Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi
Hacettepe University Journal of Faculty of Letters
Haziran/June 2021 – *38*(1), 259-271
doi:10.32600/huefd.780593

Hakemli Makaleler – Refereed Articles
Geliş Tarihi / Received: 14.08.2020 Kabul Tarihi / Accepted:20.02.2021

Art Education and Expertise An Eye Tracking Study

Sanat Eğitimi ve Uzmanlık: Bir Göz İzleme Çalışması

Banu CANGÖZ*, Bahadır OKTAY**, Necla RÜZGAR KAYIRAN***, Serap KARAMANOĞLU****

Abstract

The impact of education and expertise in art on the process of examining a work of art has been studied in the present study via eye tracking method. The main purpose of the study was to compare a group of experts and non-experts in art with regard to eye tracking measurements, artwork analyses and recall performance. In this research, expert and non-expert groups were compared in terms of eye tracking measurements, heat maps, artwork analysis and the recall performances. Heat maps were demonstrated that experts viewed Early Renaissance and Fauvism movements, artworks more while non-experts viewed Fauvist artworks more in comparison with AOIs. However, it was indicated that there is no statistically significant difference between the expert and non-expert groups for each artwork about eye metrics and recall performance during art-work analysis. On the other hand, artwork analysis grades of the experts were deter-mined to be higher at a statistically significant level in comparison with the non-experts.
Keywords: Eye tracking, selective attention, expertise, art education, paintings, artwork analysis.

Öz

Bu araştırmada sanat eğitimi ve sanatta uzmanlaşmanın sanat eseri inceleme süreci üzerindeki rolü göz izleme tekniği kullanılarak incelenmiştir. Araştırmanın temel amacı, sanat eseri inceleme esnasında sanatta uzman grup ile uzman olmayan grubu göz izleme ölçümleri, eser inceleme ve hatırlama performansı açısından karşılaştırmaktır. Araştırmada profesyonel resim sanatçılarından oluşan uzman grup ile sanat eğitimi almamış iki grup, üç farklı sanat dönemini (Erken Rönesans, Modern, Çağdaş) yansıtan resimleri incelerken göz izleme ölçümleri; ısı haritaları, jüri tarafından belirlenen eser inceleme puanları ve hatırladıkları detay miktarı açısından karşılaştırılmıştır. Isı haritaları, Erken Rönesans ve çağdaş döneme ait eserlerde uzmanların, modern döneme ait eserde ise uzman olmayanların AOI'lere daha fazla baktığını göstermiştir. Buna karşın, her üç eser için de uzman olan ve olmayan grup arasında resim inceleme esnasındaki göz izleme metrikleri ve hatırlama performansı açısından anlamlı fark olmadığını gösterilmiştir. Öte yandan, uzman grubun eser inceleme puanları uzman olmayanlardan istatistiksel olarak anlamlı düzeyde yüksek bulunmuştur.
Anahtar sözcükler: Göz izleme, seçici dikkat, uzmanlık, sanat eğitimi, resim, sanat eseri analizi.

* Prof. Dr., Hacettepe Üniversitesi, Edebiyat Fakültesi, Piskoloji Bölümü. e-posta: banucan@hacettepe.edu.tr, ORCID: 0000-0003-2213-3261

** Dr. Öğr. Üyesi, Süleyman Demirel Üniversitesi, Fen Edebiyat Fakültesi, Psikoloji Bölümü. e-posta: bahadiroktay@sdu.edu.tr, ORCID: 0000-0003-2010-4870

*** Prof., Hacettepe Üniversitesi, Güzel Sanatlar Fakültesi, Resim Bölümü. e-posta: necla.kayiran@hacettepe.edu.tr, ORCID: 0000-0003-2560-3012

****Doç., Hacettepe Üniversitesi, Güzel Sanatlar Fakültesi, Resim Bölümü. e-posta: serap.karamanoglu@hacettepe.edu.tr, ORCID: 0000-0002-7093-3012

Introduction

Paintings are products of the human mind that are silent and devoid of words, which become visible through the act of painting. Artwork analysis is a mental activity that is the study areas for cognitive psychology. While the process of artwork analysis requires an active participation from the viewer, it is also an effort to approach the artist by interpreting the work of the artist transforming the painted canvas to a replica of reality. In this regard, the relationship between psychological processes and artwork analysis which at its essence is the process of "interpreting an image" cannot be denied. According to Friedlander, "Art being a thing of the mind, it follows that any scientific study of art will be psychology." (Cited by Gombrich, 1992, p. 19). In other words, acquisition of knowledge on life by way of art takes place via a psychological mechanism that can be determined with the word experience during artistic perception. The meaning in the painting is dynamically restructured by both the artist and the viewer (Leppert, 1996, p. 19).

The viewers of a painting are not passive individuals waiting to pick up on the ready meanings in a painting but active individuals who strive to discover. The image that the viewer is expected to see in the artwork contains the viewers themselves, their knowledge, education, beliefs, experiences, goals, expectations, fears etc. That is the image substantializes a certain style of seeing. Each image seen in paintings substantializes a viewing pattern and/or patterns that are socially and culturally unique (such as classical, modern, cubist, expressionist etc.). In other words, every individual has a "way of seeing" just as every period has a certain social "way of seeing" or interpretation. It is accepted that every "-ism" has a certain way of seeing just like individual and period (Tunalı, 1981, p. 12).

Beyond being a claim against the world, painting also means of questioning, examination and discovery (Leppert, 1996, p. 17). In this regard, it is closely related to "selective attention". Just like for all cognitive processes, selective attention is also a fundamental characteristic of seeing. The most fundamental selection that should be taken into consideration with regard to seeing which is related with the change in the environment. Moreover, artists, scientists and experts had unique and selective interest fields. Experts reconstruct, and reinterpret the concepts in their minds related with their specialties and/or educational backgrounds. Therefore, the interaction of perception and expertise is an important research subject for psychologists and also educatiors. The primary biological goal of perception is to view the vital events that around us and artwork analysis can also be evaluated in this context. Productive thought should be supported with a psychological and educative approach (Cited by Arnheim, 2007, p. 36-37).

Eye tracking technique has an important potential for revealing the perceptual and cognitive processes underlying the aesthetic evaluation of the artworks. It is used for empirical examination of art processes by many researchers (Borji and Itti, 2014; Einhäuser, Spain, & Perona, 2018; Francuz, Zaniewski, Augustynowicz, Kopiś & Jankowski, 2018; Kesner et al., 2018; Locher, 2014; Locher, Gray and Nodine, 1996; Locher, Krupinski and Schaefer, 2015; Nodine, Mello-Thoms, Krupinsky, Locher, 2008). For example, the reactions of the pupils were examined when they encounter an aesthetic image (Johnson, Muday, & Schirillo, 2010; Kuchinke, Trapp, Jacobs, & Leder, 2009). The relationships between the eye movements and the features of the pictures were examined as well (Locher, Tinio & Krupinski, 2020; Plumhoff & Schirillo, 2008).

In an eye-tracking study, 8 pictures of unidentified painters were illustrated to adults who did not receive fine arts education, and they were asked to react about their meaning and the meaning of the work at a short glance of 100 ms. In this study, it has been shown that the artistic stimulus is perceived and produced rapidly. This finding has been shown to trigger artistic features of the painting and top-down processes. (Nodine et al., 2007).

Brinkmann, Commare, Leder and Rosenberg (2014) tested universality of abstract paintings by comparing eye movements with representational painting. This study has been shown that abstract paintings did not elicit more coherent pattern than representational paintings.

Locher et al. (2015) examined the effects of belief in the authenticity of the work (originals, copies, fakes) on aesthetic evaluation in expert (n = 15) and non-expert (n = 15) groups with eye tracking and behavioral measurements. The results have been demonstrated that viewers' beliefs about the work's authenticity are triggered by contextual clues and mediated top-down information processes. In the same

study, experts and non-experts in the art were compared in terms of familiarity with the paintings of well-known and unrecognized painters. It has been shown that the groups differ significantly in terms of familiarity.

Francuz et al. (2018), in an eye-tracking study, selected 25 ideally balanced oil paintings and manipulated them as low, medium and very balanced compositions. It has been shown that the participants who are experts in art (23 fine arts students who receive art education) distinguish balanced compositions more successfully than non-experts (19 social sciences without art education) and have a different visual scanning strategy.

Ericsson (2014) claimed that level of expertise can only be measured by objective tasks with the specific answers. According to classical theory of truth, the measure of expertise in art is to distinguish the quality of the work of art (Francuz et al., 2018). In a different way, the indicator of expertise in art is to distinguish a valuable artwork from artwork that is not valuable.

In accordance with the opinions of Ericsson (2014), the main motivation of our work is to develop methods that measure the expertise in art more objectively. On the other hand, the number of studies which make use of artwork analysis for understanding the human mind is limited (Massaro et al., 2012; Uusitalo, Simola and Kuisma, 2012; Zangemeister, Sherman and Stark, 1995). The aim of this study is to test the usability of eye tracking technique, which is the physiological measurement of attention, on the specialization in art and the analysis of the works reflecting different art movements. In other words, it is aimed to get a preliminary finding for further studies from a limited but controlled sample for the analysis of artwork, which is a subjective experience, with objective measurement tools. The second aim is to compare the two groups (experts and non-experts in the art) in terms of recall performance. This research has three hypotheses: H1: The PAF grades of the experts are higher than non-experts; H2: The recall grades of experts are higher than non-experts and H3: Eye tracking measurements of experts are different than non-experts.

Method

Participants

The study was carried out with a total of 20 adult volunteer university graduates between the ages of 20-45. The demographic data of the participants are presented in Table 1. Whereas one of the two groups compared in the study was comprised of professional painters (experts) who have received formal education on art, opened at least one personal exhibition and have at least three works of art; the non-expert group was comprised of individuals who have not received any formal or informal art training, who have not opened any personal or group exhibitions and who have not produced any work of art. Each group has 10 (5 male, 5 female) participants. The participants in both groups are university graduates with an education background of 12 years and above. In this research, two groups (experts in art and non-experts in art) were compared in terms of eye-tracking parameters, Painting Analysis Form (PAF) and recall performance with t-tests for independent groups. For each group participant numbers were 10 (5 male and 5 female). Although this number is not enough for a powerful comparison, our purpose was to make a pure expertise group and we used strict rules for this group because of our methodological concerns. Even though our participant numbers are not ideal for the analysis, these numbers are enough for using t-test. There are research methods textbooks suggesting that the numbers of participants required for normality. The numbers of participants may be limited to 10 (George & Mallery, 2010), and that there can be at least 10 participants in each experimental condition (Cohen, 1988). In short, the two groups are equivalent with regard to sex, age and education levels. None of the participants are color blind. Prior to the experiment, participants needed to fill out a consent form.

Table 1. Demographic characteristic of the participants

N=20	Expert Group (n = 10)	Non-Expert Group (n = 10)
Sex	5 F and 5 M	5 F and 5 M
Years of Education	12 years +: 10 people	12 years +: 10 people
Age	□= 36.00, SD= 4.52	□ = 35.70, SD= 4.85

Apparatus

Eye tracking device helps the researcher to determine where the participant is looking at a certain time and acquire information on the pattern with which the eyes of the participants move when shifting their gaze between certain areas. The Tobii T120 model eye tracker device will be used for collecting data on the eye movements of the participants. The Tobii T120 device has an embedded eye tracking server and a 17'' TFT monitor with a resolution of 1280×1024 pixels. The data collection frequency with binocular (double eye) tracking feature is 120 Hz and it can record the movements of the eye with a precision of 0.5o. The refresh rate of the device is 120 Hz, and the screen is refreshed every 8.33 ms. Accordingly, the eye movement that stays on an image for 100 ms was defined as a focus. The device can be calibrated for each participant before the experiment. In addition, reliable measurements can be obtained in case the participants use glasses or contact lenses.

Materials

Stimulating Painting Set

Three oil paintings comprised of one Early Renaissance (classical), one Fauvism (modern) and one Pop Art (contemporary) painting were used in the study for stimulation purposes which were selected in accordance with the criteria determined under the guidance of two faculty members (N.R.K. and S.E.K.) from Hacettepe University, Faculty of Fine Arts Department of Painting for controlling certain variables that can be complex with regard to methodology. In this context, the paintings selected for representing the three different art movements are equivalent with regard to technical characteristics such as the number of female and male figures, the positions of the figures in the painting, the presence and numbers of living figures other than people, the location type (home, garden etc.), details in the house, painting techniques (oil, water color etc.). When examined from this perspective, all of the selected paintings are oil paintings with two human figures with one male and female. In addition, a living figure other than human (animal, plant). The figures are situated at similar locations in the paintings with the figures pictured in front of a window inside the space. It is known that human faces draw attention more than other details because they are social stimuli. The number of human faces and sex were held constant. Thus, only expertise was examined in this research. The selected artistic features of the three oil paintings have been summarized below:

"The Arnolfini Portrait", 1434 oil painting by the Dutch painter Jan van Eyck with original dimensions of 82.2 x 60 cm. The painter is one of the important representatives of the realistic and Early Renaissance movement. The original painting is exhibited in the National Gallery in England.

"Conversation", 1912 oil painting by the French painter Henri Matisse with original dimensions of 177 x 217 cm. The painter is one of the most important representatives of Fauvism which is one of the modern art movements of the 21st century. The original painting is exhibited in the Hermitage Museum in Russia.

"Fred and Marcia Weisman", 1968 oil painting by the British painter David Hockney with original dimensions of 213.36 x 304.80 cm. The painter is one of the important representative of contemporary British art and he is also accepted as a member of the Pop Art movement in England. The original painting is exhibited in the Chicago Art Institute collection in USA. The three artworks which used as stimulant were

reached from the open access digital collection platforms of their respective museums and used for scientific purposes.

Painting Analysis Form

Panofsky (1983) argued that three different meanings should be determined for analyzing a work of art which are Natural Meaning (the factual descriptions of the work and its depiction/expression), Conventional Meaning (deeper meanings beyond those of the daily practical experiences) and Intrinsic Meaning (basic attitude of a nation, a period, a class, a religious or philosophical persuasion – unconsciously qualified by one personality and condensed into one work). The Painting Analysis Form (PAF) (Appendix A) prepared by the researchers is involves a total of 5 questions. Four of them are based on the criteria of Panofsky for measuring the level of success at which the presented paintings have been analyzed and a recall question added by the researchers (Recall and write down the figures – people, animals, objects – in the painting) (Appendix A). Acquired data from the recall question, were analyzed separately.

The PAF (excluding the recall question) filled by the participants were graded by taking the average of the independent grades of four jury members (H.D., S.P., S.S., B.D.) who work academicians at the Hacettepe University, Faculty of Fine Arts in a different session with non-disclosed identities and as double blind. Whereas the recall questions, were graded separately by the researchers. Recall performance is the number of items remembered correctly from each painting.

Apparatus

Before starting this study ethics committee approval is obtained from Hacettepe University Ethics Commision (approval date: 09/05/2014; document number: 88600825/431-1623). The participants attended the experiment individually in a silent environment without any distractions. The participants were subjected Ishihara Color Blindness Test (Birch and McKeever, 1991) prior to the application. The participants were then seated in front of the Tobii T120 eye tracker device and positioned about 60-65 cm away from the computer screen with their heads held fixed. The eye tracker device was recalibrated for each participant prior to the experiment. Instructions and the oil paintings were presented on the screen of the Tobii T120 model eye tracker device. Each painting that represents different art movements remained on the screen for 30 seconds and the paintings were randomly presented to each participant. The eye tracking measurements for the participants during the presentation were recorded by the eye tracker. An empty screen was demonstrated after each painting and the participants filled out the PAF comprised of questions for analyzing the artwork. The participants were given at most 10 minutes for filling out the PAF; that is for analyzing the paintings. The experiment lasted about 40 minutes.

Results

Paintings are products of the human mind that are silent and devoid of words, which become visible through the act of painting. Artwork analysis is a mental activity that is the study areas for cognitive psychology. While the process of artwork analysis requires an active participation from the viewer, it is also an effort to approach

Eye Tracking Analysis

Different area of interests (AOIs) were determined for the three oil paintings used in the study. Accordingly; 7 AOIs were determined for the “The Arnolfini Portrait” (male face, female face, chandelier, mirror, signature, dog, slippers), 7 for “Conversation” (male face, female face, female upper body, female right arm, balcony railing, the puddle to the right, the puddle to the left) and 4 for “Fred and Marcia Weisman” (male face, female face, the statue at the center, the totem to the right). It was produced by the heat maps that experts looked at the pre-determined AOIs more for “The Arnolfini Portrait” and “Fred and

Marcia Weisman" in comparison with non-experts; whereas non-experts looked at the AOIs for "Conversation" more. Since the two groups could not meet the normal distribution premise, Mann Whitney U test was used instead of the t-test for comparing the eye tracking metrics (amount of fixation to each AOI, total fixation duration, total amount of visits and total visit duration). A total of 72 (28 for the "The Arnolfini Portrait", 28 for the "Conversation" and 16 for "Fred and Marcia Weisman") paired comparisons were made for the three paintings examined and the AOIs determined for each painting (Hence, division by 28 was used for the first two paintings and division by 16 for the third when calculating the level of significance). Statistical analysis results for the eye tracking metrics for each AOI of each painting have been summarized in Table 2, Table 3, Table 4 and Table 5 respectively.

Table 2.Statistical results for the total amount of fixation to the AOIs

	"*The Arnolfini Portrait*"	
AIO's	Mann Whitney U	p
Man Face	45,00	0,705
Woman Face	43,00	0,597
Chandelier	40,00	0,450
Mirror	42,00	0,544
Signature	32,50	0,147
Dog	47,00	0,820
Clog	41,50	0,507
	"*Conversation*"	
AIO's	Mann Whitney U	p
Man Face	42,50	0,579
Woman Face	45,00	0,739
Woman Chest	38,50	0,393
Woman Right Arm	34,00	0,247
Balcony Iron	17,00	0,011
Lake on the Right Side	40,00	0,481
Lake on the Left Side	21,00	0,029
	"*Fred and Marcia Weisman*"	
AIO's	Mann Whitney U	p
Man Face	49,50	0,971
Woman Face	40,00	0,481
Statute in the Center	47,00	0,843
Totem on the Right Side	40,50	0,481

Table 3. Statistical results for the total fixation duration to the AOIs

	"*The Arnolfini Portrait*"	
AIO's	Mann Whitney U	p
Man Face	41,50	0,517
Woman Face	46,00	0,760
Chandelier	40,00	0,445
Mirror	35,00	0,268
Signature	34,50	0,197
Dog	40,00	0,441
Clog	44,00	0,637
	"*Conversation*"	
AIO's	Mann Whitney U	p
Man Face	18,50	0,015
Woman Face	31,00	0,165
Woman Chest	32,00	0,190
Woman Right Arm	42,50	0,579
Balcony Iron	21,50	0,029
Lake on the Right Side	40,00	0,481
Lake on the Left Side	26,00	0,075
	"*Fred and Marcia Weisman*"	
AIO's	Mann Whitney U	p
Man Face	36,00	0,315
Woman Face	46,50	0,796
Statute in the Center	45,50	0,739
Totem on the Right Side	45,00	0,739

Table 4. Statistical results for the total amount of visits to the AOIs

	"*The Arnolfini Portrait*"	
AIO's	Mann Whitney U	p
Man Face	39,00	0,405
Woman Face	46,00	0,762
Chandelier	41,00	0,496
Mirror	39,00	0,405
Signature	32,00	0,136
Dog	46,00	0,496
Clog	41,50	0,507
	"*Conversation*"	
AIO's	Mann Whitney U	p
Man Face	39,50	0,436
Woman Face	46,50	0,796
Woman Chest	37,00	0,353
Woman Right Arm	36,00	0,315
Balcony Iron	14,50	0,005
Lake on the Right Side	40,00	0,481
Lake on the Left Side	21,00	0,029
	"*Fred and Marcia Weisman*"	
AIO's	Mann Whitney U	p
Man Face	48,50	0,912
Woman Face	40,00	0,481
Statute in the Center	44,00	0,684
Totem on the Right Side	41,50	0,529

Table 5. Statistical results for the total visit time to the AOIs determined in the paintings

	"*The Arnolfini Portrait*"	
AIO's	Mann Whitney U	p
Man Face	49,00	0,938
Woman Face	42,00	0,537
Chandelier	30,00	0,121
Mirror	35,00	0,250
Signature	34,50	0,192
Dog	39,50	0,419
Clog	46,50	0,782
	"*Conversation*"	
AIO's	Mann Whitney U	p
Man Face	13,50	0,004
Woman Face	24,50	0,052
Woman Chest	32,00	0,190
Woman Right Arm	34,00	0,247
Balcony Iron	29,50	0,123
Lake on the Right Side	40,50	0,481
Lake on the Left Side	28,50	0,105
	"*Fred and Marcia Weisman*"	
AIO's	Mann Whitney U	p
Man Face	36,00	0,315
Woman Face	48,50	0,912
Statute in the Center	49,00	0,971
Totem on the Right Side	49,50	0,971

The heat maps are presented in Figures 1, 2 and 3 respectively.

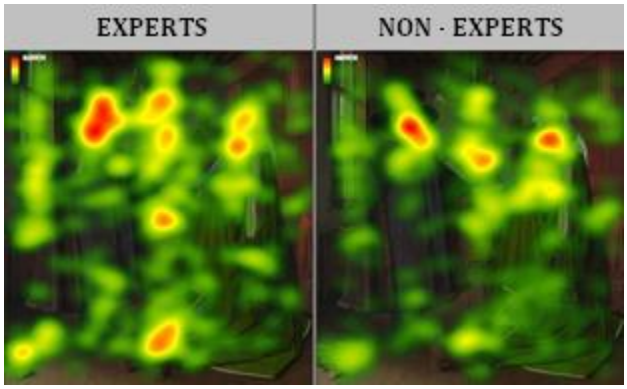

Figure 1. Heat maps for "The Arnolfini Portrait".

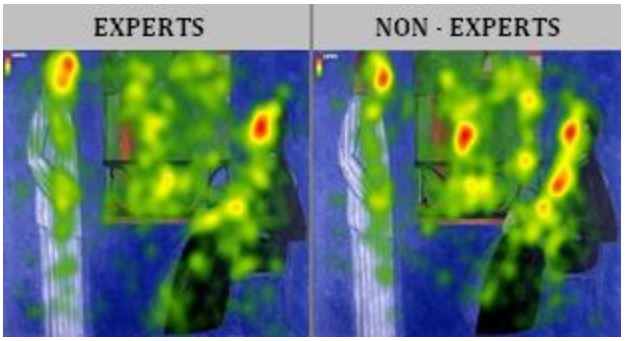

Figure 2. Heat maps for "Conversation".

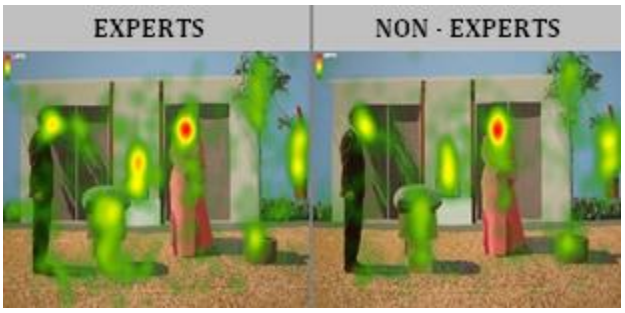

Figure 3. Heat maps for "Fred and Marcia Weisman".

PAF Analysis

The two groups were analyzed via independent groups t-test with regard to the PAF grades (excluding the recall question). In PAF each of 4 questions are graded 10 points (total score is 40). The PAF grade of the expert group was higher remarkably than the non-experts group for each of the three paintings statistically (U=7.50, p = .001 for "The Arnolfini Portrait"; U=1.00, p = .000 for the "Conversation"; U=7.00, p = .001 for the "Fred and Marcia Weisman").

Recall Analysis

There was no significant difference was determined between the two groups with regard to recall grade for the paintings of "The Arnolfini Portrait" and "Fred and Marcia Weisman" (sequentially U=20.00, p = .022; U=47.50, p = .848); the recall grade of the non-expert group was higher than that of the expert group for the "Conversation" (U=14.50, p = .006).

Discussion

Acquiring knowledge about life by way of art and also perception of art related with psychological process. According to results, perception of art is reflected as changes between experts and non-experts on the heat maps for three different art works. However there are no differences with regard to eye tracking metrics (amount of fixation, fixation duration and amount of visits between two groups. The positive impacts of expertise and education on cognitive functions are known. Experts react faster and more accurate and decisions in subjects that require expertise (Terry, 2012). When behavioral findings are examined, it was observed in accordance with the related literature findings that those who have received art training. Experts have produced their own works of art made more accurate interpretations in comparison with those who have not received any work of art (received higher PAF scores). This result demonstrates the importance of expertise related to cognitive functions. However, there is no difference between the expert

and non-expert groups with regard to eye tracking metrics. This result shows us these two groups looking at similar spots/details on a work of art regardless of expertise. The fact that there is no significant difference between the directions where the experts and non-experts focus on their eyes (attention). According to this result, the works of art analyzing and also aesthetic perceptions are independent from the specific education. On the other hand, higher PAF scores of experts indicate that educational attributes and professional experiences have an impact on the analysis processes (behavioral measurements) of paintings even if both groups focused on exactly the same details (physiological measurements), it is observed that experts are able to make more accurate analyses.

With regard to the recall scores, while experts received higher recall scores for the "Conversation" representing the Fauvism movement, there were no statistically significant differences between the two groups for "The Arnolfini Portrait" that represents the Early Renessance and "Fred and Marcia Weisman" represents the Pop Art movements. It was interpreted when this result was evaluated together with heat maps (Figures 1, 2, 3). The non-experts looked at the AOIs more in the "Conversation" than the experts. The recalled grades of experts were much more successful thanks to the performance of coding at a deeper level.

On the other hand, the examination of heat maps release focused on various differences between the distinct art movements. Whereas the experts viewed "The Arnolfini Portrait" and "Fred and Marcia Weisman" more in comparison with those in the non-experts, an opposite pattern emerged for the "Conversation". This was interpreted based on the fact that art training and greater specialization. While examining the paintings of Early Renaissance and Fauism movements, the expertise is required by the participants. Whereas the experts was more attentive than non-experts when analyzing the classical and modern works of art, they were relatively less attentive when analyzing the modern one according to the heat maps generated by way of eye movements considered as a physiological indicator of selective attention. Thus the analyses of Early Renaissance and Fauism movements artworks more difficult. Difficulty of these paintings require the greater cognitive efforts and also used more source of attention (Cartwright-Finch and Lavie, 2007; Lavie, 2005).

Especially, "The Arnolfini Portrait" representing the Early Renaissance movement is one of the artworks that is analyzed in the first years of formal art education. Therefore, experts have a tendency to examine the details deeply since they have theoretical knowledge on these artworks and rich symbolisms.

Based on the heat maps, it was observed that experts and non-experts looked at the male face more in comparison with the female one in the Early Renaissance artwork of "The Arnolfini Portrait". This shifted and they looked more towards the female face in the Pop Art artwork of "Fred and Marcia Weisman". This finding was interpreted as an indication that perceptions related with the social standing and status of women in the classical period as well as modern periods are effective on the individuals in both groups regardless of whether they are experts or not.

On the other hand, the heat maps show us the male face in "The Arnolfini Portrait". It has received greater attention despite the presence of two human figures seen from the front. In contrast, the female face in "Conversation" has received greater attention. This result conflicts with the knowledge in art education. This knowledge is when human faces seen front, it makes easier to establish a dialogue with the painting. It led us to think that the female face in "Fred and Marcia Weisman" has received greater attention since it is easier to establish a dialogue with the female face in comparison with the male face due to the fact that it is seen from up front while the male face is seen from the side. However, the same perspective fails to explain why the male face has received greater attention in "The Arnolfini Portrait" in which both faces are seen from the front.

Based on the heat maps, while experts focused on many details in "The Arnolfini Portrait" that non-experts missed; non-experts focused on a greater number of details in the "Conversation" in comparison with experts. While the fact that groups focused equally on the details in "Fred and Marcia Weisman" it can be explained by the limited number of details. There were differences between the groups for "The Arnolfini Portrait" and "Conversation" despite the fact that they include more details. This difference was interpreted as an indicator that experts tend to use details as clues in classical artworks. In contrast, non-experts tend to use details as clues in modern period artworks. On the other hand, the same finding can be explained by the

direction of attention based on the knowledge of the viewers on the artists of the work. For example, experts who know that David Hockney, the painter of "Fred and Marcia Weisman" generally complex imagery. The language of story has shifted their attention to the setup and plastic values of the work rather than its story.

Based on the idea that analyzing works of art is a perceptual and a cognitive process. The present study is a candidate for the limited number of scientific studies (Massaro et al., 2012; Uusitalo, Simola and Kuisma, 2012; Zangemeister et al., 1995) that utilizes artwork analysis as a tool for understanding the human mind. In conclusion, it is a unique and exemplary interdisciplinary model including psychologist and artists. Supporting the idea that art is a psychological event and the scientific studies on art should actually be studies on psychology. This study a starting ground for similar studies to be carried out in the future.

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Appendix A

PAINTING ANALYSIS FORM (PAF)

Explanation:

Below, you will find questions for analyzing/interpreting the painting you viewed on the screen. You have **10 minutes** to answer the questions. Please answer all questions without leaving any question blank.

1. Recall and write down the figures (person, animal, object) in the painting
2. Describe what you saw in the painting
3. What is the subject of the painting?
4. Did you infer any meaning other than practical daily experiences from what you saw in the painting? If yes, please explain.
5. Does the painter (artist) have any meaning or message related with a nation, a period, a class, a religious or philosophical understanding that he/she tries to convey? If yes, please explain.