THE USE OF SUBLIMINAL MESSAGES IN MARKETING: EXPERIMENTAL EXAMINATION

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Abstract

The experiment should answer the question of whether respondents are changing their preferences under the influence of subliminally exposed images and imperative messages. We also examined whether picture or imperative message has a stronger influence on the subject's decision. The experiment involved 210 females, who were divided into four experimental and two control groups. The film with subliminal images and messages that were contrary to what subjects preferred was presented to experimental groups, and control groups watched the same film without any messages. The results show that subliminal exposure of the material has impact on changing preferences and it turned out that the image has a stronger effect than the imperative message.

Keywords: Marketing Message, Preferences, Decision Making, Subliminal Perception.

1. Introduction

Study of perception was at first a product of scientific curiosity in order to find out more about the man and reality. However, between the two world wars, questions were raised in regard to whether results of those studies could be practically applied and encased. Knowledge about

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perception began to be applicable in psychology, medicine, professional selection, military recruitment as well as in one field which has just started - marketing.

Concept of marketing most often involves communication and exchange between the one who sells and another one who buys. Within that communication process, there is need to attract customer’s attention, then inform him/her about a product and finally to persuade him/her to buy the product. In the beginning, marketers had modest media arsenal at their disposal, such as newspapers, leaflets and radio, but with emergence of film the situation changed drastically.

Marketers asked psychologists to determine what colors should be used in advertisements in order to attract attention of customer, how long advertisement time should last, what should be emphasized, how often an advertisement should be broadcasted in order to be effective, which personality traits should be targeted, how to formulate a slogan that would be catchy and easy to remember, and so on.

During some thirty years’ period, a number of variants were tried, some of the most important principles were discovered, but the marketers were not satisfied since the best advertisements were not able to sell certain products in quantities that would satisfy the producers. Politicians and military strategists sought more reliable methods by which one could spread propaganda and undermine the enemy morale. There were various attempts, researchers varied the conditions, made adequate samples, used complicated appliances, huge funds were spent, but the progress was slow. Many renowned names could be found in the field of marketing, only to mention the name of founder of behaviorism John Watson, but the results were still not impressive enough for marketers (Watson, 1922; Buckley, 1982; Petty, Cacioppo, & Schumann, 1983).

With that objective, people started thinking about possibility of using subliminal stimuli for advertising purposes. Those proposals were at first pronounced in “half-voice”, but later they received support of certain scientists so that the first studies were initiated. Subliminal perception of stimulus is the subject matter of this paper, so that we will start from definition of the term.

The name subliminal perception contains in itself one contradiction. Namely, in Latin “subliminal” means below the threshold, and when it is below the threshold it means that it cannot be perceived, since simultaneous perception of something implies that the stimulus was intense enough, that is, above the threshold and that it lasted long enough, as well as that our attention was focused on it due to which it was perceived.

When the marketing researchers began to research subliminal perception, they continued previous researches that had been carried out in studying of perception, which results were already somewhat forgotten and pushed aside. However, an upswing in rehabilitation of those ideas was given by psychoanalysis which became stronger and famous worldwide between the two world wars. The authors argued that, if it was possible that larger part of man's psychic activity belonged to the unconscious and that one perceived, thought, decided and directed personal behavior unconsciously (Freud, 1913; Freud, 1915; Freud, 1923), why it would not be possible to affect man by stimuli that are below threshold of the man’s senses and consciousness. Researchers expected to find some sort of connection between psychoanalytic concept of the unconscious and subliminal stimuli.
Here we can refer to the idea of subjective and objective thresholds. Objective threshold is measured by using forced choice, where respondent has to choose from available alternatives; an images or a word (e.g. chair) is exposed to respondents after which they are given several alternative images or words including the one that had already been exposed and respondents have to state which one was exposed to them. The objective threshold occurs when respondents are able only on the basis of random guessing to say what they saw; stimulus exposure time needed for participants to recognize it at the level of random guessing using the forced choice method is used later so that the stimulus would be subliminally exposed (Cheesman & Merikle, 1984). Subjective threshold is determined by the time of exposure for which the respondent is unable to say that he/she consciously perceived the exposed stimulus, in doing so choice among alternatives is not imposed on him/her, and he/she should only state if he/she perceived anything or what it was. One should take into consideration that subjective threshold is higher (i.e. slower) compared to the objective one for an average of 40 ms (Merikle, Smilek, & Eastwood, 2001, Cheesman & Merikle, 1984).

McConnell et al (1958) point out that with some certainty it can be stated that the closer the stimulus to threshold of consciousness, the stronger its effects will probably be; it seems, however, that the main difficulty is to determine the threshold, since it varies from subject to subject, and from day to day, what is below the threshold for one person does not have to be so for another.

The effect of subliminally exposed material could be accepted as real only under the following conditions: it is necessary to assume that one can provide presentation of stimulus below the threshold of subjective or objective, then, it is necessary that respondent behaves in accordance with subliminally exposed message, that is, that his/her behavior in the presence of subliminally exposed message differs from behavior in the absence of subliminally exposed message in otherwise same conditions, as well as that difference in behavior can be considered as consequence of the effect of subliminally exposed message that respondent is not aware of. Accordingly, one can expect discordance (dissociation) between the respondent’s awareness of the stimulus and his/her behavior under influence of the stimulus; in other words, the respondent is not aware of subliminal stimulus but the stimulus does have an impact on his/her behavior, which is why this paradigm is also called dissociation (Snodgrass, Bernat & Shevrin, 2004; Merikle, Smilek, & Eastwood, 2001).

The first studies of subliminal perception emerged in the beginning of the 20th century and they relied on statements that Scripture presented in his book “The New Psychology” which was published in 1897, where he described basic principles of the stimulus effects that the respondent was not aware of (Scripture, 1897).

Dunlap (Dunlap, 1900) carried out an experiment in which he threw an “invisible shadow” in the eyes of the viewers who were watching the Muller-Lyer illusion, which consists of two lines of the same length on which ends are oppositely directed arrows that create illusion of different lengths of the lines. Dunlap argued that throwing of the shadow influenced his respondents’ judgment regarding length of the lines. Although those results were not confirmed by other
scientific studies, Hollingworth (Hollingworth, 1913) wrote in his handbook that such subliminal material could be used in advertising. Further research in that field was accelerated by emergence of tachistoscope during World War II, which made possible to expose pictures for very short time period.

Whoever has heard of subliminal advertising, also heard of the James Vicary experiment (Merikle, 2000), which could be considered the first checking of the effect of subliminally exposed material for advertising purposes. In 1957 he claimed that he designed a special machine which could present messages within very short time period while the audience, without knowing anything, was watching a film. The term subliminal advertising was coined by Vicary, who also founded the Subliminal Projection Company relying on results of his study that lasted six weeks.

In the study he used his machine during the film “Picnic” screening for presenting the audience messages “Drink Coca-Cola” and “Hungry? Eat popcorn”. Time of presenting the messages was extremely short, only 1/3000 of a second, while the messages were repeated every five seconds. After processing the results, Vicary noted that sales of Coca-Cola increased by 18.1% while sales of popcorn increased by 57.5% (Merikle, 2000; Karremans, Stroebe, & Claus, 2006).

Vicary presented the above results and they were promoted in Vance Packard’s book “The Hidden Persuaders” (1957), which had huge reverberation in public. The press devoted considerable attention to the Vicary’s discovery. Vicary became famous and rich. Corporations competed in order to obtain his services. Cinemas, television and radio broadcasters started using that technique. But while mass hysteria with his technique spread rapidly, it was found that the Vicary had faked the entire experiment and results in order to raise rating of his marketing company. Although Vicary himself admitted what he had done, even today there is a tendency to quote and publish his fraudulent results. Link performed the study based on the Vicary’s idea but he did not get any increase in sales of Coca-Cola (Eskenazi, Greenwald, Pratkanis, 1990).

Vicary inspired numerous studies which gave various results. Such studies led to use of subliminal messages in order to introduce potential buyers with new products so that the buyers would prefer them later.

Although according to the authors many things can be perceived within the subliminally exposed material, only few words or one frame may be unconsciously internalized with potential effect on behavior. Taking that into consideration, the message has to be simplified as much as possible in order to expect some change in behavior. This is illustrated by the following experiment which was conducted by Byrne (1959). In that experiment, the word “beef” was projected with 5 milliseconds exposure to respondents several times during the film which lasted sixteen minutes. The interesting thing is that it was one of rare experiments designed to study subliminal perceptions which had a control group, to which the same film was shown, of course without projecting the subliminal material. The results showed that respondents in the experimental group did not statistically significantly declare their preference for beef sandwiches that were offered to them from the list of five types of food in the final phase of experiment, compared to those in the control group. However, it turned out that respondents in the experimental group (according to
questionnaire given to them in order to assess the level of degree of hunger they felt) were hungrier than respondents in the control group.

The study carried out by Karremans et al. (2006) is in fact Vicary’s study changed in some details. In that experiment, the respondent was subliminally exposed to the advertisement for branded beverage (Lipton ice) and then was measured the effect it had on choice of brand and feeling of thirst in the respondent. The authors concluded that subliminal advertising of some brand influenced choosing of the brand and intention to drink the brand, but only if the people to whom it was advertised were thirsty. Similar results, although in another context, were obtained by Strahan et al. (2002) and Bermeitinger et al. (2009). The latter concluded that respondents were influenced by subliminally exposed material only if it was related to currently existing need and if the respondents were in appropriate motivational state.

Cooper & Cooper (2002) presented the subliminal messages related to thirst in TV program. Their results show that respondents exposed to such program expressed bigger thirst after presentation, compared to assessments before presentation of subliminal messages and compared to the control group which watched the same TV program only without the subliminal messages.

Bermeitinger et al. (2009) repeated the above findings but in another domain, their study shows that it is possible by using subliminal messages to motivate people to choose the particular brand of energetic pills, but only in case they need them, that is, if they are tired and motivated to concentrate.

Despite the studies we have presented, big number of papers shows that subliminal advertising is not so effective. Champion and Turner (1959) studied two groups of students who were watching film that lasted 30 minutes. During the film, every 10 seconds one group was projected a picture of bowl with rice, with inscription “Wander rice”, where the picture exposure was 1 millisecond. Another group was projected the text without any sense with the same exposure time. After the film screening, the respondents were shown picture from the experiment and they were asked whether they had seen it previously. In both groups there were respondents who said that the picture was familiar to them, but the difference was not statistically significant, and there were even more respondents in the control group who claimed that the picture was familiar to them, although the picture had not been projected to them. When the respondents were asked which, in their opinion, more appropriate title for the picture would be, the “Monarch rice” or the “Wander rice”, more respondents chose the first option, which had not been projected in the experiment.

Trappey (1996), after meta-analysis of 23 papers that examined efficiency of subliminal advertising, concluded that subliminal messages did not have stronger influence on behavior, while the same conclusion was also reached by Saegert (1987).

Moore (1988) considers that the biggest problem is that studies that examined effects of subliminal perception had not paid sufficient attention to the fact that stimuli should realistically be below the threshold, some stimuli were far below the objective threshold of consciousness so that they were essentially nonexistent for the respondent and without any influence on the behavior.
People’s consciousness about subliminal advertising was studied by Zanot et al. (1983) and they showed that 81% of respondents knew what subliminal advertising was, while in Rogers & Smith (1993) study on subliminal advertising 74% of respondents knew about subliminal advertising, and 61.5% of respondents believed that advertisers put subliminal messages in their advertising. People usually consider that kind of advertising to be manipulative and unacceptable, which led to legal prohibition of use of subliminal advertising in the USA, the United Kingdom and Australia (Karremans et al., 2006).

Finally, we could summarize the above data presented in the following way:

- Subliminal perception is an unclear phenomenon, both in the way it is interpreted and by its very nature.
- Due to various reasons, regardless the fact they are underlain by scientific curiosity or greed, that phenomenon has been subject of numerous studies.
- The quality of those studies may be questioned, primarily because many were derived ad hoc, that is, without a control group, while others were contaminated by biases of the researchers.
- There are no solid theoretical explanations either for or against existence of subliminal perception, which is caused by the fact that everyone in different ways defines this phenomenon.
- It is necessary to perform crucial studies of this phenomenon, with rigorous control and adequate methodology.

Some of the weaknesses of previous studies we tried to remove by the study that we have carried out and which is the subject matter of further presentation.

### 2. Methodological Framework
#### 2.1. Study problems

In this study, we investigated connection between subliminal presentation of images and imperative messages, and respondents’ decision making in the experiment. The experiment was supposed to answer the question of whether presentation of images and imperative messages influence the respondents to decide in accordance with experimenter’s suggestions that were presented subliminally, or they decide according to their previous attitudes. Study was expected to provide insight into which material, image or imperative message, presented subliminally, is more powerful in its influence on the respondent and his/her decision.

#### 2.2. Respondents

For the purpose of control, all respondents in the study were female, aged from 20 to 30 years, from the same department. Each experimental group consisted of 35 respondents.
Accordingly, 210 respondents in total participated in the experiment. All the respondents had normal or corrected to normal vision.

### 2.3. Procedure and Instruments

The study that we carried out can be divided into three phases: pretest phase, experimental phase and posttest phase. Pretest in the experiment was carried out by professors and assistants in a way that one week prior to the experiment, during lecture and practice classes, they gave to female students questionnary and thus determined the female respondents’ preference for apple or banana, while instructions were written in the questionary. The questionnary consisted of fifteen pairs of objects, food items, beverages, cars, etc. and the female respondent’s task was to chose within the offered pair one item which she preferred. One of the offered pairs was apple or banana. In that way we determined the kind of fruit which the female respondent preffered and then we placed her into appropriate group. The respondent wrote down her student’s record book number and thus was identified in further research. Female respondents did not know real purpose of testing, that is, they were given false instruction that they participated in translating and adaptation of one foreign instrument. Also, pretest was carried out by professors and assistants who did not appear during the further course of testing and all the above was undertaken so that female respondents could not relate pretest with other stages of testing. Based on the obtained information, the respondents were divided into groups as shown in Table 1.

In the second phase of the study, material was exposed to respondents per groups. The film was shown on television screen (size 68 cm, with cathode ray tube). The female respondents watched the film directly in a way that two rows of five chairs in each, were placed in front of the TV set, so that none of the respondents could watch the film at an angle. The film exposure was done in laboratory conditions where lighting and noise were controlled. Schedule of exposed material per groups is shown in Table 1.:

### Table 1. Experimental phases and the organization of groups and experimental factors that were applied

<table>
<thead>
<tr>
<th>1st Stage</th>
<th>Pretest: What fruit is preferred</th>
<th>Apple is preferred in pretest</th>
<th>Banana is preferred in pretest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental g.1</td>
<td>Experimental g.2</td>
<td>Experimental g.3</td>
</tr>
<tr>
<td></td>
<td>Picture of the banana</td>
<td>Text: “Take a banana”</td>
<td>Picture of the apple</td>
</tr>
<tr>
<td></td>
<td>is exposed in the course of the film</td>
<td>exposed in the course of the film</td>
<td>is exposed in the course of the film</td>
</tr>
<tr>
<td></td>
<td>Control group 1</td>
<td>Control group 2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd Stage</th>
<th>Experimental groups: Film with subliminal messages</th>
<th>Experimental g.4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Text: “Take an apple” exposed in the course of the film</td>
</tr>
</tbody>
</table>
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Control groups:
Film without subliminal messages

A film without subliminal messages is shown

A film without subliminal messages is shown

3rd Stage
Posttest: What fruit they would take

What kind of fruit would they take if it was offered: an apple or a banana

Film with the same content which lasted six minutes was shown to all female respondents, the film was showing landscape filmed from a bus that was moving. We selected such content of the film because it was neutral and yet interesting for the respondents, so that they watch it till the end without feeling bored. In order to make the film more dynamic, the content is followed by the music. At the beginning of the film, there was instruction for respondents. The film was made by using the “Sony Vegas Movie Studio“ program.

In time intervals that are successively repeated and amount 25s, 30s and 35s in the film, appropriate material was exposed to the experimental groups: small image of apple, small image of banana, message “have an apple” and message “have a banana”. The exact length of material exposure in experimental groups we cannot state because material was inserted into the film between frames, while exposure time was shortened by experimenter until reaching the exposure time at which stimulus ceased to be recognizable and from it remained barely noticeable interruption in the film. Also, real exposure time is influenced by delay of material due to delayed cable transmission, monitor refresh time, etc. Subliminally exposed stimulus appeared in the film 12 times in total.

We should also point out that we selected such kind of material, that is, those two kinds of fruit, due to the following reasons:

• all respondents had opportunity to try both kinds of fruit; they were able to build preference for one of them since flavors of those fruits are completely different.
• Offer of both kinds of fruit throughout the year is stable, so that respondents can satisfy their desire for fruit that they prefer whenever they want, this is important because their decision making in pretest or posttest is not influenced by the fact that some fruit they had not eaten for long, but mainly by preference which they created.
• Shapes (and color: apple in the experiment was red) of fruit are completely different so that when images are exposed with very short exposure, they cannot be mixed up, here we are dealing with very simple and recognizable shapes.
• In previous studies, various products were used which the respondents had not seen before so that could influence results, we wanted to eliminate such effect.

In the third phase of experiment, the respondents stated in the appropriate questionnaire which kind of fruit they would have taken if it had been offered to them, apple or banana. Also, on the questionnaire the respondent writes down her student’s record book number and name, so that corresponding results of pretest and posttest could be compared. It should be noted that question regarding the apple and banana is third in a row, while the other two (related to music and film)
are given as mask so that respondents could not guess the purpose of testing and thus spoil the results.

In the end, respondents to whom image was exposed in the experiment wrote down number of the image that they preferred, after they had made selection from five offered images of fruits from which one (second in a row) was exposed in the film that was shown to them.

3. Results and Discussion

The obtained data are shown in Table 2.

Table 2. The representation of results per groups

<table>
<thead>
<tr>
<th>1st stage</th>
<th>Pretest: What fruit is preferred</th>
<th>Apple is preferred in pretest</th>
<th>Banana is preferred in pretest</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd stage</td>
<td>Experimental groups: Film with subliminal messages</td>
<td>Experimental g.1 choosing</td>
<td>Experimental g.2 choosing</td>
</tr>
<tr>
<td></td>
<td>Apple</td>
<td>Banana</td>
<td>Apple</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Control groups: Film without subliminal messages</td>
<td>Control group 1 choosing</td>
<td>Control group 2 choosing</td>
</tr>
<tr>
<td></td>
<td>Apple</td>
<td>Banana</td>
<td>Apple</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>26</td>
<td>22</td>
</tr>
</tbody>
</table>

Diagram– 1. displays frequency of preference of one from five offered images of apple in posttest, from which one was exposed in the film which saw the first experimental group. Ordinal number of images is given on abscissa, image under number two was exposed in the film.
Diagram 1. Frequency of preference of one from five offered images of apple in posttest

Using Chi-square test we examined normality of distribution of choice of images which were given by respondents in the first experimental group in posttest, the results show that distribution statistically significantly varies from normal one (value = 16.286, df 4, p<.01).

Diagram 2. Frequency of preference of one from five offered images of banana in posttest, from which one was exposed in the film which saw the third experimental group. Ordinal number of images is given on abscissa, image under number two was exposed in the film.

Diagram 2. Frequency of preference of one from five offered images of banana in posttest

Using Chi-square test we examined normality of distribution of choice of images which were given by respondents in the first experimental group in posttest, the results show that distribution statistically significantly differs from normal one (Chi-square= 10.00, df=4, p<.05).
According to results shown in Table 2 we can see that 12 female respondents in experimental group changed their preference in relation to pretest, so that in posttest they prefer apple, however it does not mean that it is confirmed expectation that under influence of subliminally exposed material preferences really change. On the contrary, we have checked the above hypothesis by comparing the first experimental and the first control group using the Chi-square test, the results show that there is no statistically significant difference in answers of the respondents in both experimental and control group. It seems that difference is result of natural variation more than of experimental factor.

Results shown in Table 2 show that 12 female respondents in the second experimental group changed their preference in relation to pretest, so that in posttest they prefer apple, however comparison of the second experimental and control group using the Chi-square test shows that there is no statistically significant difference in results between the compared groups.

From Table 2 we can see that 9 female respondents in the third experimental group changed their preference in relation to pretest, so that in posttest they prefer banana, comparison of the third experimental group and second control group using the Chi-square test shows that there is no statistically significant difference between those groups.

If we carefully compare results of the third experimental group and second control group, we can see that in control group 13 female respondents changed preference in relation to pretest, so that in posttest they prefer banana, which is 4 more compared to corresponding experimental group. This is an unexpected finding, due to the fact that no material was exposed to the control group during the film.

The question is: why was such result obtained? We think that answer can be found in Diagram–2, which shows that the respondents, among 5 offered images, in most cases preferred image number 2, which was exposed during the film. This leads us to assumption that some respondents recognized material and that in the posttest preferred an alternative opposite from the one that was suggested to them by the exposed material, which brought to disturbance of logical distribution of responses. This is supported by the fact that respondents in the first experimental group more often preferred the image number 1, thus there was no recognition of stimulus among them, so that the results are also logically distributed.

Data show that 10 female respondents in the fourth experimental group, changed their preference in relation to pretest, so that in posttest they prefer banana. Comparison of those two groups using the Chi-square test shows that there is no statistically significant difference between those groups.

In order to examine differences in potential effects of subliminally exposed image and message, we compared results of the experimental groups. Results of the first and second experimental group were identical, comparison of results of the third and fourth experimental group using the Chi-square test shows that there is no statistically significant difference of results between the compared groups.

In order to further verify this finding, so that it would become more reliable, we decided to apply more molar analysis of results. Namely, our groups that we formed for the purpose of
performing the experiment consisted of 35 members each; after analyzing the results of checking and verification of our expectations, we raised the question if maybe lack of statistically significant differences between the respective groups was due to the size of the groups.

Since we were unable to enlarge the groups, the only available way was to join together the relevant groups which in pretesting and exposure to presentation of experimental influences underwent substantially the same treatment. In particular, we formed three new variables in a way that we combined results of the first and third experimental group into a new variable, then we combined results of the second and fourth experimental group into another new variable, and finally, the third new variable was created by combining results of the first and second control group. The above process is legitimate due to the following reasons: the first and third experimental group, during the film, were exposed to image of apple or banana depending on preferences in the pretest; the second and fourth group were exposed to the relevant imperative message, so those pairs of the groups, whose answers we summarized, underwent through formally identical treatment in the experiment, so that their respective coded answers could be combined into one variable. Control groups also underwent through identical treatment so that their answers also can be combined without disturbing methodological validity of the experiment. The newly established variables were then compared using the Chi-square test in order to determine existence of any differences between them. The results show that distribution of responses after joining the first and third experimental group is statistically significantly different from combined responses of the control groups (Chi-square= 4.060, df|=1, p<.05). After combining the second and fourth experimental group and comparison with the combined responses of the control groups it showed that there was no statistically significant difference.

The presented findings indicate that subliminal exposure of image is more effective compared to exposure of imperative message, which is logical, because cognitive processing and treatment of written material are much more complex than those which deal with image. In addition, we should take into consideration all above stated limitations of results.

4. Conclusion

Our key conclusions made on the basis of the performed experiment are the following:

- General expectation that respondents' decision will change under influence of subliminally exposed material has been confirmed using the molar analysis, and only for the groups to whom an image was exposed, while any statistically significant effect did not exist in groups to whom imperative message was exposed.
- According to results of checking general expectation, we may state that exposure of iconic material is more effective compared to exposure of imperative messages.
- In certain degree, there is memory and recognition of material that was subliminally exposed to respondents.
We can conclude that methodological procedures we applied in this study served their purpose, that is, they were appropriate for achieving objectives that we had set.

The control measures that we undertook and which were extensive make reliable the results we obtained. The study we have carried out is one of the few that were performed with use of control group and in laboratory conditions which maximize the level of control of confounding variables.

The results we obtained are in favor of those who claim that subliminal exposure of material is without significant effect on behavior of respondents, so that use of such material for marketing purposes is questionable and empirically insufficiently founded. However, there has been a certain effect, and it can be interpreted variously. In our opinion, we cannot rely on it because the Molecular analysis, which is more credible, has not shown it. Also, it is important to note that results that we presented and discussed do not oppose results of studies that were carried out so far, so that also on the basis of our study it can be concluded that image is more powerful means of persuasion compared to text. Furthermore, this is in compliance with concepts of theory of cognitive processing of information, so together with researches it is based on, the study shows that text processing is significantly more demanding than image processing (Potter et al. 2014; Wheat et al. 2010).

Contribution of this study could be increased by carrying out a new study where number of respondents would be bigger and male respondents would be also included, and with even higher level of control of external variables. Also, it could include some form of recording psycho physiological parameters (PGR, brain waves), if the study would be carried out individually rather than in groups. That kind of study could provide insight into emotional activities and changes of brain activity in case of appearance of subliminal messages.

References