

Subliminal messages in an online environment

Luka Varga¹, Helena Gabrijelčič Tomc¹

¹University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Graphic Arts and Design, Snežniška 5, Ljubljana, Slovenia

*E-mail: helena.gabrijelcic@ntf.uni-lj.si

Abstract

the paper addresses subliminal messages; more precisely, the effect of subliminal messages on a user in an online environment. The main goals of the paper were: to research the existing work regarding subliminal messages in different environments, to research different ways and effectiveness of subliminal messages implementation, to research the effects of different types of visual subliminal messages on a user within an online environment and to present the most effective implementation of subliminal messages within the online environment. 60 test subjects and 26 control subjects were used during the course of the research. The subjects estimated their desire to own the featured items based on the usage of website containing negative (20 test subjects), or positive (20 test subjects), or mixed subliminal messages (20 test subjects), or no subliminal messages (26 control subjects). Based on the results, it was deduced that the presence of subliminal messages affects the desire of having specific items; especially effective were the positive subliminal messages embedded in the background of the website as the subjects in that scenario on average estimated their desire to own the items was up to almost 50 % smaller than the average estimated desire rated by control subjects which was taken as the objective rating.

Keywords: subliminal messages, images, perception, implementation of messages, web environment

1. Introduction

1.1 Subliminal perception

The beginnings of researching subliminal perception – perception or reaction to stimuli which transpires without one's conscious awareness [1] – date back to 1884, when the American researchers Pierce and Jastrow designed an experiment and found out that it is possible to distinguish minute difference in weight between two seemingly identical objects which look and feel the same – the difference in weight being so minute that one cannot be consciously aware of any difference whatsoever. Every time they weighed the objects, using their hands only, they rated their confidence in their answer regarding which object was the heavier one from 0 to 3 – rating 3 meaning they were very confident in their answer, while rating 0 meant they were guessing. In the next phase, they compared the results of each experiment repetition with the confidence rating 0 – as these were the most relevant ones when researching subliminal perception – with the

actual results. The experiment proved the existence of subliminal perception [2]. The percentage of correct answers regarding which object is heavier was bigger than 60 % - up to 69,72 % (Jastrow, series 1 and 2 – 1123 experiment repetitions), which proves their decisions were not random guesses, as due to a high number of experiment repetitions it is statistically impossible as the number of correct answers would be about 50 % (+/- an acceptable variation based on the number of repetitions), but that there was something influencing their decisions – our choices among consciously equivalent options are not as random as we thought, they are influenced by factors our subconsciousness can fathom even though our conscious mind might not be aware of these factors.

1.2 Subliminal messages as advertising means

James Vicary was the first researcher who studied the effect of subliminal messages – messages

picked up by our subconsciousness, while our consciousness is not aware of them; usually they appeal to basic human needs (sex and fear of death are the most common and efficient, hunger, thirst etc.) – as possibility of advertising a product to a group of people [3]. He claimed to have increased the sales of Coca-Cola for 18,1 % and popcorn for 57,8 % after portraying subliminal messages during the viewing of a movie in a cinema in 1957. Vicary supposedly implanted text into the film – the text would appear every 5 seconds and last 1/2000th of a second to prevent the text from being picked up by viewers' consciousness while their subconsciousness would pick up the text. However, there is no evidence to support Vicary conducted the experiment, and many studies later on were not successful to fully confirm the effect of subliminal messages on unconscious processing [4,4–6].

Some researches alluded that subliminal messages are efficient only in very specific conditions, especially when the participants are exposed to subliminal messages and are motivated to achieve a specific goal [7–9]. Consequently, the studies have focused on the analysis of the conditions under which the subliminal messages are effective. This was possible only with the development of cognitive and social psychology and on that basis, the researchers were competent to answer the questions, why there were so many contradictions. Author Verwijmeren [10,11] and his colleagues presented some possible methods that should enable the prediction of conditions for effective and non-effective subliminal advertising and analysed the effect of warning the masses about the impact of subliminal advertising.

Actually, the researching field remains interesting including the studies that struggle to refute the impact of subliminal messages [12] and those which deepen the understanding of users in contact with subliminal advertising. In the latter, new methods for testing the users (with higher level of motivation or trust for the product) with the controlled exposition to subliminal prime are presented and the analyses of the effects are performed [13–15].

1.3 Visual subliminal messages

In general we can distinguish between textual subliminal messages and graphical subliminal

messages. Textual subliminal messages appear mostly in motion graphics (movies, animations, ...) and the implementation method is usually the same as in Vicary's bogus experimentation – implanting a text in only one frame in a frame sequence which does not last enough time for the text to be picked up by a viewer's consciousness. These messages can appear in other environments as well – in these, the text is usually implanted in a background with a minute contrast between the text and its immediate surrounding (background) so that the viewer does not consciously detect the textual message. Graphical subliminal messages can appear in any environment – print, motion graphics (in which the implementation method can be the same as that of the textual subliminal messages) and others. Graphical subliminal messages can be found in numerous cartoons, commercials and even in companies' logos [16]. Researchers Smith and Rogers conducted a study in 1994 [17], in which the effect of textual visual subliminal messages within TV commercials on the test subjects was researched. The implemented textual subliminal messages tried to persuade the subjects towards a greater affection of a specific commercial. As discovered in the research, the subjects remembered the commercials which contained subliminal messages with more difficulty than those commercials which tried to persuade the subjects towards a greater affection of a specific commercial using messages that are picked up by viewers' consciousnesses. Researchers Brasel and Gips [18] demonstrated also that users connect visual identity (logo) and popular brand name of the product, which associated with speed and risk, and as a result their behaviour in racing games changes (the participants were more motivated and audacious). Also in visual subliminal priming, the conditions under which the participants are exposed to stimuli are determinant. Priming a brand of a certain product with textual or graphical subliminal stimuli is going to be effective only when a person is in psychophysical conditions of desiring, needing this product [7,19]. Visual messages were tested also in an on-line environment [20], where the results alluded that "on-line atmospherics" could influence the user's choice.

The review of the references reveals that the studies of impact of subliminal stimuli on users are still popular. The implementation analyses of these stimuli in modern media (web) could present a new approach and findings on this topic. Images are, beside the text information, basic web content which is exposed to different interactions with users, consequently visual data in images, hidden as well as visible, are crucial for human conscious and unconscious perception and user experience. Besides psychophysical state of users and determination of the specific condition of exposure to subliminal priming, the research question about the quantitative and qualitative comparison of the impact of positive and negative subliminal messages remains unsolved.

The main goal of the research is to study the effects of different types (positive, negative) of visual (text, graphic) subliminal messages on a user within an online environment. The aim of the study was to define the most effective implementation of subliminal messages within the online environment and to analyze the impact of positive and negative subliminal priming on different types of products, which are used in different areas of user's daily routine (sport, hobby, information technology, health, clothing, relaxation).

2. Experimental

2.1 Materials

The following materials were used for the experiment:

- HTTrack Website Copier 3 [21] to clone website *mimovrste* [22].
- software Adobe PhotoShop Creative Cloud to prepare visual subliminal messages to be implanted in the background of the website
- software Adobe DreamWeaver Creative Cloud to modify the clone of *mimovrste* website for research purpose (implementing of subliminal messages, removal of content which could influence users' ratings)
- clones of *mimovrste* website with added positive, negative, mixed visual subliminal messages and without subliminal messages
- monitor of a laptop Asus N76V used by test and control subjects during the experiment

- web browser Google Chrome, for testing purposes
- 60 test (20 mixed, 20 negative, 20 positive subliminal messages, the average age of test subject was 24 years, 7 participants were older than 30 years) and 26 control subjects (the average age 22 years, 1 participant was older than 30 years).

2.1 Methods

The experiment was conducted in a darkened testing laboratory in order to have full control of lighting conditions for proper laptop screen contrast and to eliminate any uncontrolled visual stimuli, which could affect the results of the experiment. Two personal computers were involved in the analysis and were the only light source in the room. The first one (Asus N76V) served as a testing tool and the second one (HP) for management of the testing. The computers were perpendicular on each other and the distance between them was 2 meters. The distance between the participants and the monitor was 70 cm. The subjects were first given instructions and criteria regarding the rating of the products and the course of the experiment. The subjects were then allowed 60 seconds of free browsing within the cloned and modified website (based on the test group) with subliminal messages *mimovrste* or, in control group's case, cloned and modified website without subliminal messages. Free browsing within the cloned website was allowed in order to prolong the exposure of subjects to subliminal messages so that their subliminal perception could pick up said messages more easily. The subjects then followed instructions and searched and rated 8 different products from 8 different categories of application in users' daily lives. For each product, they were given 5 seconds to rate their desire of having the product. The rating 10 meant that the subject would buy the product instantly (money or lack thereof would hypothetically not be a factor in purchasing), while the rating 1 meant that the subject would under no circumstances want to own the product, even if it was given to them free of charge. Any elements (such as price, reviews, etc.) that could influence the desire of having the products were removed from the website. The entire experiment on average lasted approximately 400 seconds. The subjects rated the following products:

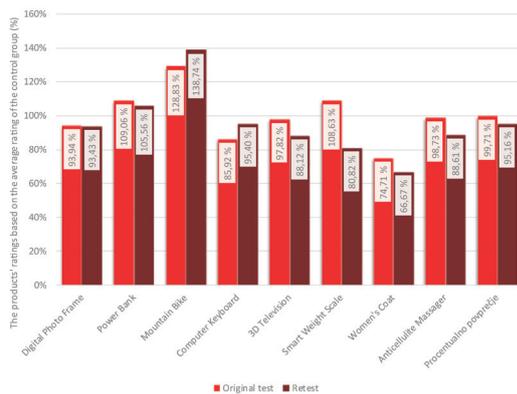


Figure 3: Comparison of relative ratings based on those of the control group between the original test and the retest - test group with negative subliminal messages

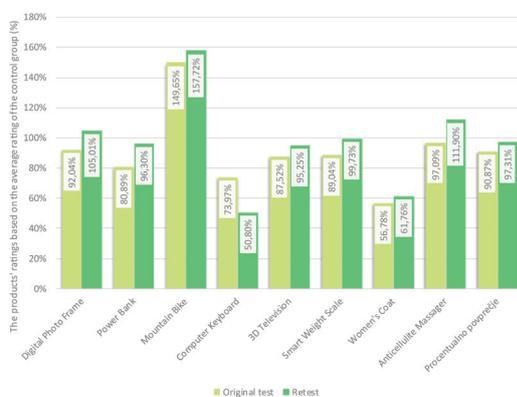


Figure 4: Comparison of relative ratings based on those of the control group between the original test and the retest - test group with positive subliminal messages

All types of subliminal messages negatively influenced the rating of Women's Coat and it also represented the lowest rating relative to the control group at each of the test groups. The least negative influence was that of mixed subliminal messages while it was also the only product which the test group on average rated with a lower rating than that of the control group. At 97,13 % of the average rating of the control group, the difference is relatively small, only 2,87 %. However, it differs by approximately 15 % from the test group's average rating of all of the products. The negative subliminal messages influenced the rating of the said product in a more negative manner. The subjects who were influenced by negative subliminal messages rated the product on average with a 25,29 % lower rating than that of the control group and with exactly 25 % lower rating than that of their

average rating of all products. The average rating of the Women's Coat by the test group with negative subliminal messages is 74,71 % compared to the average rating of the control group. The average rating of the Women's Coat product also represents the biggest negative relative delta compared to the control group's ratings. Following the women's coat rating is the Computer Keyboard, which was rated at 85,91 % of the average rating by the control group. However, the rating of the Computer Keyboard is higher by 11,20 % relative to the control group compared to the rating of the Women's Coat.

The test group with positive subliminal messages also rated the Women's Coat in average by with a substantially lower average rating than the other product – the rating was at 56,78 % of the average rating by the control group and is by 34,09 % lower than that of their relative average rating of all products and by 43,22 % lower than that of the control group. The test group with positive subliminal messages also rated the Computer Keyboard with their second lowest average rating at 73,97 % relative to the average rating of the control group and higher than the relative average rating of the Women's Coat by 17,19 %.

The ratings of the Mountain Bike – representing a healthy way of life, one's physical capabilities and endurance, the properties that are very important for humankind (evolutionally speaking) – portray the opposite trend. This product was rated by every test group with higher ratings than the control group and the rating also represented the highest average rating by the test groups relative to that of the control group. The test group with mixed subliminal messages rated the product at 137,03 % of the average rating of control group and with a 24,36 % higher than that of the test group's average rating of all the products. The test group with negative subliminal messages rated the product at 128,83 % of the average rating of the control group. The average relative rating of this product was higher by 19,77 % of their second best rated product compared to the control group (Power Bank) and by 29,12 % higher than that of the group's average rating of all the products. The group with positive subliminal messages rated the Mountain Bike with a rating of 149,65 % of the average rating of the control group.

The difference between the Mountain Bike and their second relatively highest rated product, the Anticellulite Massager, is 52,65 % while the difference between the Mountain Bike and the average relative rating of all the products by the test group stands at 58,78 %. Surprisingly, the Mountain Bike is the only product which was rated with a substantially higher rating by the test group with positive subliminal messages compared to the rating of the control group, while the group also rated the Mountain Bike with a substantially higher rating than the other test groups.

Figure 5 shows the test group with mixed subliminal messages had the lowest range of relative ratings, ranging from 97,13 % to 137,03 % of the average rating of the products relative to that of the control group (the range goes from -2,87 % to +37,03 % - the entire range ranging to 39,90%). The test group with the negative subliminal messages had a higher range of the average relative ratings to the control group – from 74,71 % to 128,83 % (ranging from -25,29 % to + 28,83 % compared to the control group – combined range at 54,12 %), while the test group with positive subliminal messages had the highest range of average product's ratings compared to the control group – they ranged from 56,78 % to 149,65 % (from -43,22 % to +46,65 % which is 92,87 % compared to the control group).

The ranges of control groups' ratings relative to the ratings of the test group can be seen on Figure 5.

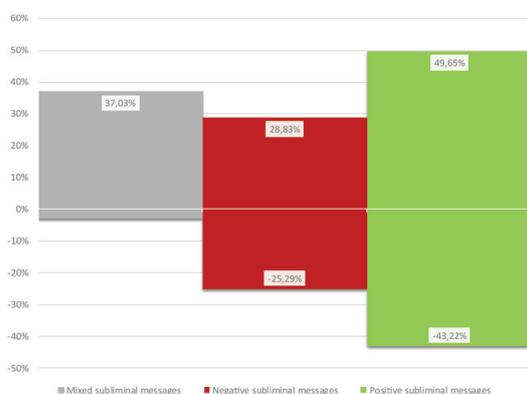


Figure 5: The range of the test groups' ratings compared to the ratings of the control group – the max range in negative and positive direction

Figure 2 shows that the presence of mixed subliminal messages has a particularly positive

influence on the ratings of the products connected to health and body care. The Mountain Bike and the Anticellulite Massager particularly stand out with their average relative ratings of 137,03 % and 133,29 % compared to the average rating of the control group.

The Smart Weight Scales is also connected to health and body care, however, it can also have a negative impact. Smart Weight Scales enable a connection with smart mobile devices and constant monitoring and analysing of the changing of our body's weight. Nowadays, though, people are very burdened by their physical appearance and their desire to achieve the perfect ratio between their height and weight often leads to psychical illnesses (bulimia, anorexia etc.). Most of these illnesses depend on a constant monitoring of one's body weight [23] – which is one of the main differences between a Smart Weight Scales and the 'normal' weight scales. Excessive worrying about one's weight can, we believe, hurt someone's health in the long term. Weight scales are also only a means to measuring one's weight and therefore its use has no beneficial effect to one's body or health while the usage of a Mountain Bike or Anticellulite Massager can have a beneficial effect to one's health and does take care of one's body. The often usage of the weighting scales can, we believe, therefore, have a negative impact on one's health, while the people who often use them have a low self-esteem and a low confidence level (even though they might have a completely usual figure, they can feel fat). As this might not be beneficial to one of the basic human needs – the need to reproduce as people with low self-esteem and low confidence level often have trouble finding sexual partners or are less desired [24] – the fact that the mixed subliminal messages have a substantially lower influence on the test subjects than the influence of the messages combined with the Mountain Bike or the Anticellulite Massager is not an unexpected one. Out of the 8 rated products, the Anticellulite Massager has the fifth highest average relative rating. All the other products, except the Women's Coat, were rated better by the test subjects compared to the control group. However, as these products do not represent basic human needs, the effect of the subliminal messages is noticeably lower (the average

ratings of every product are in the range of 10 % relative to the ratings of the control group).

Based on the results of the other test groups, which have a substantially higher ranges of the average products' ranges, we assume, that the presence of mixed subliminal messages exactly due to the opposing meanings of said messages engages awareness in the test subjects of both positive and negative consequences of owning a certain product. This awareness enables a substantially better judgement of a certain product – and with it, the awareness lowers the range of relative average ratings compared to other test groups whose test subjects subliminally realize only one aspect of owning a certain product while the other aspects are mostly known based by their own experience and beliefs – therefore, their ratings vary a lot more and, as a consequence, they mean a higher ratings' range. As the subjects subjected to the influence of mixed subliminal messages subliminally realize both the good and the bad aspects of owning a product, we believe they have a subconscious feeling of knowing a product and understanding the situation that they would find themselves in better and thus have a false sense of safety. Safety, one of the basic human needs, could inspire positive feelings and enable us to divert our attention to satisfying our other basic human needs [25]. Therefore, we could deduct that the cause for a higher average rating of each of the products relative to the control group and the reason for a lower ratings' range is especially the safety and comfort of subliminally understanding each of the aspects of owning the products (a direct consequence of simultaneous portraying of positive and negative subliminal messages), which also inspires positive feelings.

We noticed similar trends also with the test group with positive subliminal messages. While the only product which received a better rating than that of the control group is the Mountain Bike product, the Anticellulite Massager again occupies the second place in highest relative rating. While the average rating is lower than that of the control group, it is still noticeably higher than the average rating of all of the products. The rating of the Anticellulite Massager stands at 97,09 % of that of the control group, while the group's average stands at

90,87 % relative to the control group. The Smart Weight Scales have the fourth highest rating relative to the ratings of the control group. The trends are therefore similar in the cases of both the group with mixed subliminal messages as well as positive subliminal messages in certain key products.

While the fact that the positive subliminal messages, which aim to increase the desire of owning a certain product, only seemed to work as intended in the Mountain Bike product might seem as surprising, it must be noted that the Mountain Bike is an exception also proved by the fact that all of the test groups' ratings were at max relative to the control group. The Mountain Bike is the only product, which represents an active effort and an active concern for health and body care. As mentioned before, the usage of the Anticellulite Massager also represents a concern for health and body care, however, the using of the Anticellulite Massager does not make the user actively involved and its use only represents a passiveness in health concern and body care. Based on the test results, we can assume that the positive subliminal messages only affect the subjects positively when the products or actions connected with the usage of the product represent an active effort to fulfil basic human needs, while the product or the activity that is intertwined with using the object is already fulfilling our basic human needs which we know and/or realize based on our previous experience with mentioned products (Strahan 2002, Veltkamp 2007, Bermeitinger 2009). The effect with every other product or activity is exactly the reverse as we are constantly bombarded by advertisement messages, which promote exclusively positive aspects of the products. We suppose that, as a result, users have developed defence mechanisms which raise warning flags – in case something is too good to be true, it is because it is not true. Those warning mechanisms, we believe, are especially active when a user is online as most of the users either know of or are victims of frauds, which rely heavily on tricking the victims how good their deal is. The positive subliminal messages implant that feeling into our sub-consciousness. We might be prone to ignoring those warning flags based on our own previous experience or due to recommendations by people we trust. Therefore, the fact that positive subliminal messages

significantly improved the test group's rating of the Mountain Bike is not surprising.

As can be seen on Figure 2, the test group with negative subliminal messages exhibits a cyclic trend of products' ratings with the cycle repeating itself after every 3 rated products. The first amongst the products is rated the worst, the second is rated better, while the third is rated the best. The rating then drops significantly and the cycle repeats itself again. The first product in the cycle is always rated significantly worse relative to the rating of the control group while the last product in the cycle is always rated significantly better relative to the rating of the control group. The last item in both completed cycles is intertwined with health and body care. Therefore, we could also presume that this property – the connection to basic human needs, which provokes a positive reaction, in combination with the negative subliminal messages, which are intended to provoke a negative reaction – is responsible for the slump in the test group's rating of the next item relative to that of the control group. In that case, the '3-product cycle' is the result of a random selection of the product's index in the array of products selected for the subjects to rate. The '3-product cycle' could also exist, however, we cannot confirm it without further research and a bigger number of products to be rated.

The group with negative subliminal messages also rated the Mountain Bike the best and Women's Coat the worst relative to the control group's ratings, however, the Mountain Bike has a substantially lower rating than that of the other two test groups. The Anticellulite Massager is also rated 4th highest relative to the ratings of the control group and is even slightly below the average rating of all of the products of the test group relative to the control group. Therefore, we can assume that the negative subliminal messages, consistent with our expectations, lower the ratings of the products connected to basic human needs while, based on the results, the ratings of the other products are not significantly lowered when in presence of negative subliminal messages. The ratings are generally lower than the ratings of the test group with mixed subliminal messages and higher than the ratings of the test group with positive subliminal messages.

The least negative impact to the rating was caused by mixed subliminal messages as the subjects in that group rated the product at 97,13 % relative to the control group. While the difference to the control group is relatively small, at only 2,87 %, it is, however, quite considerable compared to the average relative rating of all the products in that test group – the difference to that average is approximately 15 %. It was also the only product that test group rated worse than the control group.

Negative subliminal messages had a higher effect on the rating of Women's Coat. The subjects rated the product on average with 25,29 % lower rating, relative to the control group, and exactly 25 % lower rating compared to the group's average relative rating.

The test group with positive subliminal messages also rated the textile item a lot lower than the control group – the average rating was at 56,78 % of the control group's average rating and 34,09 % lower than the group's average relative rating.

Figures 3 and 4 show that the subjects in both of the retested test groups, after being exposed to the subliminal messages again, exhibited a negative trend of rating the products in the case of the test group with negative subliminal messages and a positive trend of rating the products in the case of the test group with positive subliminal messages. Both of the test groups differed from their original test by about 5 % and the range of their ratings relative to the control group increased by about 15 %, which confirms our thesis that the effect of subliminal messages increases by increasing the frequency of exposure to the subliminal messages.

The Mountain Bike got an almost 10 % higher rating in both test groups compared to the results of their first test, which again confirms that all types of subliminal messages have a positive effect on the ratings of products actively connected to health and body care or any other basic human needs. The ratings of other products were as expected – higher in the case of the test group with positive subliminal messages and lower in case of the test group with negative subliminal messages. The only product which stands out among both test groups (along with the Mountain Bike) is the Computer Keyboard which shows a reversed trend – the group with

positive subliminal messages rated it worse while the group with negative subliminal messages rated it better during the retest.

4. Conclusions

In the research positive and negative (text, image) subliminal messages in on-line environment were analysed. The messages were tested on eight different products from eight different categories of daily application. The results of the study reveal that subliminal messages in this environment have a great effect on user's ratings of products.

The most consistent effect was detected in the presence of mixed subliminal messages implanted in the background of a web portal, which resulted in a higher average product ratings relative to those of the control group, however, the mixed subliminal messages have a much smaller range of relative ratings compared to the control group.

The user is affected by the positive and negative subliminal messages implanted in the background of a web portal as well; however, the effect of strictly positive or strictly negative subliminal messages varies based on the product shown and is not consistent among all of products. Products connected with basic human needs and products that could motivate the users to achieve a specific goal are affected by the subliminal stimuli the most [7–9]. In our research we have discovered that positive subliminal messages have potentially the biggest and potentially the lowest effect on the user. By increasing the frequency of exposure to subliminal messages, the effect of subliminal messages on the user increases – showing a positive trend in the case of positive and a negative trend in the case of negative subliminal messages; the range of ratings compared to the control group increases as well.

Based on the results, the suggested method of implementing subliminal messages (where such a use is legally allowed) is using mixed subliminal messages implanted in the background of a web portal in order to achieve the most consistent effect on users. Using positive or negative subliminal messages could have significantly better or significantly lesser effect than when using mixed subliminal messages – it depends on the context (i.e. product) in

which a specific type of subliminal message is implanted.

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