PROCEEDINGS OF THE
XXVII SCIENTIFIC
CONFERENCE

EMPIRICAL STUDIES IN PSYCHOLOGY

MAY 13– 16th, 2021
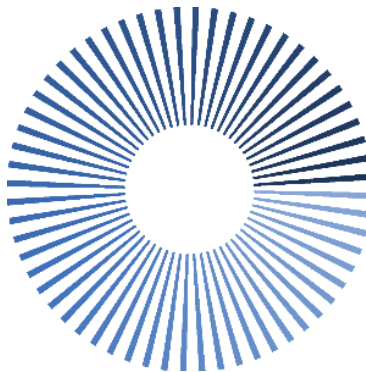FACULTY OF PHILOSOPHY, UNIVERSITY OF BELGRADE

EMPIRICAL STUDIES IN PSYCHOLOGY

MAY 13 – 16th, 2021
FACULTY OF PHILOSOPHY, UNIVERSITY OF
BELGRADE

Institute of Psychology, Faculty of Philosophy, University of Belgrade

Laboratory for Experimental Psychology, Faculty of Philosophy, University of Belgrade

Belgrade, 2021

PROGRAMME COMMITTEE

prof. dr Orlando M. Lourenço
prof. dr Claus-Christian Carbon
prof. dr Agostini Tiziano
prof. dr Lucia Tramonte
prof. dr Maria do Céu Taveira
prof. dr José M. Peiró
prof. dr Gonida Sofia-Eleftheria
doc. dr Milica Vukelić
doc. dr Ivana Stepanović Ilić
dr Zora Krnjaić
prof. dr Dejan Todorović
prof. dr Sunčica Zdravković
prof. dr Iris Žeželj
doc. dr Danka Purić
prof. dr Zvonimir Galić
prof. dr Dušica Filipović Đurđević
prof. dr Slobodan Marković
prof dr Jérémy Lemoine
prof. dr Ksenija Krstić
prof. dr Dražen Domijan
doc. dr Oliver Tošković
doc. dr Olja Jovanović
doc. dr Dobrinka Kuzmanović
doc. dr Bojana Bodroža
doc. dr Ivana Jakovljev
doc. Dragan Janković
prof. dr Pavle Valerjev
prof. dr Denis Bratko
prof. dr Petar Čolović
doc. dr Jelena Matanović
dr Janko Međedović
doc. dr Marija Branković
dr Anja Wertag
doc. dr Dragana Stanojević
doc. dr Maja Savić
dr Nataša Simić
dr Maša Popović
dr Darinka Anđelković
prof. dr Tamara Džamonja Ignjatović
doc. dr Kaja Damnjanović
dr Maša Vukčević Marković
dr Marko Živanović
prof. dr Goran Opačić
prof. dr Aleksandar Kostić
prof. dr Nenad Havelka
dr Marina Videnović (chairwoman)

3

ORGANIZING COMMITTEE

dr Marina Videnović
prof. dr Dušica Filipović Đurđević
prof. dr Slobodan Marković
doc. dr Ivana Stepanović Ilić
doc. dr Kaja Damnjanović
doc.dr Oliver Tošković
dr Nataša Simić
dr Marko Živanović
Olga Marković Rosić
Predrag Nedimović
Teodora Vuletić
Jelica Jovanović
Ivana Jovanović
Anđela Milošević
Ana Avramović
Ksenija Mišić
Milana Rajić

EDITORS

Dr Marina Videnović, naučni saradnik
Prof.dr Dušica Filipović Đurđević
dr Marko Živanović, naučni saradnik
doc.dr Ivana Stepanović Ilić
doc. dr Kaja Damnjanović, naučni saradnik
Milana Rajić, istraživač saradnik

Cover photo:
TUNING FORKS (E. Zimmermann, Leipzig – Berlin)
Instruments for generating tones of a given frequency. They are used in studies of auditory sensitivity for determining the differential, absolute and upper thresholds. Figure shows a set of three tuning forks generating the C-major chord, each fork generating the tones of 256 Hz (c¹), 320 Hz (e¹), and 384 Hz (g¹) respectively. The forks were tuned to the pitch of the originals from the German Physico-Technical Imperial Institute (Phys.-techn. Reichsanstalt).

Assessment of Affective Experience in Relation to Color and Familiarity of Stimulus

Nikolina Vicanović (nikolina.vicanovic@student.ff.unibl.org)
Laboratory for Experimental Psychology LEP-BL, University of Banja Luka

Svetlana Borojević (svetlana.borojevic@ff.unibl.org)
Laboratory of Experimental Psychology LEP-BL, University of Banja Luka

Abstract

Although the colors are an integral part of our daily life and carry a certain affective and symbolic meaning, it is not entirely clear how this meaning is formed. One of the more dominant theories that explains emotional reactions to colors by individual experience is Palmer's theory of ecological valence. According to this theory, positive or negative affective assessment is determined by the valence of previous experiences. The aim of this research is to determine the differences in the assessment of the affective experience of stimuli in relation to color and familiarity. The study involved 102 female subjects. Two factors were varied - stimulus familiarity (with two levels - known and abstract) and stimulus color (with four levels - red, green, yellow, blue). The connotative differential scale was used to assess the affective meaning. The results show that there is a main effect of familiarity and color on the assessment of affective meaning. A statistically significant interaction was also found between the varied factors.

Keywords: color; affective meaning; stimulus familiarity

Introduction

We ascribe a particular meaning to every object that we can perceive with our senses. One of the sensory attributes that is often associated with affective meaning is color. Red is often associated with warmth, anger and excitement, green with relaxation, yellow with happiness, and blue with coldness and calm (Collier, 1996; Clarke & Costall, 2008; Hupka et al., 1997; Kaya & Epps, 2004; Oyama, 2003). However, it is not entirely clear what the mechanisms are for creating these associations. This relationship can be determined by basic sensory processes, evolution, socialization, but also personal experiences (Cuykendall & Hoffman, 2008; Palmer & Schloss, 2010). The evolutionary approach emphasizes that the objects and events necessary for survival are often associated with characteristic colors (blue with water, green with leaves, yellow with the sun). Such colors evoke emotions of pleasure. Early socialization explains the use and experience of color through gender stereotypes (Picariello, Greenberg, & Pillemer, 1990). One of the more dominant theories that explains emotional reactions to colors by individual experience is Palmer's theory of ecological valence. According to this theory, color preference arises from the average emotional reactions of people to color-related objects. Positive or negative affective assessment is determined by the valence of previous experiences, so some colors have "approach" signal, but sometimes they send an "avoid" signal. People are usually attracted to colors associated with salient objects that generally elicit positive affective reactions (Palmer & Schloss, 2010; Schloss, Hawthorne-Madell, & Palmer, 2015). We cannot have personal experience with unknown stimuli, so the mechanism of creating the affective meaning of such stimuli is probably different.

This study examines the affective meaning of colors to stimuli that differ according to the degree of familiarity.

Method

Sample

The research was conducted on a sample of 102 subjects, students of the Faculty of Philosophy. All participants were female.

Design and Procedure

Two factors were varied — *stimulus familiarity* (with two levels — known and abstract), unrepeatable by subjects, and *stimulus color* (with four levels — red, green, yellow, blue), repeated by subjects. The RGB color parameters were as follows: blue (0,76,248), green (0,173,51), yellow (255,247,0) and red (248,23,0). Stimuli were known and concrete objects such as cars and balls, and abstract stimuli in the form of closed contours that have no meaning. Stimuli were created using 3DPaint in Windows software. Each stimulus was displayed on the computer screen individually, with the respondents assessing their feelings according to the given stimulus. Examples of stimuli are shown in Figure 1.

Figure 1. Examples of stimuli

To assess the affective meaning, a Scale of Connotative Differential was used, which refers to the emotional-evaluative factor (Janković, 2000) and contains five pairs of adjectives: unpleasant-pleasant, undesirable-desirable, hateful-nice, bad-good, unattractive-attractive. Respondents rated the intensity of their affective experience on a seven-point scale, -3 to 3, where "positive" adjectives were on the right and "negative" on the left.

Results

The results show that there is a main effect of familiarity ($F_{(1,2738)} = 9.22$, $p < .01$, $\eta^2 = .003$) and stimulus color (F

$(3,2738) = 42.99$, $p <.001$, $\eta^2 = .045$) on the assessment of affective meaning. A significant effect of both factors on individual adjective pairs was also found. There is a statistically significant interaction between varied factors (F $(3,2738) = 32.47$, $p <.001$, $\eta^2 = .034$).
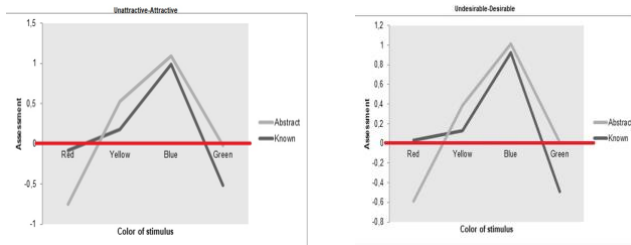

Figure 2. Assessments for two pairs of adjectives: *unpleasant-pleasant* and *undesirable-desirable*
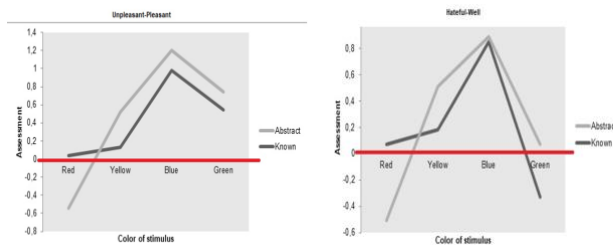

Figure 3. Assessments for two pairs of adjectives: *unattractive-attractive* and *hateful-nice*
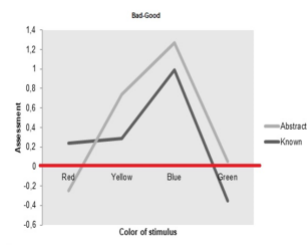

Figure 4. Assessments for pair of adjectives: *bad-good*

Scheffe post hoc analysis showed that assessments of affective meaning can be divided into three groups. For known stimuli, the lowest scores (directed towards the negative pole of the adjective) were obtained for green stimuli (M=-0.5, SD=1.7) on all adjective pairs followed by red (M=0.6, SD=1.8) and yellow stimuli (M=0.2, SD=1.8) on the positive side of the scale, within the mean values), while the highest scores (positive semi-adjectives) were obtained for blue stimuli (M=1.01, SD=1.8), (F(3,892)=24.560, p<.001). On the other hand, for abstract stimuli, the lowest (negative) estimates are obtained for red stimuli (M=-0.6, SD=1.3), the highest (positive) estimates for yellow stimuli

(M=0.6, SD=0.3), while estimates directed towards the positive pole of the adjective, but within the mean values of the scale are obtained for blue (M=0.1, SD=1.2) and green stimuli (M=0.1, SD=1.1), (F(3,1846)=51.926, p<.000).

Discussion and conclusion

Each visual stimulus that is perceived causes a subjective experience, which means that we attributed some personal and emotional characteristics to it. When color is added to that, the experience itself can be changed. Color can enhance or weaken the affective experience and this effect can be explained by Palmer's theory of ecological valence. People's emotional reaction is related to the aesthetic preference of colors, and people prefer certain colors if previous experiences with them have been positive. They are also repulsed by colors that connect them to objects that have negatively affected them (Palmer, Schloss, 2010). This research attempted to examine what is the affective meaning of stimuli of different colors with which we have no previous experience, as well as to what extent it differs from the meaning of known objects shown in the same colors. The results show a difference in the estimates of the affective meaning of stimuli depending on their color and whether they are known or unknown to us. A statistically significant interaction between color and familiarity in the assessment of affective significance was also obtained. The most valued known objects were the blue ones. This is consistent with previous research which has shown that blue color elicited a high number of positive emotional responses including feelings of relaxation, calmness, happiness or comfort (Kaya & Epps, 2004). It was also found that blue is the favorite color of adult subjects (Terwogt & Hoeksama, 1995). On the other hand, green objects are the most negatively evaluated, which is not completely surprising, because numerous studies have shown that green can evoke both positive and negative impressions (Davey, 1998; Mahnke, 1996; Saito, 1996).

In the case of affective meaning of unknown stimuli, the results are completely different. Blue and green stimuli were assessed in the same way on the mean values of the scale. Yellow stimuli are most pleasing, while those in red are negatively rated. Mahnke and Mahnke (1993) found that people exposed to red color reported higher levels of anxiety than when they are exposed to blue or green. It is possible that red stimuli that cannot be associated with real objects, affect the way described by the authors and are therefore negatively evaluated.

The main conclusion of this study is that there is a difference in the affective assessment of known and unknown stimuli, which is in line with the postulates of the theory of ecological valence. Future research should also examine the effect of gender, but also additional colors, on these estimates.

References

Collier, G. L. (1996). Affective synesthesia: Extracting emotion space from simple perceptual stimuli. *Motivation and Emotion*, *20*, 1-32.

Clarke, T., & Costall, A. (2008), The emotional connotations of color: A qualitative investigation. *Color Research & Application*, *33*, 406-410.

Cuykendall, S.B. and Hoffman, D.D., 2008. *From color to emotion: Ideas and explorations*. Irvine, CA: University of Irvine, California.

Davey, P. (1998). True colors: The glorious polychromy of the past suggests a strong historical need for color, despite current reductive fashions. *The Architectlral Review, 204,* 34-36.

Hupka, R., Zaleski, Z., Otto, J., Martínez, L. & Tarabrina, N. (1997). The Colors of Anger, Envy, Fear, and Jealousy A Cross-Cultural Study. *Journal of Cross-Cultural Psychology*. *28*. 156-171.

Janković, D. (2000). Konotativni aspekt značenja: konstrukcija konotativnog diferencijala. *Psihologija*, 1-2, 221-239.

Janković, D. (2000). Konotativni aspekt značenja: utvrđivanje latentnih dimenzija. *Psihologija*, 1-2, 199-220.

Kaya, N., & Epps, H. (2004). Relationship between color and emotion: A study of college students. *College Student Journal*, *38*(3), 396-405.

Mahnke F. (1996). *Color, environment, human response.* New York: Van Nostrand Reinhold.

Mahnke, F.M., & Mahnke, R.H. (1993), *Color and light in man-made environments.* New York: Van Nostrand Reinhold.

Oyama, T. (2003). Affective and Symbolic Meanings of Color and Form: Experimental Psychological Approaches. *Empirical Studies of The Arts*, *21*, 137-142.

Palmer, S., & Schloss, K. (2010). An ecological valence theory of human color preference. *PNAS*, *107* (19), 8877-8882.

Picariello, M., Greenberg, D., & Pillemer, D. (1990). Children's sex-related stereotyping of colors. *Child Development, 61*, 1453-1460.

Saito, M. (1996). Comparative studies on color preference in Japan and other Asian regions, with special emphasis on the preference for white. *Color Research and Application*, *21*, 35-49.

Schloss, K. B., Hawthorne-Madell, D., & Palmer, S. E. (2015). Ecological influences on individual differences in color preference. *Attention, perception & psychophysics*, *77*(8), 2803–2816.

Terwogt, M., & Hoeksama, J. (1995). Colors and emotions: Preferences and combinations. *The Journal of General Psychology*, *122*(1), 5-17.