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The role of background color, interletter spacing, and font size on preferences in the digital presentation of a product

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Abstract

The main goal of this research was the analysis of persons' attitudes towards digital graphical information regarding various types of smartphone's virtual package designs. Sixty students from two different faculties were involved in the study. Both the faculty and gender effects were controlled. The packages were electronically presented to the subjects on the computer screen. A binary pairwise procedure within the framework of the conjoint analysis was employed to assess the examinees' preferences. The experimental stimuli differed in the brand name location in relation to the product image (left and right hand side), background colors used (grey and pink), and the typography applied to the brand name (big and compact text versus small with the increased interletter spacing). The main results showed significant effects of brand name location and typography along with significant interactions concerned with the background package color. Generally, males preferred grey variants while females – pink. These results analyzed along with the conjoint analysis outcomes surprisingly show that the background color was the main factor influencing males' preferences while for women it was the least important issue. The cluster analysis results demonstrated significant interpersonal discrepancies and identified three, similar in number, groups sharing common preference structures.

Keywords

digital signage, conjoint analysis, brain lateralization, color preferences, interletter spacing, font size

1. Introduction

Packaging concerns almost all goods in a contemporary world. Classically, the main product package functions (Robertson, 2006) include the: containment, protection, convenience, and communication. While, generally, all these uses are important sometimes they have no application as there are packages for products that physically do not exist such as computer software or a piece of music. Both in real and virtual environments one may also find packages used for selling various kinds of services, or services accompanying a product. Thus, quite frequently there exists only a digital version of the package used for informative and marketing purposes and available in electronic shops, auction portals, displayed on billboards or used as a part of digital signage messages.

It has already been proved that the visual appearance both of real packages as well as their virtual counterparts may have influence on purchasing decisions, therefore, the recommendations based on scientific investigations are of great interests for marketing researchers and practitioners. Many studies dealing with static visual marketing message conveyance were and still are inspired by knowledge derived from various fields such as psychology, vision physiology or anthropology. The general idea of this type of investigations very often comes down to verifying to what extent those general theories apply in practical situations, what the limitations are, and how they can be transformed to practical design rules. In the current study we continue research in this trend and investigate components existing in almost any packaging that is the background color, brand name, and product image.

The remainder of this work at first review the research related to examined factors which ends with specifying detailed goals of the research. Then, the description of the conducted experiment is presented. The obtained data are next demonstrated and analyzed. Finally, the discussion of the findings is provided along with the conclusions.

2. Related research

Generally, the package design issue has been subject to many investigations concerned with a great variety of problems. Lately, a comprehensive review and classification of articles from academic journals in English published between 1990 and 2011 and dealing with the broadly understood packaging design has been provided by Azzi et al. (2013). The authors list five fields of high importance for packaging design including: (1) safety, (2) ergonomics, (3) sustainability, (4) logistics, and (5) marketing and communication. The current study is mostly focused on last area, though it can also be treated as an attempt to determine how to fit the message to a human being which is, in turn, the domain of the ergonomics.

The importance of packaging informative and marketing functions was noticed many decades ago. Dichter in 1957 called the package a *silent salesman* whereas Lewis (1991) went even further treating the packaging as a *flag of recognition* and a *symbol of values* and recognizing the considerable influence of the pack design on relationships between the brand and the consumer. The magnitude of package design significance is also acknowledged in recent studies (e.g. Wells et al., 2007). It is commonly believed that the packaging plays an important role in attracting attention, providing information and shaping customers' perception about a product (Orth and Malkewitz, 2008 and 2012; Clement et al., 2013; Littel and Orth, 2013). Many studies have proved that final purchase decisions and price expectations may be strongly influenced by the packaging design (Bloch, 1995; Orth et al., 2010; Reimann et al., 2010). Therefore, there are a number of various studies aimed at seeking the ideal form of the package in diverse contexts (e.g. Crilly et al., 2004 and 2009; Garber et al., 2009; Hoegg et al., 2010; Chou and Wang, 2012) and exploring factors that influence the users' preferences (e.g. Limon et. al., 2009; Gofman et al., 2010; Holmes and Paswan, 2012). A great body of literature in this regard has been devoted to the so called low involvement products (e.g. Ryynänen and Hakatie, 2013).

2.1. Package background

Visual appearance of the package depends on different factors (Silayoi and Speece, 2007) including the way the background is designed. There is little research related specifically to this issue, though this effect seems to be an important factor. Among the studies related to the pattern used there is a paper presented by Krugman (1966) which revealed that beer can designs were differently perceived by White and Negros. The more colorful or gaudy the design was, the more inexpensive it seemed to be to the White customers. In the Grobelny and Michalski (2011) study the digital signage background pattern factor also significantly influenced the subjects' preferences. The gaudy type of the background was considered better than the subtle and uniform ones. The difference between the subtle and uniform color was not meaningful. Further analyses, however, showed that the preference structure was not straightforward and seemed to be considerably influenced by other design factors.

There exists a significant body of research concerned with perceiving colors in general. Early study of Granger (1955) and Guilford and Smith (1959) provides the following hierarchy of color preferences blue $\succ$ green $\succ$ purple $\succ$ red $\succ$ yellow. In the work of Helson and Lansford (1970) similar order was obtained: blue $\succ$ green $\succ$ red $\succ$ purple $\succ$ yellow. Some colors may induce more arousal than others which was shown for red and green colors examined by Wilson (1966). According to this study red seems to be more stimulating than green. Excitement induced by the red color has been also noticed in research from the marketing domain. Lately, Puccinelli et al. (2013), in turn, explored the effect of red versus black prices' labels included in advertisements of toasters and microwave ovens. It occurred that males perceived red prices as less expensive than the black ones. This effect was not observed for women and was markedly abated for males when the experimental task required more involvement.

A very comprehensive research pertaining to the usage of color in marketing was presented by Labrecque and Milne (2012). Among other things they explored the effects of various color hues, saturations and lightness level values on perceived brand personality dimensions. The brand was represented by fictitious logos that were demonstrated on a computer screen. The obtained results showed positive correlations for pink and white with sincerity, red with excitement, blue with competence, black with sophistication and ruggedness with brown. Additionally, saturation had a positive relationship with excitement but lightness did not influence this dimension. Saturation had a positive whereas lightness negative relationship with ruggedness. Authors took advantage of the obtained results to design a target brand personality for condoms by changing only the package color. They not only managed to replicate the previously obtained results but also showed that the manipulated color factors can affect purchase intensions. An interesting discussion of the color role in marketing is presented in Grossman and Wisenblit (1999) and extensive review related to various aspects of colors usage in marketing is provided in the paper of Labrecque et al. (2013).

Studies also showed that the color preferences may be influenced by the object to which the color is applied (Taft, 1997; Schloss et al., 2012). In the marketing science domain, a number of studies supported this point of view. For instance, Holmes and Buchanan (1984) compared College students generally preferred colors with favorite colors for diverse objects such as cars, clothing and furniture. The results showed that color preferences depend on the type of object and are independent of the general color preferences. Middlestadt (1990) examined the effect of two background colors (red and blues) on three products attitudes: a bottle of perfume, a gold and silver pen and a bottle of mineral water. The results show that pen presented on a blue background was more preferred that pen on a red background. The effect of background color was not meaningful for the remaining two objects. In other study Kauppinen-Räisänen (2010) using the conjoint analysis showed that even for similar products from the same general category (painkillers and sore throat medicine) the customers' color preferences towards package background may differ. A complementary qualitative investigation, involving the same packages and background color factor levels, was performed by Kauppinen-Räisänen, and Luomala (2010). They provided some more insights into the interaction between the color and a product type in the context of attention, aesthetics and communication.

There are also studies showing that the colors may be perceived differently by specific groups of people. Some scientists showed that color preferences might result from culture differences (e.g. Saito, 1996). In marketing, cultural differences were explored, for instance, by Clarke Honeycutt (2000) who analyzed print advertising colors usage in France, the United States, and Venezuela. The results show preference of red, orange, and green colors in Venezuelan ads whereas in France and the U.S. significantly higher proportions of black and brown colors are used. Kauppinen-Räisänen et al. (2012) employed an exploratory conjoint analysis to investigate factors of package design including various background colors in Finland, the USA, and Ghana. The results generally confirm different attitudes expressed towards product packages by people from the examined countries. In some cases, however, the cross-cultural effects were not meaningful (e.g. Labrecque and Milne, 2012).

The studies of a mediating effect of gender on color preferences are not consistent. Although general studies of Granger (1955), Guilford and Smith (1959), Ou et al. (2004) or recently Labrecque and Milne (2012) gave no evidence for the importance of gender with regard to color preference, others proved this effect being significant, especially in the marketing context (Funk and Ndubisi, 2006; Ritnamkam & Sahachaisaeree, 2012; Puccinelli et al. 2013).

2.2. Typography

Research regarding the text features in the information conveyance deals generally with font properties (its types, size, color, the use of serifs etc.) and text arrangements (vertical, horizontal, along the curve, the usage of white spaces between text components etc.). Investigators and practitioners are interested in what way these factors influence various aspects of information processing (e.g. legibility, usability), human attitudes, or customers' behavior.

There were a number of studies concerned with typography in the general vision and psychology research domain. The review of various font properties and font design concepts in the context of letter identification during reading has been recently provided by Sanocki and Dyson (2012). A very interesting review of advancements in the design and identification of letters both from the scientific researchers' and practitioners' point of view is available in the work of Dyson (2013). In the field of psychology, Oppenheimer and Frank (2008) investigated the role of the information processing ease in categorization judgments. They manipulated the fluency by changing the font face and size and shown that participants tended to rate less fluent exemplars worse. Numerous studies explored also the effect of inter-letter spacing. Liu and Arditi (1996) examined five-letter, upper-case, random strings and obtained generally more letter confusions for narrowly spaced fonts than for the wide spacing condition. Chung (2002), in turn, showed that increasing the letter spacing would improve the reading speed in central and peripheral vision. However, this effect was significant up to a certain point and further increase of the inter-letter spacing had negligible impact on the reading speed. Arditi and Cho (2005) analyzed legibility of various sizes of serifs and spaces between fonts. They observed small enhancement in the reading speed for fonts with small serifs and bigger inter-letter spacings. Subsequent studies supported the importance of the inter-letter spacing effect. Perea et al. (2011) showed that recognition of words is faster for slightly wider than default spaces between letters and does not depend on the word-frequency and the word length. These findings were extended to a wider range of spacing conditions (Perea and Gomez, 2012) and exhibited a decreasing linear trend. The positive effect of the intra-word spacing increase was also observed for young people with developmental dyslexia (Perea et al., 2012). The latest studies in this regard employing the eye movement analyses gave further evidence confirming the importance of various aspects of typography in different perceptual and cognitive tasks (e.g. Rayner et al., 2010; Paterson and Jordan, 2010; Slattery and Rayner, 2013).

Usability of various font types was subject to investigation also in the context of human computer interactions, especially web pages. The pioneer research in this regard was carried out by Tullis and his colleagues (1995). They studied on-screen presentation of text displayed in four various font families available in the Microsoft Windows operating system (MS Sans Serif, Arial, Ms Serif, and Small Fonts)

having three different sized 6, 8, and 10 points and demonstrated either in bold and non-bold versions. The results showed bigger preferences of the larger fonts without serifs however, the difference between 8 and 10 points fonts was small. The readability discrepancy between bold and non-bold characters occurred to be irrelevant. Readability and preferences of fonts designed specifically for the screen display usage (Verdana and Georgia) were explored by Boyarski et al. (1998). Georgia occurred to be better than the Times Roman font. The differences between Verdana and Georgia were inconclusive. A study of Bernard et al. (2003) deals with the very popular Times New Roman and Arial typefaces used for computer-displayed text. They compared two sizes and dot-matrix and anti-aliased format conditions for readability and subjective perception regarding typeface legibility, sharpness, ease of reading, and general preference. The results show that the 10-point anti-aliased Arial typeface was read slower than the rest and 12-point dot-matrix Arial typeface was generally preferred over other typefaces. In the context of designing web sites, Ling and van Schaik (2006) examined how two font types Times (serif) and Arial (sans-serif) together with line length influence the visual search and information retrieval. Similar studies dealt also with other than Latin alphabets, for instance the work of Ramadan (2011) about Arabic typeface style and font size or Myung (2003) conjoint analysis aiming at providing some guidelines for Korean typography in Web environment.

In the field of marketing, the appropriate choice of fonts in the design of a brand's visual equity proved to be important for enhancing a brand's identity (Doyle, Bottomley, 2004). The analysis of the font-product congruity in the perception of logotype was further investigated by the same authors (Doyle and Bottomley, 2006). Childers and Jass (2002) examined how typeface semantic cues in printed advertisements influence brand perceptions and the consumers' memory. They showed that typefaces convey unique associations regardless of the text meaning and that higher consistency among typeface semantic cues, advertisement visual cues, and advertisement copy claims increase memorability. Wang and Chou (2011), in turn, focused on the effects of logo typography on findability time of diverse cylindrical packaging. They analyzed seven font types and seven types of and provided recommendations in what circumstances the specific fonts should be applied to decrease the visual search time. Several papers dealt with the font size effect in a marketing context. Lately, Aydinoğlu and Krishna (2011) showed how a different size labels may change the size judgments, consumption and perceived consumption of various food products. The font size factor was also explored by Pillai et al. (2012). They demonstrated positive effect of type size on readers' subjective comprehension of the text and their attitude towards advertised product in a typical print advertisement. The influence on objective comprehension, however, occurred to be irrelevant. The holistic approach to the design of packages in which the typography (including the font size) of various items plays an important role in the bottle of wine perceptions is presented by Orth and Malkewitz (2008).

2.3. Text-image relative locations

Apart from specifying background color and determining the appropriate typography the package designers usually include some graphical components such as producer's logo, or product images or other pictures more or less related to the product use. A number of studies in a general psychology and neuropsychology have shown that the graphical message may be differently perceived by people depending on how the text is located in relation to the image. This phenomenon is commonly attributed to the human brain hemispheric asymmetry also called the cerebral lateralization (Sperry, 1961; Hellige, 1980 and 1990). Because the right hemisphere is better suited to process pictorial information and the left one is more logical and verbal, placing the image on the left hand side of the text enhances the processing of the whole message (text and graphics) as the left field of view is processed by a right brain hemisphere and the right part by a left one. Many investigations regarding the marketing message support the significant influence of the brain lateralization mechanism on product package perception. An early study described in the work of Beaumont (1985) demonstrated that image composition (without text) in which the most important information is located on the right hand side receives higher aesthetics scores. This supported the suggestion that the informative content

should be situated in the right visual field even if it has a graphical form. Janiszewski (1990) in his experiments demonstrated that brand names and logos evaluation significantly depended on its placement relative to other advertisement's content needing attention. Rettie and Brewer (2000) showed that if the stimuli were composed according to the aforementioned recommendation the subjects remembered the presented information better than in other cases.

Research concerned with the brain lateralization effect, however, not always yielded straightforward results. In the field of marketing, Gontijo et al. (2002) investigated various brand names and demonstrated that they can have dual nature and behave like words in some aspects and like nonwords in others. Furthermore, the Westerman et al. (2013) findings concerned with bottles of vodka and water revealed that the lateralization mechanism may be distorted by the package context, that is, relative dimensions of applied images and captions. They obtained results inconsistent with the brain lateralization hypothesis. Ohme et al. (2010), in turn, measured the frontal cortex activation as a response to TV advertisements by means of EEG and identified left frontal hemispheric dominance only in one out of three stimuli. Although there are some reservations regarding the validity and reliability of psychophysiological techniques in marketing research (Wang and Minor, 2008), measuring brain waves activity and other similar approaches might help marketers to design the advertisements according to their needs.

The lateralization effect seems also to be ambiguous in the context of cultural factors. In the results obtained by Silayoi and Spece (2005) research concerned with the food packages, Bangkok inhabitants preferred pictures to the left of the text which is not in concordance with the classical brain asymmetry theory. Similar inconsistencies were presented by Chokron and De Agostini (2000) who studied French and Israeli subjects' aesthetic preferences. The results based on 162 participants showed that left-to-right readers preferred stimuli with a rightward directionality while right-to-left readers the opposite one. Later, examining various pictures, Ishii et al. (2011) revealed a meaningful discrepancy in aesthetic preferences for Japanese and English. Generally, pictures of left – right directionality were assessed as prettier by English but adversely by Japanese. Also in this case, the way of reading differentiating both nations probably modified the behavior.

3. Statement of the problem and purpose of the study

Generally, the present study aims at investigating which of the selected factors influence the buyers' preferences towards the visual appearance of the package marketing message and to what degree. In the current research, the package presents a smartphone which is currently a very popular and commonly used product. It draws considerably more attention than low-involvement articles (Vaughn, 1980) examined extensively in most of this type of research. The product's features are not taken into account. We focus on the background color, relative location of the brand's name and the product's image, and the brand name typography.

Given the previous research results conducted in other circumstances we hypothesize the following:

Hypothesis 1.

The package background color significantly influences potential customers preferences but the perception may differ depending on gender.

Many of the investigations including the color effect in some way do not precisely specify the characteristics of colors used in experiments nor control the psychological differences in the color perception. The application of the CIE Lab or other similar system would certainly facilitate comparisons between various studies.

Hypothesis 2.

Packages with a brand name situated to the right of the product image are better rated than those with a brand name located on the left hand side of the image.

To the best of authors' knowledge, the interletter spacing factor has not been explored in the context of the product package design. Taken into account the results from general psychology and predicting that the brand name would rather not be perceived as a text, one could put forward the following hypothesis:

Hypothesis 3.

Bigger interletter spacings along with smaller fonts are less liked than the typical interletter spacings and bigger fonts.

It was mentioned earlier in the literature review that there are some indications from general psychological and physiological studies showing that package design factors related to color and brain lateralization may strongly depend on the consumers' gender. This inclined us to include this effect in the present study and formulate the following hypothesis.

Hypothesis 4.

Gender of subjects has a significant effect on the perception of the analyzed product package design factors especially with respect to the background color.

The specific package design factors might influence the preferences of various groups of potential customers in a different way. Therefore, we also investigate separately young people attending two faculties and thus having diverse educational interests. Thus, the next hypothesis is as follows:

Hypothesis 5.

Groups of potential customers having different interests and education differently perceive the analyzed package design factors.

4. Material and methods

4.1. Participants

Sixty persons took part in the current study. All of them were full-time students of Wroclaw University of Technology. Their age ranged from 20 to 25 years and they used the smartphones on a daily basis. The gender and the faculty in which they were studying were controlled therefore there was equal representation of males and females as well as students from the Computer Science and Management and Mechanical Engineering faculties.

4.2. Stimuli Experimental design, and procedure

The research investigated the subjects' preferences towards electronic versions of smartphone's mockup packages. The stimulus presented a simple, three-dimensional looking cartoon box with a typical smartphone's image along with the product's unreal name. The picture of the real device was modified by removing brand names. The marketing message was differentiated by three independent factors: the package color, caption location, and the type of the caption. The effect of smartphone's package color (PC) was examined on two levels, namely the pink color which is associated with excitement and the grey one which is more toning down and usually linked with neutrality. The detailed specification of the colors employed is demonstrated in Table 1. The picked colors were quite close to each other in the CIE Lab color space (Robertson, 1977) with the distance of merely 21 which means that were perceptually similar.

Table 1. Colors used in packages and various types of pink supported by all of the browsers http://www.w3.org/TR/css3-color/#html4.

Color name	Color sample	CIE Lab	Decimal RGB	Hexadecimal RGB

Grey (this study)		(63, 0, 0)	(153, 153, 153)	#99 99 99
Pink (this study)		(68, 19, 7)	(204, 153, 153)	#CC 99 99
Red with low saturation and high lightness (Labrecque and Milne 2012)		(73, 40, 18)	(255, 148, 148)	#FF 94 94
Baker-Miller Pink (Schauss, 1979; 1981)		(73, 45, 3)	(255, 145, 175)	#FF 91 AF

The factor concerned with the location of the smartphone's name in relation to its picture was also treated on two levels: one – a position near the left border of the package, and the second one – close to the right edge of the box. Additionally, two caption type variants which differed in font size and distance between fonts were employed. The big font version had standard font spacing while in the second option had significantly bigger distances between fonts set in such a way that the overall caption size was identical in both versions. In the latter case the font size was two times smaller than in the former one. The combination of these three independent variables produced eight experimental conditions. All of them are presented in Figure 1.

Figure 1. All eight experimental conditions employed in the study.

4.3. Experimental design, and procedure

Thanks to the small number of levels in the examined effects it was possible to apply the full factorial, within subjects design for all of the package design factors. As a result of this, every participant assessed all eight experimental conditions: *two package colors* × *two caption locations* + *two caption formats* = 2 × 2 × 2 = 8. There were additional two between subjects variables related to the characteristics of this study participants, namely *Gender* and *Faculty*.

The participants were to perform pairwise comparisons of all the experimental conditions by pointing which one of the presented in pairs packages is more preferred without specifying the degree of preferences. The exemplary comparison is shown in Figure 2.

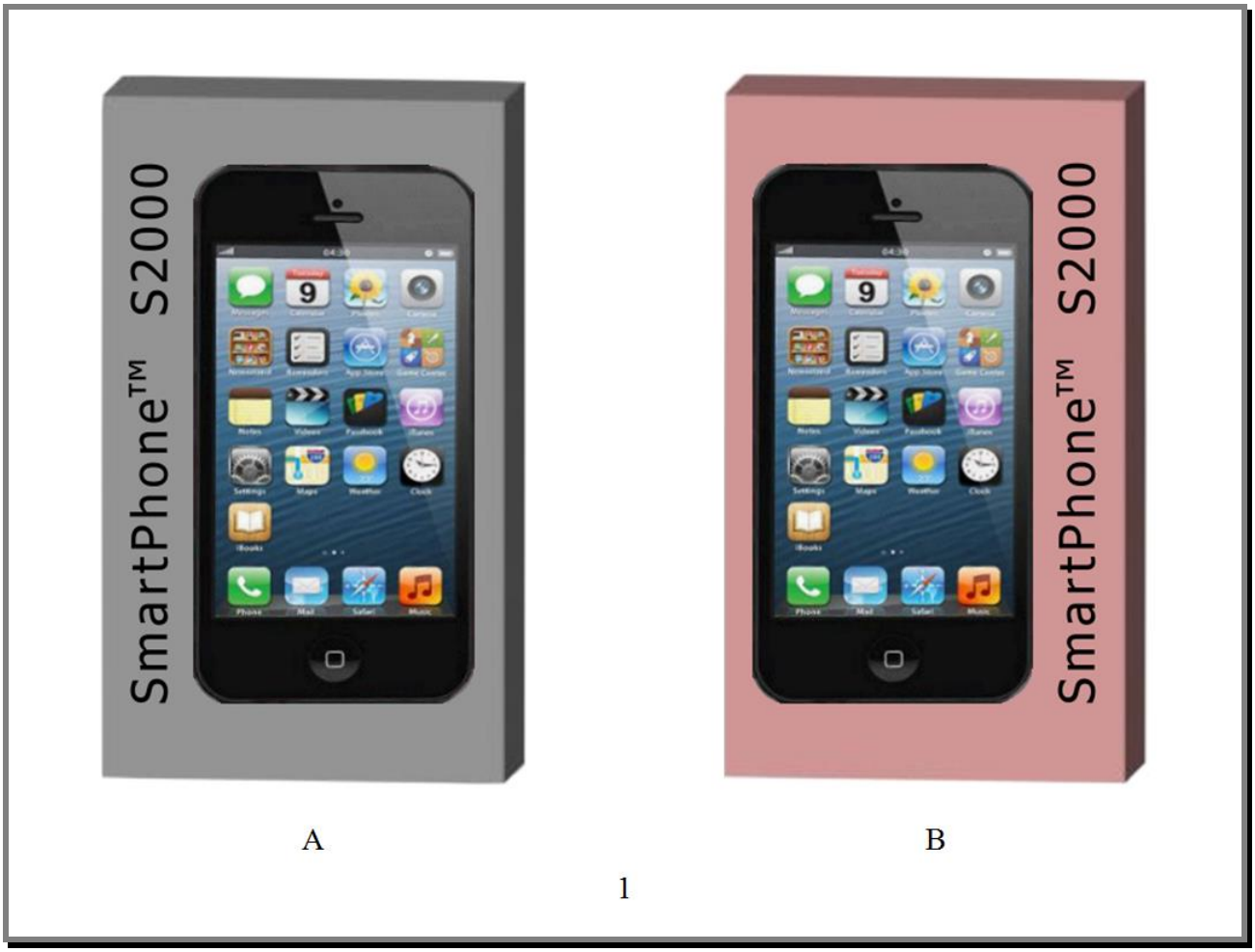

Figure 2. An example of pairwise comparison of two experimental conditions.

For eight experimental variants the number of necessary comparisons amounts to $(8^2 - 8) / 2 = 28$. In order to minimize the influence of the variant location effect, the subjects conducted the comparisons twice so there were 56 comparisons performed by every participant. In the second turn the location of the packages was swapped.

The degree of preference for each experimental condition expressed by a single examinee was computed in the following way: at first, the sum of the selections for each package option was computed and then the value was divided by two as each pair of smartphone's package variants was rated twice. A preference score which was calculated in such a way could take the value between zero – when the given package version was not chosen at all, and seven – which meant that the given variant was selected in all of the comparisons it appeared. In other words, the bigger the preference score was the higher the participants liked the smartphone's package.

The Microsoft Power Point version 2007 file was used to present the comparisons. Each slide included one comparison so there were 56 slides used. The participants were asked to put results of their comparisons into the specifically prepared Microsoft Excel 2007 file. Both the slideshow as well as the spread sheet files were delivered to the subjects by electronic mail and via one of the social media web site. After completing the evaluation, which lasted about ten minutes, the examinees sent the MS Excel file back.

5. Results

This section contains the outcomes of the gathered subjects' preferences. At first basic descriptive statistics are demonstrated and described. Then, results of the five way analysis of variance are given showing which of the factors significantly affected the preferences. In order to decompose the overall preferences towards the examined smartphone's packages into the partial utilities for the examined factor levels and assess the relative importances of the design factors, the conjoint analysis approach was applied. Conjoint analyses were performed both on the aggregated level as well as individually for all of the examined groups of persons. The last subsection is devoted to present these analyses results. Finally, the cluster analysis of the conjoint partial utilities was employed to identify groups of subjects having similar preference structures.

5.1. Descriptive statistics

Preference scores for all experimental conditions averaged over all participants are illustrated in Figure 3. According to participants the best package should have grey background color and a big caption located on the right side of the smartphone's image. On the other hand, the least liked packages included pink and grey versions of the variants with small texts situated near the left border of the package. One can easily observe that generally the conditions with big captions with standard spacing were better rated than variants with a smaller and more dispersed fonts used for presenting the smartphone's name. Additionally, it seems that the preference pattern for big caption versions is similar to those with the small ones. This observation will be further explored by means of the analysis of variance in the next section of this paper.

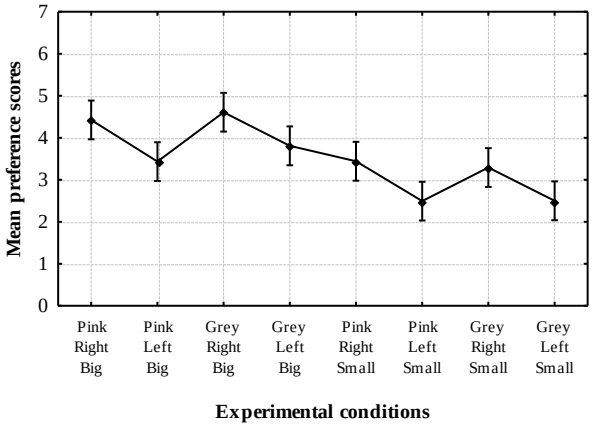

Figure 3. Mean preference scores for all experimental conditions averaged by all subjects taking part in the examination. Whiskers denote mean standard errors.

Descriptive statistics of preference scores for the investigated groups of participants are put together in Table 2. Taking into account mean and median values one may easily notice that the results show similar pattern of preference scores for male and female subjects studying in both analyzed faculties. Men decidedly more favored the grey package with big caption located on the right side of the image and disliked the most the pink option with small text near the left border of the box. For women from both faculties the best rated version had the pink background with the big text situated on the right

hand side while the least liked was the grey colored package having a small caption located on the left side of the smartphone's picture.

Table 2. Descriptive statistics of preferences scores for all of the investigated conditions in the examined groups of participants. Blue borders indicate the most preferred options within a given group of participants whereas the red borders highlight the least liked variants.

Faculty	Gender	Package variant	N*	Mean	MSE**	Median	Min	Max	SD***
Computer Science and Management	Men	1. Pink, Right, Big	15	3.5	0.33	3	2	6.5	1.3
		2. Pink, Left, Big	15	2.1	0.51	1.5	0	7	2.0
		3. Grey, Right, Big	15	5.7	0.30	6	4	7	1.1
		4. Grey, Left, Big	15	4.6	0.52	5.5	0	7	2.0
		5. Pink, Right, Small	15	2.6	0.47	2.5	0.5	7	1.8
		6. Pink, Left, Small	15	1.3	0.30	1	0	3	1.1
		7. Grey, Right, Small	15	4.5	0.61	5	0	7	2.4
		8. Grey, Left , Small	15	3.6	0.32	3.5	2.0	5.5	1.2
	Women	1. Pink, Right, Big	15	5.3	0.40	5.5	1.5	7	1.5
		2. Pink, Left, Big	15	4.4	0.49	4.5	2	7	1.9
		3. Grey, Right, Big	15	4.4	0.45	4.5	0.5	7	1.7
		4. Grey, Left, Big	15	3.8	0.51	4	0	6	2.0
		5. Pink, Right, Small	15	3.7	0.54	3.5	1.0	7	2.1
		6. Pink, Left, Small	15	2.6	0.43	2.5	0	5.5	1.6
		7. Grey, Right, Small	15	2.5	0.51	2	0	6	2.0
		8. Grey, Left , Small	15	1.5	0.38	1.5	0	5.5	1.5
Mechanical Engineering	Men	1. Pink, Right, Big	15	3.8	0.49	4	1.0	7	1.9
		2. Pink, Left, Big	15	3.1	0.43	3.5	0	7	1.7
		3. Grey, Right, Big	15	4.3	0.41	4	2.0	7	1.6
		4. Grey, Left, Big	15	3.6	0.42	3.5	1.5	6.5	1.6
		5. Pink, Right, Small	15	3.1	0.34	3	0.5	5	1.3
		6. Pink, Left, Small	15	3.0	0.34	3	0.5	5	1.3
		7. Grey, Right, Small	15	3.7	0.43	3.5	0	7	1.7
		8. Grey, Left , Small	15	3.3	0.30	3.5	1.5	5.5	1.2
	Women	1. Pink, Right, Big	15	5.1	0.31	5	3.5	7	1.2
		2. Pink, Left, Big	15	4.1	0.38	4	2	7	1.5
		3. Grey, Right, Big	15	4.1	0.57	4	1	7	2.2
		4. Grey, Left, Big	15	3.2	0.48	3.5	0	5.5	1.9
		5. Pink, Right, Small	15	4.4	0.49	4.5	1.5	7	1.9
		6. Pink, Left, Small	15	3.1	0.52	3	0	6	2.0
		7. Grey, Right, Small	15	2.5	0.41	2.5	0	6	1.6
		8. Grey, Left , Small	15	1.6	0.33	1.5	0	4	1.3

* N – number of valid cases
** MSE – Mean Standard Error
*** SD – Standard Deviation

Analyzing the presented descriptive statistics it is also worth noting that the standard deviations and mean standard errors for package versions being rated either very high or very low were the lowest in all groups of subjects except for men studying at Mechanical Engineering faculty. It could suggest that people in particular groups were in concordance as to the best and the worst package designs however, such an agreement was markedly less visible for other experimental conditions. The mean preference scores along with mean standard errors from Table 2 were graphically illustrated in Figure 4.

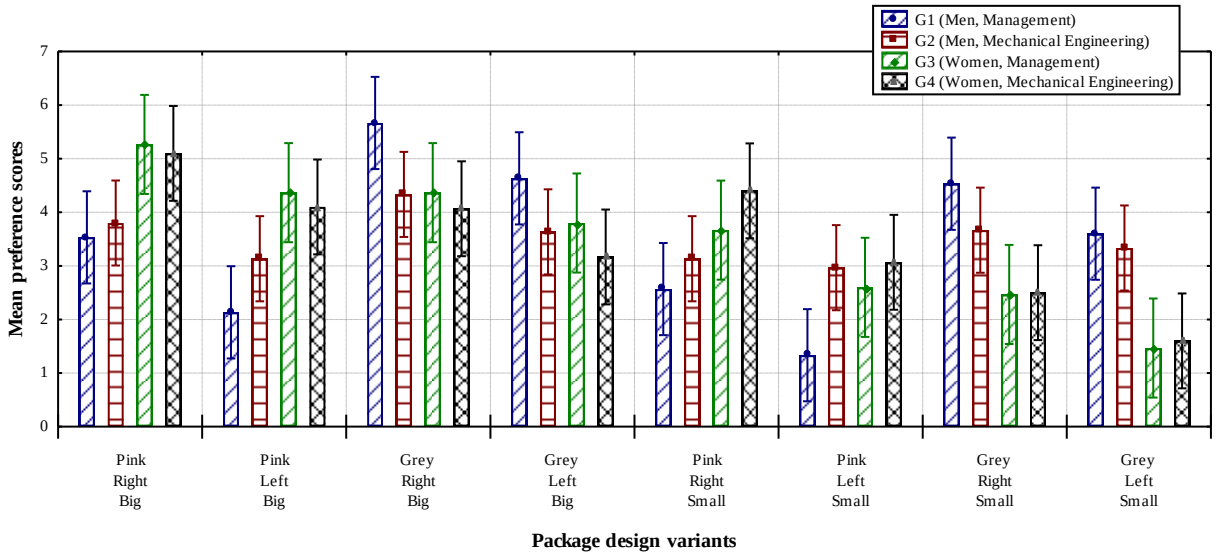

Figure 4. Mean preference scores of all of the experimental conditions computed separately for each of the examined group of participants. Whiskers denote mean standard errors.

5.2. Analysis of variance

The descriptive statistics analysis from the previous section of the paper suggests that the observed differences may be meaningful. In order to formally verify the significance of differences between the examined factors and among the investigated groups of participants a five way analysis of variance: (*Package color*) × (*Caption location*) × (*Caption type*) × (*Gender*) × (*Faculty*) was applied. The results of the Anova are shown in Table 3.

Table 3. Analysis of variance results for the preference scores

Effect	Sum of Squares	df	Mean Sum of Squares	F	p
Package color (PC)	1.3	1	1.3	0.45	0.50
Caption location (CL)	94	1	94	33	< *0.000001
Caption type (CT)	155	1	155	54	< *0.000001
Gender (GE)	0	1	0.000	0.000	1
Faculty (FA)	0	1	0.000	0.000	1
Package color × Caption location	0.92	1	0.92	0.32	0.57
Package color × Caption type	3.7	1	3.7	1.3	0.26
Caption location × Caption type	0.019	1	0.019	0.0065	0.94
Package color × Gender	186	1	186	65	< *0.000001
Caption location × Gender	0.68	1	0.68	0.23	0.63
Caption type × Gender	21	1	21	7.4	*0.0068
Package color × Faculty	34	1	34	12	*0.00068
Caption location × Faculty	2.1	1	2.1	0.74	0.39
Caption type × Faculty	11	1	11	3.9	**0.04996
Gender × Faculty	0	1	0.000	0.000	1.0
Package color × Caption location × Caption type	0.0083	1	0.0083	0.003	0.96
Package color × Caption location × Gender	0.10	1	0.10	0.036	0.85
Package color × Caption type × Gender	1.4	1	1.41	0.49	0.48
Caption location × Caption type × Gender	2.0	1	2.0	0.70	0.40
Package color × Caption location × Faculty	0.25	1	0.25	0.088	0.77
Package color × Caption type × Faculty	0.033	1	0.033	0.012	0.91
Caption location × Caption type × Faculty	0.35	1	0.35	0.12	0.73
Package color × Gender × Faculty	14	1	14	4.8	**0.030
Caption location × Gender × Faculty	5.2	1	5.21	1.8	0.18
Caption type × Gender × Faculty	0.17	1	0.17	0.059	0.81

Package color × Caption location × Caption type × Gender	0.033	1	0.033	0.012	0.91
Package color × Caption location × Caption type × Faculty	0.13	1	0.13	0.046	0.83
Package color × Caption location × Gender × Faculty	0.47	1	0.47	0.16	0.69
Package color × Caption type × Gender × Faculty	0.30	1	0.30	0.10	0.75
Caption location × Caption type × Gender × Faculty	0.052	1	0.052	0.018	0.89
Package color × Caption location × Caption type × Gender × Faculty	0.21	1	0.21	0.073	0.79
Error	1287	448	2.9		

* $p < 0.01$
* $p < 0.05$

The obtained results revealed that two main effects were statistically significant: *Caption location* [$F(1, 448) = 33$; $p < 0.000001$] and *Caption type* [$F(1, 448) = 54$; $p < 0.000001$]. Subjects, generally, considerably better rated captions located on the right hand side of the package than those situated on the left side of the smartphone's image (3.9 ± 0.11 *SME* vs. 3.1 ± 0.11 *SME*). It also occurred that the bigger and compact captions were more preferred than those smaller and dispersed ones (4.1 ± 0.11 *SME* vs. 2.9 ± 0.11 *SME*). The figures 5 and 6 present the mean preference scores for those two factors respectively along with 95% confidence intervals.

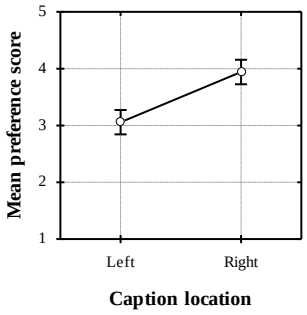

Figure 5. Effect of Caption location on mean preference scores [$F(1, 448) = 33$, $p < 0.000001$]. Whiskers denote 0.95 confidence intervals.

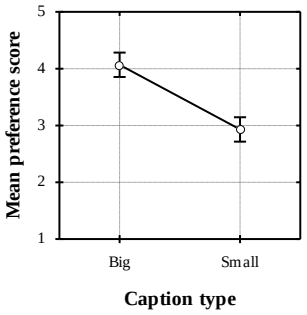

Figure 6. Effect of Caption type on mean preference scores [$F(1, 448) = 54$, $p < 0.000001$]. Whiskers denote 0.95 confidence intervals.

The performed analysis of variance also showed four meaningful two way interactions including *Package color* with *Gender* [$F(1, 448) = 65$; $p < 0.000001$] and with *Faculty* [$F(1, 448) = 12$; $p = 0.00068$] as well as *Caption type* with *Gender* [$F(1, 448) = 7.4$; $p = 0.0068$] and with *Faculty* [$F(1, 448) = 3.9$; $p = 0.04996$]. Mean preference scores of those interactions are demonstrated in Figures 7-10. Analyzing the presented data one can easily see that women in contrast to men decidedly better rated pink backgrounds (4.1 ± 0.15 *SME* vs. 2.8 ± 0.15 *SME*) while men preferred more the grey version (4.2 ± 0.15 *SME* vs. 2.9 ± 0.15 *SME*). Significantly different scores related to the *Package color* were also obtained for participants from the examined faculties. Mechanical Engineering students liked the pink package background more than the grey one (3.7 ± 0.15 *SME* vs. 3.3 ± 0.15 *SME*) while subjects from Computer Science and Management faculty favored the grey over the pink variants (3.8 ± 0.15 *SME* vs. 3.2 ± 0.15 *SME*).

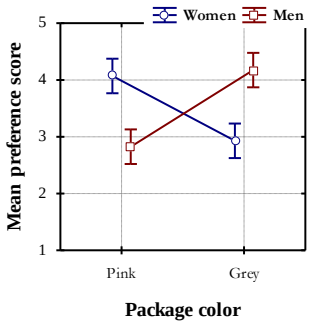

Figure 7. Effect of *Package color* × *Gender* interaction on mean preference scores [$F(1, 448) = 65$, $p < 0.000001$]. Whiskers denote 0.95 confidence intervals.

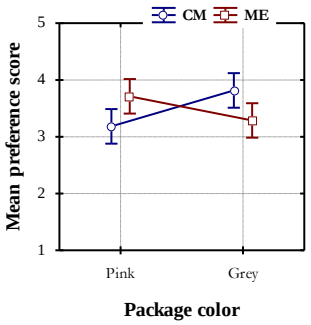

Figure 8. Effect of *Package color* × *Faculty* interaction on mean preference scores [$F(1, 448) = 12$, $p = 0.00068$]. Whiskers denote 0.95 confidence intervals.

As far as the *Caption type* is concerned one can observe quite similar preference patterns for the investigated groups of participants. Both women and men valued the big and compact captions more than the small and dispersed ones however, women liked bigger texts definitely more than men did and disliked the small caption variants stronger as compared to the men's scores. Subjects from both faculties favoured big captions over the small ones as well, though Computer Science and Management students preferred the big texts stronger than their friends from the Mechanical Engineering Faculty (4.2 ± 0.15 *SME* vs. 3.9 ± 0.15 *SME*) and rated the small caption versions lower than the Mechanical Engineering subjects (2.8 ± 0.15 *SME* vs. 3.1 ± 0.15 *SME*).

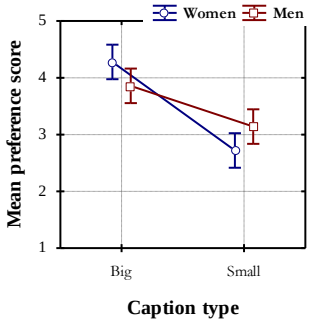

Figure 9. Effect of *Caption type* × *Gender* interaction on mean preference scores [$F(1, 448) = 7.4$, $p = 0.0068$]. Whiskers denote 0.95 confidence intervals.

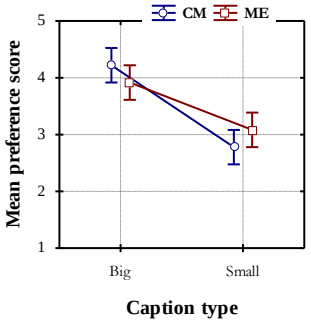

Figure 10. Effect of *Caption type* × *Faculty* interaction on mean preference scores [$F(1, 448) = 3.9$, $p < 0.04996$]. Whiskers denote 0.95 confidence intervals.

Finally, one statistically significant, three way interaction was observed, namely *Package color* × *Gender* × *Faculty* [$F(1, 448) = 4.8$; $p = 0.03$]. The average preferences for this effect are illustrated in Figure 11 shows similar preference pattern for both faculties with women favoring pink designs over the grey ones and men having the reversed preferences. The difference between the faculties lies in that for men from the Mechanical Engineering faculty the discrepancy between pink and grey background is much smaller (3.3 ± 0.22 *SME* vs. 3.7 ± 0.22 *SME*) than for men from the Computer Science and Management faculty (2.4 ± 0.22 *SME* vs. 4.6 ± 0.22 *SME*) respectively. For women from the Computer Science and Management faculty, in turn, the discrepancy between the pink and grey backgrounds was smaller (4.0 ± 0.22 *SME* vs. 3.0 ± 0. 22 *SME*) than for their counterparts from the Mechanical Engineering faculty (± 4.2 *SME* vs. 2.8 ± 0.22 *SME*).

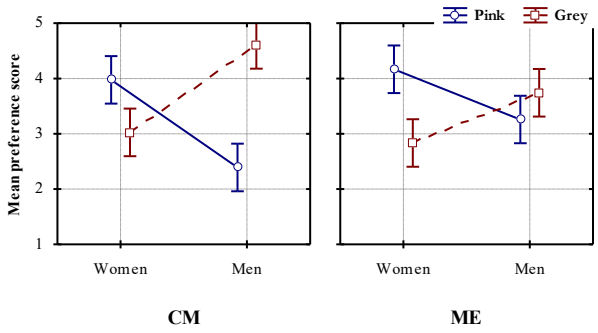

Figure 11. Effect of *Package color* × *Gender* × *Faculty* interaction on mean preference scores [$F(1, 448) = 4.8$; $p = 0.03$]. Whiskers denote 0.95 confidence intervals.

5.3. Conjoint analysis

This section presents the choice-based Conjoint analysis of the subjects' preferences. At first, the data of all of the participants are analyzed together and the aggregate level results are described. Next, the cluster analysis of the individual partial utilities is employed to group subjects having a similar preference structure. For the clustered groups, the aggregate level relative importances along with and part-worths were computed again. Finally, the following three different choice simulations were conducted for those groups: the First Choice Model (FCL), the Bradley, Terry, Luce (BTL) approach, and the Logit Probability Model (LPM). In this research, the dummy variable regressions, estimated by ordinal least squares were used to find partial contributions of the attributes for an individual participant.

5.3.1. Aggregate level conjoint analysis

The Table 4 contains results of the series of conjoint analyses performed for all of the persons taking part in the research and separately for the between subjects variables. Taking into account all participants the biggest relative importance (35.2%) is attributed to the package *Background color* factor, the second most important was the *Caption type* (33.6%) whereas the least influence on mean preferences of all participants had the caption location (31.3%). The mean part-worths calculated for the particular variables show positive impact of the right-hand side caption location and the big and compact version of the caption type. The participants' preferences, on average, were affected negatively by the pink background color and positively by the grey version of the package.

Table 4. Aggregate-level relative importances and part-worth estimates for all participants and for the investigated groups.

Variables and their levels	**Part-worth estimates and relative importances**								
	Women CM	Men CM	Women ME	Men ME	Women	Men	CM	ME	All subjects
Background color	**21.8%**	**43.6%**	**28.9%**	**46.4%**	**25.4%**	**45.0%**	**32.7%**	**37.7%**	**35.2%**
Pink	0.475	-1.108	0.667	-0.242	0.571	-0.675	-0.317	0.213	-0.0521
Grey	-0.475	1.108	-0.667	0.242	-0.570	0.675	0.317	-0.213	0.0521
Caption location	**35.9%**	**26.2%**	**33.5%**	**29.5%**	**34.7%**	**27.9%**	**31.0%**	**31.5%**	**31.3%**
Right	0.442	0.575	0.517	0.233	0.479	0.404	0.508	0.375	0.442
Left	-0.442	-0.575	-0.517	-0.233	-0.479	-0.404	-0.508	-0.375	-0.442
Caption type	**42.3%**	**30.3%**	**37.5%**	**24.1%**	**39.9%**	**27.2%**	**36.3%**	**30.1%**	**33.6%**

Big	0.950	0.492	0.608	0.225	0.779	0.358	0.721	0.417	0.569
Small	-0.950	-0.492	-0.608	-0.225	-0.779	-0.358	-0.721	-0.417	-0.569

* CM – Faculty of Computer Science and Management
ME –Faculty of Mechanical Engineering

One may notice that the average part-worth values for the *Background color* are markedly smaller than those for the remaining two variables. As the relative importances are comparable the difference might be due to the opposite preferences towards pink and grey colors between investigated groups of people. Indeed, the conjoint results computed for women suggest the positive impact of the pink background color on their preferences while the grey variants had the negative utility. The influence of the background color for men is completely opposite with a positive utility of the grey color and negative for the pink one. A similar situation present the conjoint results obtained separately for students from the Faculty of Mechanical Engineering and Faculty of Computer Science and Management. The ME participants' preferences were higher for pink backgrounds than for grey ones whereas CM subjects' likings were negatively affected by the pink color, and positively by the grey one. Analyzing the relative importances for the examined groups of students, one may notice that generally for male participants the *Background color* factor was considerably more important (45%) then for females (25.4%). Women, in turn, considered the remaining two variables more significant as compared to men with *Caption type* being the most influential (39.9% versus 27.2%). The conjoint analyses results for the faculties revealed that students from the ME faculty considered the *Background color* variable as the most important (37.7%) whereas participants recruited from the CM faculty regarded the *Caption type* factor as the most significant one (36.3%). Relative importances of other variables were comparable.

5.3.2. Preferences' segmentation

A cluster analysis of the partial utilities was employed to conduct the segmentation of subjects' preferences towards the investigated smartphones' packages. Using the k-means classification method, attempts were made to divide the persons into two, three and four groups. The two clusters solution was rejected as not all differences in preferences for a given profile between defined clusters were statistically significantly. On the other hand, the division of the participants into four clusters resulted in significantly unequal number of subjects being assigned to particular groups. A specification of three clusters seemed to be the best option since three segments included more or less the same number of subjects: Cluster1: 21 persons, Cluster2: 21, and Cluster3: 18 and the differences for all examined packages were statistically meaningful which is demonstrated in Table 5.

Table 5. The series of Analyses of variance for all of the clusters and all of the variables' levels.

No	Package color	Caption location	Caption type	Between SS	df	Within SS	df	F	p
1	Pink	Right	Big	82	2	81	57	29	< 0.000001*
2	Pink	Left	Big	116	2	105	57	32	< 0.000001*
3	Grey	Right	Big	69	2	119	57	17	0.000002*
4	Grey	Left	Big	127	2	88	57	41	< 0.000001*
5	Pink	Right	Small	104.5	2	104	57	28	< 0.000001*
6	Pink	Left	Small	67	2	99	57	19	< 0.000001*
7	Grey	Right	Small	168	2	85	57	56	< 0.000001*
8	Grey	Left	Small	63	2	87	57	21	< 0.000001*

The distances and squared distances between the clusters means are put together in Table 6. These values are similar to each other (from 2.1 to 2.4) which indicate that differences between each of the clusters pair means are comparable.

Table 6. Euclidean distances between clusters. Distances are below while squared distances above diagonal.

	Cluster 1	**Cluster 2**	**Cluster 3**
Cluster 1	0	4.2	5.3
Cluster 2	2.1	0	5.6
Cluster 3	2.3	2.4	0

Structures of preferences for all of the specified clusters are illustrated in Figure 12. The obtained outcomes of the cluster analysis suggest that there are three groups of participants with quite clear, well-defined and distinct perceptions of the investigated smartphone's packages. Analyzing the average preferences towards given package design variants within the specified clusters it can be seen that the cluster 1 and 3 participants were rather unaffected by the *Caption type* variable. They exhibit similar structures both for the big and compact versions of captions as well as for small and more dispersed ones. Participants from the second cluster, on the other hand, seem to be especially strongly influenced by the *Caption type* effect as the average preferences for all profiles with big captions were markedly better liked than those with small captions. The data also reveal that subjects from the third cluster are strong supporters of the grey package background color. Cluster 1 members preferred the pink background color but much stronger for the profiles with captions located on the right side of the smartphone's picture. Counterpart versions with captions on the left hand side of the image were decidedly less liked in this group.

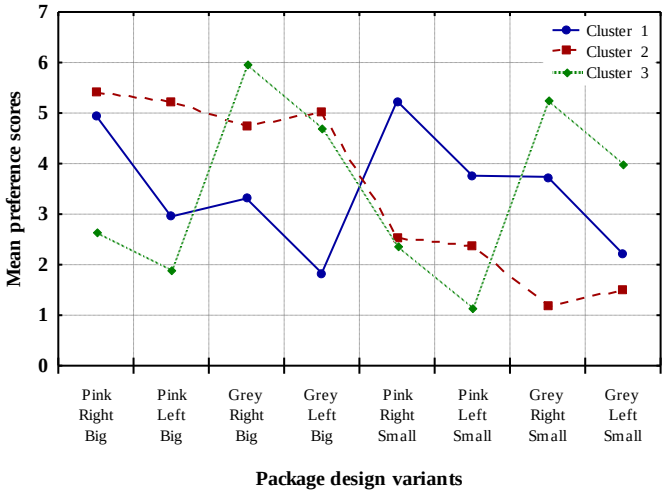

Figure 12. Plot of mean preferences towards individual profiles for all of the clusters.

Additional conjoint analyses were carried out individually for each of the group determined by the cluster analysis. Both, the aggregate-level relative importances and the average partial utilities for the factors' levels are given in Table 7 while the gender and faculty affiliation of the participants within given cluster is presented in Table 8. In the context of the predefined in this research groups, the Cluster3 seems to be the most homogenous as it contains almost solely men from the CM faculty (12) and from the ME faculty (6) – there is only one woman in this group. For subjects from this cluster the *Background color* variable is crucial in shaping their preferences with the relative importance as high as 57.3% and a big negative value of the mean part-worth (-1.479) attributed to the pink background

color. The remaining *Caption location* and *Caption type* variables were markedly less significant to the students in this group with values of 24.1% and 18.6% respectively.

Table 7. Aggregate-level relative importances and part-worth estimates for the clusters.

Variables and their levels	Part-worth estimates and relative importances		
	Cluster 1	Cluster 2	Cluster 3
Background color	**33.8%**	**17.5%**	**57.3%**
Pink	0.726	0.393	-1.479
Grey	-0.726	-0.393	1.479
Caption location	**39.8%**	**28.9%**	**24.1%**
Right	0.809	-0.0357	0.569
Left	-0.809	0.0357	-0.569
Caption type	**26.4%**	**53.6%**	**18.6%**
Big	-0.238	1.601	0.306
Small	0.238	-1.601	-0.306

In the second cluster, the *Caption type* variable exhibited the highest relative importance with a very big and positive average partial utility (1.601) for the big and compact texts. The positive impact of the big captions was also observed in Cluster3 but the relative importance of this variable was the lowest in comparison with the remaining variables in this group. The second cluster consisted of mostly women (17), there were only four males. There was a comparable number of ME and CM faculty participants, 9 and 12 respectively. In the first cluster there was a similar number of males (9) and females (12), however, most of them were from the Faculty of Mechanical Engineering (15 versus 6 from the CM). Subjects' preferences from this cluster were affected the strongest by the *Caption location* (39.8%) variable with the positive mean part-worth value for the right location (0.809), then by the *Background color* (33.8%), and finally by the *Caption type* (26.4%).

Table 8. Characteristics of the subjects assigned to the obtained clusters.

	Gender		Faculty	
	Females	**Males**	**CM**	**ME**
Cluster 1	12	9	6	15
Cluster 2	17	4	12	9
Cluster 3	1	17	12	6

One of the advantages of a conjoint analysis is the possibility of predicting users' decisions concerned with choosing the specific product profiles. Among the available methods in this regard, the First Choice Model, Bradley-Terry-Luce Model and Logit Probability Model are the most frequently applied. In this research, all three models mentioned above were employed and the results are put together in Table 9 and graphically illustrated in Figures 13–15.

Table 9. The choice simulation results for different models.

No	Package color	Caption location	Caption type	First Choice Model (FCL)			Bradley, Terry, Luce (BTL)			Logit Probability Model (LPM)		
				Cluster 1	Cluster 2	Cluster 3	Cluster 1	Cluster 2	Cluster 3	Cluster 1	Cluster 2	Cluster 3
1	Pink	Right	Big	33%	38%	0%	0.171	0.195	0.103	0.245	0.301	0.0222
2	Pink	Left	Big	0%	38%	0%	0.114	0.197	0.0627	0.0712	0.305	0.0134

3	Grey	Right	Big	10%	19%	44%	0.120	0.167	0.209	0.0821	0.177	0.404
4	Grey	Left	Big	0%	5%	22%	0.0616	0.169	0.168	0.0198	0.155	0.185
5	Pink	Right	Small	48%	0%	0%	0.188	0.0804	0.0816	0.330	0.0183	0.0188
6	Pink	Left	Small	5%	0%	0%	0.131	0.0830	0.0414	0.105	0.0271	0.0131
7	Grey	Right	Small	5%	0%	28%	0.137	0.0527	0.187	0.111	0.00862	0.238
8	Grey	Left	Small	0%	0%	6%	0.0787	0.0559	0.147	0.0356	0.00693	0.105

Generally, it may be observed that all of the used approaches are to a large extent consistent. All three models suggest that subjects from the first cluster will choose the profile with a pink background color, and a small caption located on the right hand side of the smartphone's picture. Cluster 2 members, in turn, will be attracted the most by the pink package version with big and compact captions situated either on the right or on the left side of the package. There is no difference at all for those two variants in the First Choice Model, whereas in the Bradley-Terry-Luce and Logit Probability approaches the discrepancy is tiny. As far as the third cluster is concerned, all three models point clearly to the grey profile having big caption positioned to the right of the image.

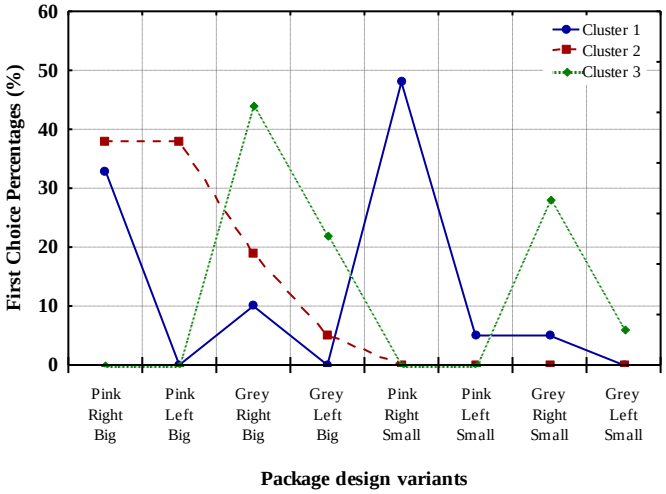

Figure 13. Plot of Means for Each Cluster for the First Choice Model

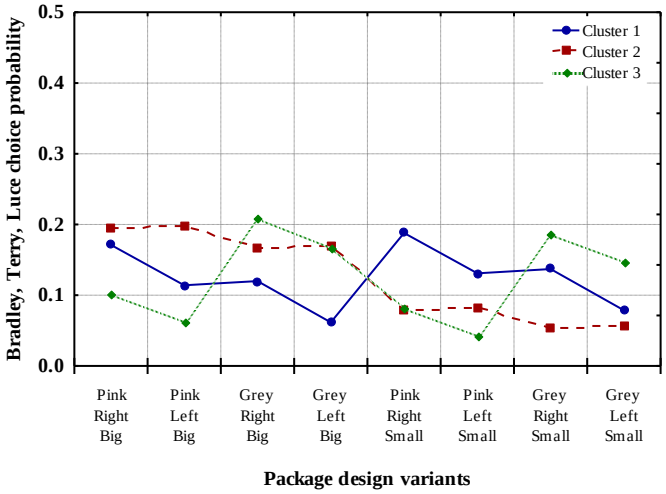

Figure 14. Plot of Means for Each Cluster. Bradley-Terry-Luce Model

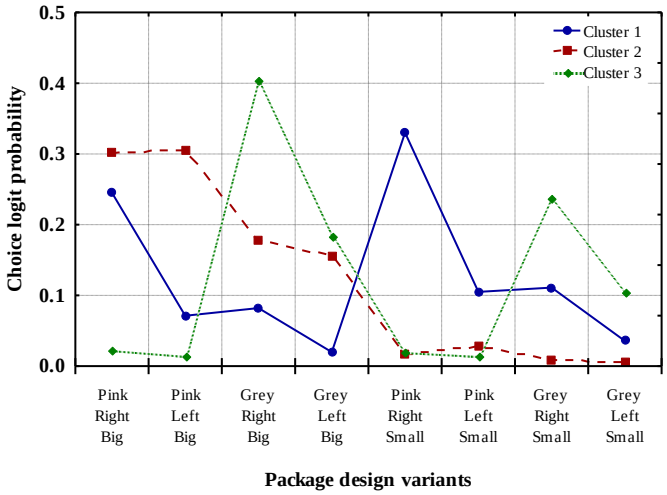

Figure 15. Plot of Means for Each Cluster Logit Probability Model

Comparing plots from Figures 13-15 one may observe that the First Choice and Logit Probability models show that in the second cluster, the probability of choosing any package variant with small captions is zero or very close to zero. Though, the Bradley-Terry-Luce decision rule gives small chances for choosing the profiles with small texts, one may call the cluster2 members strong supporters of the big captions. In the first and third group of participants it can be noticed that the probabilities of selecting profiles with small and big captions have similar structures which means that *Caption type* variable have weak influence on the subjects decisions. The crucial role in these clusters is being played by the combination of the *Background color* and *Caption location* factors. It seems that participants from the third cluster extremely dislike the pink background color since the choice probabilities for this type of profile are close to zero in all of the models. On the other hand, the cluster one members would rather choose the pink versions of packages but on the condition that the text is located on the right hand side of the package. It is also worth noting that the Bradley-Terry-Luce model results have the most regular and clear pattern in this research.

6. Discussion

The literature review regarding product package designs shows that there are numerous aspects that may strongly influence customers' perception. The current study tries to add some more insights into this problem by analyzing the applied typography, package background color as well as brain lateralization effect in various groups of potential young customers.

The analysis of variance findings demonstrated significant effects of relative locations of the package brand name and product image and typography. The preferred brand name right location was rather expected in the context of the general brain lateralization studies described in the related research section (e.g. Sperry, 1961; Hellige, 1980 and 1990) and shows that participants treated the caption as text. The higher mean likings of the big typography over the smaller one was not a surprise in light of previous research as number of investigators obtained similar results in various conditions and different areas of scientific interests (e.g. Tullis and his colleagues, 1995 or Bernard et al., 2003). The Anova results, however, are in contrast with the findings showing greater readability of the slightly bigger than standard spaces between fonts (e.g. Arditi and Cho, 2005; Perea et al., 2011; Perea and Gomez, 2012; Perea et al., 2012). This effect may probably be attributed to the fact that the examined text was short and did not exhibit any difficulty in understanding its meaning. The gain in readability due to the bigger interletter spacing could also be diminished by the vertical orientation of the text, and thus lowering the preference scores.

The used typography was moderated by gender and faculty factors, however the pattern of the preferences' structure is the same. The fact that women preferred big captions stronger than men did and CM students liked big captions considerably more than their ME counterparts could have their origin in the individual differences that were revealed both by the cluster and conjoint analysis. The differences between the two faculties could also lie in that the ME subjects have decidedly more experiences with engineering and technical drawings. The legibility in these kinds of documents is of a great importance, thus, in light of the studies showing that increased interletter spacing may positively influence readability some people might have unconsciously taken it into account.

Although the package background color effect was irrelevant for the overall sample, it was robustly moderated by *gender* and *faculty* effects. Women had bigger preferences towards pink than grey while men exactly the opposite. Similarly, students from the Mechanical Engineering faculty favored the pink color over the grey one whereas Computer Science and Management subjects higher scored grey than pink. The findings with respect to the gender effect on color are in concordance with the qualitative investigation of Clarke and Costall (2008). They demonstrated very strong and common association between pink and femininity. As much as 69% percent of participants referred to pink as feminine which is similar to opinions in other works (e.g. Mahnke, 1996; Labrecque and Milne, 2012;). Pink is also considered nurturing, warm, and soft (Mahnke, 1996; Fraser and Banks, 2004) and may be positively linked to the sincerity dimension and negatively to ruggedness (Labrecque and Milne, 2012). Some previous evidence indicated that the specific pink color (the so called Baker-Miller pink, see Table 1) may even reduce aggressive behavior (Schauss, 1979; 1981), however further studies (e.g. Gilliam and Unruh, 1988) suggest that the effect might be only temporal. All of those described results suggest significant connotations between the pink color and features usually consociated with females.

On the other hand, the grey color is usually not associated with any emotions, and described as neutral, calming or even boring (Clarke and Costall 2008). Jacobs et al. (1991) found also that US students associated grey with high quality and as dependable. Assuming men being less emotional than women these associations of grey might have played a role in assessing the smartphones' packaging by males. Our findings are also in agreement with the general results showing that women rate better warm object colors while males perceive cool object colors as more pleasant (Helson and Lansford, 1970). Moreover, the results of McInnis and Shearer (1964) indicating, among other things, that women prefer tints more than shades are also in concordance with the current study outcomes.

The strong effect of the pink color on the smartphone's package perception may suggest that for females the product is closer to the *feeling* (versus *thinking*) extreme edge of the product categorization scale (Vaughn, 1980). Conversely, for men the smartphone's is rather near the *thinking* end.

The obtained gender differences regarding the color perception are not consistent with some general color studies such as Granger (1955), Guilford and Smith (1959) or recently Labrecque and Milne (2012). This inconsistency is probably due to the fact that those studies either did not involved any specific context (Granger, 1955; Guilford and Smith, 1959) or involved abstract logos not related to any concrete object. It seems that in situations where the context is clear like in the current study, the gender effect significantly influences the preferences towards colors, like in the research of Helson and Lansford (1970), Funk and Ndubisi (2006), Ritnamkam & Sahachaisaeree (2012) or Puccinelli et al. (2013). Furthermore, a number of earlier studies repeatedly show that color preferences are to a significant extent influenced by the type of the object to which they are applied (Taft, 1997; Schloss et al., 2012).

The interaction between *Package color* × *Faculty* reveals that students from ME on average prefer pink over grey and CM participants conversely. This interaction however should be analyzed along with the three way interaction *Package color* × *Gender* × *Faculty* which exhibits, both for the CM and ME faculties, akin patterns to the one observed in the *Package color* × *Gender* interaction, that is, men like more grey over pink while women the other way round. The higher rates of the pink over the grey variants for ME Faculty in the two way interaction of *Package color* × *Faculty* arise from the fact that women from

CM preferred pink over grey to a lesser extent that it was the case for ME women. At the same time males from CM rated grey backgrounds better than pink ones to a larger degree than ME men.

The bigger dominance of grey over pink for men in one faculty as compared with men from the second faculty is very interesting but quite difficult to explain. One of the possible reasons could be related to the decidedly lower number of female students in the faculty of Mechanical Engineering as compared to Computer Science and Management. As the pink is associated with femininity – some male students might perceive the color as attractive. The other aspect might be connected to the used shade of pink containing a significant grey component, causing the color being close to the red with low saturation and a high lightness value e.g. similar to the one used by Labrecque and Milne (2012) in their second experiment (the distance in the CIE Lab space amounts only to 24; for the color specification see Table 1). This could have lessened the negative impression of the *female* color for some male subjects and be perceived as a shade of red rather than pink. Similar factors could affect female participants but, naturally, in the opposite way.

Another purpose of this study was to verify to what extent the examined factors influenced the participants' perception of packaging. Therefore, we applied a series of conjoint analyses revealing different relative importances of the studied effects in the examined groups. Very interesting and quite surprising findings concern discrepancies between men's and women's relative importances. The package background color factor was markedly more important to men than to women: 45% versus 25.4% respectively. Moreover, for males it was the most essential of all examined factors influencing their preferences whereas for female subjects significantly the least influential one. This outcome suggests that the negative perception of the pink color for men played the crucial role in forming the men's subjective feelings towards the examined package variants.

An additional result worth mentioning regards conjoint analyses carried out separately for the faculties. The main difference here are the opposite signs of the partial utilities for pink and grey backgrounds. The explanation is exactly the same as the one presented above in the context of the *Package color* × *Faculty* and *Package color* × *Gender* × *Faculty* interactions. Nevertheless, the relative importance value shows that for the ME students the *Background color* is the most important factor shaping their preferences.

The color perception may strongly depend on individual differences and be influenced by learned associations and cultural factors (Clarke and Costall, 2008; Labrecque and Milne, 2012; Labrecque et al., 2013). In the current study, this view is supported by the clear-cut division of the subjects into three almost equinumerous groups that have considerably different structures of preferences. Some other factors, for instance, culturally formed associations with the pink color, probably also influenced the results. The simulation models results of the conjoint analysis conducted separately on the obtained clusters allow for analyzing the obtained partial utilities in an aggregated form by means of probabilities of choosing the specified package variant. Data from all of the three approaches are markedly consistent across the clusters, which could be an additional confirmation of proper participants' grouping.

7. Limitations and future research

While interpreting results of this research, a few limitations should be taken into account. Some of them stem from the applied methods. The decision of acquiring the subjects' preferences by means of the pairwise comparisons dramatically reduces the number of factors and their levels that could be practically investigated in a single study. Therefore, we focused only on three factors having two levels. On the other hand, such an approach seems to be more precise than other methods e.g. direct ranking (Koczkodaj, 1998). The additional reason for restricting the number of researched package variants is concerned with applying full-factorial design which was aimed at identifying possible interactions. Since the analysis of variance did not show any significant interactions between the graphical factors (only interactions with Gender and Faculty were statistically meaningful), future experiments can be

elaborated using, for instance, fractional factorial approach, allowing for more factors and factor levels to be examined.

This study refers to preferences of relatively homogenous, young subject – future studies should verify whether the findings of this research could be generalized to other groups of people varied in age, nationality, interests or aesthetic perception. In light of the studies on the brain lateralization and possible cultural and social influences on perceiving colors (e.g. Saito, 1996; Clarke and Honeycutt, 2000), it seems that multicultural comparisons would also be very interesting.

There were some works showing the influence of various color mixtures on subjects' preferences (e.g. Ou et al., 2004; Humar et al., 2008; Wu et al., 2009; Schloss and Palmer, 2011). In the current research only the preferences towards a single and uniform package background color were examined, so subsequent research might also include various color combinations.

Given the homogenous groups of subjects along with consistent and statistically significant results presented in this study, it appears that the sample size was sufficient. However, some additional research involving bigger number of participants could be desirable to confirm the outcomes. In contrast to many previous studies we have investigated a package design factors of a comparably higher involvement product which customers probably treat as more *feeling* than *thinking*. Similar studies investigating other categories of products such as *high-involvement - thinking* and differences between them could also be valuable.

One should also bear in mind that the present study findings come from the controlled experiment and concern imaginary product package presented only in an electronic form. It is worthy of verifying whether preferences towards physically available packages in a real-life shopping conditions would yield similar results.

It is assumed in this study that the students from the two faculties might exhibit different preference structures – in future investigations the subjects may be divided into groups having similar interests by applying appropriate questionnaires.

8. Conclusions

This research sheds some more light on what influences the potential customers' preferences towards a package graphical design for a commonly used product but requiring higher involvement. We focused specifically on visual appearance of a smartphone's virtual package and investigated factors related with the background color, brand name typography and location in relation to the smartphone's image.

The obtained outcomes generally confirms the opinion that human preferences are to a large extent dependent on the context and that there exist significant discrepancies not only between males and females but also between groups having similar educational background or interests. The analysis of variance results in conjunction with the conjoint analysis seem to be especially interesting for the package background color effect. The decidedly stronger negative perception of the pink color dominated the men's preferences whereas women rather unexpectedly treated this factor as of very low importance. Their subjective opinions regarding the examined variants were formed by other factors. As far as we are aware similar effect has not been yet reported in any study.

From the methodological point of view it seems that application of standard methods of analyses like Anova's should be supplemented by other methods like Conjoint and Cluster analyses. As it was demonstrated in the current study, taking advantage of different methods allows for deeper understanding of the factors that influence the potential customers' preferences which, as a result, have impact on purchase decisions.

Finally, this research findings support the need for verifying and validating theories and experimental results obtained on the ground of general psychological and physiological studies in different, more ecologically valid circumstances.

References

Arditi, A., & Cho, J. (2005). Serifs and font legibility. Vision Research, 45(23), 2926–2933. doi:10.1016/j.visres.2005.06.013

Aydinoğlu, N. Z., & Krishna, A. (2011). Guiltless gluttony: The asymmetric effect of size labels on size perceptions and consumption. Journal of Consumer Research, 37(6), 1095–1112. doi:10.1086/657557

Azzi, A., Battini, D., Persona, A., & Sgarbossa, F. (2012). Packaging design: General Framework and Research Agenda. Packaging Technology and Science, 25(8), 435–456. doi:10.1002/pts.993

Beaumont, J. G. (1985). Lateral organization and aesthetic preference: The importance of peripheral visual asymmetries. Neuropsychologia, 23(1), 103–113. doi:10.1016/0028-3932(85)90048-X

Bernard, M. L., Chaparro, B. S., Mills, M. M., & Halcomb, C. G. (2003). Comparing the effects of text size and format on the readibility of computer-displayed Times New Roman and Arial text. International Journal of Human-Computer Studies, 59(6), 823–835. doi:10.1016/S1071-5819(03)00121-6

Bloch, P. H. (1995). Seeking the ideal form: Product design and consumer response. Journal of Marketing, 59(3), 16–29. doi:10.2307/1252116

Boyarski, D., Neuwirth, C., Forlizzi, J., & Regli, S. H. (1998). A Study of Fonts Designed for Screen Display. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 87–94). New York, NY, USA: ACM Press/Addison-Wesley Publishing Co. doi:10.1145/274644.274658

Childers, T. L., & Jass, J. (2002). All dressed up with something to say: effects of typeface semantic associations on brand perceptions and consumer memory. Journal of Consumer Psychology, 12(2), 93–106. doi:10.1207/S15327663JCP1202_03

Chokron, S., & De Agostini, M. (2000). Reading habits influence aesthetic preference. Cognitive Brain Research, 10(1–2), 45–49. doi:10.1016/S0926-6410(00)00021-5

Chou, M. C., & Wang, R. W. Y. (2012). Displayability: An assessment of differentiation design for the findability of bottle packaging. Displays, 33(3), 146–156. doi:10.1016/j.displa.2012.06.003

Chung, S. T. L. (2002). The effect of letter spacing on reading speed in central and peripheral vision. Investigative Ophthalmology and Visual Science, 43(4), 1270–1276.

Clarke, T., & Costall, A. (2008). The emotional connotations of color: A qualitative investigation. Color Research & Application, 33(5), 406–410. doi:10.1002/col.20435

Clarke III, I., & Honeycutt Jr., E. D. (2000). Color usage in international business-to-business print advertising. Industrial Marketing Management, 29(3), 255–261. doi:10.1016/S0019-8501(99)00068-1

Clement, J., Kristensen, T., & Grønhaug, K. (2013). Understanding consumers' in-store visual perception: The influence of package design features on visual attention. Journal of Retailing and Consumer Services, 20(2), 234–239. doi:10.1016/j.jretconser.2013.01.003

Crilly, N., Moultrie, J., & Clarkson, P. J. (2004). Seeing things: consumer response to the visual domain in product design. Design Studies, 25(6), 547–577. doi:10.1016/j.destud.2004.03.001

Crilly, N., Moultrie, J., & Clarkson, P. J. (2009). Shaping things: intended consumer response and the other determinants of product form. Design Studies, 30(3), 224–254. doi:10.1016/j.destud.2008.08.001

Dichter, E. (1957). The Package and the Label. Packaging Carton Research Council, London.

Doyle, J. R., & Bottomley, P. A. (2004). Font appropriateness and brand choice. Journal of Business Research, 57(8), 873–880. doi:10.1016/S0148-2963(02)00487-3

Doyle, J. R., & Bottomley, P. A. (2006). Dressed for the occasion: Font-product congruity in the perception of logotype. Journal of Consumer Psychology, 16(2), 112–123. doi:10.1207/s15327663jcp1602_2

Dyson, M. C. (2013). Where theory meets practice: A critical comparison of research into identifying letters and craft knowledge of type design. The Design Journal, 16(3), 271–294. doi:10.2752/175630613X13660502571741

Fraser, T., & Banks, A. (2004). Designer's color manual: The complete guide to color theory and application. San Francisco: Chronicle Books.

Funk, D., & Ndubisi, N. O. (2006). Colour and product choice: a study of gender roles. Management Research News, 29(1/2), 41–52. doi:10.1108/01409170610645439

Garber Jr., L. L., Hyatt, E. M., & Boya, Ü. Ö. (2009). The effect of package shape on apparent volume: an exploratory study with implications for package design. Journal of Marketing Theory & Practice, 17(3), 215–234. doi:10.2753/MTP1069-6679170302

Gilliam, J. E., & Unruh, D. (1988). The effects of Baker-Miller pink on biological, physical and cognitive behaviour. Journal of Orthomolecular Medicine, 3(4), 202–206.

Gofman, A., Moskowitz, H. R., & Mets, T. (2010). Accelerating structured consumer-driven package design. Journal of Consumer Marketing, 27(2), 157–168. doi:10.1108/07363761011027259

Gontijo, P. F. D., Rayman, J., Zhang, S., & Zaidel, E. (2002). How brand names are special: brands, words, and hemispheres. Brain and Language, 82(3), 327–343. doi:10.1016/S0093-934X(02)00036-6

Granger, G. W. (1955). An experimental study of colour preferences. The Journal of General Psychology, 52(1), 3–20. doi:10.1080/00221309.1955.9918340

Grossman, R. P., & Wisenblit, J. Z. (1999). What we know about consumers' color choices. Journal of Marketing Practice: Applied Marketing Science, 5(3), 78–88. doi:10.1108/EUM0000000004565

Guilford, J. P., & Smith, P. C. (1959). A System of color-preferences. The American Journal of Psychology, 72(4), 487. doi:10.2307/1419491

Hellige, J. B. (1980). ERIC/ECTJ Annual review paper: Cerebral hemisphere asymmetry: Methods, issues, and implications. Educational Communication and Technology, 28(2), 83–98.

Hellige, J. B. (1990). Hemispheric asymmetry. Annual Review of Psychology, 41(1), 55–80. doi:10.1146/annurev.ps.41.020190.000415

Helson, H., & Lansford, T. (1970). The role of spectral energy of source and background color in the pleasantness of object colors. Applied optics, 9(7), 1513–1562. doi:10.1364/AO.9.001513

Hoegg, J., Alba, J. W., & Dahl, D. W. (2010). The good, the bad, and the ugly: Influence of aesthetics on product feature judgments. Journal of Consumer Psychology, 20(4), 419–430. doi:10.1016/j.jcps.2010.07.002

Holmes, C. B., & Buchanan, J. A. (1984). Color preference as a function of the object described. Bulletin of the Psychonomic Society, 22(5), 423–425. doi:10.3758/BF03333865

Holmes, G. R., & Paswan, A. (2012). Consumer reaction to new package design. Journal of Product & Brand Management, 21(2), 109–116. doi:10.1108/10610421211215553

Ishii, Y., Okubo, M., Nicholls, M. E. R., & Imai, H. (2011). Lateral biases and reading direction: A dissociation between aesthetic preference and line bisection. Brain and Cognition, 75(3), 242–247. doi:10.1016/j.bandc.2010.12.005

Jacobs, L., Keown, C., Worthley, R., & Ghymn, K.-I. (1991). Cross-cultural Colour Comparisons: Global Marketers Beware! International Marketing Review, 8(3). doi:10.1108/02651339110137279

Janiszewski, C. (1990). The influence of print advertisement organization on affect toward a brand name. Journal of Consumer Research, 17(1), 53–65.

Kauppinen-Räisänen, H. (2010). The impact of extrinsic and package design attributes on preferences for non-prescription drugs. Management Research Review, 33(2), 161–173. doi:10.1108/01409171011015847

Kauppinen-Räisänen, H., & Luomala, H. T. (2010). Exploring consumers' product-specific colour meanings. Qualitative Market Research: An International Journal, 13(3), 287–308. doi:10.1108/13522751011053644

Kauppinen-Räisänen, H., Owusu, R. A., & Bamfo, B. A. (2012). Brand salience of OTC pharmaceuticals through package appearance. International Journal of Pharmaceutical and Healthcare Marketing, 6(3), 230–249. doi: 10.1108/17506121211259403

Koczkodaj, W. W. (1998). Testing the accuracy enhancement of pairwise comparisons by a Monte Carlo experiment. Journal of Statistical Planning and Inference, 69(1), 21–31. doi: 10.1016/S0378-3758(97)00131-6

Krugman, H. E. (1966). White and Negro responses to package designs. Journal of Marketing Research, 3(2), 199–200. doi:10.2307/3150212

Labrecque, L. I., Patrick, V. M., & Milne, G. R. (2013). The marketers' prismatic palette: A review of color research and future directions. Psychology & Marketing, 30(2), 187–202. doi:10.1002/mar.20597

Labrecque, L., & Milne, G. (2012). Exciting red and competent blue: the importance of color in marketing. Journal of the Academy of Marketing Science, 40(5), 711–727. doi:10.1007/s11747-010-0245-y

Lewis, M. (1991), Understanding Brands, Kogan Page, London.

Limon, Y., Kahle, L. R., & Orth, U. R. (2009). Package design as a communications vehicle in cross-cultural values shopping. Journal of International Marketing, 17(1), 30–57. doi:10.1509/jimk.17.1.30

Ling, J., & van Schaik, P. (2006). The influence of font type and line length on visual search and information retrieval in web pages. International Journal of Human-Computer Studies, 64(5), 395–404. doi:10.1016/j.ijhcs.2005.08.015

Littel, S., & Orth, U. R. (2013). Effects of package visuals and haptics on brand evaluations. European Journal of Marketing, 47(1/2), 198–217. doi:10.1108/03090561311285510

Liu, L., & Arditi, A. (1996). Letter confusion observed under small interletter spacings. Investigative Ophthalmology and Visual Science, 37(3).

Mahnke, F. H. (1996). Color, environment, and human response. New York: Reinhold.

McInnis, J. H. & Shearer, J. K. (1964). Relationship between color choices and selected preferences for the individual. Journal of Home Economics, 56(3), 181-187.

Mills, C. B., & Weldon, L. J. (1987). Reading text from computer screens. ACM Computing. Surveys, 19(4), 329–357. doi:10.1145/45075.46162

Middlestandt, S. E. (1990). The effect of background and ambient color on product attitudes and beliefs. Advances in Consumer Research, 17(1), 244-249.

Myung, R. (2003). Conjoint analysis as a new methodology for Korean typography guideline in Web environment. International Journal of Industrial Ergonomics, 32(5), 341–348. doi:10.1016/S0169-8141(03)00074-X

Ohme, R., Reykowska, D., Wiener, D., & Choromanska, A. (2010). Application of frontal EEG asymmetry to advertising research. Journal of Economic Psychology, 31(5), 785–793. doi:10.1016/j.joep.2010.03.008

Oppenheimer, D. M., & Frank, M. C. (2008). A rose in any other font would not smell as sweet: Effects of perceptual fluency on categorization. Cognition, 106(3), 1178–1194. doi:10.1016/j.cognition.2007.05.010

Orth, U. R., & Malkewitz, K. (2008). Holistic package design and consumer brand impressions. Journal of Marketing, 72(3), 64–81. doi:10.1509/jmkg.72.3.64

Orth, U. R., & Malkewitz, K. (2012). The accuracy of design-based judgments: a constructivist approach. Journal of Retailing, 88(3), 421–436. doi:10.1016/j.jretai.2011.11.004

Orth, U. R., Campana, D., & Malkewitz, K. (2010). Formation of consumer price expectation based on package design: Attractive and quality routes. Journal of Marketing Theory & Practice, 18(1), 23–40. doi:10.2753/MTP1069-6679180102

Ou, L.-C., Luo, M. R., Woodcock, A., & Wright, A. (2004). A study of colour emotion and colour preference. Part I: Colour emotions for single colours. Color Research & Application, 29(3), 232–240. doi:10.1002/col.20010

Perea, M., & Gomez, P. (2012). Increasing interletter spacing facilitates encoding of words. Psychonomic Bulletin & Review, 19(2), 332–338. doi:10.3758/s13423-011-0214-6

Perea, M., Moret-Tatay, C., & Gómez, P. (2011). The effects of interletter spacing in visual-word recognition. Acta Psychologica, 137(3), 345–351. doi:10.1016/j.actpsy.2011.04.003

Perea, M., Panadero, V., Moret-Tatay, C., & Gómez, P. (2012). The effects of inter-letter spacing in visual-word recognition: Evidence with young normal readers and developmental dyslexics. Learning and Instruction, 22(6), 420–430. doi:10.1016/j.learninstruc.2012.04.001

Paterson, K. B., & Jordan, T. R. (2010). Effects of increased letter spacing on word identification and eye guidance during reading. Memory & Cognition, 38(4), 502–512. doi:10.3758/MC.38.4.502

Pillai, K. G., Katsikeas, C. S., & Presi, C. (2012). Print advertising: Type size effects. Journal of Business Research, 65(6), 865–868. doi:10.1016/j.jbusres.2010.04.010

Puccinelli, N. M., Chandrashekaran, R., Grewal, D., & Suri, R. (2013). Are men seduced by red? The effect of red versus black prices on price perceptions. Journal of Retailing, 89(2), 115–125. doi:10.1016/j.jretai.2013.01.002

Ramadan, M. Z. (2011). Evaluating college students' performance of Arabic typeface style, font size, page layout and foreground/background color combinations of e-book materials. Journal of King Saud University - Engineering Sciences, 23(2), 89–100. doi:10.1016/j.jksues.2011.03.005

Reimann, M., Zaichkowsky, J., Neuhaus, C., Bender, T., & Weber, B. (2010). Aesthetic package design: A behavioral, neural, and psychological investigation. Journal of Consumer Psychology, 20(4), 431–441. doi:10.1016/j.jcps.2010.06.009

Rettie, R., & Brewer, C. (2000). The verbal and visual components of package design. Journal of Product & Brand Management, 9(1), 56–70. doi:10.1108/10610420010316339

Ritnamkam, S., & Sahachaisaeree, N. (2012). Cosmetic packaging design: A case study on gender distinction. Procedia - Social and Behavioral Sciences, 50, 1018–1032. doi:10.1016/j.sbspro.2012.08.102

Robertson, A.R. (1977). The CIE 1976 color-difference formulae. Color Research and Application, 2, 7-11

Robertson, G. L. (2006). Food packaging: principles and practice. Boca Raton: Taylor & Francis/CRC.

Rayner, K., Slattery, T. J., & Bélanger, N. N. (2010). Eye movements, the perceptual span, and reading speed. Psychonomic Bulletin & Review, 17(6), 834–839. doi:10.3758/PBR.17.6.834

Ryynänen, T., & Hakatie, A. (2013). Low involvement, low price and low quality image renegotiated – a case study of staple food package design. The International Review of Retail, Distribution and Consumer Research, 23(2), 204–219. doi:10.1080/09593969.2012.759611

Saito, M. (1996). A comparative study of color preferences in Japan, China and Indonesia, with emphasis on the preference for white. Perceptual and Motor Skills, 83(1), 115–128. doi:10.2466/pms.1996.83.1.115

Sanocki, T., & Dyson, M. C. (2012). Letter processing and font information during reading: Beyond distinctiveness, where vision meets design. Attention, Perception, & Psychophysics, 74(1), 132–145. doi:10.3758/s13414-011-0220-9

Schauss A. G. (1979). Tranquilizing effect of color reduces aggressive behavior and potential violence. Journal of Orthomolecular Psychiatry, 8, 218-220.

Schauss A. G. (1981). Application of behavioral photobiology to human aggression: Baker-Miller pink. The International Journal for Biosocial Research, 2, 25-27.

Schloss, K. B., Strauss, E. D., & Palmer, S. E. (2012). Object color preferences. Color Research & Application. doi:10.1002/col.21756

Silayoi, P., & Speece, M. (2007). The importance of packaging attributes: a conjoint analysis approach. European Journal of Marketing, 41(11/12), 1495–1517. doi:10.1108/03090560710821279

Singh, S. (2006). Impact of color on marketing. Management Decision, 44(6), 783–789. doi:10.1108/00251740610673332.

Slattery, T. J., & Rayner, K. (2013). Effects of intraword and interword spacing on eye movements during reading: Exploring the optimal use of space in a line of text. Attention, Perception, & Psychophysics, 75(6), 1275–1292. doi:10.3758/s13414-013-0463-8

Sperry, R. W. (1961). Cerebral Organization and Behavior: The split brain behaves in many respects like two separate brains, providing new research possibilities. Science 133 (3466): 1749–1757. doi:10.1126/science.133.3466.1749

Taft, C. (1997). Color meaning and context: Comparisons of semantic ratings of colors on samples and objects. Color Research & Application, 22(1), 40–50. doi:10.1002/(SICI)1520-6378(199702)22:1<40::AID-COL7>3.0.CO;2-4

Tullis, T. S., Boynton, J. L., & Hersh, H. (1995). Readability of Fonts in the Windows Environment. In Conference Companion on Human Factors in Computing Systems (pp. 127–128). New York, NY, USA: ACM. doi:10.1145/223355.223463

Van Oel, C. J., & van den Berkhof, F. W. (Derk). (2013). Consumer preferences in the design of airport passenger areas. Journal of Environmental Psychology, 36, 280–290. doi:10.1016/j.jenvp.2013.08.005

Vaughn, R. (1980). How advertising works: A planning model. Journal of Advertising Research, 20(5), 27.

Wang, R. W. Y., & Chou, M. C. (2011). Differentiation in the arched surface of packaging: Its influence on the findability of logo typography displays. Displays, 32(1), 24–34. doi:10.1016/j.displa.2010.09.006

Wang, Y. J., & Minor, M. S. (2008). Validity, reliability, and applicability of psychophysiological techniques in marketing research. Psychology and Marketing, 25(2), 197–232. doi:10.1002/mar.20206

Wells, L. E., Farley, H., & Armstrong, G. A. (2007). The importance of packaging design for own-label food brands. International Journal of Retail & Distribution Management, 35(9), 677–690. doi:10.1108/09590550710773237

Westerman, S. J., Sutherland, E. J., Gardner, P. H., Baig, N., Critchley, C., Hickey, C., Zervos, Z. (2013). The design of consumer packaging: Effects of manipulations of shape, orientation, and

alignment of graphical forms on consumers' assessments. Food Quality and Preference, 27(1), 8–17. doi:10.1016/j.foodqual.2012.05.007

Whitfield, T. W. Whiltshire, T. J. (1990). Color psychology: A critical review. Genetic, Social & General Psychology Monographs, 116(4), 387.

Wilson, G. D. (1966). Arousal properties of red versus green. Perceptual and Motor Skills, 23(3), 947–949. doi:10.2466/pms.1966.23.3.947