

The Influence of the Brain Lateralization on Preferences Related to the Simple Digital Signage Message

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ABSTRACT

This paper presents research concerned with how people perceive and subjectively assess various digital signage messages consisting of a simple image and one word text. Three independent factors were manipulated including: the background color (white and black), the text font size (36 and 72 points), and, finally, the image location (to the left and right hand side of the text). The examination involved 70 participants – 40 women and 30 men. The pairwise comparisons based on Analytic Hierarchy Process developed by Saaty were employed to produce the subjects' preferences. The obtained results indicated considerable differences in relative weights towards examined factors. However, the consistency indices occurred to be significant and suggested that probably participants had difficulties in specifying coherent likings.

Keywords: Digital signage, Consumers' preferences, Analytic Hierarchy Process, Brain lateralization

INTRODUCTION

Recently, marketing activities very often take advantage of the latest digital developments in presenting the marketing content both in public urban environment and such publicly available indoor buildings as railway stations, airports or shopping malls. Although the use of various digital signage displays is becoming more and more popular there is relatively little research concerned with how various graphical aspects of the marketing message influence customers' perception. There are, naturally, general investigations related with graphical displays, however few of could be directly applied in this specific context. Therefore, there is a need for verifying whether previously elaborated theories apply to this specific domain of marketing.

This research is especially focused on the brain lateralization effect. It is widely believed that the human brain hemispheres are to a certain extent specialized. The right hemisphere is better suited to process pictorial information while the left one is more logical. A number of studies supported this view including, for instance, Hellige (1980, 1990), Beaumont (1985), Janiszewski (1990). It is interesting if this effect works also in conjunction with other factors and how they influence the potential customers' preferences. Since the typical digital signage screen usually contains some text and images we have decided to additionally differentiate the experimental conditions by the background color, font size, and the relative location of an image and the text.

METHOD

Participants

A total of 70 students of Wrocław University of Technology took part in the experiment. There were 40 female participants and 30 males. The subjects were young as more than 90% of them were less than 30 years old. The detailed age ranges are demonstrated in Table 1.

Table 1. Age ranges of participants.

Age (years)	Share (%)	No of subjects
< 20	4	3
20-29	89	62
30-39	6	4
> 40	1	1

Experimental design and procedure

Three independent variables were manipulated in this study, that is, Background color, Font size and Graphics location. All of the factors were examined on two levels. The full factorial design was applied, so the factors produced eight experimental conditions. The details of all the factor levels are put together in Table 2.

Table 2. Factors and factor levels used in this study.

Factor	Factor levels
Background color	White
	Black
Font size	Small – 36 pixes
	Big – 72 pixes
Graphics location	Left
	Right

The overall time needed to complete the questionnaires amounted to about 9 minutes. The number of possible pairwise comparisons depend on the number of investigated variants according to the following formula $(n^2-n)/2$, thus given eight experimental conditions it was equal 28 in this study. Each of the necessary comparison was presented twice. For each pair, at first the given experimental variant was located on the left hand side of the screen while later on the right side.

Para 1

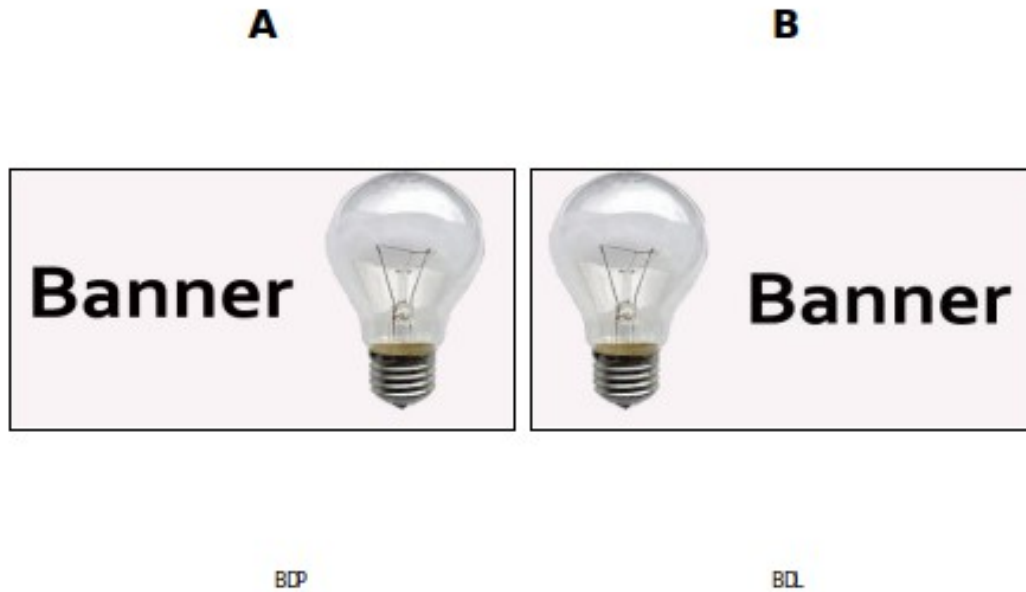


Figure 1. One of possible pairwise comparisons used in the present research.

The subjects expressed their opinion by means of the verbal statements whereas the necessary calculations were based on numerical values presented in Table 3.

Table 3. The verbal and numerical scale applied in the study

No	Scale	Numerical value
1.	Equally preferred (Hardly to say)	1
2.	Rather preferred	3
3.	Preferred	5
4.	Decidedly preferred	7

The dependent measure reflected the subjective preferences expressed by examinees and were obtained according to the Analytic Hierarchy Process (Saaty, 1978) framework and was based on obtaining the eigenvectors of the pairwise comparison matrices. The vector of weights includes values ranged from zero to one therefore their mean values are demonstrated as percentages. The bigger the weight, the more preferred the given variant was.

RESULTS AND DISCUSSION

The obtained overall results in the form of average values of preferences towards examined variants are presented in Table 4. The sixth column contains data for all of the subjects taking part in the examination while the last column presents relative weights of participants exhibiting strong consistency in their ratings. These two set of results are respectively presented in Figures 2 and 3.

Table 4. Overall results for all subjects and subjects having strongly consistent preferences

No.	Experimental condition			Symbol	All subjects mean weights (% , n=70)	Consistent subjects mean weights (% , n=37)
	Background color	Font size	Graphics location			
1.	White	72	Left	BDL	13.5	11.3
2.	White	72	Right	BDP	15.6	6.66
3.	White	36	Left	BML	11.7	13.3
4.	White	36	Right	BMP	11.1	10.7
5.	Black	72	Left	CDL	15.0	18.5
6.	Black	72	Right	CDP	12.8	17.6
7.	Black	36	Left	CML	10.9	10.6
8.	Black	36	Right	CMP	9.39	11.3

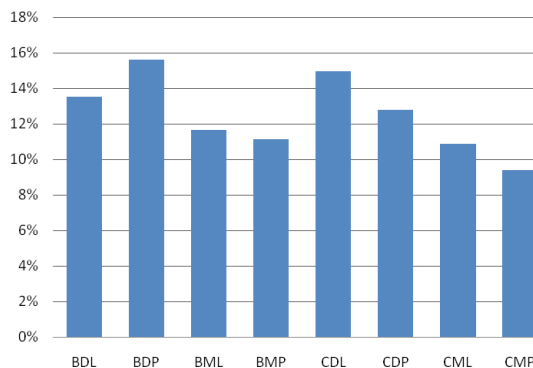


Figure 2. All subjects mean weights (% , n=70)

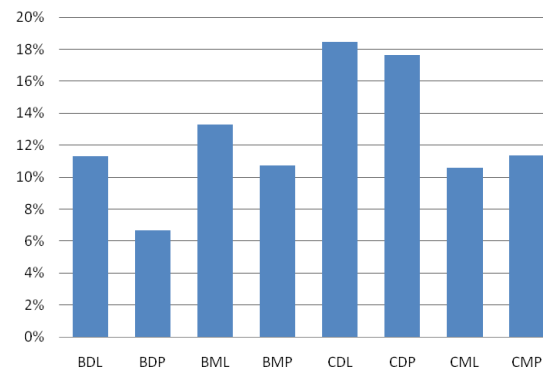


Figure 3. Consistent subjects mean weights (% , n=37)

According to the computed mean preference weights, the most preferred by subjects variant was the one with white background, big text, with the image located on the right hand side of the graphical message. On the other hand, the least liked variant had a black background, small fonts, and the image situated near the right edge. The difference between the best and the worst rated condition amounted 6.12%. Looking at the Figure 2 results one may observe general tendency of giving higher scores to variants with big text as compared to variants where the small fonts were employed. This finding is in concordance with the results reported by Bernard et al. (2003) and Michalski et al (2006) as well as in other studies dealing with font sizes e.g. Tullis et al. (1995) or Ramadan (2011).

At the same time among small text conditions participants preferred more the images located near the left than the right border. Similar effect was observed for big fonts with black backgrounds conditions. This, in turn, is consistent with a number of scientific reports on a brain hemisphere lateralization such as Beaumont (1985), Janiszewski (1990), Rettie and Brewer (2000). However the reversed preferences for variants with a big text and white background do not support this theoretical conjecture coming from more general psychological and physiological studies. This surprising outcome certainly requires further research.

As the first step towards this, we repeated our calculations only on the subjects exhibiting strong consistencies in their pairwise comparisons. This was assessed by computing for every participant Consistency Ratio indicators according to the AHP framework. The results based only on these participants presented in Figure 3 show similar pattern of the dominance of variants with image located on the left hand side over those with images near the right border. The only exception are the variants with a black background and small texts, however the difference here is relatively small and probably it might be not relevant – this naturally should be checked by appropriate statistical methods and supplemented by additional investigations.

The obtained results regarding background colors are inconsistent since for all of the subjects the effect has little impact on the final preferences and the differences could be attributed to other factors. The situation is different while we analyze only subjects with a greater degree of consistency. Here it seems that the variants with black background are generally better perceived.

CONCLUSIONS

This study results confirmed that such simple graphical factors as the background color, font size and image versus text location may considerably influence the subjects' preferences. Generally, the findings show that results of the basic research coming from other fields of science should be repeated and confirmed in more real life problems.

The obtained outcomes seem to be promising and should certainly be continued and more thoroughly investigated. Further analysis of the presented data, including for instance analysis of variance, are required to show whether the examined factors statistically significantly differentiate the mean preference weights. Furthermore, as it is suggested by Grobelny and Michalski (2011), methods such as conjoint or factor analyses may provide more insights into the structures of preferences. The discrepancies between results suggest that there might be groups of subjects having specific preference structures. Therefore, an additional cluster analysis could be employed to verify this hypothesis.

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