OPEN ACCESS

European Journal of Behavioral Sciences
ISSN 2538-807X

The Effect of Art Expertise on Visual Symmetry and Asymmetry Preference

Borbála Tamás*, Andrea Barta, and István Szamosközi

Babeș-Bolyai University, Cluj-Napoca, Faculty of Psychology and Educational Sciences, Department of Applied Psychology, Romania

ARTICLE INFO

Keywords:
art expertise
symmetry- asymmetry preference
geometrical forms

ABSTRACT

The main differences between artists and non-artists can be discovered in information processing, drawing performance and aesthetical preferences. Aesthetical preference is influenced by stimulus complexity and by the symmetry-asymmetry dimension of the presented stimulus. Although the differences between artists and non-artists are clear regarding aesthetical evaluation, there is evidence supporting the assumption that symmetry is preferred over asymmetry regardless of domain specific knowledge. In the current study we investigated the role of visual art expertise in the aesthetical evaluation of simple and complex symmetrical and asymmetrical geometrical forms, using visual stimuli based on Jacobsen and Höfel (2001). Participants from art high school and university have been gathered (N = 56) and were divided into three groups based on their visual art and art history experience (experts, novice, and medium experience). Our main result shows a significant effect of experience in visual art on aesthetical preference, participants in the expert group preferred complex asymmetrical stimuli more, compared to participants in the art novice group. Simple and complex asymmetrical forms were more aesthetically preferred by the expert group than the other two groups. We also found that symmetrical forms are preferred over asymmetrical ones regardless of level of expertise in art, however the preference of art experts tends to be more unified over stimulus complexity. Our results are in line with results from previous studies regarding symmetry-asymmetry preference. We can conclude that beside the general preference for symmetrical forms, experience in art alters asymmetry preference and it regulates the preference over simple- complex symmetrical and asymmetrical stimuli.

1 Introduction

One can conclude that some of the major outcomes of experiencing visual arts are aesthetic judgement, aesthetic evaluation, or preference. Regardless of the proper outcome, the process is influenced by emotions (Xenakis et al., 2012; Menninghaus et al., 2019), emotions that give rise to pleasure (Lindell & Mueller, 2011), previous experiences (Leder et al., 2002), and several attributes of the to-be-judged visual stimuli (Weichselbaum et al., 2018). The process

* Corresponding author E-mail address: borbala.tamas@ubbcluj.ro

Cite this article as:
Tamás, B., Barta, A., & Szamosközi, I. (2022). The Effect of Art Expertise on Visual Symmetry and Asymmetry Preference. *European Journal of Behavioral Sciences, 5*(1): 11-17. https://doi.org/10.33422/ejbs.v5i1.592

of aesthetic experience is complex and multidimensional, including several high-level cognitive functions, such as visual imagery and autobiographical memory (Belfiet al., 2019). Complexity, novelty (Jacobsen & Höfel, 2001), and symmetry (Weichselbaum et al., 2018) play an essential role in the process, as external factors of the stimulus.

It is long known that symmetry preference is based on an evolutionary aspect. / Symmetry preference is considered to be based on an evolutionary aspect. Previous study results show that humans have a natural tendency to prefer symmetrical faces and shapes over asymmetrical ones (Makin et al., 2019). In the case of abstract stimuli, symmetry tends to have a major influence on preference, and besides symmetry, stimulus complexity also has an impact on the aesthetical experience (Gartus & Leder, 2017).

The complexity of visual stimulus can be defined quantitatively and qualitatively (Gartus & Leder, 2018). When abstract stimuli are the target for aesthetical preference, after symmetry, complexity tends to be the second most important aspect that is influencing the process. Complex stimuli are preferred over less complex forms (Gartus & Leder, 2017), however the rating of complexity changes over frequent encounter with the same stimulus. In the case of visual artworks, familiar pieces of artworks are judged less complex (Gartus & Leder, 2018). The number of elements that are involved in the stimulus are considered a quantitative measure to define complexity. These aspects are double symmetry, vertical symmetry, horizontal symmetry, diagonal symmetry, checkerboard- and rotational organizations (Chipman & Mendelson, 1979). In the present study we used visual stimuli originally created by Jacobsen and Höfel (2001), and by manipulating the number of elements of the stimuli, complexity has been manipulated as well (Jacobsen & Höfel, 2002).

Information, previous experience, or domain specific knowledge influence stimulus complexity. Experience in visual arts, as domain specific knowledge, tends to differentiate between the aesthetical preference of artists and non-artists. Even though there is a general preference for symmetry in both groups, art experts' preference for asymmetrical forms is greater compared to novices' (Leder et al., 2002, Weichselbaum et al., 2018). Other study results showed that fixation duration of experts was longer in the case of visual stimuli considered as not beautiful (Fudali-Czyz et al., 2018), suggesting that not only aesthetical preference is altered by domain specific knowledge, but the characteristics of the eye behaviour too, therefore stimulus processing is different compared to art novices (Harland et al., 2014).

1.1 Objectives

The aim of the current study is to investigate the impact of visual art expertise on symmetry and asymmetry preference of simple and complex geometrical forms.

2 Materials and Methods

2.1 Participants

56 participants attending art high-school or university have been gathered. Participants have been divided into three groups based on their visual art and art history knowledge. Expert group (N = 19) consisted of participants with 5 or more years of experience in academic education of visual arts and art history. In the medium experience group (N = 20) participants had 3 or more years of experience in academic education of visual arts and art history. The novice group (N = 17) consisted of participants with less than 3 years of experience in academic education of visual arts and art history. The mean age was of participants was 21.55 years, ranging from 16 to 28 years (see Table 1).

Table 1.

Sociodemographic Data of the Participants

		N	Min.	Max.	M.	SD	%
Age		56	18	30	21.64	2.5	
Gender	Male	14					25
	Female	42					75
Visual art experiennce	Expert	19					33.9
	Intermediate group	20					35.7
	Novice	17					30.4

2.2 Material

In the present study we investigated participants' symmetry- asymmetry preference of simple and complex geometrical forms, using the stimuli created by Jacobsen & Höfel (2001). Two hundred fifty- two stimuli have been constructed, half of which (126) were symmetrical, while the other half were asymmetrical. Stimulus complexity has been manipulated by changing the number of elements of the pattern. In this research we used the original stimuli set created by the aforementioned authors, where each stimuli pattern consisted of solid black circle, showing a centered, quadratic, rhombic cut-out an arrangement of 86 to 88 basic graphic elements (Jacobsen & Höfel, 2002).

2.3 Procedure

Participants were presented with the stimuli, and they were requested to evaluate the presented patterns aesthetically. The task instruction coresponded to the original instruction of Jacobsen and Höfel (2002). Participants have been instructed to try to evaluate the stimuli by not anchoring to any external piece of art, when they are considering to evaluate the presented stimuli as beautiful, not beautiful or indifferent. Participants were also instructed, before they made their judgement to spread the stimuli set out in front of them, in order to get a good overall impression of the patterns. Time restriction was not applied during the data collection (Jacobsen & Höfel, 2002). They were instructed to evaluate the patterns as beautiful, not beautiful or indifferent, however at least 75 of the shown stimuli have to be categorized as beautiful and 75 of the patterns have to be categorized as not beautiful (Jacobsen & Höfel, 2001).

2.4 Data Analysis

A statistical power analysis, G*Power (Faul, Erdfelder, Lang, Buchner, 2007; Faul, Buchner, Lang, 2009), has been used to compute sample size. In order to detect an effect of $\eta^2_p = .04$ with 80% power in two- way analysis of variance ANOVA (three groups, alpha = .05), G*Power suggests we would need 21,3 participants in each group (N = 64).

3 Results

A Shapiro- Wilk test of normality did not show a significant departure from normality for the mean scores: of Simple symmetrical forms $W(56) = .952$, $p = .07$; Complex symmetrical forms $W(56) = .976$, $p = .311$; Simple asymmetrical forms $W(56) = .983$, $p = .6$; Complex asymmetrical forms $W(56) = .988$, $p = .854$.

Two- way between- groups analysis of variance was conducted to explore the impact of artistic experience on the dependent variable, measured by visual stimuli originally produced by Jacobsen and Höfel (2001). Participants were divided into three groups based on their level of expertise in visual arts and art history (Experts, Medium experience, Novice) (see Table 2).

The interaction effect between level of expertise and symmetry- asymmetry dimension was not statistically significant, F (6, 212) = 0.278, p = 0.947. There was a statistically significant main effect for level of expertise on aesthetical preference, F (2, 212) = 4.08, p = .018 the effect size was medium (partial eta squared = .037). There was a statistically significant main effect of symmetry- asymmetry preference, F (3, 212) = 6.57, p = .00, the effect size was large (partial eta squared = .085).

Table 2.
Summary of the Two- way Analysis of Variance for Visual art and art history experience and Symmetry-asymmetry preference

	Experts		**Medium experience**		**Novice**					
Source	**M**	**SD**	**M**	**SD**	**M**	**SD**	**Effect**	**F**	**df**	**η2**
Simple symmetrical	1.58	.38	1.62	.35	1.69	.33	G	4.08*	2	.037
Complex symmetrical	1.6	.34	1.67	.33	1.73	.37	S	6.57**	3	.085
Simple asymmetrica	1.71	.27	1.88	.35	1.85	.33	G x S	0.27	6	
Complex asymmetrical	1.73	.27	1.93	.26	1.93	.24				

Note. N = 56. ANOVA = analysis of variance; Experts = 5 or more years of experience; Medium Experience = 3 or more years of experience; Novice = less than 3 years of experience; G = group; S = visual stimuli.
* $p < .05$
** $p < .00$.

Post- hoc comparison using the Bonferroni test indicated that the mean score for the art novice group (M = 1.8, SD = 0.33) was significantly different from the art expert group (M = 1.66, SD = 0.32). The mean score for the medium expert group (M = 1.77, SD = 0.35) did not differ significantly from either of the other groups (see Figure 1).

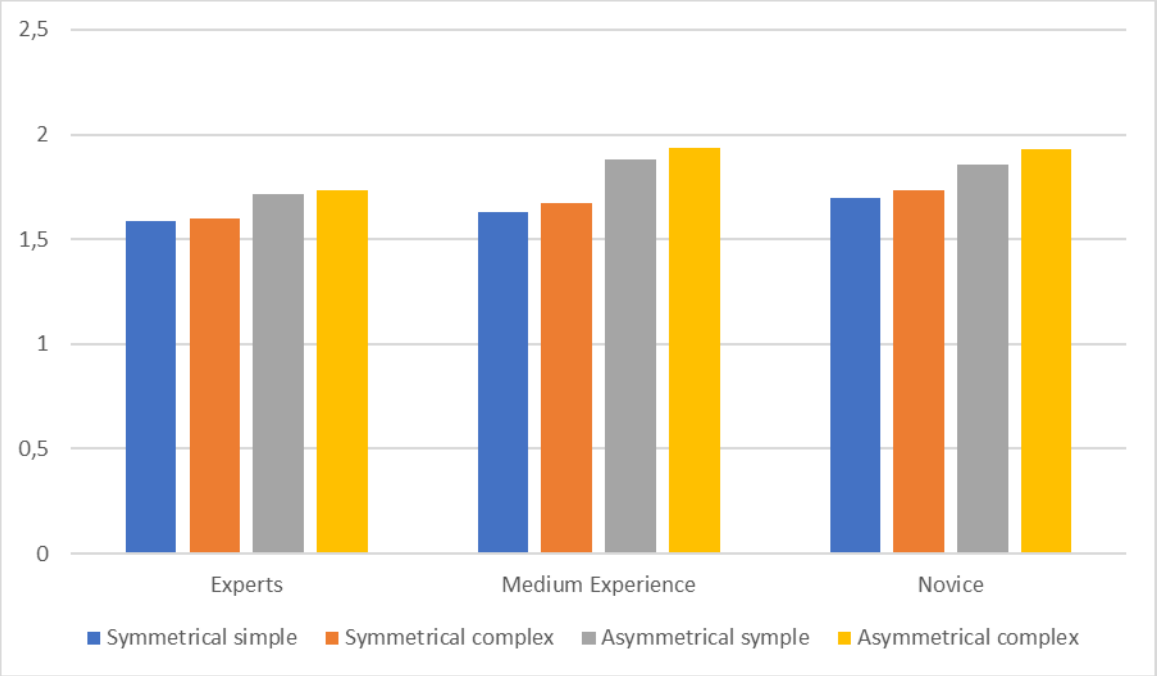

Figure 1. Preference for Symmetrical- asymmetrical simple and complex geometrical forms of the three groups
Note: the higher the score the less preferable the stimuli have been judged.

To fully understand group differences, we conducted Pair- wise tests of the differences between art expert-, intermediate- and art novice group over simple symmetrical, complex symmetrical, simple asymmetrical and complex asymmetrical preference (see Table 3).

Table 3.
Pair- wise comparison for simple symmetrical, complex symmetrical, simple asymmetrical and complex asymmetrical preference

Comparision group		Mean Difference	*p*
Experts	Simple symmetrical vs. Complex assymetrical	-.149	.16
	Simple symmetrical vs. Complex symmetrical	-.015	.89
	Simple symmetrical vs Simple assymetrical	-.131	.22
Medium Experience	Simple symmetrical vs. Complex assymetrical	-.308	.003
	Simple symmetrical vs. Complex symmetrical	-.042	.68
	Simple symmetrical vs Simple assymetrical	-.253	.015
Novice	Simple symmetrical vs. Complex assymetrical	-.263	.037
	Simple symmetrical vs. Complex symmetrical	-.042	.71
	Simple symmetrical vs Simple assymetrical	-.123	.145

Note. The mean difference is significant at the p = .05 level

Pair-wise comparision indicated that the mean score of the art novice group for simple symmetrical forms (M = 1.69, SE = .079), was significantly different from complex assymetrical forms (M = 1.93, SE = 0.79). However, the mean score for simple symmetrical forms was not significantly different from complex symmetrical (M = 1.73, SE = .079) and simple asymmetrical forms (M =1.85 , SE = .079) in the art novice group.

The mean score of the intermediate group for simple symmetrical forms (M = 1.62, SE = .073), was significantly different from complex asymmetrical forms (M = 1.93, SE = .073), and the mean score for simple symmetrical forms was significantly different from simple asymmetrical forms (M = 1.88, SE = .073). The mean score for complex symmetrical forms (M= 1.67, SE = .073) was significantly different from complex asymmetrical forms (M= 1.88, SE= .073), however the mean score for simple symmetrical forms was not significantly different from complex symmetrical (M = 1.67, SE = .073) and simple asymmetrical forms (M = 1.882, SE = .073) in the intermadiate group.

The mean score of the art expert group for simple symmetrical forms (M = 1.58, SE = .075), was not significantly different from either of the other three forms: complex asymmetrical (M = 1.73, SE = .075), complex symmetrical (M = 1.6, SE = .075) and simple asymmetrical forms (M = 1.71, SE = .075).

4 Discussion

In the present study we investigated the effect of visual art expertise on symmetrical and asymmetrical preference of simple and complex geometrical forms. Two- way between- groups analysis of variance was conducted to explore the impact of artistic experience on the dependent variable, measured by visual stimuli originally created by Jacobsen and Höfel (2001). Participants were divided into three groups based on their level of expertise in visual arts and art history. The interaction effect between level of expertise and symmetry- asymmetry dimension was not statistically significant. There was a statistically significant main effect for level of expertise on aesthetical preference, where the effect size was medium. Post- hoc comparison using the Bonferroni test indicated that the mean score of the art novice group was significantly different from the scores of the art expert group. The mean score of the medium expert group did not differ significantly from either of the other groups. There was a statistically significant main effect of symmetry- asymmetry preference, in which case the effect size was large.

The findings of the current study are in line with previous research results. They indicate that symmetry plays a major role in the aesthetical evaluation of visual stimuli originally created by Jacobsen and Höfel (2001), regardless of expertise (Weichselbaum et al., 2018; Jacobsen & Höfel, 2001; Jacobsen & Höfel, 2002). However asymmetrical forms are more preferred by art experts than novices. A possible explanation for this might be that, since aesthetical evaluation or preference is dependent on domain specific knowledge, experience in art leads to greater preference for asymmetrical forms. This assumption can be explained by a model proposed by Leder et al. (2004), according to which, preference is explained by the understanding of the visual stimulus. Since contemporary art provokes a deeper understanding by its conceptual and less explicit manner, individuals who are trained in visual arts are more inclined to perceive abstract, or asymmetrical stimuli as beautiful. Another possible explanation for the results of this study is that art experts' processing of visual stimuli is characterized by top-down information processing (knowledge, meaning making), therefore their aesthetical evaluation is associated with meaning as well, and is not just based on the information flow, that characterizes bottom-up information processing (Belfiet al., 2019).

The result of the present study also show that the level of expertise in visual arts indicates a more unified preference for symmetry and asymmetry, meanwhile the preference for symmetrical forms is statistically significantly higher in the intermediate and novice groups. One possible explanation for the nuanced aesthetical preference of the expert group can be the involvment of emotional factors in the aesthetic decision making. The study results of Fayn et. al (2017) indicate that art-related knowledge alters emotional experiences, art expertise results in fine-grained differentiation of emotions, therefore we can conclude that domain-specific knowledge, such as visual art influences aesthetical decision making by nuancing the aesthetical preferences for simple and complex asymmetrical forms.

5 Conclusion

Our results indicate that beside the general preference for symmetrical forms, experience in art alters asymmetry preference and it regulates the preference for simple and complex symmetrical and asymmetrical stimuli. However, expertise in visual art does not result in a change in preference for asymmetrical forms over symmetrical, it does unify the extent of the preference. Based on our findings, we conclude that preference for symmetrical forms is universal, nonetheless our results show smaller discrepancy between symmetrical and asymmetrical preference scores of visual art experts. Considering the above mentioned findings we conclude that the aesthetical preference of visual art experts for symmetrical and asymmetrical forms is influenced by top- down information processing, resulting in a more sophisticated preference for asymmetrical forms.

6 References

Belfi, A. M., Vessel E.A., Brielmann A., Isil A.I., Chatterje A., Leder H., Pelli D. G. & Starr G. (2019). Dynamics of aesthetic experience are reflected in the default- mode network. *NeuroImage*. https://doi.org/10.1016/j.neuroimage.2018.12.017

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191. http://dx.doi.org/10.3758/bf03193146

Fayn, K., Silvia, P. J., Erbas, Y., Tiliopoulos, N., & Kuppens, P. (in press). Nuanced aesthetic emotions: emotion differentiation is related to knowledge of the arts and curiosity. Cognition and Emotion. https://doi.org/10.1080/02699931.2017.1322554

Fudali-Czyz A., Francus P. & Augusztynowicz (2018). The Effect of Art Expertise on Eye Fixation- Related Potentials During Aesthtetic Judgment Task in Focal and Ambient Modes. *Frontiers in Psychology, 9*(1972), 1-9. https://doi.org/10.3389/fpsyg.2018.01972

Gartus A. & Leder H. (2013). The small step toward asymmetry: Aesthetic judgment of broken symmetries. *i- Perception, 4*, 352-355. https://doi.org/10.1068/i0588sas

Gartus A. & Leder H. (2017). Predicting perceived visual complexity of abstract patterns using computational measures: The influence of mirror symmetry on complexity perception. *PLoSONE, 12*(11), 1-29. https://doi.org/10.1371/journal.pone.0185276

Harland B., Gillett J., Mann C.M, Kass J., Godwin H.J., Liversedge S.P. & Donnelly N. (2014). Modes of Address in Pictorial Art: An Eye Movement Study of Manet's Bar at the Folies-Bergere. *LEONARDO, 47*(3), 241-247. https://doi.org/10.1162/LEON_a_00676

Chipman S.F. & Mendelson M.J. (1979). Influence of Six Types of Visual Structure on Complexity Judgements in Children and Adults. *Journal of Experimental Psychology: Human Perception and Preference, 5*(2), 365-378. https://doi.org/10.1037/0096-1523.5.2.365

Jacobsen Th. & Höfel L. (2001). Aesthetics electrified: an analysis of descriptive symmetry and evaluative aesthetic judgement processing event-related brain potentials. *Empirical Studies of the Arts, 19*(2), 177-190. https://doi.org/10.2190/P7W1-5F1F-NJK9-X05B

Jacobsen Th. & Höfel L. (2002). Aesthetic judgements of novel graphic patterns: analyses of individual judgments. *Perceptual and Motor Skills, 95*, 755-766. https://doi.org/10.2466/pms.2002.95.3.755

Leder, H., Belke, B., Oeberst, A. & Augustin, D. (2004). A model of aesthetic appreciation and aesthetic judgements. *British Journal of Psychology, 95*, 489-508. https://doi.org/10.1348/0007126042369811

Lindell A., K. & Mueller J. (2011). Can science account for taste? Psychological insights into art appreciation. *Journal of Cognitive Psychology, 23*(4), 453-475. http://dx.doi.org/10.1080/20445911.2011.539556

Makin A.D.J., Rampone G. & Bertamini M. (2019). Symmetric patterns with different luminance polarity (anti- summetry) generate an automatic response in extrastriate cortex. *Journal of Cognitive Neuroscience, 32*(2), 353-366. https://doi.org/10.1111/ejn.14579

Menninghaus W., Wagner V., Wassiliwizky E., Schindler I., Hanich J., Jacobsen T. & Koelsch S. (2019). What are aesthetic emotions? Psychol Rev. 2019 Mar;126(2):171-195. https://doi.org/10.1037/rev0000135

Weichselbaum H., Leder H. & Ansorge U. (2018). Implicit and Explicit Evaluation of Visual Symmetry as a Function of Art Expertise. *i- Perception*, 1-24. https://doi.org/10.1177/2041669518761464

Xenakis I., Arnellos A. & Darzentas J. (2012). The functional role of emotions in aesthetic judgment. *New Ideas in Psychology, 30*, 212-226. https://doi.org/10.1016/j.newideapsych.2011.09.003