Suvremena psihologija 16 (2013), 2, 171-184

Izvorni znanstveni članak - UDK 159.952.4

IS ATTENTION NECESSARY IN PERCEPTION?

Svetlana Borojević
Univerzitet u Banjoj Luci, Filozofski fakultet
Bulevar vojvode Petra Bojovića 1A, 78 000 Banja Luka
borojevicsvetlana1@gmail.com

Vasilije Gvozdenović
Univerzitet u Beogradu, Filozofski fakultet
Čika Ljubina 18-20, 11 000 Beograd
vgvozden@f.bg.ac.rs

Abstract

This research was conducted to investigate the phenomenon of *inattentional blindness*, which, examines the possibility of perception without visual attention. This study also attempted to determine whether certain features of stimuli can have an effect on the degree of that phenomenon.

The study comprises three experiments, in which the procedure was exactly the same, but the type of presented stimuli differed. Thirty subjects participated in each experiment. They were randomly divided into three groups, which corresponded to three experimental conditions. The total sample consisted of 90 subjects.

The results of Experiment 1 and Experiment 2 show that there is no adequate perception without active engagement of attention, while the results of Experiment 3 indicate that certain type of stimuli can be perceived automatically, without visual attention. Analysis of all results suggests that there is the effect of type of stimuli on seeing a stimulus in inattentional conditions, but not on accuracy of identification.

Key words: perception, visual attention, inattentional blindness

INTRODUCTION

The complexity of our visual system is reflected in the fact that perception is not a passive process, but an active process of receiving and analyzing, as well as discrimination of intrinsic (size, color and texture) and extrinsic (position and velocity) features of objects without direct contact with them (Coello, 2005). The process of seeing begins when light enters the eye, activating a large number of retinal receptors and finishes in the appropriate zones of the brain, where the received information is processed. In this way we get a clear and complete picture of objects that surround us. The way in which such a comprehensive and coherent picture is

© “Naklada Slap”, 2013. Sva prava pridržana.

created is exactly the problem that theorists have been trying to explain for years. The problem dates back to the beginnings of psychology, in "confronting" analytical and synthetic theory and continues today between followers of neuroscience and Gestalt psychologists. Gestalt psychologists believe that the entirety is primary and perception is momentary and automatic, without cognitive mediation. Neuroscientists believe that perception is a process carried out through several qualitatively different stages (Palmer, 2002; 2003). What actually stems from such approaches is the question of the role of attention in perception. According to Gestalt psychology, perception is done automatically, without the engagement of attention, while the followers of the other view consider that perception is not even possible without visual attention.

Visual attention has aroused much interest in researchers in recent years, considering that mental orientation to the information given in the visual modality has the most important role in the coordination of seeing and motor activity. Visual attention relates to focusing our mental activity on particular stimuli and the exclusion of other irrelevant stimuli that at any moment affect our senses (Chun & Wolfe, 2001). This process is carried out continuously (we are not even aware of it) and it is realized on the basis of two characteristics of attention – capacity and selectivity (Gvozdenović, 2011). Visual attention selects information according to its current relevance for the organism, so some information is accepted and some rejected. Similar to a reflector, visual attention illuminates the objects we look at and which have been processed better than other objects in the environment. This is known as a "spotlight metaphor" (Posner, 1978). On the other hand, the "lens metaphor" (Posner, 1978) suggests that attention can be directed to parts of the visual field to a different extent, which can affect the number of details that can be observed at one focus of attention.

In defining visual attention, the connection of that construct with eye movements must be pointed out. Before we direct our eyes to a specific location, we must orient our attention to the same location, so the eye movements and attention must always be considered together (Hoffman, 1998). The most general classification of eye movements includes reflex (sacadic) and voluntary (controlled) movements. Voluntary movements are slow and controlled by the frontal lobe, while reflex eye movements are fast, automatic and appear with the presentation of sudden stimulation (Johnson & Proctor, 2004). Hoffman (1998) concluded that eyes are blind during saccades and that the information is received during fixation between them, which lasts for about 250 milliseconds.

Undoubtedly, visual attention is the main mechanism of perception. According to many authors, it is not only important but also necessary. But, there is evidence that does not entirely support such claims. That evidence comes from a relatively new theoretical approach known as *inattentional blindness*. This approach is the result of working on the elimination of methodological disadvantages in the earlier studies of attention. The most commonly used tasks in early studies were distracting

 © "Naklada Slap", 2013. Sva prava pridržana.

and visual search task. But, in such tasks subjects knew that the test stimulus can appear (and they must answer if it appears), so it was inevitable that a certain amount of attention must focus on the task. This type of task, therefore, fails to adequately eliminate attention, so it cannot be applied to analyze the phenomenon which was originally intended. There was a need to create a new method that would ensure the absence of expectations of the test stimulus and where the task was only to observe a visual field. The approach of *inattentional blindness* was based on such a method. The classical task with a new procedure consisted of presenting a cross on the computer screen. Subjects were previously given instructions to estimate the length of the cross' lines. This procedure is repeated several times, but in the third or fourth trial, the critical stimulus showed up unannounced in one of the cross quadrants. It is, in fact, the main trial, in which attention is completely eliminated and the subjects should answer if they saw something else besides the cross. The answer to this question is crucial for the examination of what is perceived without the participation of attention. Common procedure involves fixing the gaze on a point at the center of the screen, to control eye movements. Since this allows only one critical stimulus for one subject, the main disadvantage is that it requires a large number of subjects. Also, there are control trials of divided and full attention conditions, which also include a large number of subjects. These control trials are intended to show whether the perception of a critical stimulus is possible at all and according to the results of such trials, the amount of *inattentional blindness* is estimated.

Many studies based on the paradigm of *inattentional blindness* were conducted to verify the findings of previous studies based mostly on Feature integration theory. These new studies have shown that grouping by proximity, similarity of lightness and common fate cannot be perceived in inattention conditions. On the other hand, some characteristics of objects are perceived without attention. Such characteristics are color, location, numerosity and motion. Results of perceiving the shape of objects are not totally clear (Mack & Rock, 1998; 2000). In the first experiment, conducted by Mack and Rock, low percentage of inattentional blindness was found for a small black square. Even more, few simultaneously presented squares in different quadrants were perceived in the inattention condition, implicating the possibility of information processing from more than one area of the display without attention. However, later experiments in which larger shapes were presented have shown that perception in inattention condition was at chance level. These experiments have also shown that the amount of *inattentional blindness* is smaller for solid shapes than for outline shapes.

It was found that significant stimuli (such as personal name) were more often perceived in cases of inattention. The explanation for these results is that appropriate perception of very familiar stimulus requires little information. Only part of such information is sufficient for recognition.

This research was conducted in order to verify a phenomenon of inattentional blindness and to examine the impact of stimuli type on perception in inattention

© "Naklada Slap", 2013. Sva prava pridržana.

conditions. Respectively, this study attempts to investigate how different stimuli (different in shape and structure) affect the appearance of *inattentional blindness*, since previous studies were inconsistent. The difference in perception of various types of stimuli would indicate the specificities of our visual system and its' functioning, as well as the importance of visual attention in it. Three experiments were organized with the same procedure but different stimuli. The stimuli differed in terms of shape and structure.

EXPERIMENT 1

The aim of this experiment was to determine the effectiveness in detecting a triangle as the critical stimulus in inattention, divided and full attention conditions. This type of stimulus is chosen because it is a relatively easily recognizable geometric shape. If the percentage of subjects who correctly identified the stimulus in the first group (that worked in inattention conditions) was equal (or almost equal) to the percentage of subject who also correctly identified the stimulus in the third group (that worked in full attention conditions), it would mean that this simple geometric shape could be observable without visual attention. Subjects in the second group worked in conditions of divided attention.

Design: Design in this experiment is multivariate frequency. The first variable *group* has three categories ("inattention", "divided attention", "full attention"). The second variable *seeing the critical stimulus* is dichotomous, with categories "seen" and "not seen". The third variable *accuracy of identification* is also dichotomous, with categories "correct" and "incorrect". The first variable is manipulative (independent), while the second and third are registered dependent variables.

Subjects: Thirty subjects, students of the Faculty of Philosophy, participated in the experiment. All subjects had normal or corrected to normal vision and were tested individually. Subjects were randomly divided into three groups, which corresponded to the three different experimental conditions (inattention, full attention and divided attention).

Stimuli: Same stimuli were used for all three groups of subjects – a cross, displayed in the center of the computer screen and triangle as the critical stimulus. The triangle was small and displayed at the periphery (outside of the focus of attention, which is determined by a circular area around the lines of the cross). Length of the cross' lines are varied through a series of trials. The cross appeared in every trial, while the critical stimulus appeared in only one trial (third critical trial) during the experiment. The number of trials for each subject was 3, so there were a total of 90 trials in this experiment.

Instruments: The experiment was conducted on a laptop, model Acer Aspire 5520 ICW 50, using the software package SuperLab 4.5 for Windows. The stimuli were presented on a laptop screen, at a distance of 50 centimeters from the subjects. Subjects' answers were recorded in a special protocol designed for this research.

 © "Naklada Slap", 2013. Sva prava pridržana.

Procedure: In the first two trials, the procedure was the same for all three groups. Before each trial a fixation mark was presented in the center of the screen. The subjects were given instructions to focus on that mark. After that, a cross was presented in the center of the screen and the subject's task was to assess which of the two lines of the cross were longer (horizontal or vertical). The cross was presented on the screen for 200 msec, which is less time than it generally takes to move the eyes from one location to another (Mack & Rock, 1998). The cross dimensions changed from trial to trial. After each presentation of the cross, a pattern mask (that covered the entire area of the visible screen) appeared for 1500 msec. In the third trial, simultaneously with the cross, the critical stimulus (triangle) was presented. After that, the subjects answered the question if they saw something else on the screen, beside the cross. The difference between the three groups of subjects was in the instructions they received. The first group received no additional instructions (inattention), the second group was instructed to observe the entire area of the screen (divided attention), while the third group was instructed to ignore the cross but to observe the appropriate quadrant of the cross (where the triangle appeared). After the third exposure, all subjects were given a recognition test, in which they should recognize the critical stimulus in a series of multiple choice forms. Correct identification was considered only when the exact shape was selected, while the response was considered incorrect when misidentification or the inability to select any form in the recognition test occurred.

Statistical analysis: Data analysis was performed using chi-square test for independent samples. Based on the value and statistical significance of chi-square test, it can be concluded that the samples (groups) differ in observed characteristics. Given the fact that the values of these characteristics are dichotomous, in cases in which the frequency of some cells is less than five, Fisher's exact test was applied. This test actually tests the statistical significance of the estimated probability of error for the claim that there is a difference between the frequencies.

Results And Discussion

The results clearly show that an unexpected stimulus cannot be perceived in inattention conditions. Although five of the ten subjects (50%) perceived "something new" on the screen in the critical trial, all of them failed to recognize this new figure. Under conditions of divided attention four out of ten subjects (40%) perceived a new stimulus but nobody recognized it correctly. Most subjects perceive and correctly identify a triangle when their attention is focused on the quadrant in which it appears. Differences between all groups were statistically significant for the accuracy of identification (χ^2 (2) = 21.818, $p < 0.001$), but not for seeing a critical stimulus (χ^2 (2) = 5.833, $p > 0.05$). Single comparisons between groups show that there are significant differences between the second and third (Fisher's exact test: $p = 0.029$ for seeing; Fisher's exact test: $p = 0.000$ for accuracy of identification) and the first

© "Naklada Slap", 2013. Sva prava pridržana.

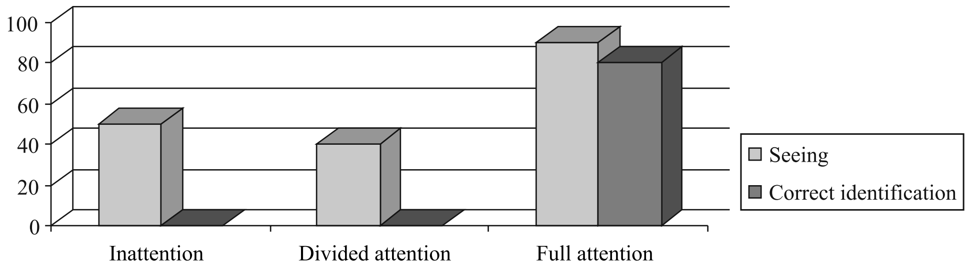

Figure 1. Graphical representation of percentage of seeing and correct identification of simple geometric shape (triangle)

and third group (Fisher's exact test: $p = 0.000$ for accuracy). These differences imply that the small triangle, shown at the periphery cannot be adequately perceived without engaging visual attention. These results also confirm the existence of the phenomenon of *inattention blindness* and the assumptions of Irvin Rock and Arien Mack that even simple geometric shapes cannot be accurately identified without mediation of higher cognitive mechanisms (Mack & Rock, 1998).

The disadvantage of this and the other two experiments is that they used binary dependent variables, so there is a risk of accidental guessing. Although subjects could answer only "see" or "not see" a critical stimulus, for accurate identification they had to choose one of the ten shapes, presented in the recognition test, which certainly reduces the possibility of guessing the right answer.

EXPERIMENT 2

The goal of this experiment was the same as in the previous experiment. Thirty new subjects (divided into three groups) participated in this experiment. The only difference is in the type of critical stimulus. In this experiment a square was shown, instead of the triangle. The reason for choosing this stimulus is the inconsistency of results about perception of different shapes in earlier studies using inattentional blindness paradigm. On the other hand, some studies have shown that shape can be processed without awareness and at early levels of visual processes (Ro, Singhal, Breitmeyer & Garcia, 2009), so this experiment will contribute to the clarification of attention's role in perception of this simple geometric shape.

Results And Discussion

The results of statistical analysis are shown in Figure 2. Distribution of the results has shown certain unevenness between the three groups of subjects. But this disparity does not reach statistical significance ($\chi^2(2) = 5.963$, $p > 0.05$, for accuracy

 © "Naklada Slap", 2013. Sva prava pridržana.

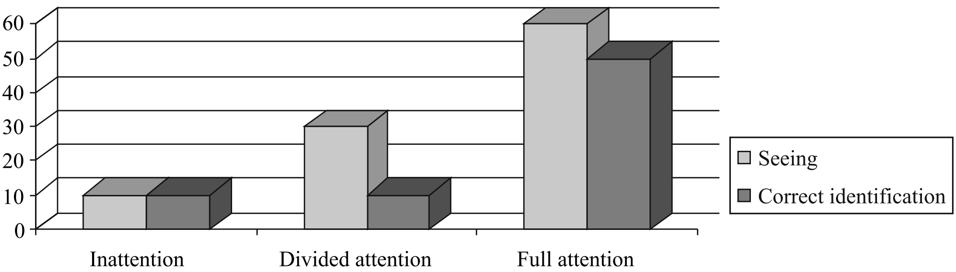

Figure 2. Graphical representation of percentage of seeing and correct identification of simple geometric shape (square)

of identification, χ^2 (2) = 5.700, $p > 0.05$ for seeing). There are, also, no statistically significant differences found when doing single comparisons between groups (except between first and third group for seeing). Although the absence of significant differences between the first and third group may lead to the conclusion that, in a certain percentage, small square shown on the periphery is observed without the active engagement of attention, it seems more likely that the cause of the lack of statistical significance is a smaller percentage of seeing and correct identification of the critical stimulus in full attention conditions. Only five subjects correctly identified the square when their attention was focused on the quadrant in which it appeared. Considering that these results are unexpected, the question is whether the time frame, within which the critical stimulus is exposed, is long enough. There is a possibility that the exposure time was too short to identify the square. Results that are the most relevant for this paper are those relating to the first group of subjects. Although one subject detected and recognized the square in the condition of inattention, such a result might be on the level of accidental guessing, so it could not be concluded that this type of critical stimulus is observed automatically, without attention.

EXPERIMENT 3

The goal of this experiment was the same as in the previous two experiments. Thirty new subjects (divided into three groups) participated in this experiment and critical stimulus was Kanizsa illusory square. This type of stimulus was chosen because of its complexity. Unlike simple geometric shapes, illusory square represents the articulation of perceptual unit that does not exist on the level of stimulation or the sensory level (Marković, Kostić & Todorović, 2004). Illusory contours are examples of creating coherent perceptual units on the basis of incomplete or insufficiently specific stimulation. Spatially separate packmen-shaped inducers give the impression of a white square. Perception of this phenomenon was explained with Gestalt Principle of grouping (Kanizsa, 1955) and the first experiments conducted

© “Naklada Slap”, 2013. Sva prava pridržana.

in the frame of inattentional blindness paradigm examined this principle, showing that attention is necessary for grouping by proximity, similarity and common fate.

Results And Discussion

As in the previous experiments, results in this experiment also show that there is a difference in the perception and recognition of the critical stimulus. More subjects (in all groups) report seeing a critical stimulus relative to the percentage of subjects who correctly identified it. There are also differences between groups in percentage of seeing a critical stimulus, but they are not statistically significant (χ^2 (2) = 3.810, $p > 0.05$). The less accurate identification appears in the group that worked in the divided attention condition, while the highest number of correct answers was in the group that worked in the full attention condition. Obtained differences between the groups were statistically significant (χ^2 (2) = 7.500, $p < 0.05$). Comparing only the first and third group, the results diverge from those previously mentioned. Fisher's exact test does not reach statistical significance (p = 0.185), so it can be concluded that there is no difference in accuracy of identification of illusory square between subjects that worked in the inattention condition and subjects who worked in the full attention condition. In the first group, seven of ten subjects perceived "something new" on the screen and four of them correctly recognized it. Three subjects with incorrect identification, chose forms in the recognition test that are very similar to illusory square (e.g. illusory triangle or illusory rectangle). Apparently, it is possible to adequately perceive this type of stimulus without attention. This launches new questions about the phenomenon of *inattentional blindness.* One of those is whether particular stimulus configurations could be sufficiently specific to reduce or increase the amount of this perceptual phenomenon. In an attempt to answer this question, further analysis was performed which included the results of all three experiments.

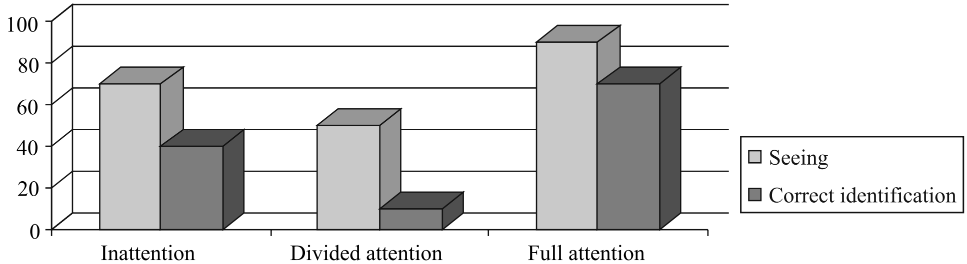

Figure 3. Graphical representation of percentage of seeing and correct identification of illusory square

© "Naklada Slap", 2013. Sva prava pridržana.

EXPERIMENT 1-3

To determine whether there are differences in the amount of *inattentional blindness* in relation to various types of stimuli, the results obtained in the groups that worked in inattention conditions were compared. Since the procedure in all experiments was completely the same, comparison is statistically justified. Results of this analysis are presented in Figure 4.

The results presented in Figure 4. show that the percentage of seeing and correct identification differ, depending on the type of stimulus. This difference is statistically significant (χ^2 (2) = 7.602, $p < 0.05$ for seeing a critical stimulus; χ^2 (2) = 6.240, $p < 0.05$ for accuracy of identification). Further analysis indicates that the largest differences are between the square and the illusory square (Fisher's exact test: p = 0.009), for seeing a critical stimulus. But, when correct recognition is considered, the largest difference is between triangle and illusory square (Fisher's exact test: p = 0.043).

In order to investigate the details of the effect obtained in Experiment 3, logistic regression was applied. This type of analysis provides data on probability of *inattentional blindness* occurrence compared to the group (that subjects belong to), to the type of presented figure (structural different real and illusory figure) and to the shape of the presented figure (triangle and square).

Occurrence of *inattentional blindness* was considered as an impossibility of seeing critical stimuli or as an impossibility of correct identification of those stimuli. Thus, analysis was done separately for these two aspects. The results are shown in Tables 1. and 2.

It is observed that there is an effect of variable *group* on seeing a critical stimulus. The *type* of figure is also a significant factor, while the shape of the figure was found to be insignificant in explaining this dependent variable. The odds ratio is larger for *group* (2.173) than for *type* of figure (0.375), but looking at the length of

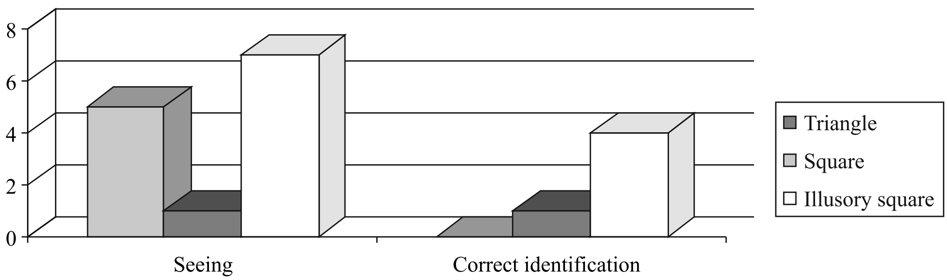

Figure 4. Graphical representation of percentage of seeing and correct identification of different type of stimuli in inattention conditions (N = 30)

© "Naklada Slap", 2013. Sva prava pridržana.

Table 1. Results of logistic regression for seeing as dependent variable

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for EXP (B)	
							Lower	Upper
Group	0.776	0.279	7.732	1	0.005	2.173	1.257	3.756
Type	-0.981	0.475	4.263	1	0.039	0.375	0.148	0.952
Shape	-0.339	0.453	0.558	1	0.455	0.713	0.293	1.733

Table 2. Results of logistic regression for accuracy of identification as dependent variable

	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for EXP (B)	
							Lower	Upper
Group	1.406	0.363	15.002	1	0.000	4.078	2.002	8.306
Type	-0.693	0.477	2.109	1	0.146	0.500	0.196	1.274
Shape	0.242	0.497	0.238	1	0.626	1.274	0.481	3.379

confidence interval of estimated odds, we found the type of figure having the shortest interval length.

The results presented in Table 2. show that only *group* is a significant factor in the estimation of probability of inattentional blindness occurrence. Such data is in accordance with basic claims in inattentional blindness paradigm. But, although the type of figure is a significant predictor of noticing a critical stimulus, it cannot predict correct recognition.

GENERAL DISCUSSION

Visual perception is a very complex process of continuous reception and processing of information, which enables interactions with objects in the world around us and directs our behavior. According to a number of authors, attention has a central role in this process (Chun & Wolfe, 2001). Attention has the function of selecting relevant information, integrating the observed components into a single unit, as well as ensuring the active role of the observer. But, the question is what happens with visual perception when attention is not activated. One way to test this problem is by the paradigm of *inattentional blindness*. It is a phenomenon in which subjects do not perceive the stimulus in front of their eyes in situations when they are occupied with a task that requires attention. The results of Experiment 1 and Experiment 2 confirm this phenomenon. In conditions when attention is focused on the primary task, relatively simple and easily recognizable stimuli, such as a triangle and a square, are perceived to some extent but not identified. Mack and Rock (1998) differentiated between solid and outline shapes, pointing out that the amount of *inattentional*

 © “Naklada Slap”, 2013. Sva prava pridržana.

blindness is smaller with solid shapes. Results from this study confirm that, since we used contours of a triangle or a square as critical stimuli. Further, more detailed analysis showed that the shape of presented stimuli is not a significant predictor in the occurrence of *inattentional* blindness (either in seeing critical stimulus or in correct identification). Irrespective of the complexity (number of lines that make up the geometric form), outline shapes could not be perceived in inattention conditions. What is also evident from these results is that even in the case of divided attention, simple geometric shapes could not be perceived adequately. Our visual system is sensitive to edges positioned at different orientation in space, and once the particular orientation of edges is known, it seemed very easy to connect these edges into complex object shape (Tarr, 2003). But the results from the first two experiments show not only that the whole geometric shapes cannot be discerned and recognized without visual attention, but even the segments (edges that form these shapes) cannot be perceived at early stages of vision, because none of the subjects reported seeing the critical stimulus and subsequently recognizing another form.

Nevertheless, the results obtained in Experiment 3 are not fully in accordance with the aforementioned. Although a critical stimulus in this experiment was an illusory contour, which is a more complex type of stimulus in relation to simple geometric shapes, it turned out that it is easier to perceive it in inattention conditions. These results triggered new questions. Because of their specificity, illusory contours are separately and thoroughly studied in the field of visual perception. Most of the studies have shown that grouping is crucial for this type of stimuli configurations (Fahle & Koch, 1995; Vuilleumier, Valenza & Landis, 2001). Spatially unlinked inductors (packmen) are grouped in a certain way, so that the brain interprets such a figure as a complete percept, i.e. as an opaque white square whose corners closed black disks. (Ramachandran, Ruskin, Roger-Ramachandran & Tyler, 1994; Vuilleumier & Landis, 1998). But the problem of grouping is a specific problem in the psychology of perception. Some authors think that grouping is preattentive (Kahneman & Henik, 1981; Treisman, 1986, Vuilleumier at al., 2001). But there are also authors who suggest that perception of Kanizsa type of illusory contour occurs after spatial integration of depth edges defined by occlusion (Palmer & Nelson, 2000), which means that grouping of packmen together requires attention (Mack & Rock, 1998; Li, Cave & Wolfe, 2008). At the most general level, the results obtained in this study support the claims of the first group of authors. But further analysis shows somewhat different data. Logistic regression procedure indicates that the type of figure is a significant predictor of seeing a critical stimulus, but not for its accurate identification. These findings support the argument that grouping inductors in illusory contour is only possible with focused attention. Still, it seems that something makes this stimulus more visible, since significantly more subjects have reported seeing it in relation to the simple geometric shapes. As inducers of these illusory contours were black packmen, and earlier studies have found that colour can be processed without awareness at the early level of vision (Mack & Rock, 1998; Ro

© "Naklada Slap", 2013. Sva prava pridržana.

et al., 2009), the question is whether the inducers' colour affects visibility in inattention conditions or the specificity of the illusory contour. It should be further explored. Especially because it was found that deployment of attention in illusory contours' perception (in visual search task) depends on their nature (Li et al., 2008). So something that could be examined within the *inattentional blindness* paradigm is the difference in perception without attention of various types of illusory contours or one type of contour (e.g. Kanizsa type) with different coloured inducers.

Results of this study show that the amount of inattentional blindness is larger in the perception of simple geometric shapes than illusory shapes, which means that attention is necessary for the adequate integration of line segments into complete perceptual units. Such a finding is fully consistent with the theory of early selection (Broadbent, 1958). But, in the case of the illusory square, results show that it is possible to notice such configurations without attention and this supports a late selection view, in which stimuli are processed to deep levels even when unattended (Deutsch & Deutsch, 1963). This indicates the specificity of our visual system to perceive single inductors that form subjective contours at early level of vision. These findings fit best into the hybrid model of selection (Lavie, Hirst, Fockert & Viding, 2004) which combines both the early selection and late selection views. This model considers the level and type of perceptual load involved in task-relevant processing. It should certainly be further explored whether some characteristics of illusory contours, such as size, colour, location or complexity, can affect perception in the absence of attention with respect to this hybrid model.

REFERENCES

Broadbent, D. (1958). *Perception and communication*. London: Pergamon Press.

Chun, M., Wolfe, J. (2001). Visual attention. In: B. Goldstein (Ed.) *Handbook of Perception* (pp. 272-310). Oxford, UK: Blackwell Publishers Ltd.

Coello, Y. (2005). Spatial context and visual perception for action. *Psicologica, 26*, 39-59.

Deutsch, J.A., Deutsch, D. (1963). Attention: some theoretical considerations. *Psychological Review, 70*, 80-90.

Fahle, M., Koch, C. (1995). Spatial displacement, but not temporal synchrony, destroys figural binding. *Vision Research*, *35*, 491-494.

Gvozdenović, V. (2011). *Visual attention*. Beograd: Faculty of Philosophy.

Hoffman, J.E. (1998). Visual attention and eye movements. In: H. Pashler (Ed.) *Attention* (pp. 119-154). London: University College London Press.

Johnson, A., Proctor, R. (2004). *Attention: theory and practice*. London: Sage Publications Ltd.

Kahneman, D., Henik, A. (1981). Perceptual organization and attention. In M. Kubovy, J.R. Pomerantz (Eds.) *Perceptual organization*. Hillsdale, NJ: Erlbaum.

Kanizsa, G. (1955). Quasi perceptional margins in homogenously stimulated fields. *Rivista di Psicologia*, *49*, 7-30.

 © "Naklada Slap", 2013. Sva prava pridržana.

Lavie, N., Hirst, A., Fockert, J., Viding, E. (2004). Load theory of selective attention and cognitive control. *Journal of Experimental Psychology: General*, *133*, 339-354.

Li, X., Cave, K., Wolfe, J. (2008). Kanizsa type subjective contours do not guide attentional deployment in visual search but line termination contours do. *Perception & Psychophysics*, *70*, 477-488.

Mack, A., Rock, I. (1998). *Inattentional blindness: perception without attention*. In: R. Wright (Ed.) *Visual Attention* (pp.112-189). Oxford University Press.

Mack, A., Rock, I. (2000). *Inattentional blindness*. Bradford Books.

Marković, S., Kostić, A., Todorović, D. (2004). *Language and perception – three studies in experimental psychology.* Beograd: Faculty of Philosophy.

Palmer, S. (2002). Perceptual grouping: it's later than you think. *Current Directions in Psychological Science, 11*, 101-106.

Palmer, S. (2003). Visual perception of objects. In: A. Healy, R. Proctor, I. Weiner (Ed.) *Handbook of Psychology*, (pp. 179-213). Hoboken, New Jersey: John Wiley & Sons.

Palmer, S., Nelson, R. (2000). Late influences on perceptual grouping: illusory contours. *Perception & Psychophysics*, *62*, 1321-1331.

Posner, M.I. (1978). *Chronometric exploration of the mind*. Hillsdale, NJ: Erlbaum.

Ramachandran,V., Ruskin, D., Cobb, S., Rogers-Ramachandran, D., Tyler, C. (1994). On the perception of illusory contours . *Vision Research*, *34*, 3145-3152.

Ro, T., Singhal, N., Breitmeyer, B., Garcia, J. (2009). Unconscious processing of color and form in metacontrast masking. *Attention, Perception, Psychophysics*, *71*, 95-103.

Tarr, M.J. (2003). Visual object recognition: can a single mechanism suffice? In M.A. Peterson, G. Rhodes (Eds.), *Perception of faces, objects and scenes: analytic and holistic processes* (pp. 177-211). Oxford: Oxford University Press.

Treisman, A. (1986). Properties, parts and objects. In K. Boff, L. Kaufman, J. Thomas (Eds.), *Handbook of Perception and Human Performance* (1-70). Hoboken, NJ: Wiley.

Vuilleumier, P., Landis, T. (1998). Illusory contours and spatial neglect. *NeuroReport, 9*, 2481-2484.

Vuilleumier, P., Valenza, N., Landis, T. (2001). Explicit and implicit perception of illusory contours in unilateral spatial neglect: behavioural and anatomical correlates of preattentive grouping mechanisms. *Neuropsychologia*, *39*, 597-610.

JE LI PAŽNJA NEOPHODNA U OPAŽANJU?

Sažetak

Ovo istraživanje je provedeno s ciljem ispitivanja fenomena *sljepila zbog nepažnje*, tj. mogućnosti opažanja bez angažiranja vizualne pažnje. Ova studija je, također, pokušala utvrditi da li određene karakteristike podražaja utječu na količinu tog fenomena.

© "Naklada Slap", 2013. Sva prava pridržana.

Istraživanje čine tri eksperimenta u kojima je procedura bila potpuno ista, ali su se razlikovali tipovi prezentiranih podražaja.

U svakom eksperimentu je sudjelovalo 30 ispitanika, koji su slučajnim odabirom podijeljeni u tri grupe kojima su odgovarala tri eksperimentalna uvjeta. Ukupan uzorak je činilo 90 ispitanika.

Rezultati Eksperimenata 1. i 2. pokazuju da ne postoji adekvatna percepcija bez aktivnog angažiranja pažnje, dok rezultati Eksperimenta 3. pokazuju da određen tip podražaja može biti percipiran automatski, bez sudjelovanja vizualne pažnje. Analiza svih rezultata upućuje na zaključak da postoji utjecaj tipa podražaja na opažanje podražaja u uvjetima nepažnje, ali ne i na točnost identifikacije.

Ključne riječi: percepcija, vizualna pažnja, sljepilo zbog nepažnje

Primljeno: 23. 09. 2013.

 © “Naklada Slap”, 2013. Sva prava pridržana.