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The Role of Art Expertise on Visual Symmetry and Asymmetry Preference

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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 are evidence supporting the assumption that symmetry is preferred over asymmetry regardless of domain specific knowledge. In the current study we investigated the role of expertise in visual art on aesthetical evaluation of symmetrical and asymmetrical, simple, and complex 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 distributed into three separate groups by 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 art novice group. Asymmetrical simple and complex forms were aesthetically preferred more by expert group than the two other groups. We also found that symmetrical forms are preferred over asymmetrical ones regardless of level of expertise in art, however 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.

Keywords: art expertise, symmetry- asymmetry preference, geometrical forms

1. Introduction

One can conclude that one 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 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 considered to base on an evolutional 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 play a major influence in preference, besides symmetry, stimulus complexity also has an impact on the aesthetical experience (Gartus & Leder, 2017).

The complexity of visual stimulus can be defined in quantitative and qualitative aspects (Gartus & Leder, 2018). When abstract stimuli are the target stimuli for aesthetical preference, besides symmetry, complexity tends to be a second important aspect, that is influencing the process. Complex stimuli are preferred over fewer complex forms (Gartus & Leder, 2017), however rating of complexity changes over frequent encounter of 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 as a quantitative aspect to define complexity. These aspects are double symmetry, vertical symmetry, horizontal symmetry, diagonal symmetry, checkboard- and rotational organizations (Chipman & Mendelson, 1979). In the present study we used visual stimuli, originally produced by Jacobsen and Höfel (2001), and by manipulating the number of elements on the stimulus, complexity have been manipulated as well (Jacobsen & Höfel, 2002).

Information, previous experience, or domain specific knowledge are influencing stimulus complexity. Experience in visual arts, as domain specific knowledge tends to differentiate aesthetical preference of artists from non-artists. However, there is a general preference over symmetry between the two groups, art expert's preference for asymmetrical forms are greater compared to novices' (Leder et al., 2002, Weichselbaum et al., 2018). Other study results indicate longer fixation duration of experts on visual stimuli that were judged 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, therefore stimulus processing is different compared to art novices (Harland et al., 2014).

Objectives

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

1.1 Materials and Methods

Participants

56 participants from art high- school and university have been gathered. Participants have been distributed into three separate groups by their visual art and art history experience. Expert group (N = 19) contained participants with visual art experience 5 or more than 5 years of experience in academic education of visual arts and art history. In the medium experience group (N = 20) participants have been included with 3 or more than 3 years of experience in visual arts and art history in academic education. The novice group (N = 17) contained participants with less than 3 years of experience in visual arts and art history in academic education. Mean age was 21.55, it ranged from 16 to 28 years.

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

Material

In the present study we investigated a symmetry- asymmetry preference of complex and simple geometrical forms. We used the stimuli created by Jacobsen & Höfel (2001). Two hundred fifty- two stimuli have been constructed. Half of the stimuli (126) were symmetrical, while the other half of the stimuli were non- symmetrical. Stimulus complexity has been manipulated by changing the number of elements of the pattern.

Procedure

Participants were presented with the stimuli; they were requested to evaluate aesthetically the presented patterns. They were instructed to evaluate the patterns as beautiful, not beautiful or indifferent, however at least 75 of the shown stimuli have to been categorized as beautiful and 75 of the patterns have to been categorized as not beautiful (Jacobsen & Höfel, 2001).

Data Analysis

A statistical power analysis, G*Power (Faul, Erdfelder, Lang, Buchner, 2007; Faul, Buchner, Lang, 2009), have 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).

1.2 Results

A Shapiro- Wilk test of normality did not showed 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 according to their level of expertise in visual arts and art history (Experts, Medium experience, Novice).

Table 2.: *Means and Standard Deviations for Level of expertise in visual art and art history and Symmetry- asymmetry preference for complex and simple geometrical forms*

	Symmetrical simple		Symmetrical complex		Asymmetrical simple		Asymmetrical complex	
Group	M	SD	M	SD	M	SD	M	SD
Experts	1.58	0.38	1.6	0.34	1.71	0.27	1.73	0.27
Medium experience	1.62	0.35	1.67	0.33	1.88	0.35	1.93	0.26
Novice	1.69	0.33	1.73	0.37	1.85	0.33	1.93	0.24

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 3.: *Summary of the Two- way Analysis of Variance for Visual art and art history experience and Symmetry- asymmetry preference*

Source	df	SS	MS	F
Group	2	0.87	0.43	4.08*
Symmetry-asymmetry	3	2.11	0.7	6.57**
Group x Symmetry-	6	0.17	0.03	0.27

asymmetry

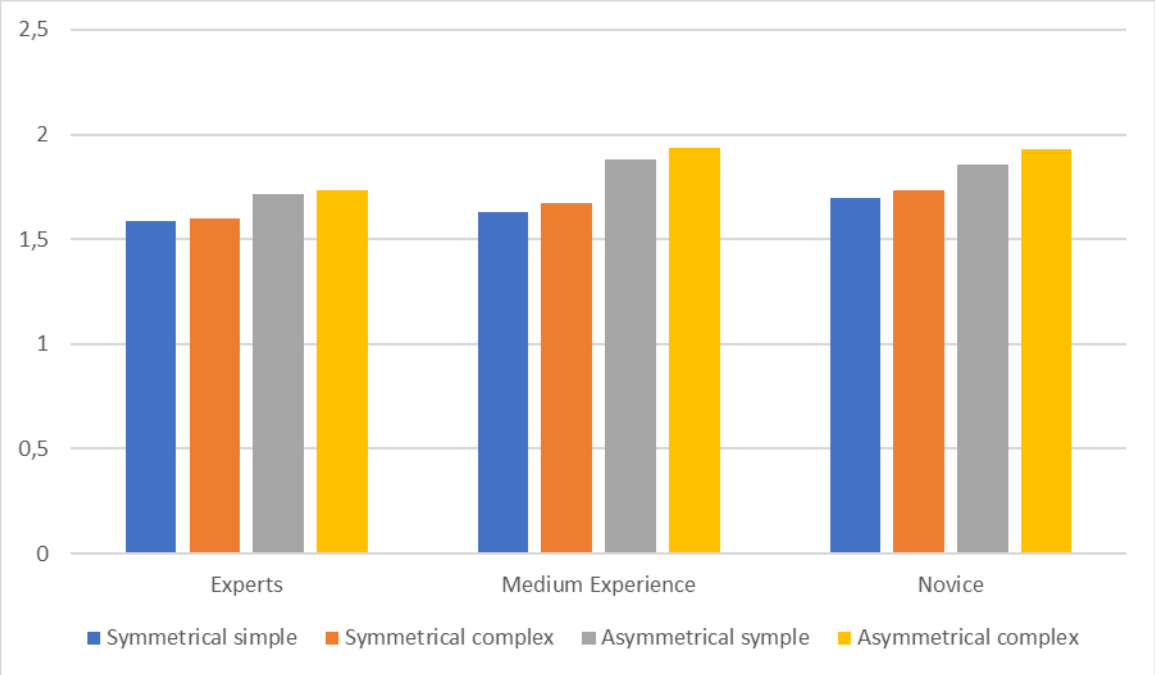
Within cells	212	709.48
Total	224	25.96

** p < .05*

*** p < .00.*

Post- hoc comparison using Bonferroni test indicated that the mean score for 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.

Figure 1: *Preference for Symmetrical- asymmetrical simple and complex geometrical forms of the three groups.*



Note: higher the score the less preferable the stimuli been judged.

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

Pair-wise comparision indicated that the mean score fort art novice group of 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 of simple symmetrical

forms were not significantly different from complex simmetrycal (M = 1.73, SE = .079) and simple assymmetrical forms (M =1.85 , SE = .079) in the art novice group.

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

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

2 Discussion

In the present study we investigated the effect of level of expertise in visual art on symmetrical and asymmetrical 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 produced by Jacobsen and Höfel (2001). Participants were divided into three groups according to 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, the effect size was medium. Post-hoc comparison using Bonferroni test indicated that the mean score for art novice group was significantly different from the art expert group. The mean score for 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, the effect size was large.

The findings of the current study are in line with the results of previous studies. They indicate that symmetry plays a major role in aesthetical evaluation of visual stimuli originally produced by Jacobsen and Höfel (2001), regardless of level of expertise (Weichselbaum et al., 2018; Jacobsen & Höfel, 2001; Jacobsen & Höfel, 2002). However asymmetrical forms are more preferred by art experts, compared to novices. As a possible explanation, aesthetical evaluation or preference is dependent on domain specific knowledge, experience in art leads to greater preference to asymmetrical forms. This assumption can be explained by a model proposed by Leder et al. (2004), where preference is explained by 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 exposed to perceive abstract, or asymmetrical stimuli as beautiful. Another possible explanation of the result 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

are defined with meaning as well, not only by the information flow, that characterized by bottom- up information processing (Belfiet al., 2019).

The result of the present sutdy also indicates that the level of expertise in visual arts results a more unified preferrence for symmetry and assymetry, meanwhile the preference for symmetrical forms is greater and statistically significant in the intermediate and novice groups. One possible explanation for the nuanced aesthetical preference of the expert group can be the involvment of the emotional factors of the aesthetic decision making. The study result of Fayn et. al (2017) indicate that art related knowledge alters emotional experiences, art expertise results 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 asymmetrical simple and asymmetrical complex forms.

3 Conclusion

Our results indicate 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. However expertise in visual art does not result a change in preference for assymetrical forms over symmetrical, it does unifies the extent of the preference. In regard to our findings we conclude that preference for symmetrical forms are universal, nonetheless our results show smaller discrepancy between symmetrical and assymetrical preference scores of visual art expert. Considering the above mentioned findings we conclude that the aesthetical preference for symmetrical and assymetrical forms of visual art experts is influenced by top- down information processing, resulting a more sophisticated preference for asymmetrical forms.

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