

EFFECT OF BIAS ON THE PERCEPTION OF TWO SIMULTANEOUSLY PRESENTED AMBIGUOUS FIGURES

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Ambiguous figures are pictures which reverse their appearance during prolonged viewing and can be perceived in two (or more) available interpretations. Explanations for this phenomenon favour either early bottom-up processes or higher-level top-down processes. This study aimed to investigate the perception of simultaneously presented neutral and biased (i.e. with a slight modification towards one or another of the available interpretations) ambiguous figures. Our results have indicated that observers tend to perceive two adjacent identical figures as reversing simultaneously, and the same percepts dominated both in the reversal rate and the duration of perception. In the case of biased and neutral figures presented in pairs, modifications of interpretation either increased or decreased the frequency of a biased percept. The results show that both bottom-up and top-down perceptual processes influence the perception of ambiguous figures.

Key words: *ambiguous figure, adaptation, multiple-figure presentation, bias, visual perception*

Introduction

Ambiguous figures, for example, Rubin's vase-faces, involve the pictorial depictions that can be perceptually organized in two or more ways. Explanations proposed for the bistability of these figures tend to fall into two generalizations emphasizing either

bottom-up or top-down processes. The satiation theory suggests that perceptual reversals are the result of the adaptation processes occurring in stimulus-driven sensory mechanisms. The activity of one perceptual mechanism supports only one of the either attainable percepts, and when this mechanism fatigues, another one comes

into action, and the competing percept emerges (e.g., Cohen, 1959). The cognitive explanation suggests that the reversals are caused by feedback operations of central mechanisms on lower level sensory activities (e.g., Girgus et al., 1977). G. M. Long and T. C. Toppino (2004) provide a detailed review on the phenomenon of reversals of ambiguous figures and potential theoretical explanations.

The present study was undertaken in an attempt to provide further insight into the adaptation (or reverse-bias) effect, which is commonly classified as depending on sensory processes. In the studies testing this paradigm, the researcher examines the effect by exposing to a participant an unambiguous version of a reversible figure before presenting the standard ambiguous one. Typically, the participants, after a prolonged (i.e. from 60 to 150 seconds) inspection of one of the unambiguous versions, report the alternative version of the presented ambiguous figure (Long et al., 1992; Long and Olszweski, 1999). The data are usually explained in the framework of satiation theory according to which the neural structures responsible for the percept compatible to the unambiguous version are fatigued and therefore, an alternative version of the ambiguous figure is comprehended. Recent research shows that adaptation is not only greatly influenced by presentation duration of adapting stimulus, but it is also known to be highly localized; so, in order to obtain the effect, the adaptation and test stimuli have to match in size (Long and Moran, 2007). The third feature of adaptation effect is its transience, as it is possible to diminish it by prolonging the delay period between adapting and test stimuli to approximately 10 sec

(or even less) (Long and Moran, 2007). However, if either one of those conditions is modified, only the priming (or positive bias) effect, i.e. the perception of the ambiguous figure in the same interpretation as the previously presented unambiguous figure is obtained (Long et al., 1992; Long and Olszweski, 1999).

In this study, we have explored the transience feature of the adaptation effect. It is known that if there is a delay of several seconds between adapting and test stimuli, observers tend to report not the alternative but the same interpretation of the ambiguous figure, i.e. they start experiencing the priming effect which is usually obtained after a short-term adaptation (1 to 5 seconds) although they had a prolonged (approximately 150 seconds) adaptation duration which should lead to the reverse-bias effect (Long and Moran, 2007).

When one is viewing a single ambiguous figure, he / she is able to interchange his / her percepts only in a mutually exclusive manner. We were interested in the possible outcomes on the adaptation effect, if there are several available interpretations for a subject to select from (i.e. in contrast to a single figure presentation task when two percepts simply interchange each other). This kind of a design might extend the understanding of the pattern of the changes of ambiguous figures. Therefore, in this study, the adapting stimulus was not shown before the test stimulus, but they were presented simultaneously. In order to do that, we incorporated the adaptation and the multiple-figure presentation paradigms (Flügel, 1913; Babich and Standing, 1981; Toppino and Long, 1987). For this purpose, each figure was modified twice, so that

one of the interpretations would dominate, but another one could still be conceivable. When that kind of a design is used, the observer is capable to choose from more than one available perceptual interpretation.

According to satiation theory, distinct neural channels are responsible for the changes in perception of ambiguous figures, and the percept changes due to satiation of neurons, responsible for that particular interpretation. G. Burton (2002) investigated how the successor states are determined in a four-state multistable figure. There is no choice of state in a bistable ambiguous figure, as the states interchange each other. But when more interpretations are introduced, their exchangeability might be random, or it might follow some sort of a unifying pattern. His results showed that the succession patterns of the perceptions of the observers were in part influenced by their expectations depending on the answer codes (i.e. either related to shape / orientation of the figure or arbitrary letter codes) given to each available interpretation.

We hypothesized that the introduction of a bias to one of the presented figures should either significantly increase the possible randomness of perceptual changes (i.e. participants will more often perceive ambiguous figures in different interpretations) or, alternatively, the changes will start to follow some sort of a unifying pattern (e.g., observers will start to perceive both figures significantly more often in the biased interpretation). It is also possible that the perceived reversal rates of ambiguous and biased stimuli presented together will be higher than those of two identical ambiguous stimuli viewed simultaneously.

Methods

Participants

Twenty students (5 male and 15 female) participated in the study. The subjects ranged in age between 21 and 23 years. Each participant had normal or corrected-to-normal vision and had no prior experience as a psychophysical subject. All the participants were right-handed according to self-report. They were completely naïve to the hypotheses and goals of the study and received course credit for participation.

Materials

The stimuli were displayed on a CRT monitor (diagonal 53 cm, resolution 1600 x 1200 pixels, frame-rate 80 Hz) connected to a Pentium class computer. A computer program written in the Delphi 3 programming language was used to record the changing interpretations (i.e. the rate of reversals) and the time spent on each interpretation (i.e. durations of percepts).

In the literature, three types of reversible figures are found: perspective reversal, meaning reversal, and figure-ground reversal (Long and Toppino, 1981). Having in mind that observers, while viewing ambiguous figures belonging to different types, are known to expose a different sensitivity to the same manipulations (Strüber and Stadler, 1999), ambiguous figures of all three types were used in our study.

We chose the Necker cube, the Bugelski rat-man, and the Rubin vase-faces as experimental stimuli. Each of the figures was drawn in black (luminance 0.5 cd/m²) on a white (130 cd/m²) background, and they were presented on an overall grey (70 cd/m²) background. Two standard ambiguous

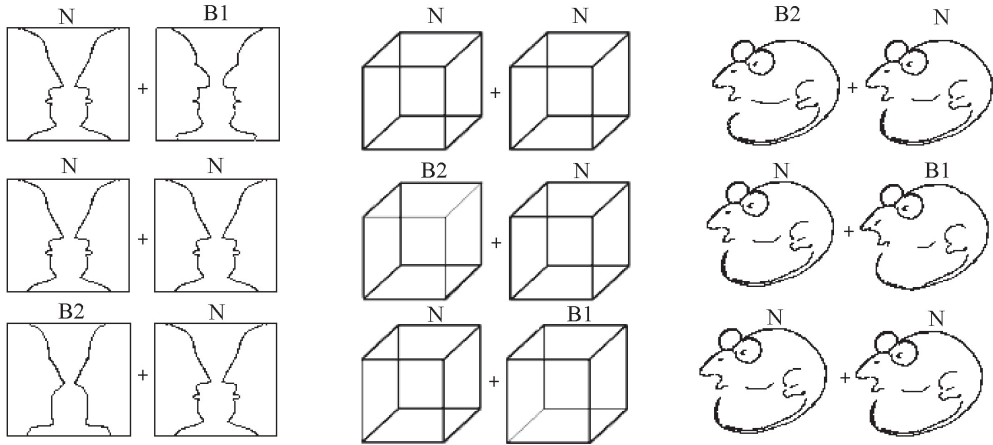


Fig. 1. Pairs of ambiguous figures used in this study: figure-ground reversal – Rubin vase-faces (left column); perspective reversal – Necker cube (middle column); meaning reversal – Bugelski & Alampay rat-man (right column); A – bias of percept-1, B – bias of percept-2, N – neutral version of an ambiguous figure

figures (No-bias pair) or a pair of neutral and biased reversible figures (Bias pair) were presented simultaneously, and they were viewed binocularly. Two types of neutral-biased pairs were used, namely a Bias-1 pair with a modification towards one interpretation and a Bias-2 pair with a modification towards another interpretation. This comprised a total of nine figure pairs (see Fig. 1). In case of the Necker cube, the bias was achieved by using lower contrast lines (75 cd/m^2). One figure subtended a visual angle of $2.4^\circ \times 2.4^\circ$, and the space between the two figures was approximately 0.6° .

Procedure

The experiment was conducted in a normal daylight environment. Participants sat approximately 60 cm away from a computer monitor. Before the testing commenced, each participant had been shown all three figures and was allowed to watch each stimulus until reversals were perceived. A period of a few

minutes generally sufficed for this purpose. This part of the testing was included for the activation of certain mental representational capabilities necessary for the origination of reversals (Mitroff et al., 2006).

At first, each participant viewed a neutral-neutral pair and sequentially two neutral-biased pairs with each possible alternative of the biased figure. Everyone was tested with both biased versions of each ambiguous figure. The presentation order of three ambiguous figures was counterbalanced. The left / right position of the biased figure in a neutral-biased pair was also counterbalanced.

When figure pairs were presented, the participants were instructed to view them naturally, not to provoke perceptual reversals, and to press three appropriate keys on the keyboard: one for the percept-1 perceived in both figures simultaneously (common reversals), another for the percept-2 (common reversals), and the third for different percepts perceived in both figures

(Table 1). A fixation point between figures was used to encourage participants to look at both figures simultaneously and not to focus their attention on a single figure.

In all conditions, stimuli were presented for 150 seconds, and approximately 30-second rest periods were provided between trials. It is reported that changing the retinal position of a presented ambiguous figure returns its reversal rate back to the baseline (Toppino and Long, 1987). Since the position of a biased figure was counterbalanced between the trials, less neural satiation was present, and therefore it should not markedly affect the obtained results. Hence, short breaks were considered enough for adaptation processes to dissipate.

For data analysis, the average amounts of presses of each key per minute were calculated as rates of reversals (i.e. reversal rate of Percept-1, Percept-2 and Different percepts). The mean intervals between pressing one key or the alternative ones was computed as the durations of percepts. Each participant took part in the experiment individually in a 30-minute session.

Results

A 3×3 repeated measures ANOVA with the Bias factors (No-bias, Bias-1, and Bias-2) and Percept (Percept-1, Percept-2, and Different percepts), was used to estimate the variability of the mean values of the reversal rate and duration of each percept. The Bias-1 and Bias-2 values represent the biased interpretations of Percept-1 and Percept-2, respectively (Table I). The analysis was performed separately on each figure pair. The reversal rate data of all figure pairs used in this experiment are presented in Fig. 2, and the duration of percepts is presented in Fig. 3.

Table 1. *Percept-1 and Percept-2 determined by experimenter*

Figure	Percept-1	Percept-2
Necker cube	Down position	Up position
Bugelski rat-man	Man	Rat
Rubin vase-faces	Faces	Vase

Reversal rate analysis

Analysis of the reversal rates for the Necker cube revealed a significant effect for the Bias: the reversal rate was significantly higher when Bias-2 (*up*) was introduced, in comparison to that of Bias-1 (*down*) ($F(2, 40) = 3.73, p < 0.05$). No significant differences between the reversal rates of No-bias and Bias-1, or No-bias and Bias-2 pairs were detected. A significant effect for Percept was also obtained ($F(2, 40) = 61.31, p < 0.0001$), with a greater number of reversals reported for Percept-1 (*down*) in comparison to that of Percept-2 (*up*) ($p < 0.0001$) and Different percepts ($p < 0.0001$). A significant Bias \times Percept interaction ($F(4, 80) = 5.43, p < 0.01$) was observed, and it was subsequently analysed by conducting separate Bias (3) ANOVAs for all conditions. The results revealed significant differences only when the reversal rates of Percept-2 (*up*) were compared, revealing that its perceived rate was highest in the Bias-2 (*up*) condition: it was higher than the '*up*' values in No-bias ($p < 0.05$) and Bias-1 pairs ($p < 0.0001$). Thus, the bias of '*up*' increased the frequency of the '*up*' percept in comparison to its perception in a pair of neutral Necker cubes.

Reported reversal rates for the Bugelski rat-man showed the main effect for Bias ($F(2, 40) = 7.11, p < 0.01$). The reversal rate

perceived in the Bias-1 (*man*) condition was lower than those of the No-bias ($p < 0.01$) or Bias-2 (*rat*) ($p < 0.0001$) conditions, but the difference between the reversal rates of Bias-2 and No-bias pairs was not significant. A significant effect of Percept ($F(2, 40) = 33.95, p < 0.0001$) showed that the reversal rate of Percept-1 (*man*) was higher than that of Percept-2 (*rat*) ($p < 0.02$) and of Different percepts ($p < 0.0001$). A significant Bias \times Percept interaction ($F(4, 80) = 8.86, p < 0.01$) was also obtained, and it was subsequently analysed by conducting separate Bias (3) ANOVAs for all conditions. A significant effect for Bias ($F(2, 40) = 4.76, p < 0.02$) was obtained while comparing the acquired reversal rates of Percept-1 (*man*) when the values of '*man*' in Bias-1 pairs were significantly smaller than the same values in the No-bias ($p < 0.02$) and Bias-2 (*rat*) pairs ($p < 0.03$), but the difference between the reversal rates of the No-bias and Bias-2 pairs was not significant. The Bias of '*man*' decreased the reversal frequency of the

'*man*' percept as compared to this percept in the neutral pair. A significant effect for Bias ($F(2, 40) = 11.74, p < 0.01$) was obtained again when the reversal rates of Percept-2 (*rat*) were compared. Its frequency in the Bias-1 (*man*) pairs was lower than in Bias-2 (*rat*) ($p < 0.0001$) and No-bias ($p < 0.01$) pairs. The difference between the reversal values of the No-bias and Bias-2 pairs was again not significant. Otherwise stated, the bias of '*rat*' decreased the frequency of the '*man*' percept. A comparison of the Different percepts found a significant effect for Bias ($F(2, 40) = 4.64, p < 0.05$) when the reversal rate of the Different percepts was higher in Bias-1 (*man*) pairs in comparison to No-bias pairs ($p < 0.05$), but the difference of these values between the No-bias and Bias-2 pairs was not significant. Thus, the bias of '*man*' increased the frequency of the Different percepts as compared with the No-bias pair.

Analysis of the reversal rate of Rubin vase-faces revealed the main effect for Percept ($F(2, 40) = 48.08, p < 0.0001$) when

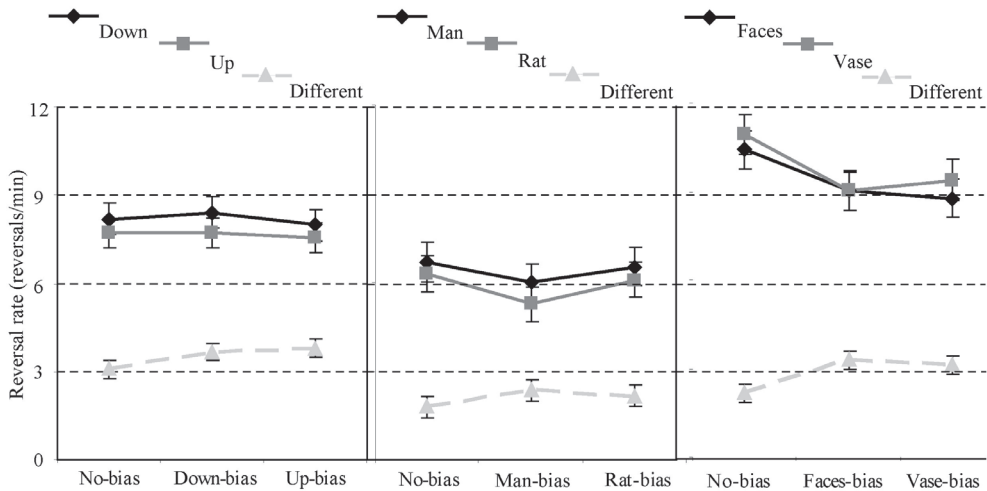


Fig. 2. Differences in reversal frequencies from either percept to percept-1 (black lines), from either percept to percept-2 (grey lines), and from either percept to different percepts (dashed grey lines) for neutral and biased pairs. Error bars represent SEM (standard error of the mean)

the reversal rate of the Percept-2 (*vase*) was higher than that of Percept-1 (*faces*) ($p < 0.05$) and Different percepts ($p < 0.0001$). No significant differences between No-bias, Bias-1 and Bias-2 values were detected.

Duration of percept analysis

A significant effect for Percept ($F(2, 40) = 72.66, p < 0.0001$) was found in the analysis of the Necker cube pairs: Percept-1 (*down*) was significantly longer perceived than Percept-2 (*up*) ($p < 0.0001$) and the Different percepts ($p < 0.0001$). A significant Bias \times Percept interaction was also obtained ($F(4, 80) = 5.44, p < 0.003$) which was further analysed by separate Bias (3) ANOVAs for all conditions. A significant effect for Bias ($F(2, 40) = 5.73, p < 0.02$) was obtained while comparing the durations of Percept-1 (*down*): it was perceived for a significantly shorter period in the Bias-2 (*up*) pairs in comparison with the No-bias ($p < 0.01$) or Bias-1 (*down*) pairs ($p < 0.05$). A significant effect for Bias ($F(2, 40) = 10.63, p < 0.0001$) was also obtained while comparing the durations of Percept-2 when its duration was significantly longer in the Bias-2 (*up*) pairs than in the No-bias ($p < 0.01$) and Bias-1 (*down*) ($p < 0.0001$) pairs. Hence, a bias of '*up*' orientation significantly shortened the perceived duration of alternative orientation.

Data of ANOVA, obtained with the Bugelski rat-man figure, showed a significant effect for Percept ($F(2, 40) = 20.30, p < 0.0001$): Percept-1 (*man*) was perceived longer than both Percept-2 (*rat*) ($p < 0.0001$) and Different percepts ($p < 0.0001$). A significant Bias \times Percept interaction was also obtained ($F(4, 80) = 9.16, p < 0.0001$) which was further analysed by separate Bias (3) ANOVAs for all conditions.

A significant effect for Bias was obtained when comparing the durations of Percept-1 (*man*), ($F(2, 40) = 3.48, p < 0.05$), when it was perceived for a shorter time in Bias-2 (*rat*) pairs than in No-bias pairs ($p < 0.05$), but the difference in the duration of '*man*' percepts between '*man*' and '*rat*' biases was not significant. When the values of Percept-2 were compared, the main effect for Bias was found again ($F(2, 40) = 14.80, p < 0.0001$), when it was significantly shorter perceived in Bias-1 (*man*) pairs than in No-bias pairs ($p < 0.01$) and Bias-2 (*rat*) pairs ($p < 0.0001$). Hence, biases had reciprocal effects on each other, that is, a bias of one interpretation significantly shortened the perceived duration of the alternative orientation, and vice versa.

Different durations also revealed a significant effect for Bias ($F(2, 40) = 8.51, p < 0.01$) when Different percepts were longer perceived in Bias-1 (*man*) pairs in comparison to No-bias ($p < 0.01$) and Bias-2 pairs ($p < 0.01$).

An effect for Percept ($F(2, 40) = 44.82, p < 0.0001$) was found analysing data of vase-faces when Percept-2 (*vase*) was significantly longer perceived than Percept-1 (*faces*) ($p < 0.05$), and for Different percepts ($p < 0.0001$). A significant Bias \times Percept interaction was also obtained ($F(4, 80) = 3.84, p < 0.05$), which was further analysed by separate Bias (3) ANOVAs for all conditions. A significant effect for Bias was obtained when comparing the values of Percept-1 (*faces*) ($F(2, 40) = 3.55, p < 0.05$) when it was longer perceived in the No-bias condition than in the Bias-2 (*vase*) condition ($p < 0.02$), but the difference in the duration of '*vase*' percepts between '*faces*' and '*vase*' biases was not significant. Thus, the bias of '*vase*' decreased the duration of the '*faces*'

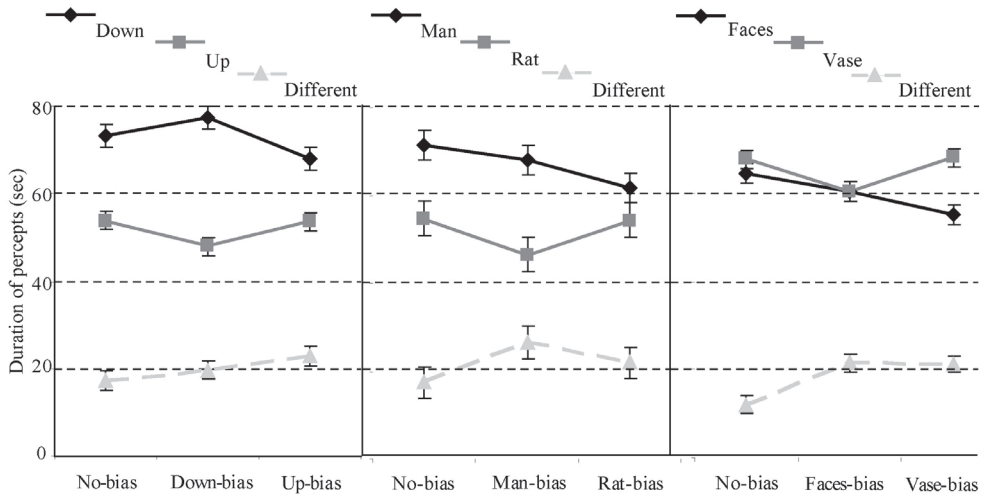


Fig. 3. Dominance durations of percept-1 (black lines), percept-2 (grey lines), and different percepts (dashed grey lines) for neutral and biased pairs. Error bars represent SEM

percept. A significant effect for Bias was also obtained while comparing the values of Different percepts ($F(2, 40) = 5.33, p < 0.05$) when the duration of Different percepts in the No-bias condition was significantly shorter than in the Bias-1 (*faces*) ($p < 0.05$) and Bias-2 (*vase*) ($p < 0.05$) conditions.

Discussion

The objective of the present study was to examine the adaptation paradigm when it was combined with multiple-figure presentation. We hypothesized that this experimental design might provide an insight into the activation of the sensory processes that are generally classified as operating in the perception of reversible figures. We presented a biased ambiguous stimulus concurrently with a standard ambiguous figure in order to measure the possible impact of the former on the latter and to reveal certain features for such a pattern of reversals when a participant is able to perceive more than two available perceptual interpretations. Analysis of the

reversal rate and the duration of percepts showed some bias-related effects on the perception of ambiguous figures, i.e., in case of the Necker cube, the percept that is commonly not preferred (i.e. in the 'up' position of the cube) (Orbach et al., 1963; Toppino and Long, 1987) was perceived significantly more often due to the introduction of its bias. Data obtained with the Bugelski rat-man figure showed that the introduction of the 'rat' bias significantly dropped the reversal rate of the 'man' percept. However, the introduction of the 'man' bias significantly decreased the reversal rate of the 'man' percept. In addition, one of the percepts of an ambiguous figure was more preferred than another (Fisher, 1967; 1968), and the same percept corresponded both in reversal rate and duration of percepts data: 'down' percept in the Necker cube analyses, 'man' in the Bugelski rat-man, and 'vase' in Rubin's vase-faces were significantly longer and more frequently perceived in comparison to alternative percepts. Finally, the results of the present experiment support also the

finding that ambiguous figures belonging to different types demonstrate a different sensitivity to the same manipulation (Long and Olszweski, 1999; Strüber and Stadler, 1999). The duration of different percepts perceived in both figures was significantly affected by a bias for both the Bugelski rat-man and Rubin's vase-face image which is often regarded as having both figure-ground and meaning reversal characteristics (Strüber and Stadler, 1999). In case of the Bugelski rat-man, different percepts were perceived for a significantly longer duration in the man-bias in comparison to no-bias and rat-bias pairs, and the reversal rate of different percepts was also significantly higher in man-bias pairs as compared to no-bias. In Rubin's vase-faces, different percepts were perceived for significantly longer durations in both vase-bias and faces-bias pairs in comparison to a no-bias pair.

Our experiment was explicitly designed to test the hypotheses that (1) the introduction of any bias should either significantly increase the possible randomness of perceptual changes or, alternatively, that (2) observers will tend to perceive both figures significantly more often in the biased interpretation. Our results only partially support both of these hypotheses.

As to the results concerning the hypothesis of an increased randomness of perceptual changes, they are mostly evident in the data of different percepts perceived in both figures. The durations of different percepts were significantly increased by adding any of the biases to Rubin's vase-faces figure. Both the perceived rate and duration of different reversals were significantly higher when the bias of 'man' was added to the Bugelski rat-man figure in comparison to a pair with no bias.

As to the results concerning the hypothesis of an increased reporting of a biased interpretation, the effect of a bias on the reversal rate was visible only partially for some of the viewed figures. It was obtained in reversal rate data for the 'up' percept of the Necker cube and the 'rat' percept of the Bugelski rat-man. In case of the duration of percepts data, biases had reciprocal effects on each other, i.e. a bias of one orientation significantly shortened the perceived duration of the alternative orientation, and vice versa. This pattern of data was obtained for the Bugelski rat-man figure. Therefore, the impact of a positive bias is visible in our data, but it can't explain all the bias-related effects that were obtained.

Even though the effect chosen in the study belongs to the sub-class of satiation theory supporting data, it is evident that this theory cannot explain the obtained results. Neither they are interpretable in the framework of cognitive theory. Numerous studies show the operation of either of the processes in the perception of ambiguous stimuli to depend on the methodical differences in the experiments (for an extended review, see Long and Toppino, 2004).

Several joint theories tried to reconcile the constant issue regarding the function of bottom-up versus top-down effects in the ambiguous figure perception (Hochberg and Peterson, 1987; Toppino and Long, 1987; Long and Toppino, 2004), and several studies refer to a specific relation between the mechanisms of spatial and selective attention and visual bistability (Leopold and Logothetis, 1999; Pitts et al., 2007; 2008). D.A. Leopold and N.K. Logothetis (1999) claim that, although perceptual reversals depend on neural satiation-related activity in 'early' visual areas, this activity highly

relies on the interventions of frontal-parietal brain areas which integrate sensory information and thus cause a sort of “continuous recall” upon it. In normal vision, this process goes on entirely unobserved, and only the process of visual multistability makes its actions discernible. The results may be explained in accordance with this view. Although in our study we used only stimulus-related manipulations, we have obtained the effects that are generally classified as belonging to the top-down class of results, for example, the distribution of results due to the usage of different types of ambiguous figures. In addition, the same percepts were perceived significantly more often in the analyses of both the rate of reversals and the duration of percepts.

Although the present results give considerable support neither to the randomness hypothesis nor to the positive bias effect hypothesis, we cannot conclusively rule out the possibility that adaptation is associated with both sensory and cognitive mechanisms, because our experiment did not cover all of their different aspects. The adaptation to simultaneously presented stimuli does not necessarily determine a more random selection of the available percepts or a frequent perception of a biased interpretation; therefore, one may assume that higher cognitive processes coordinate and determine the particular interpretations reported by participants. The accentuated features of one of the available interpretations might orient

higher-order processes towards the relevant percept and, therefore, cause its significantly longer and more frequent perception.

Conclusions

1. The introduction of a bias had a different effect on different ambiguous figures. Effect of bias was most prominent for the Bugelski rat-man figure where both the ‘*rat*’ and ‘*man*’ biases suppressed the perception of the opposite interpretation of two simultaneously presented figures. The bias of the ‘*up*’ percept increased the frequency of its percept and shortened the duration of the ‘*down*’ percept for the Necker cube. The effect of a bias was least significant for the Rubin vase-faces figure where the bias of ‘*vase*’ decreased the duration of the ‘*faces*’ percept.
2. The percepts of two figures presented simultaneously usually reversed synchronously. The introduction of a bias increased the frequency and duration of different percepts for the Bugelski rat-man and the Rubin vase-faces figures when one interpretation was perceived in one figure and another interpretation in the other figure.
3. Experimental data are difficult to explain by either satiation theory or cognitive theory, and they are more consistent with the opinion that both bottom-up and top-down processes influence the perception of ambiguous figures.

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TENDENCIJOS ĮTAKA DVIEJŲ DVIPRASMŲ FIGŪRŲ SUVOKIMUI

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S a n t r a u k a

Dviprasmės figūros yra vaizdai, kuriuos stebint ilgesnį laiką keičiasi jų suvokimas – galimos dvi (ar daugiau) jo interpretacijos. Šis fenomenas aiškinamas arba ankstyvesniais vadinamaisiais *bottom-up* procesais, arba aukštesnio lygio vadinamaisiais *top-down* procesais. Šiame straipsnyje tiriama, kaip vyksta vienu metu pateikiamų dviejų figūrų – vienos dviprasmės, kitos dviprasmės modifikuotos taip, kad viena interpretacijų yra išryškinta, suvokimas. Rezultatai parodė, kad dviejų šalia esančių nemonifikuotų dviprasmų figūrų suvokiamos interpretacijos keičiasi kartu, o viena interpretacijų dominuoja tiek pagal trukmę,

tiek pagal dažnį. Figūros modifikavimas dažniausiai sumažindavo priešingos nei išryškinta interpretacijos suvokimą. Stipriausias efektas buvo stebint Bugelskio piešinių žmogus-žiurkė, mažiausias – Rubino piešinių vaza-veidai. Dažnesnį ir ilgesnį išryškintos interpretacijos suvokimą galbūt maskavo faktas, kad figūros modifikavimas dažniais atvejais padidindavo skirtingų interpretacijų suvokimą vienu metu, kai viena figūra suvokiama vienokia prasme, kita – kitokia. Rezultatai gali būti aiškinami tuo, kad tiek *bottom-up*, tiek *top-down* procesai turi įtakos dviprasmų figūrų suvokimui.