UNCONSCIOUS VISUAL PERCEPTION IN THE DECISION MAKING PROCESS

Katarína KOŠÍKOVÁ¹, Ľubor PILÁRIK²

¹Institute of Experimental Psychology, Slovak Academy of Sciences
Dúbravská cesta 9, 813 64 Bratislava, Slovak Republic
E-mail: kate_kosik@hotmail.com

²Department of Psychological Sciences, Faculty of Social Sciences and Health Care
Constantine the Philosopher University in Nitra
Kraskova 1, 949 74 Nitra, Slovak Republic
E-mail: lpilarik@ukf.sk

Abstract: In this paper the authors deal with the idea of the influence of subliminal perception in the process of decision making. They present the results of two experimental studies performed on a sample of university students. The objective of the research was to investigate whether the subliminal presentation of stimuli can influence preferences for the object under consideration and its subsequent evaluation. This was followed by an assessment in 2 experimental conditions in each experimental research study (1st with an object and 2nd with an object associated with a positive facial expression). The results of the experimental studies showed neither change in preferences nor change of evaluation of subliminally presented stimuli, in either of the experimental conditions. According to our results, unconscious perception does not affect the decision making process and, specifically, does not have any effects on the selection of subliminally presented stimuli from several options and on its subsequent evaluation.

Key words: unconscious perception, unconscious emotions, decision making, subliminal presentation

INTRODUCTION

The concept of unconscious perception is connected with many myths. Perhaps the best known is the study about subliminal perception by James Vicary (in Merikle, 2000). He claimed that during a 6-week period in 1957, 45 thousand viewers saw two advertising messages “Drink Coca-Cola” and “Eat popcorn”, while they watched a film (this presentation lasted 3 milliseconds). He stated that the sales of popcorn rose 57.7% and the sales of Coca-Cola rose 18.1%. However he has never released technical details of his study and it is obvious that this experiment can be methodologically easily attacked because there was no control group and in 1962 Vicary himself stated that the original study was a fabrication. This apparently had a greater advertising impact than any form of unconscious perception might have had. Concepts of subliminal, unconscious or default perception are used by some authors as synonyms (e.g., Merikle, 2000), but sometimes subliminal perception is considered a special case of unconscious perception. In general, we can say that subliminal perception is the perception of such stimuli, whose presence is unnoticed but which influence thinking, feeling and our subsequent behavior. The stimulus in this case cannot be per-
ceived because its characteristics lie below the level of absolute threshold (very short and weak stimuli) or differentiation (in comparison of two very similar stimuli) threshold of perception (Špok, 2007a).

Unconscious perception is one of the oldest and most controversial themes of experimental psychology. The history of investigation goes back to the 18th century. The first research studies have attempted to prove the existence of unconscious perception by demonstrating that a stimulus is perceived unconsciously when the subject is not aware of perceiving it. This method worked with the absence of conscious perception, where inferences concerning the absence of awareness were based on the subject’s introspective reports (Merikle, Daneman, 1998). Later, the researchers focused on the behavioral measure of the awareness of the stimulus (Balota, 1983; Fowler et al., 1981; McCauley et al., 1980). These research studies were based on the assumption that the inability to distinguish similar stimuli suggests a complete absence of conscious perception. An example of a behavioral measure is the study of Kunst-Wilson and Zajonc (1980), in which they tried to prove the influence of unconscious perception of stimulus on affective reactions. Insignificant, irregular geometric shapes were presented to participants for 1 msec. After the presentation, the perception of the stimulus was evaluated in two different ways: forced choice of recognition (measure of the awareness of the stimulus) and forced choice of preference (measure of the unconscious perception).

Very often the observed phenomenon at present is the effect of a mere exposure, represented by the study of R.B. Zajonc. Zajonc (2001) mentioned that when 5 subliminal pictures are presented to the first group for 5 times each (together 25 times) and 1 subliminal picture is presented 25 times to the second group, it leads not only to significantly more positive evaluation of this picture in the second group, but also to better mood and subjective feeling in this group after the presentation. The most common methodology in examining unconscious perception is the dissociation paradigm - the paradigm of direct and indirect effect (e.g., Dell’Acqua, Grainger, 1999; Draine, Greenwald, 1998; Merikle, Reingold, 1991; Merikle, Reingold, 1998; Debner, Jacoby, 1994). This method requires the use of two tasks: first one, which demonstrates the absence of direct effect (identification of semantic and structural identity of stimulus) and second, which confirms the presence of indirect effect (effect, which is the result of stimulus processing). The direct effect tasks include, for example, the method of detection, recognition, forced choice and free statement. The tests which verify indirect effect include, for example, the preference test or fragment completion task (Špok, 2007b; Merikle, Reingold, 1998).

Zajonc (2000) claims that unconscious emotions are characterized by the following signs:

1) they are caused by an unconscious event, such as for example subliminal stimulus,
2) unconsciously caused affect is perceived as diffuse.

Several studies have proven the existence of unconscious emotions. One of the first studies was the study of Kunst-Wilson and Zajonc (1980), in which they proved that repeated exposure to a stimulus increases the feeling that participants like the stimulus without realizing that they had been exposed to it several times. Similarly, the results of Murphy and Zajonc’s (1993) stud-
ies state that subliminally presented affective stimulus (happy and angry facial expressions) can unconsciously influence the evaluation of the stimulus given after subliminal priming. Unconscious emotions were also recognized in clinical studies, in free-floating anxiety, for which it is typical that a person is not aware of the origin of this feeling (Zajonc, 2000). Kihlstrom et al. (2000) characterize unconscious emotions as those to which the change of ideas or behavior is attributed and which are responsible for the emotional state, independent of the person’s awareness.

Emotions enter the process of decision making and without them the decision would take a long time or the deciding person might not find the right choice. Damasio (2000) found, that patients with ventromedial prefrontal cortex damage (connected with emotions) could not make the right decision, consider alternatives and choose one of them. Findings of Damasio clearly point to the fact that emotions are part of the decision making process and they are necessary to make the decision choice itself. Many other studies even show a link between emotional intelligence and decision making process (e.g., Pilárík, Sarmány-Schuller, 2009; Pilárík, Sarmány-Schuller, 2011; Avsec, 2012) as well as a relation of decision making process and analytical-intuitive style of decision making (e.g., Sarmány-Schuller, 2010; Sarmány-Schuller, Kuračka, 2012).

Murphy and Zajonc (1993) in their study examined whether the evaluation and preference for an object can be influenced by previous subliminal presentation of emotional stimuli. They told participants that pictures of Chinese ideograph, which should be evaluated on a 5-point scale, will be presented to them. In the experimental group, presentation also included subliminal pictures of facial emotional expressions (smiling and frowning face). The conclusion of the study is that participants who were exposed to priming with positive facial expressions evaluated the ideographs significantly more positively than the control group.

Winkielman, Berridge and Wilbarger (2005) in their work examined the influence of subliminally presented affective facial expressions (happy and angry) on consumer behavior and product evaluation. They found, that subliminally presented pictures of positive facial expressions raised the participants’ consumer behavior and resulted in more positive evaluation of the product.

The common denominator of these research studies was using facial expressions to induce emotional feeling on the subliminal level and to influence the participant’s behavior. Participants also evaluated an object submitted by the researchers. It means that previous research studies did not include selection from several alternatives.

The aim of this study was to find whether and how can:

1) subliminally presented stimulus influence selection of this stimulus from other offered alternatives and its subsequent evaluation
2) subliminally presented emotionally accentuated stimulus, which is associated with a concrete object, influence the selection of this stimulus from many offered alternatives and its subsequent evaluation.

**EXPERIMENT 1**

**Participants**

Our participants were 34 students from different types of universities (students of law,
informatics, teaching, chemistry, pharmacy, archaeology, energetics, journalism, ethnology, environmental studies and sociology) from different regions of the Slovak Republic. The age range was 20-25 years. Mean age and distribution based on gender is listed in Table 1.

Table 1. Distribution and mean age of research group the 1** experiment

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>Mean age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>17</td>
<td>22.2</td>
</tr>
<tr>
<td>Men</td>
<td>17</td>
<td>23.8</td>
</tr>
</tbody>
</table>

Measures and Instruments

To detect the choices within the decision making process we used an indirect effect test of unconscious perception - The preference test. In this test participants had to classify four different colorful mugs according to their own preference (1 = the most preferred, 4 = the least preferred). Subsequently we measured the evaluation of the selected object using three tasks:

"Evaluate the selected object on a scale from 0-100."

"Would you buy the selected object?" - with the possibilities yes/no

If the participant answered yes, there was a follow up question:

“How much would you pay for this object (in euro)?”

At the same time, we used the direct effect test, which was used to detect whether the participant saw the subliminally presented subject. In the forced choice test, the participant had to choose from different objects (in experimental situation 1) and different facial expressions (experimental situation 2), where one of them was subliminally presented and the others were semantically or structurally similar.

Procedure

The experimental plan had an inner subject design, which was created from three situations: 1) a presentation of subliminally presented object, 2) a presentation of subliminally presented object associated with a positive facial expression, and 3) a control situation (without subliminally presented object).

Subliminally presented objects:

1) situation 1: pictures of a mug in four different colors (yellow, red, blue and green),
2) situation 2: a picture of a smiling person (four men and four women) holding a mug in his/her hand.

In situation 1 in the middle of the screen on the white field there was in the form of cross displayed target for the period of 1000 milliseconds, which signalized beginning of each test. Subsequently the picture of mug in each color (yellow, blue, green and red) was subliminally presented to participants for period of 16 milliseconds. After presentation of the mug, there was so called mask. The mask consisted of white field with a geometrical shape (circle, square, triangle and rectangle) in the middle of the screen. The geometrical shape was in the color of neutral grey (hexadecimal color design: 666666, R: 102, G: 102, B: 102) and was presented for period of 2000 milliseconds. After each exposition there was a task, in which participants should determine which geometrical shape they had seen. This task served as a protective tool for the real focus of the experiment. The exposition of subliminal stimulus, mask and task for recognition of geometrical shape was repeated 16 times. Test
of forced choice was administrated after these repetitions. Participant had to choose from four different objects: (a mug - subliminally presented stimulus, a glass bottle, a plate and a bowl). Subsequently the preference test was administrated and participants were also asked to evaluate selected mug (in a percentage as well as price) (Figure 1).

Situation 2 was different from the previous one because the colorful mug was associated with a picture of a person (man or woman) expressing emotion of happiness. To verify the absence of direct effect we used the forced choice test, where the participants had to choose one from three emotional facial expressions (happy, angry and neutral). After this step the preference test and questions of objects' evaluation were administrated to the participants (Figure 2).

Situation 3 was different from the previous two situations in the absence of subliminally presented objects. Between each situation the participants solved a puzzle (picture creation).

Figure 1. Graphical representation of experimental situation 1

Figure 2. Graphical representation of experimental situation 2
RESULTS

In experimental situation 1 we tried to find out whether there will be change of preference and evaluation of the object after its subliminal presentation. We did not find statistically significant difference between object’s evaluation before and after its subliminal presentation ($Z = 1.20, p > .10$). No change occurred in the percentage evaluation of the object ($t(33) = 1.56, p > .10$) or its price ($Z = .21, p > .10$).

In experimental situation 2 we associated the object with a positive facial expression and we found that change occurred neither in the object’s preference ($Z = -.50, p > .10$) nor in the percentage evaluation ($t(33) = .31, p > .05$) nor in the price evaluation of the object ($Z = 1.85, p > .05$).

DISCUSSION

Our results of the first experiment show that no change occurred in either the experimental situation, which means that participants did not choose subliminally presented object more often than other objects, or in the object’s evaluation after its subliminal presentation. These findings are consistent with the previous results of Švecová and Sarmány-Schuller (2005), who have not confirmed the change in objects preference after their subliminal presentation. The fact that a change did not occur in the selection or evaluation of the object can probably be attributed to an intervening variable, which is the participants’ color preference. As our results provided new information and stimuli, we decided to modify the experimental design and carry out experimental study 2. As crucial seems to be the usage of the subliminal stimulus, which was a colorful mug. So in our other study we used objects that were in neutral colors (black-white, or shades of grey), because we wanted to eliminate the influence of color preference in the participants’ decision making process.

EXPERIMENT 2

Participants

Participants were 42 students from different types of universities (students of economics, informatics, teaching, geography, marketing, finance, law, biology, nursery, human resources, and sociology) from different regions of the Slovak Republic. The age range was 20-25 years. Mean age and distribution based on gender is listed in Table 2.

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>Mean age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>17</td>
<td>22.4</td>
</tr>
<tr>
<td>Men</td>
<td>25</td>
<td>22.3</td>
</tr>
</tbody>
</table>

Table 2. Distribution and mean age of research group the in 2nd experiment

Measures and Instruments

To detect choices within the decision making process we used the indirect effect test of unconscious perception - Preference test. In this test the task of the participants was to rank 8 objects. Four objects were presented subliminally (a mug, a vase, a bowl and a bottle) and another four objects were with subliminally presented objects that are semantically or structurally similar (a flower pot, a dish soap, a candlestick, a plate). Participants had to rank these objects in their own preference ($1 = \text{the most preferred}, 8 = \text{the least preferred}$).
the least preferred). The number of objects, compared to the previous research, was higher in order to reduce the percentage of the object’s random selection. Subsequently, we measured the evaluation of the selected object using two tasks: “Evaluate the selected object on a scale from 0-100.” “How much would you pay for this object (in euro)?”

Free choice test - we used it to verify direct effect of subliminally presented stimulus. We asked participants whether they had noticed any flashing of a picture during the experiment and if yes they should write down what was in the picture. The instruction was: “During the experiment, there was a flashing picture. Did you see what it was? If yes, write down what you saw in the picture.”

Procedure

The experimental plan had an inner subject design, which was created from three situations: 1) a presentation of subliminally presented object, 2) a presentation of subliminally presented object associated with a positive facial expression, and 3) a control situation (without subliminally presented object).

Figure 3. Graphical representation of experimental situation 1

Figure 4. Graphical representation of experimental situation 2
Subliminally presented objects:
1) situation 1: pictures of four objects (a mug, a vase, a bowl and a bottle) in grey color (Figure 3);
2) situation 2: pictures of a smiling person (four men and four women) holding one object in his/her hand shown in grey color (Figure 4).

The procedure of the experiment was the same as in Experiment 1.

RESULTS

In experimental situation 1 we did not find statistically significant difference between the evaluation of the object before and after its subliminal presentation ($Z = -.07, p > .10$). There was no change in the percentage of the object’s evaluation ($Z = -.53, p > .10$) or its price evaluation ($Z = -1.37, p > .10$).

In experimental situation 2 we associated the object with the positive facial expression and we realized that there was no change in the object’s preference ($Z = -.50, p > .10$) or price evaluation ($Z = -1.61, p > .05$). But when we subsequently eliminated participants who were aware of the object’s presentation, based on dissociation paradigm ($n = 6$), we determined a statistically significant change in the amount of money ($Z = -2.45, p < .05$) toward the lower amounts after subliminal presentation of this object.

DISCUSSION

Based on the results of the second experiment we can claim the conclusions from the previous experiment. After eliminating color as a variable, which might have influenced the preference of stimuli, we found that there was no change in preference or evaluation of subliminally presented object. Participants did not place the subliminally presented object in a more prominent place, compared to the control situation, and they did not assign to this object a higher percentage nor did they show a tendency to pay more for this object.

Based on the dissociation paradigm we verified the level of awareness of presented objects. According to the participants’ statements we found, that the presentation of a subliminally presented object was not realized by 43% of the participants, and this group’s decision making process was not influenced by subliminal presentation of the object.

Moreover, the second experimental situation, where subliminally presented object was associated with an emotional facial expression, did not bring a change in the decision making process of the participants.

The detection rate of the awareness of the presented objects was reasonable. Participants in one group did partially realize seeing the presented stimulus, when they claimed that they had seen a face, figure, woman, man and so on, but they had not seen the object which was part of the picture. Therefore, we can assume that there was no association of a smile with the object but the positive emotional state was induced. The same conclusion was reached by Zajonc (2001). The possible explanation of the situation, manifested in the participants showing a tendency to pay less for the object, could be Isen’s (Isen, Daubman, Nowicki, 1987) mood maintenance hypothesis. The mood maintenance hypothesis assumes that positive people tend to risk less to preserve their mood. The lower amount of money paid leads to maintenance of positive mood, because a loss of larger amount of money could change their mood to a negative one.
On the other hand, our results do not support the findings of Murphy and Zajonc (1993). Subliminally presented objects were not evaluated more positively and did not influence the preference of subliminally presented stimuli. The effect of subliminal stimuli on the decision making process of individuals depends on personal preferences or current needs (see Karremans, Stroebe, Claus, 2006).

CONCLUSION

The results of the experiments discussed above did not support the influence of subliminally presented stimuli on the decision making process of individuals. Interesting, however, should be the focus on stimuli characteristics, which have a tendency to evoke emotions in the deciding individuals and distinguish the effect of emotions as actual state vs. emotions associated with the consequences of a decision. It also opens the requirement to detect individual threshold because ad hoc set characteristics of presented stimuli do not guarantee that presentation of selected stimulus can be considered as subliminal.

Received June 27, 2012

REFERENCES


NEUVEDOMENÁ VIZUÁLNA PERCEPCIA V PROCESE ROZHODOVANIA

K. Košíková, L. Pilárík