly only from violet – yellow ( $p = .05$ ), whereas the package which also included the green colour, but in the blue – green condition was perceived to be healthier from almost all conditions. These finding support the hypothesis 3.

#### 3.2.4 Calories perception

A t-test with a colour contrast as the grouping variable and calories perception as the test variable revealed significant differences between analogous ( $M_{anal} = 3.72$ ,  $SD_{anal} = 1.30$ ) and complementary colours on calories estimation ( $M_{comp} = 4.15$ ,  $SD_{comp} = 1.45$ ) ( $t(454) = -3.315$ ,  $p = .001$ ). Indeed, an ANOVA indicates there are significant differences between colour combinations ( $M_{orange - yellow} = 3.66$ ,  $M_{blue - violet} = 4.00$ ,  $M_{blue - green} = 3.51$ ,  $M_{orange - blue} = 4.17$ ,  $M_{red - green} = 3.78$ ,  $M_{violet - yellow} = 4.5$ ,  $F(5, 450) = 5.42$ ,  $p < .001$ ,  $\eta_p^2 = .057$ ). Post – hoc test Tukey’s HSD revealed significantly that the yellow – violet package was more caloric than yellow – orange ( $p = .002$ ), blue – green ( $p = p < .001$ ) and red – green ( $p = .014$ ) packages. Additionally, blue – green package was perceived less caloric than the blue – orange package ( $p = .033$ ). There were no more significant differences among yellow – orange, blue – green, blue – violet, red – green, violet – yellow and blue – orange conditions ( $p_s > .05$ ). These results support hypothesis 4.

### 3.4 Discussion

Study 1 indicates that the type of colour combination (i.e., analogous or complementary colours) impacts significantly the consumer behaviour, which is consistent

with previous literature (Bix et al., 2013; Deng et al., 2010). The results provide the support for the initial hypotheses. Specifically, the packages of cookies in analogous colours were perceived as more willing to be purchased, more attractive, healthier and less caloric for the clients than the packages in complementary colours. Furthermore, results also suggest that there are differences across specific conditions. Blue – green package of cookies was perceived more attractive, but also healthier and less caloric than blue – orange package. In addition, yellow – violet package was considered as less willing to be bought, less healthy and more caloric than blue – green and yellow – orange packages. Indeed, green – blue package of cookies was perceived as healthier in comparison with the most of colour combination, expect from yellow – orange condition. This finding is consistent with previous colour research demonstrating that green colour is associated with healthfulness (Shuldt, 2013).

Indeed, Study 1 represents a first step in examining the relationship between the type of colour contrast and consumer preferences. The previous publication (Bix et al., 2013) reflects the importance for further research across different types of product. In order to extend the findings about colour contrast, we present the following study.

## **4. Study 2**

### **4.1 Method**

In order to examine further the relationship between analogous and complementary colours with packaging, a second study was designed, but using a different product category – milk. Publications suggest the importance of using different product categories in colour contrast research (Bix et al., 2013). The first study demonstrated significant differences between blue – orange and blue – green packages. Consequently, the second study aims to investigate if the conclusions of the Study 1 can be applicable to other products, in this case milk. The experiment was carried out on personal computers or mobile devices using a



questionnaire on Qualtrics. One hundred - fifty respondents (89 females and 61 males,  $M_{age} = 24.59$ ,  $SD = 4.01$ ) mainly from European countries were randomly allocated to the blue – orange ( $n = 74$ ) or blue – green condition ( $n = 76$ ). Twenty respondents were excluded from analysis due to incomplete answers. As well as in the Study 1, participants were notified that the goal of the study was to understand marketing implications of colour in packaging.

The questionnaire included two parts. Firstly, all respondents were asked to answer eight questions in order to check if they are colour – blinded. As in the first study, the test of Dr Shinobu Ishihara (1917) was used for colour - blinded check. Respondents were presented a set of eight coloured dotted plates, each of them showing a number. In order to proceed further in questionnaire, they have to choose a right number to every questions. The analysis excluded eleven participants who turned out to be colour - blinded.

In the second part of the survey, firstly participants were shown the following instructions: “*Imagine that you are in the shop and you are seeing the cartoon of milk*”. Under these instructions, a picture of the cookies either in blue-green or blue-orange packaging (depending on which condition) was presented. Besides the colour manipulation, two conditions were identical in every aspect. Next, participants were asked two questions about healthfulness perception and product attractiveness. In the second study, the same scales were used. On a 7 – point scale respondents were asked how strongly they feel this product is attractive (1 = less attractive and 7 = more attractive). In addition, they needed to assess healthfulness impression, using also a 7 – point scale how strongly they feel this milk is healthy (1 = less healthy and 7 = more healthy). Lastly, all participants answered demographic questions (age, gender, nationality and education level).

## **4.2 Results**

### *4.2.1 Product attractiveness*

Analysis of product attractiveness revealed significant differences between blue-orange (complementary colours) and blue-green conditions on product attractiveness. As demonstrated in the first study, milk in the package of analogous colours, blue-green condition ( $M_{blue - green} = 3.92$ ,  $SD_{blue - green} = 1.74$ ) was perceived as more attractive than in the package of the complementary colours, blue-orange condition ( $M_{blue - orange} = 2.78$ ,  $SD_{blue - orange} = 1.42$ ) ( $t(148) = 4.38$ ,  $p < .001$ ). These results support hypothesis 2.

#### 4.2.2 Healthfulness perception

Analysis of healthfulness estimation as the dependent measure and type of colour contrast as the predictor, revealed that milk in blue-green carton ( $M_{blue - green} = 4.11$ ,  $SD_{blue - green} = 1.72$ ) is perceived to be healthier than in blue-orange carton ( $M_{blue - orange} = 2.55$ ,  $SD_{blue - orange} = 1.1$ ) ( $t(148) = 6.595$ ,  $p < .001$ ). These results support hypothesis 3.

### 4.3. Discussion

Study 2 provides further evidence implicating that blue-green packaging, representing analogous colours has positive effect on purchase on product attractiveness and healthfulness perception in contrast to blue-orange packaging, complementary colours. The results obtained from Study 1 were applicable to also different product category, milk.

## 5. General Discussion

Colour has been shown to be a key, visual element of packaging, exercising a paramount influence on clients' behaviour. However, past publications focused mainly on attributes of single colour effect, hue, saturation and value. This is the first study to demonstrate consumers may responded differently to analogous and complementary colours in packaging. Using colour theories of arts and aesthetics, we merge colour marketing literature with psychology literature to assess how the analogous and complementary colours can attract clients' attention and shape their expectations.

Dataset of Study 1 was gathered via an online questionnaire, applied six different conditions to packages of cookies: blue – violet, blue – green, yellow – orange, blue – orange, yellow – violet and red – green. Indeed, Study 1 confirmed that packages in analogous colours are seen as more attractive, healthier and less caloric than packages in complementary colours. Furthermore, clients showed that they are more likely to purchase products in packaging in analogous colours. The results supported all of the initial hypotheses. As expected, the differences across specific conditions were identified. A blue–orange package of cookies was perceived as less attractive, more caloric and less healthier than exactly the same package of cookies in blue – green condition.

In order to deepen the knowledge obtained through Study 1, the Study 2 aimed to verify if the results stated using packages of cookies are applicable in different type of products. It was demonstrated that blue–green carton of milk is perceived as more attractive than blue – orange carton of milk with exactly the same properties. Furthermore, the results showed that clients perceive blue–green carton of milk as healthier than the one in blue–orange condition, which is consistent with the previous publication proving green association with healthfulness. However, this work extends recent research by demonstrating that this association exists also in green combination with blue colour (Shuldt, 2013).

This paper contributes to literature by providing first empirical tests of how analogous and complementary colours can influence colour preferences and therefore consumer behaviour. We demonstrate that analogous colours have the potential to increase product appeal and purchase intent. Additionally this work suggest that packaging in analogous colours, especially in blue – green condition can shape customers' healthfulness and calories estimations. Furthermore, we identify that there are differences between specific colour conditions within analogous and complementary colours, which are needed to be taken into account.

Our studies imply that marketers can use the colour combination, analogous colours to enhance aesthetic appeals and powerfully influence calorie and other health – related judgements. This work provides the knowledge for marketing managers how to combine colours appropriately that will create positive connections with their package design. Based on this study, they may explore use of different colours, as interactions of colours may create significantly different perceptions than single colours. Our findings are essential for product designers as well, because colour interrelationship is a dominant visual aspect of packaging.

### **5.1 Limitations and suggestions for future research**

This paper has several limitations that further research should address. First of all, we rely on data collected from online questionnaire. Electronic presentation differs depending on type of device, software and screens. Consequently, it is difficult to ensure the same attributes of the experimental stimuli. Further research should consider repeating this study using a paper questionnaire. Secondly, the study uses only one combination of each colour conditions, it neglects the diversification among the same pair of colours. Further research should verify if the same conclusions can be stated with using the same combinations of colours, but of different properties, in terms of hue, saturation and value. As previous publication suggests, it is essential to examine different product classes (Bix et al., 2013), in which product attractiveness and healthfulness are critical factors in clients' buying decisions.

## **6. Conclusion**

To finalise, this study has provided one of the first empirical research on how analogous and complementary colours in packaging may influence on consumers' health – related judgements of the product, their purchase intent and product attractiveness. Packages in analogous colours are perceived as more likely to be purchased, more attractive and less caloric than the ones in complementary colours. Therefore, we can provide theoretical and

marketing implications about colour interrelationship in packaging that can be beneficial for food producers, package designers and marketers.

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## Appendices

### Appendix 1. The six packages of cookies surveyed in the Study 1.

Complementary colours:



Analogous colours:



### Appendix 2. The 2 cartons of milk surveyed in the Study 2.



### **Appendix 3. The beginning of the both experiments.**

Dear participant,

Welcome to my survey! I am a student of Master in Management at Nova School of Business and Economics and this study is part of my Master Thesis. I am currently conducting research in order to analyze marketing implications of colour.

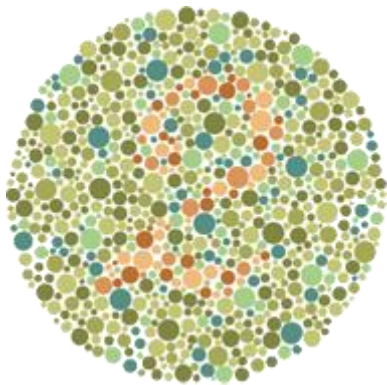
This is a multiple choice questionnaire and takes approximately 3 minutes to complete.

All your answers are treated anonymously and confidential. They will only be evaluated for research purposes.

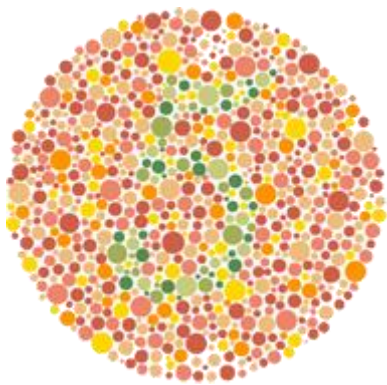
Thank you very much for participating!  
Zuzanna

### **Appendix 4. The test for colour-blindness used in two studies.**

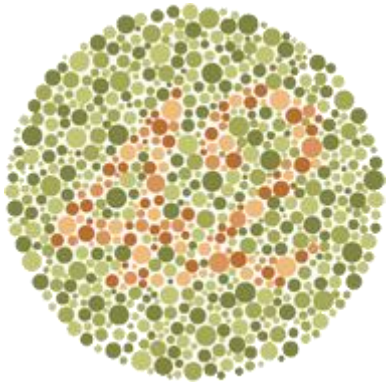
Look at that picture. What do you see?



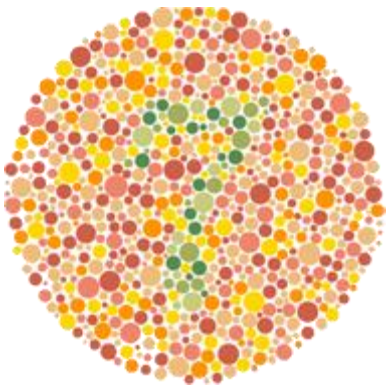
Look at that picture. What do you see?



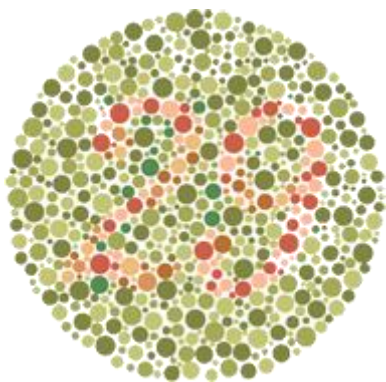
Look at that picture. What do you see?



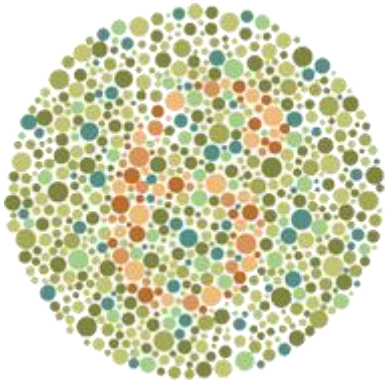
Look at that picture. What do you see?



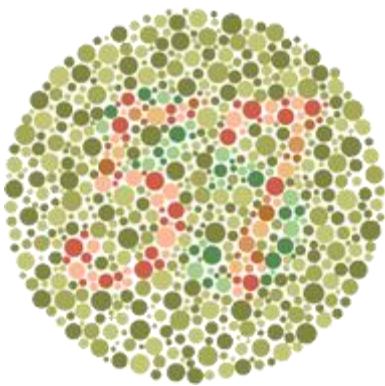
Look at that picture. What do you see?



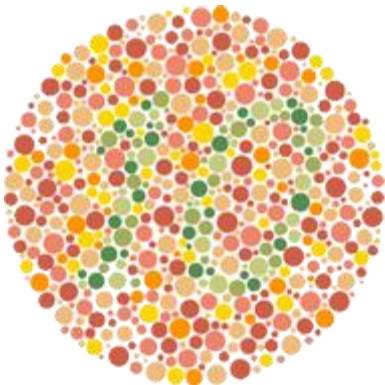
Look at that picture. What do you see?



Look at that picture. What do you see?



Look at that picture. What do you see?



## Appendix 5. The questionnaire used in Study 1.

### Instruction:

Imagine that you are in a shop and you are seeing the following package of cookies:

(picture of package of cookies)

1. How likely is it that you, yourself, would purchase this product?

- definitely will buy
- probably will buy
- may or may not buy
- probably will not buy
- definitely will not buy

2. How strongly do you feel these cookies are healthy?

Please rate using the scale, where 1 means less healthy and 7 more healthy.

	1	2	3	4	5	6	7
Healthfulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. How strongly do you feel these cookies are caloric?

Please rate using the scale, where 1 means less caloric and 7 more caloric.

	1	2	3	4	5	6	7
Calories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. How strongly do you feel this product is attractive?

Please rate using the scale, where 1 means less attractive and 7 more attractive.

	1	2	3	4	5	6	7
Product attractiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Appendix 6. The questionnaire used in Study 2.

### Instruction:

Imagine that you are in a shop and you are seeing the following carton of milk:

(picture of carton of milk)

1. How strongly do you feel this product is attractive?

Please rate using the scale, where 1 means less attractive and 7 more attractive.

	1	2	3	4	5	6	7
Product attractiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. How strongly do you feel this milk is healthy?

Please rate using the scale, where 1 means less healthy and 7 more healthy.

	1	2	3	4	5	6	7
Healthfulness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>