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„An ecological approach to art perception, considering the physical and eye movement in front of an artwork“

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Abstract

Previous research in the field of aesthetic evaluation of art focused on different aspects of visual perception. However, the aspect of physical movement was left behind, which is due to the fact that in this field laboratory studies are the common research practice. Recently the researcher started to investigate differences between the experience of art in a museum and in the laboratory, which showed main differences in the aesthetic experience due to the setting. Therefore, the necessity of a method, which allows to control influencing variables and still gives the viewer a real-world experience, is high. The goal of this exploratory study was to create an ecological valid surrounding to perceive art and to investigate the connection of physical as well as eye movement with expertise and art appreciation. The used visual material was a high-quality print of an abstract artwork. For the recording of the physical movement a newly created infrared method and for the recording of the gaze common eye-tracking glasses were used. The newly tested method worked without any problems and can be considered as a reliable tool to record movement. The analyses showed no connection between art appreciation and movement. Furthermore, no difference in the movement due to expertise was found.

Keywords: ecological valid “gallery” setting, eye-tracking, movement-tracking, abstract art, art expertise, ecologically valid real-world engagement, art appreciation, aesthetic evaluation

Introduction

“One sees the environment not with the eyes but with the eyes-in-the-head-on-the-body-resting-on-the-ground.” (Gibson, 1986, p. 205)

Already in 1979 Gibson noticed that perception is not just done with the eyes (Gibson, 1986; first published 1979). He argued instead that a person must be thought of as interacting with the environment. This also includes, among other factors, physical movement. This physical interaction, since the time of Gibson, has been an emerging focus of psychology, perception, and especially cognitive science, with agreement that such interactions between how we move and what we see must be important to study. Because cognition happens in a moving body and if we want to understand how we perceive the world the whole body while navigating through its environment has to be investigated. This topic is also argued to be of key importance to related applied fields such as psychological aesthetics and enjoyment of art, where we are also typically moving and interacting in a space in front of or around a physical art object. However, despite such importance, this is not considered in most current models or empirical investigations of visual perception (Pelowski, Markey, Luring, & Leder, 2016) and – from our knowledge – not considered in combination with emotions or aesthetic judgements in previous research (Pelowski et al., 2018). Furthermore, despite the growth of research in the field of art psychology there is still a major dilemma about where and how art is actually experienced and how it is studied in comparison (Pelowski, Forster, Tinio, Scholl, & Leder, 2017).

The topic of this master thesis is therefore physical movement in connection with visual perception in the ecologically valid real-world engagement with visual art. Where a completely new infrared camera technology to record physical movement was used, along

with mobile eye-tracking. The contribution of this work is twofold: First, to see if a new method can be used to distinguish the movement of people, while they are looking at art; and to evaluate this method in combination with two other measurements, a questionnaire, which captures the emotional evaluation and aesthetic judgement of the artwork, and the recording of eye movement. Second, to explore two factors: art expertise (i.e., those with training in art history versus no training) and aesthetic evaluation in relation to physical movement. We explore the research questions (a) if there is a connection between expertise/ liking of the artwork with body and eye movement – where do people stand, and do they stand on different positions depending on their expertise? (b) can we find a relationship between the amount movement and art appreciation or expertise?

The interference between the eye movement and the body-movement is not considered here, even if it is an interesting topic. However, it would exceed the limited extent of this master thesis.

All of this was done in an ecological “gallery” setting, that reproduced the common situation to perceive art, but which at the same time allowed the control of confounding variables as in a laboratory, which has never been done before.

Before moving to the empirical part of this thesis, in the next sections, it is discussed why it is so important to investigate art perception in an ecological approach and provide a brief history of methods and previous research findings on expertise in connection to eye movement as well as emotional evaluations and aesthetic judgement, and the research on physical movement in connection with art.

The Importance of an Ecological Setting

In the last 20 years, the research of art perception has been growing. However, there is a huge gap between where art is experienced in comparison to where it is studied (Pelowski

et al., 2017; Pelowski et al., 2018). It is questionable if the laboratory findings can be generalized to art perception in a natural setting (Barrett, Mesquita, & Smith, 2010).

People who want to experience art would go to a museum, pay an entry fee and look at the artworks room after room, with other visitors around them. On the contrary, in a laboratory, usually participants are students and are invited to sit in front of a screen, look at pictures of artworks (just for a few seconds), and then are asked to evaluate these pictures. The internal goal in these settings could just be a monetary reward or course credits, even if we do not know that for sure. However, this could also influence the results in laboratory studies and cannot be controlled. An even more extreme setting has to be set up for brain imaging studies, where participants lie in a MRI tube, are asked not to move and look at art, which is presented on a screen behind the tube through a mirror. Because of these obvious differences it is not surprising that researchers started to investigate the differences in the experience between these two settings (see Locher, Smith, & Smith, 1999; Locher, & Dolese, 2004; Brieber, Nadal, Leder, & Rosenberg, 2014; Brieber, Leder, & Nadal, 2015; Brieber, Nadal, & Leder, 2015; Specker, Tinio, & Van Elk, 2017). All of these studies found differences in the art experience regarding, for example, the pleasantness (Locher, Smith, & Smith, 1999), interest (Brieber, Nadal, Leder, & Rosenberg, 2014), and the arousing ability of art (Brieber, Nadal, & Leder, 2015), generally being that art in a museum is experienced as more intense (Specker et al., 2017). There are different factors which can influence this experience: social factors, like group size (Tröndle, Kirchberg, & Tschacher, 2014) or characteristics of typical museum visitors (Chang, 2006). Another major factor could be the viewing time, since in a laboratory a picture is viewed for around 5 seconds (Brieber et al., 2014), in comparison to the viewing time in a museum, which can last from a mean of 10 seconds (Smith, & Smith, 2001) up to 20 minutes (Pelowski, 2015).

Physical Movement and Art Perception

Human cognition and motor behavior are inseparably linked with one another (Gramann, Gwin, Bigdely-Shamlo, Ferris, & Makeig, 2010). This is associated with Gibson's idea of "natural vision" (1986), which means "when no constraints are put on the visual system, we look around, walk up to something interesting and move around it so as to see it from all sides, and go from one vista to another" (Gibson in Turner & Penn, 2002, p. 474), this leads to an involvement of the entire perceptual system. Such a natural vision idea would naturally touch the ecologically valid interaction with art. When thinking of the assessment of movement, perception, and art viewing, two main aspects might be considered: how we move our bodies or posture when viewing, and where we move within a room or in front of an artwork. Despite, this interesting question no previous research has been found which investigated the influence of movement on art appraisal and evaluation (see next section with review of past studies).

Previous research investigating physical movement in connection with art. One of the oldest findings is that visitors tend to pay the most attention to artworks on the right wall of an entrance, less to the ones at the left wall, and the least attention to those which are closest to the exit (Melton, 1935). Furthermore, the longer visitors are in a room or the more artworks they see the less attention is given to them (Robinson, 1928; Melton, 1935). The research history goes on by showing the influence of other environmental factors on the movement of a person. For example, the location of the labels in a museum can force a movement around sculptures (Griswold, Mangione, & McDonnell, 2013). In general, according to Griswold et al., the viewer sees an artwork, approaches it – if interested –, reads the label and steps back to take in the artwork as a whole. Furthermore, Eskine, Kacinik, and

Prinz (2012) increased the subliminal rating¹ of an artwork by asking participants to do jumping jacks before looking at it. According to them, physical arousal, which was generated with the exercise, is unconsciously connected to an emotional arousal. One study by Kapoula, Adenis, Lê, Yang, and Lipede (2011) showed that in a picture with a deeper pictorial field viewers leaned more into it.

In the field of museum studies there is also long history of mapping basic movement patterns through a room or gallery (e.g., beginning with Robinson, 1928; Melton, 1935). Nevertheless, this was not done in a very accurate way, since it was mostly coded manually (see Yalowitz & Bronnenkant, 2009; Klein, 1993 for review). For example, one study by Bailey, Bronnenkant, Kelley, & Hein (1998) tracked 100 visitor groups by focusing on one person, and mapping the movement of this person. They identified different potential stops and recorded where and for how long visitors stopped, which is a rough way of recording movement patterns.

One of the first attempts at an accurate recording of movement in a gallery (together with other physiological measurements) was done as part of the research project eMotion in Switzerland (Tröndle, & Tschacher, 2012; Tröndle, Greenwood, Bitterli, & van den Berg, 2014; Tröndle, Greenwood, Kirchberg, & Tschacher, 2014; Tröndle, Kirchberg, & Tschacher, 2014). The movement measurement was done with a sensor-glove, which also recorded heart rate and skin conductance level. However, in this project important components were missing: the recording of the time a participant was actually looking at art, because no eye movement data was collected and a statistical analysis of the data. Despite these it was a first step in the research of movement, with the main outcome of different movement patterns but with no attempt to discuss why these occurred. The analysis showed that participants “who did not enter conversations during their exhibition tour spent more time in front of individual

¹ Sum score of the ratings: inspiring, stimulating, dull, exciting, moving, boring, uninteresting, stirring, imposing and forgetful

artworks” (Tröndle, Greenwood, Kirchberg, et al., 2014, p. 126) and visitors spend more time looking at labels when they were alone in the exhibition.

New technologies offer more options to track visitor paths through a museum: “magnetic positioning, dead reckoning, Wi-Fi, Bluetooth, radio frequency (RF)” (Lanir et al., 2017, p. 315). One of these modern approaches, a Bluetooth-based data-collection, was done in the Louvre museum. Visitors were tracked through their digital footprint, a method which allows recording of a massive amount of data (Yoshimura et al., 2014). However, the goal of this study differs from our goal – investigating the connection of introspective aspects and distance to an artwork while viewing – since they wanted to solve the problem of overcrowding in museums, which is very often the case in museum movement-studies (see Lanir et al., 2017).

Although these new technologies offer simple and good opportunities to investigate movement the literature shows that the connection of distance to the artwork and the emotional experience has barely been studied. As already mentioned when viewing an artwork in a natural setting, a viewer approaches to get a brief glance at it, followed by stepping closer to read a label, and then stepping back to view the entire painting (Griswold et al., 2013). A study by Clarke, Shortess, and Richter (1984) investigated the optimal viewing distance for an artwork and found a nonlinear correlation between the distance to the artwork and the size of it. However, the preferred viewing distance, was with a visual angle between 25-35°. Here it refers to a side to side visual angle, which means the angle which is formed by the projected rays from one eye to the left and right end of the artwork. While viewing smaller painting the visual angle is smaller, therefore, people are standing proportionally further away from it. In comparison to larger paintings where the distance is equals to a visual angle of 35°.

The previous described studies show that different aspects seem to influence body position and movement, however, there are no studies which combine this movement with an emotional experience.

Eye Movement and Art Perception

Visual attention is limited because of the physiology of the sensory system. A detailed and clear vision is just possible in the region of the Fovea, which takes up 2° of the 180° of our visual field. During the viewing of a scene, the eye moves from one fixation to the next. These movements are called saccades, during this time the “visual input is reduced or even totally suppressed” (Mayr, Knipfer, & Wessel, 2009, p. 2). Visual information is gathered only during fixations, the time when the eyes are stable, which takes usually between 250-300ms (Palcu & Florack, 2015). The time and location of fixations are seen as important features for a psychological experience, since they represent attention and salience (Tatler, 2007). Furthermore, previous research has shown that art appreciation and the time spend on viewing an artwork are correlated (Brieber et al., 2014). Eye movements are guided by two processes: top-down and bottom-up. Bottom-up or stimulus-led processes mean that salient features of the environment, like colors or faces, direct our attention. Top-down processing, or cognitive-led, happens when we are consciously guiding our attention, for example when we are searching for our keys or, in an artistic context, when the viewing pattern is influenced by the semantic meaning of the painting through the title (Kapoula, Daunys, Herbez, & Yang, 2009). In art perception, according to Pihko et al. (2011), in the first 10s of viewing an artwork, bottom-up processes occur so that salient objects capture the attention, and later on top-down processes happen if people have a background about the artwork or more expertise with art.

The measurement of eye movement can be done with two kinds of eye-tracking: stable and mobile. Stable eye-tracking, which is used in the laboratory, means that participants sit in front of a screen and cannot move their heads, since a certain distance between the eyes of the participant and the screen has to be maintained during the recording. This allows one to automatically code all fixations of the participant to a certain point of the painting and is therefore the common research practice (Ashrafi & Garbutt, 2018). The disadvantage of this method is that it is a very unnatural way of perceiving, especially art. In contrast, mobile eye-tracking allows the participant a natural setting, where the person is allowed to move around. However, if no specific system is used, this method has the disadvantage of the necessity to manually code all fixation, because of the requirement of processing camera streams, data recording and image processing, which is challenging and expensive (Santini et al., 2018). This is the reason why mobile eye-tracking is rarely used. In the cases of its usage, the coding is also typically coarse, such as coding every fixation as looking at “art” or “not art” (Pelowski et al., 2018). One study (Mitschke, & Leder, 2017) using mobile eye-tracking with the aim to investigate how people encounter sculptures and graffiti in an ecological valid setting – the Danube Canal in Vienna – coded the fixations in 7 categories: graffiti, sculpture, advertisements, architecture, nature, traffic and path. In another study (Tatler, Macdonald, Hamling, & Richardson, 2016) restricted the analysis to the first minute of viewing. As far as we know the literature on eye movements in a natural setting is very limited, and the knowledge we have from previous research is based on laboratory studies.

Expertise and Art Perception

Eye movement. Artists or experts in the field of art are expected to have different viewing patterns in comparison to laymen. They have a higher knowledge regarding art or

artworks, because they were trained to pay attention to specific colors, figures and the overall composition of the artwork; as well as being provided with historical backgrounds of the different areas and styles. In general, the gaze moves from one Region of Interest (ROI) to the next and, according to Tatler (2007), returns very often to the center of the painting. The eyes move to the most powerful attractors, which are for untrained viewers human features, and for artists abstract/structural features, which are not object related (Vogt in Vogt & Magnussen, 2007, p. 92). Prior knowledge about the viewed artwork leads to divergent fixations and provided information guides the attention (Tatler et al., 2016). A descriptive analysis of fixations by Nodine et al. (1993) showed that naïve viewers fixated on the central parts of the painting, whereas the experts paid more attention to the background features. On the contrary, another study by Harland et al. (2014) with another artwork showed that the expected gaze behavior did not differ between expert and naïve viewers, as would have been expected by the art theoretical framework. However, when further information was provided, the experts fixated more often on the features which were expected. A study by Pihko et al. (2011) – which included more than one artwork – evaluated the emotional evaluation and aesthetic judgment of paintings, which were categorized in five levels going from representational to abstract. In both groups the level of abstraction influenced the duration and number of fixations and the length of the scan-paths. Nevertheless, in one part of the experiment, with the shorter viewing time of 10s, the distance of the fixations to the center of the painting differed between the two groups, providing further evidence that experts have a more holistic viewing strategy (see Zangemeister, Sherman, & Stark, 1995). In their study, consistent results were found in the rating of aesthetic judgment and emotional evaluation of abstract artworks, which differ between naïve and expert viewers. Naïve viewers rated the artworks as less positive and even negative with growing abstraction, which did not occur in

the group of experts (see Pihko et al., 2011), which supports the previous findings by Uusitalo et al. (2009).

Physical movement. Results from previous research showed that expertise and eye movements have a relationship. This could also be transferred to physical movement and expertise. However, as far as we know there are no studies which examine whether there is a difference in the viewing position or amount of movement between naïve and expert viewers. However, it could be possible that similar factors, which lead to difference in eye movement between art experts and naïve viewers also influence movement in front of the artwork. For example, one working hypothesis could be that because of a broader knowledge about painting techniques art experts would step closer to the artwork to see all the technical details. There are a wide range of different possibilities of explanations and ideas how expertise could influence movement. Therefore, this study provides through an exploratory approach a first step to investigate this field.

Liking the Artwork and Movement

Other interesting factors which could have a connection to eye as well as physical movement are emotions induced by art. The only study investigating this is by Papathomas (2002), dealing with the emotions felt while looking at art, was working with a painting of Hughes, which is considered as an reverspective. This stands for reverse perspective and means an optical illusion, which is created through the three-dimensional surface of the painting. The work shows that an increased distance also increases enjoyment of the painting. However, this is not possible to generalize because of the specific painted cues of this kind of art. Furthermore, papers which are theorizing how emotions and movement are connected are by Griswold et al. (2013) and O'Doherty (in Elderfiled, 2005, p. 102). Grisworld et al. (2013) argue that less distance could increase the degree of "intimacy" someone feels and therefore

enjoys it more. On the other hand, O'Doherty (in Elderfiled, 2005, p. 102) theorized that standing further away increases the enjoyment, because with this distant position, the appraisal of the artwork is better. Because of these mixed opinions and no research in this field, it is very important to take the first step and study the impact of movement in art perception.

Present Study and Hypotheses

The history of tracking physical movement while viewing art was shaped by museum studies with the goal to find a solution for overcrowding. Connections between art appraisal and movement were barely investigated. Furthermore, as far as we know research dealing with the influence of art expertise on movement does not exist. As can be seen through the above review the results of an influence of expertise on eye movement are antithetical. Moreover, previous findings in this field came from laboratory studies, which are known to provide a different art experience in comparison to a natural setting. However, a natural setting has the disadvantage that it is more complicated to control different factors during the viewing of art, for example the group size, other visitors in a museum, personal differences and so on. Therefore, the demand for a method that can monitor all of these variables and still give the viewer the feeling of having a "real art experience" is high. In this study an ecological valid gallery was created, which allows participants a natural vision (see the section "Measurement of physical movement") and gives the researcher a way to investigate eye and physical movements during a valid art experience. Since there are few studies in this field this study is primarily exploratory with the following research questions: First, if the new method for measuring physical movement is able to distinguish the paths a participant takes in front of an artwork. Second, to investigate eye movement with mobile eye-tracking and to measure the location of fixations in a more accurate way as done before. Third, if there

is a difference in the eye and/or body movement behavior of naïve and expert viewers. Fourth, if the preferred visual angle (Clarke, Shortess, & Richter, 1984) would lead to an average distance for this sized painting, between 1.9 meter (35°) or 2.7 meter (25°). Fifth, if we can find a connection between how participants move and their ratings of the appraisal of the artworks (beautiful and good).

The study was also designed to consider the interaction of movement and viewing, but for the purpose of this thesis this will not be considered.

Method

Participants

For this study we aimed to have a generally even distribution of people with higher art knowledge and lower art knowledge. Therefore, psychology students from the University of Vienna, expected to be generally art novices, and students of Art History were invited to participate in this study. As a compensation for participation the students received LAB-credit points or 5 euro. Participants were administered a new battery for assessing both relative art knowledge (i.e., specific art-related expertise) and general interest in art and art viewing (VAIAK, Specker et al., 2018), leading to a score for both constructs, which was used to divide the participants into two data driven groups – higher and lower art knowledge. Thus, these individuals were included in order to provide a distribution across these constructs (see Results for verification) rather than with any expectation of an a priori group-wise comparison.

Out of the 47 participants, who finished the study, we ended in a final sample of 39 participants ($M = 29.39$ years, $SD = 10.17$) - details about exclusion see results. Since no gender difference regarding art perception and judgement was expected, this variable was not surveyed.

Procedure

Prior to the experiment, participants were informed about the aim of the study, what they could expect and gave their written consent to the experiment. The study was explained with following words (translated from German):

In this study, we are interested in how people look at art in real art gallery spaces. Therefore, we have set up a room to resemble a gallery with a work of art. We would like you to go into the next room and look at the art as you typically would if you

were visiting art in a museum. Please look for how long and in whatever way you wish. When you are finished, please come back here and we will give you a short survey about your rating of the artwork. For the purpose of this study, we would also like you to wear eye-tracking glasses. This is so we can have a better idea of what parts of the artwork people look at. Please ignore them as best as you can and just look as you normally would. (German expression in Appendix B)

It was made sure that the artwork could not be seen before entering the gallery space and no background information of the artwork was provided. Following the instruction, participants put on the mobile eye-tracking device, subsequently it was calibrated (see below). After the calibration of the camera, the recording of the movement in front of the artwork had been turned on and participants entered the room and looked at the work of art. As already described, when finished, participants returned to the “instruction room” and filled out a questionnaire and the VAIK (Specker et al., 2018) to complete the study.

Setting

Facilities in the art history department were used for the study, since the goal was to measure the physical body movement of an individual in an ecological valid gallery setting, and these facilities fulfilled the requirements. These facilities were divided into two rooms: one which was used as the instruction room, where the participants were informed about the study, the eye-glasses were calibrated and the questionnaires filled out. The other room consisted of two separate sections. The first section, which was entered after the instruction room was like a hallway (~3m). After entering the hallway, parts of the painting, which was in the second section of the room, could be seen. This can be seen as similar to approaching a painting in a museum from one room to the next. The other part was the main gallery space with a size of 3.5 x 3 m. It had white walls, brown floor, art gallery style lighting, and one

painting centered on one wall. In this room the movement tracking device was placed in the corners of the wall with the artwork.

Stimuli

The artwork used in this study was a large high-quality print (117.5 x 91.2 cm) of “Kämpfende Formen” (fighting forms), an abstract oil painting from the German artist Franz Marc (1880 – 1916), displayed in Figure 1. The reason for the high-quality print was that, similar to an original artwork, the viewer can see brush strokes and is therefore rewarded in case of stepping closer to it. This artwork was chosen because of its large size and abstract style, since there are no salient regions, like faces or objects, which capture attention (see Massaro et al., 2012; Ashrafi & Garbutt, 2018, Pihko et al., 2011). Therefore, a uniform treatment of all regions can be expected.

Figure 1. “Kämpfende Formen” by Franz Marc



Regarding the art historical background of the artwork, Marc painted it in 1914 under the impression of the war, in which he died 1916. It is argued that the artwork is divided into a dark-side, filled with blue colored forms, and a red-side with sharp and angular forms. These forms seem to compete with each other, as indicated by the title of the painting. The colors are assigned to different aspects by Marc himself, blue as representing “spiritual” and red “bodily” (see Schleif, 2016).

No information about the historical background or the title of the artwork was given to participants. Furthermore, none of the participants had known the artwork, which was assessed in the post-study interviews.

Mobile Eye Tracking Assessment

Mobile eye-tracking glasses by SensoMotoric Instruments (iViewETG; Teltow, Germany) were used to track the viewing patterns (Figure 2). The recording was done at a rate of 60 Hz by a small device (similar to a mobile phone), which was carried in a small bag around the waist. The eye-tracking glasses consist of a lightweight frame with clear lenses and two cameras, one recording the environment and the other the pupils. Before entering the “gallery space”, the glasses were calibrated with a three-point calibration method.

Figure 2. *Eye-tracking glasses by SensoMotoric Instruments*



For the distinction of the eye movement the painting was divided into 35 equal cells (234 x 304 mm), 15 cells for the artwork and 20 cells for the frame, all fixations, which did not fall into the artwork or frame of it were coded as “other”. The fixations of each participant were manually coded after the study. Prior studies (Pelowski et al., 2018; Santini et al., 2018), which also used mobile eye-tracking glasses showed that wearing the glasses does not influence art perception.

Physical Body Movement Assessment

To track movement, we employed the interactive Audience Sensor KIT (TASKvector), a specially designed movement tracking device (Güldenpfennig et al., 2016). This platform and software package are specifically designed for the tracking of standing, walking or other interaction patterns in a gallery or other onsite instillation of art. Two cameras were installed at the front corners of the room: one infrared depth camera and a normal RGB camera, these were connected via USB to a computer controller, which stored the data. The handling of the system was done as well as via this computer. The cameras were housed in wooden cabinets, which were positioned in 45° angels in the corners of the room, which allowed the recording of a 3.5 x 3.5 m square. The accuracy of the recording was between 5 - 20 mm, depending on the distance to the cameras. This device recorded on a frequency of 1 Hz, which results in one picture each second. In the post-study interview the participants said that they did not noticed the boxes in the corners and did not expected a recording of their movement.

For the analysis, the grid was divided in 99 cells with a size (234 x 304 mm) equal to the eye-tracking data (see Figure 7). This size was used so that in a further step the floor and the eye data can be compared but also because two feet of a person can fit into it.

Questionnaire of Art Assessment and Emotional Experience

When participants left the room with the artwork, they were asked to fill out a questionnaire, which captures the following aspects: the artwork's appraisal, the emotional/cognitive experience, relation between the art and the room space, and the artwork's meaning.

For the evaluation of the artwork's appraisal eleven 7-point scales² were used ("The art was...?", -3 = 'left adjective', 3 = 'right adjective', 0 = 'neither of the two'), which were based on the Semantic Differential technique of Osgood et al. (1957). This method had been used in previous lab or museum studies (e.g. Pelowski, 2015; Pelowski et al., 2018), because it captures the main dimensions important to art: hedonic assessment of the art (beautiful:ugly; meaningful:meaningless; interesting:boring, good:bad), underlying stimulus potency (strong:weak; intimate:distance; serious:humorous; potent:impotent) and activity (active:passive; dynamic:static; collecting:notcollecting) (Pelowski et al., 2018). It has been argued that the two latter dimensions provide a measurement of cognitive and physical engagement, where activity refers to the necessity of making an adjustment to the stimuli and potency the amount of adjustment, which has to be made (Carroll, 1959, p. 113).

The emotional/ cognitive experience was evaluated with thirteen unipolar 8-point scales (e.g. "Please think about how you felt while looking at the art. I felt ...", 0 = 'not at all', 1-6 = 'some feeling', 7 = 'extremely feeling something'). This was used because it showed a good measurement in previous studies (e.g. Pelowski, 2015; Pelowski et al., 2018). The used scales capture the cognitive (confused; changed my mind about the art meaning; insight; novelty; the intention of the artist) and emotional experience, with aspects which focus on an awareness of the body (stimulated; thrilled; awe; moved; aware of my body/

² The questions were given to the participants in German, the German expressions can be found in Appendix B.

actions) and more general aspects like the general emotional arousal and positive and negative emotion valence.

An open question was provided which asked participants what they thought the artwork's meaning was. However, this was not analysed in this master thesis.

In addition, we asked four questions regarding the relationship between the movement of the participant in front of the art and in the gallery space, because this represents the focus of our research questions (7-point, 1 = 'strongly disagree'; 7 = 'strongly agree'): 'Did the room influence the way you encountered the artwork?', 'Did you think about your physical approach to the artwork?', 'Did you think about the movement in front of the artwork?' and 'Did you consider your distance to the artwork?'.

As a last step of the experiment, participants filled out the VAIK (Specker et al., 2018), which is a new and validated measurement that reliably estimates the constructs art interest and art knowledge. The art interest part consists of eleven questions on a 7-point scale. The art knowledge part itself consists of two parts. The first one includes six multiple choice questions whereas the second one displays ten artworks and participants had to name the style and artist of these. The score in art knowledge was used for the analysis to divide the participants into two groups (a high art knowledge group and a low art knowledge group).

Results

The results are divided into sections starting with the descriptive data of the participants, the general appraisal of the artwork, the aesthetic evaluation, viewing time, etc. Followed by the analyses of the eye-tracking as well as the movement assessment, and digging deeper into an analysis of the exact movement data as well as a multiple regression for movement and an evaluation if we can find a basic relationship between rating the artwork as beautiful and good and the eye and movement data. This section ends with a group-wise exploratory correlation analyses of all art assessment and emotional experience data.

Although this study was exploratory, and thus focuses more on descriptive analysis and effect sizes, inferential statistics were also used throughout to provide maximum information for the reader. An alpha of $p = .05$ was used for all analyses. For all groupwise comparisons, a Levene-test was done to test the equality of variances. If this assumption was violated, the corrected values (from the robust method) are written as footnotes.

Since not all variables fulfilled the requirements for parametric tests, for all correlation analyses the non-parametric Kendall tau-b correlation coefficient was used, which provides a more accurate and conservative test than other nonparametric approaches and has been used in previous research (Pelowski, 2015).

All analyses were done with SPSS Statistics 25 and all graphics with RStudio (Version 1.2.1335).

Descriptive Data

In this section the descriptive results of all the obtained data is summarized. The descriptive results of all variables gathered by the questionnaire can be found in the Tables 1-3; these variables are also visualized in Figure 3. Furthermore, the descriptive results of the eye-tracking can be found in this section, as well as different measurement of if the art experience is influenced by expertise (Table 4-8). Most participants filled out all the survey questions, with less than 1% of the answers missing.

Participants. Eight participants were excluded from the final sample, due to loss of the eye-tracking data, which resulted in a final sample size of 39 participants for this part of the analysis ($M = 29.37$ year, $SD = 10.17$). This sample was used for all calculations, except for the parts where movement data was involved, since the movement data of two additional participants was lost.

Artwork appraisal & emotional/ cognitive experience. Regarding the appraisal of the artwork, participants rated the artwork as generally on the positive side of scales for beautiful, active, strong, familiar, significant, serious, dynamic, collecting, good and that it had a strong effect. In the scales questioning the emotional and cognitive experience, the mean of the following variables was on the lower part of the scale: ‘confused me’, ‘awesome’, ‘changed my mind about the art meaning’, ‘understood the intention of the artist’ and ‘negative emotions’.

Awareness of movement and distance from the artwork. Regarding survey questions about awareness of movement while viewing the art, as can be seen in the Table 3 and Figure 3, participants were generally aware of their movement in front of the artwork, aware of their distance to the artwork, and felt that the room had influenced the way they encountered the artwork and that they were aware of their physical approach to the artwork.

Table 1

Mean and SD of Art Appraisal

Variables	<i>M</i>	<i>SD</i>
beautiful	4.72	1.162
active	5.85	1.136
strong	5.95	1.293
familiar	4.10	1.353
significant	4.31	1.260
serious	4.13	1.080
dynamic	5.95	1.161
strong effect	4.95	1.432
interesting	4.82	1.537
collecting	4.23	1.385
good	4.55	1.309

Note. These variables were re-poled, so that higher values express higher characteristics in the variable expressions displayed. 7-point scale. “The art was...” (1...not at all; 7.... very).

Table 2

Mean and SD of Emotional and Cognitive Experience

Variables	<i>M</i>	<i>SD</i>
stimulates me	4.97	1.716
confused me	3.26	1.728
awesome	2.69	1.542
enthusiastic	4.03	1.755
changed my mind about the art meaning	2.67	1.722
aware of my body/ actions	5.05	2.077
knowledge	4.03	1.513
novelty	4.23	1.784
moved me	4.26	1.728
The intention of the artist	3.95	1.754
emotional stimulated	4.51	1.684
positive emotion	5.18	1.412
negative emotion	2.72	1.521

Note. 8-point scale. “I felt...” (1...not at all; 8.... extremely).

Table 3

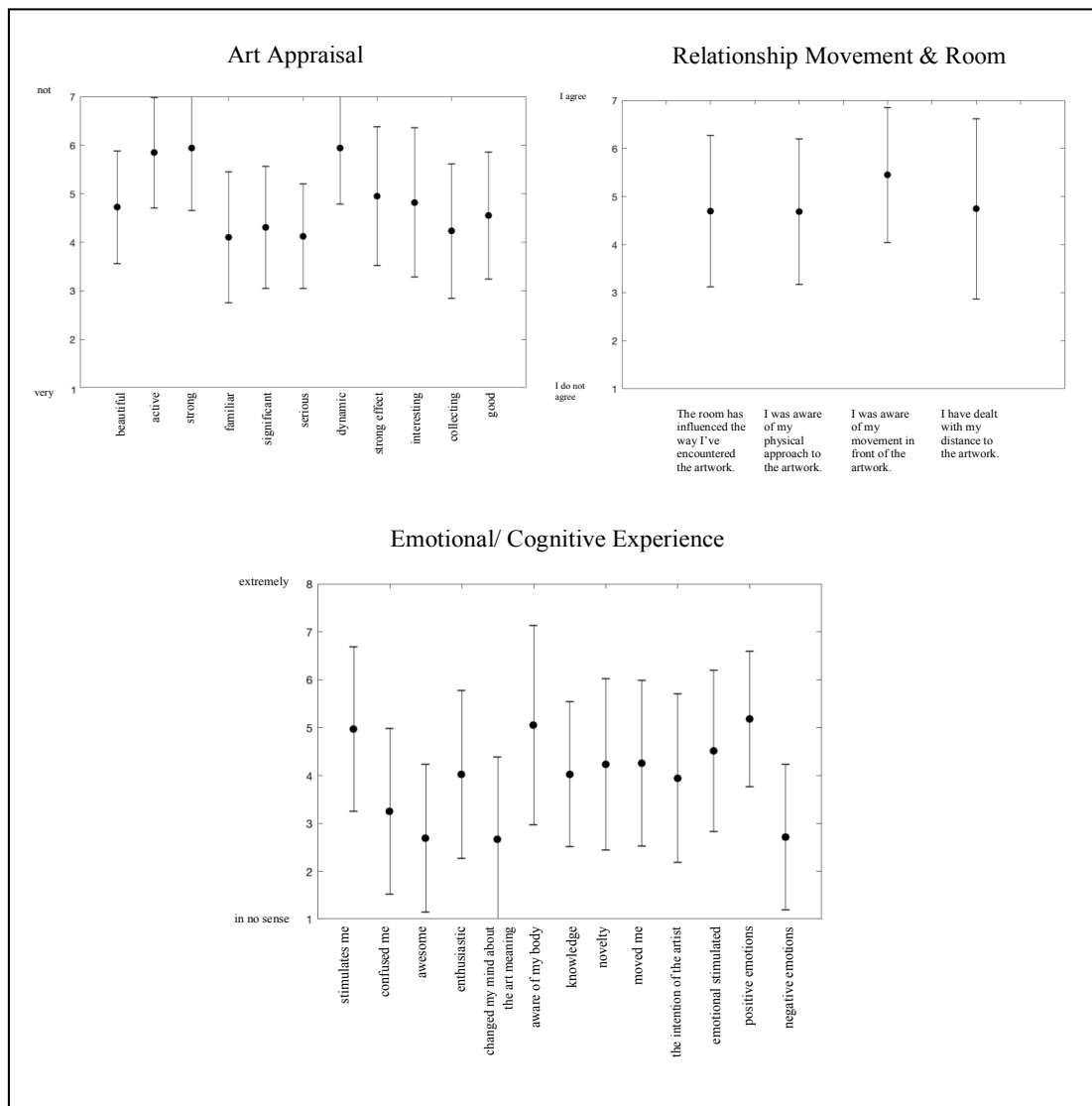
Mean and SD of Questions regarding the relationship between movement and room

Variables	<i>M</i>	<i>SD</i>
-----------	----------	-----------

The room influenced the way I encountered the artwork.	4.69	1.575
I was aware of my physical approach to the artwork.	4.68	1.509
I was aware of my movement in front of the artwork.	5.45	1.408
I was aware of considering my distance to the artwork.	4.74	1.874

Note. 7-point scale. “Please think back to the relationship of the room and the artwork.” (1...I do not agree; 7.... I agree).

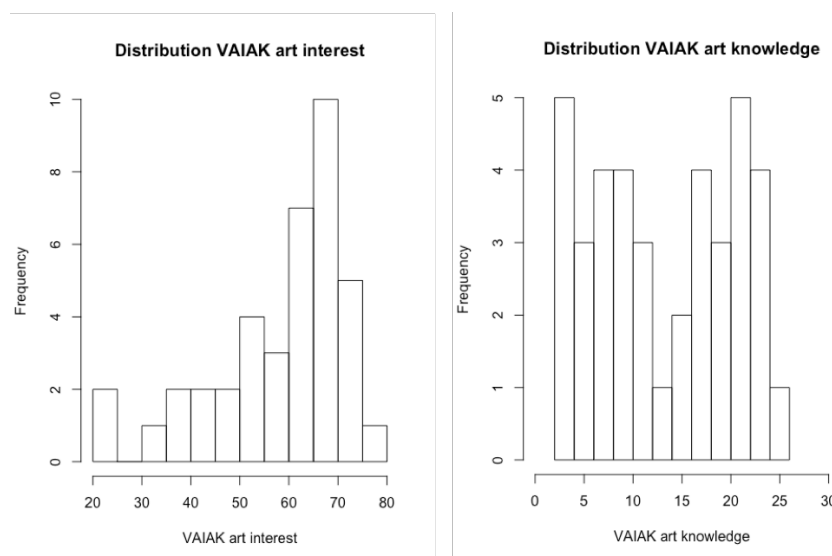
Figure 3. *Mean and SD of the results from the questionnaire*



Art knowledge and interest. The results from the Vienna Art Interest and Knowledge Test were used to differentiate between experts or naïve viewers in the field of art. The sample group was above the middle of the art interest scale ($M = 59.00$, $SD = 14.06$,

$min = 21$, $max = 77$) and in the art knowledge part they had a mean of 13.77 ($SD = 7.16$, $min = 3$, $max = 25$). The distribution of the two variables can be seen in Figure 4. The clear double hump in the variable art knowledge suggests a good distribution between experts and naïve viewers. However, in the other variable of the VAIK it can be seen that more participants were interested in art.

Figure 4. *Distribution of the VAIK results*



Eye-tracking data. Participants spent between 0.95 min and 10.75 min in the room ($M = 176508.15ms$, $SD = 128991.98ms$). During this time, the length of fixations ($M = 216.41ms$, $SD = 35.09ms$) and saccades ($M = 79.30ms$, $SD = 2.19ms$) was recorded. In general, 8.5% of the fixations per participant were missing due to technical issues (i.e., dropped fixations). The highest value of missing data of one person was 35.75%.

Comparison between high and low art knowledge group. To compare our participants regarding their expertise and the connection of this expertise with the surveyed variables, as well as viewing time, different methods can be chosen. In this thesis we decided to mainly split the participants into two groups, depending on their score in the aspect ‘art

knowledge' of the VAIK, since two clusters regarding higher and lower knowledge can be seen, supporting our selected participant (art history and psychology student) sample. For further exploration, we also treated the results of the VAIK in the variable art knowledge and interest as a continuous variable and correlated them with all other variables. The results of this analyses can be found in Appendix A (Table 4). None of the results was significant after Bonferroni correction.

For the data driven group-wise comparison a median split between higher ($N = 20$) and lower knowledge ($N = 19$; $Mdn = 13$) was done, the following t-test comparison showed that the two groups differed significantly in their art interest ($t(37) = -3.467, p = .001$)³, art knowledge ($t(37) = -12.886, p < .001$) and the variable 'I was aware of my physical approach to the artwork' ($t(36) = 2.190, p = .035$)⁴. Results of all other variables can be found in Table 5-8.

Table 5

T-test between the Low and High art knowledge group in their Art Appraisal

Variables	Group	N	M	SD	Df	t	p
beautiful	0	18	4.72	1.127	34	0.000	-
	1	18	4.72	1.227			
active	0	19	5.84	0.958	37	-	.983
	1	20	5.85	1.309			
strong ⁵	0	19	6.26	0.653	36	1.532	.134
	1	19	5.63	1.674			
familiar	0	19	4.47	1.307	37	1.711	.095
	1	20	3.75	1.333			
significant	0	19	4.42	1.170	37	0.543	.591
	1	20	4.20	1.361			
serious	0	19	4.05	1.079	37	-	.676
	1	20	4.20	1.105			
dynamic	0	19	5.95	0.848	36	0.000	-

³ Corrected: $t(37) = -3.404, p = .002$

⁴ Corrected: $t(26.78) = 2.427, p = .031$

⁵ Corrected: $t(23.36) = 1.532, p = .139$

	1	19	5.95	1.433			
strong effect	0	19	5.00	1.247	37	0.215	.831
	1	20	4.90	1.619			
interesting	0	19	5.16	1.537	37	1.351	.185
	1	20	4.50	1.504			
collecting	0	19	4.26	1.368	37	0.140	.889
	1	20	4.20	1.436			

Note. * $p < .05$, ** $p < .01$; group 0 = low art knowledge, group 1 = high art knowledge

Table 6

T-test between the Low and High art knowledge group in their Emotional/Cognitive Experience

Variables	Group	N	M	SD	Df	t	p
Good	0	19	4.37	1.422	36	-	.393
	1	19	4.74	1.195		0.865	
stimulates me	0	19	4.95	1.615	36	-	.926
	1	19	5.00	1.856		0.093	
confused me	0	19	3.16	1.834	37	-	.734
	1	20	3.35	1.663		0.343	
awesome	0	19	3.11	1.663	37	1.668	.104
	1	20	2.30	1.342			
enthusiastic	0	19	4.05	1.957	37	0.092	.927
	1	20	4.00	1.589			
changed my mind about the art meaning	0	19	2.68	1.827	37	0.061	.952
	1	20	2.65	1.663			
aware of my body/ actions ⁶	0	19	5.16	1.463	37	0.309	.759
	1	20	4.95	2.564			
knowledge	0	19	4.21	1.584	37	0.739	.464
	1	20	3.85	1.461			
novelty	0	19	4.32	1.565	37	0.287	.776
	1	20	4.15	2.007			
moved me	0	19	4.21	1.475	37	-	.874
	1	20	4.30	1.976		0.160	
The intention of the artist	0	19	3.68	1.765	36	-	.362
	1	19	4.21	1.751		0.923	
emotional stimulated	0	19	4.74	1.368	37	0.806	.425

⁶ Corrected: $t(30.47) = 0.313$, $p = .756$

	1	20	4.30	1.949			
positive emotion	0	19	5.32	1.493	37	0.583	.564
	1	20	5.05	1.356			
negative emotion	0	19	2.74	1.195	37	0.075	.941
	1	20	2.70	1.809			

Note. * $p < .05$, ** $p < .01$; group 0 = low art knowledge, group 1 = high art knowledge

Table 7

T-test between the Low and High art knowledge group in the felt Relationship between their Movement and the Room

Variables	Group	N	M	SD	Df	t	p
The room has influenced the way I've encountered the artwork.	0	19	4.63	1.640	37	-	.818
	1	20	4.75	1.552		0.232	
I was aware of my physical approach to the artwork. ⁷	0	18	5.22	0.808	36	2.190	.035
	1	20	4.20	1.824			
I was aware of my movement in front of the artwork.	0	18	5.33	1.372	36	-	.642
	1	20	5.55	1.468		0.468	
I have dealt with my distance to the artwork.	0	19	4.74	1.695	37	-	.983
	1	20	4.75	2.074		0.022	

Note. * $p < .05$, ** $p < .01$; group 0 = low art knowledge, group 1 = high art knowledge

Table 8

T-test between the Low and High art knowledge group in Art Interest and Viewing Time

Variables	Group	N	M	SD	Df	t	p
art interest ⁸	0	19	51.95	16.274	37	-	.001
	1	20	65.70	6.906		3.467	
Viewing time	0	19	211579	159910	37	1.695	.098
	1	20	143191	81573			

Note. * $p < .05$, ** $p < .01$; group 0 = low art knowledge, group 1 = high art knowledge

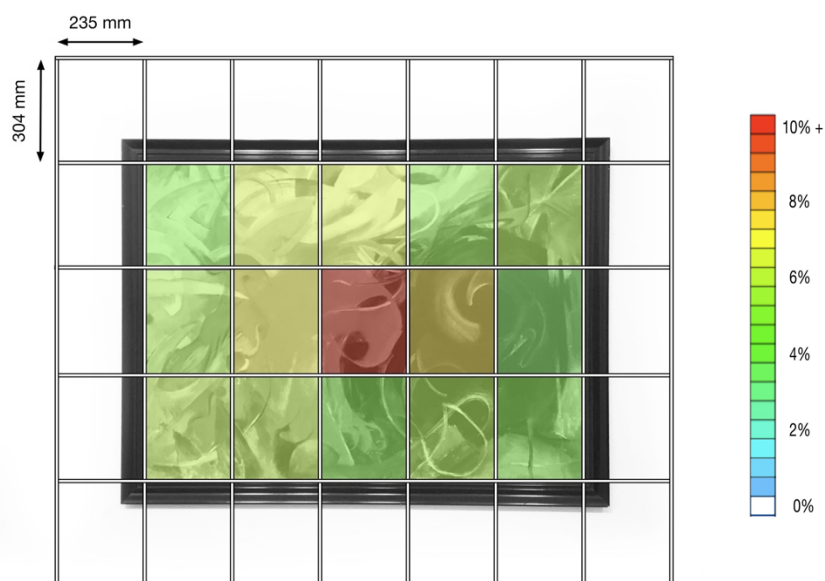
⁷ Corrected: $t(26.78) = 2.271, p = .031$

⁸ Corrected: $t(24.02) = 3.404, p = .002$

How Do we Look at Art in an Ecological Valid “Gallery” Setting and is there a Difference between viewers with high and low art knowledge? – Assessment of Eye-tracking Data

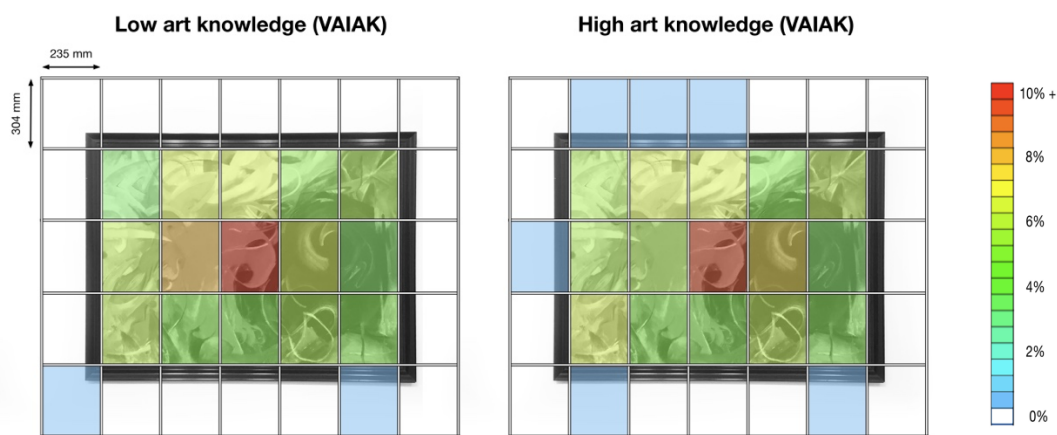
For the analysis of the eye tracking data, the software BeGaze 3.7.40 by SensoMotoric Instruments (SMI) was used. Each fixation was manually coded by a trained rater who watched the recorded eye-tracking video with a fixation cross and assigned the fixation location to one of 36 cells overlaid as a grid on the painting (35 cells for the painting and frame and one for outside the painting area). The cell size was chosen to allow an even distribution of cells across the painting with a center and that the size of one grid (304 x 235 mm) also matches the grid on the floor, where one cell is about the size of an average male standing with feet together. Figure 5 shows the grid of cells and a heat map of the averaged fixations for all participants. Around 25% of the fixations were clustered in the three centered cells of the artwork and 4.56% where coded as “other”, which means they were outside of the shown grid.

Figure 5. Heat map eye-tracking



Influence of expertise. The relative frequencies of the fixations divided in the two groups – high art knowledge and low art knowledge group – are displayed in heat maps (Figure 6). Visual inspection revealed no major differences between the two groups. In the group with low art knowledge a quarter of all fixation were in the middle three squares of the grid and in the other group around 24% of the fixations. In total not more than 5% of the fixations in both groups were outside the grid.

Figure 6. *Heat map of eye-tracking divided into two groups by art knowledge*

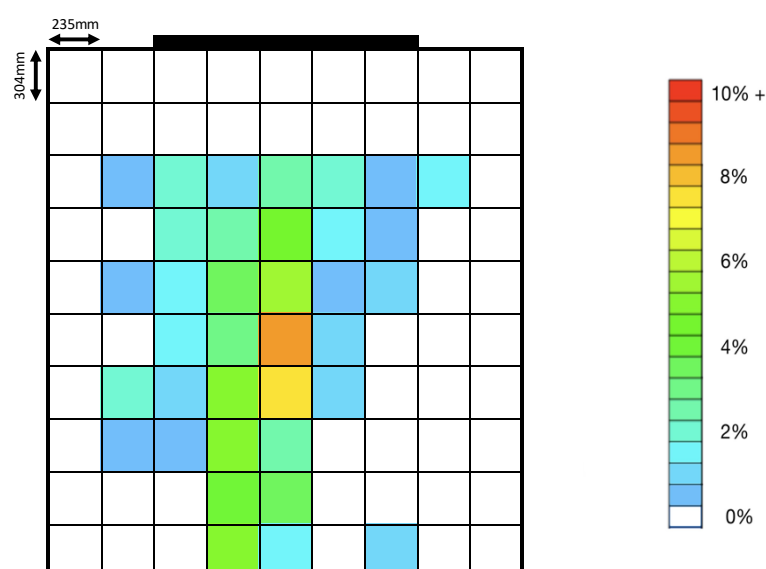


As a final, extremely unconservative, analysis to see if we could detect any difference between the art knowledge groups in regard to looking area distribution, individual t-tests were conducted for all 36 cells of the eye-tracking grid comparing the two groups. (Note, especially without Bonferroni correction as was done here, this would tend to inflate potential for ‘significant’ results). However, this too showed zero significant differences.

How do We move in Front of an Artwork in an Ecological Valid “Gallery” Setting and is there a Difference between viewers with higher and lower at knowledge? – Assessment of Movement Data

As already mentioned at the beginning of the Results the movement data of two participants was lost and therefore the total number of participants, for which all of the following analysis was done, is 37.

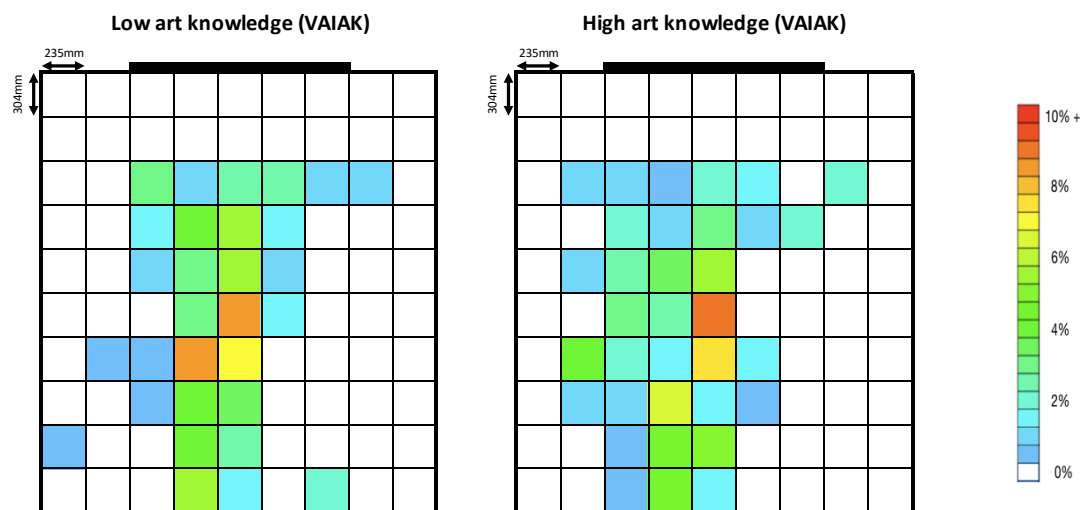
The movement data was coded in a similar fashion to the eye-tracking data, with each point coded (automatically by the system) into a grid of 99 cells on the floor (10x9) of the same size as those used in the eye-tracking analysis (see Figure 7). Around 4.9% of the movement positions were missing due to the fact that, at the beginning of the recording, participants were standing too far away from the art, and therefore outside of the grid. In Figure 7 a heatmap of the averaged movement positions of the participants is presented. Most of the time participants stood directly in front of the art work around 1.75 m away from it and more often to the left as to the right of the artwork.

Figure 7. *Heat map of movement*

Influence of Expertise. A similar heatmap was created for both expertise groups (Figure 8). For both groups we can see that most of the time participants were again standing around 1.75 m away in front of the artwork. However, when they moved, they preferred to be more to the left side.

To be in line with the eye-tracking analysis, a comparison between the two groups over all cells (99) was done and the results showed no significant differences⁹ over all 99 t-tests.

Figure 8. *Heat map of movement divided into two groups by art knowledge*



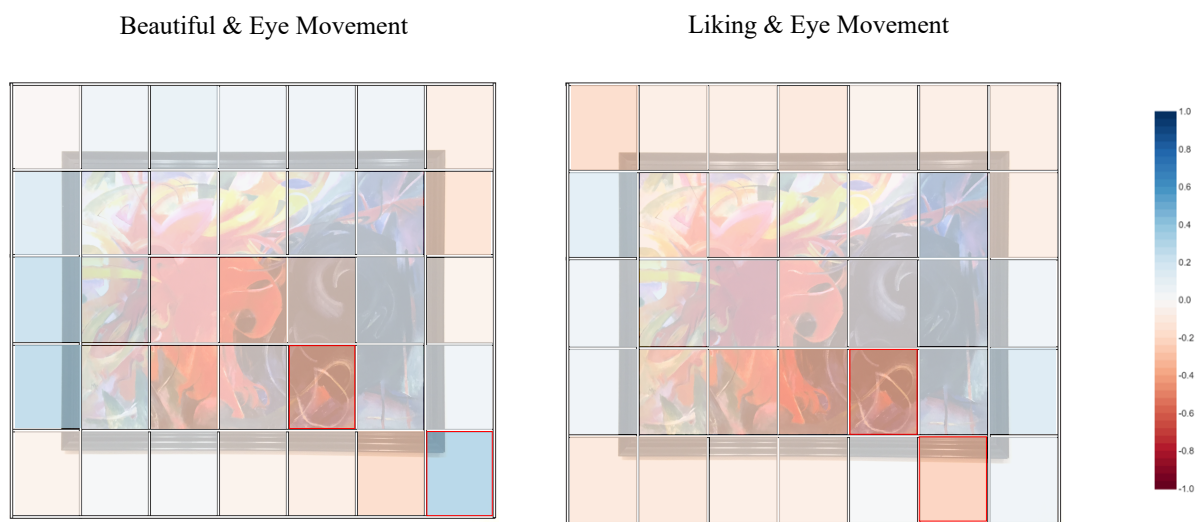
Do we Look or Stand different if we Appreciate Art in an Ecological Valid “Gallery” Setting?

Since we know that expertise is just one of many factors that could have a basic relationship to how we move and where we look, in this section a similar analysis to the two above was done for the two variables beautiful and good (liking). These variables were selected since they can be seen as standard ratings of a general art appraisal. However, we did not split the participants in two groups – more or less liking – since these variables have a

⁹ without Bonferroni correction

short span of 7 points and therefore a correlation analyses between rating scores and percentage of fixations in each grid area was chosen. Tables with the exact values of the correlations between the eye-tracking data (Table 9) and the movement data (Table 10) can be found in the Appendix A. A visual illustration can be found in the following figures for the eye-tracking data (Figure 9) and the movement data (Figure 10).

Figure 9. *Heat map of the correlation between Beautiful/ Liking Ratings and Percentage of Fixations at Parts of Painting*



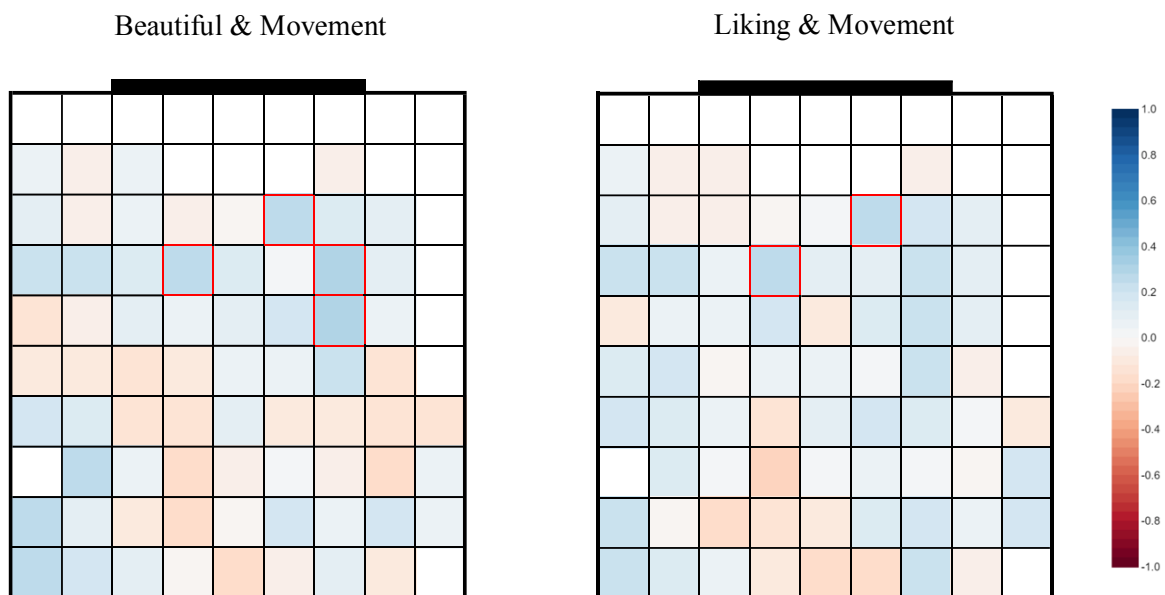
Note. The cells with a red frame were significant $p < .05$. However, after Bonferroni correction none of the results was significant; $p < 0.05/36$.

Art appraisal and eye movement. As can be seen in the Figure 9, the only significant results without Bonferroni correction were between rating the artwork as beautiful and two cells, the fourth row/fifth column (D5) as well as bottom right (E7). The correlation between the rating of liking the artwork and the eye movement data showed two significant results, without Bonferroni correction, for D5 and E6, which is in the last row the seventh column.

Art appraisal and physical movement. The correlation results between rating the artwork as beautiful and the movement of the participants showed four significant results –

red framed in the figure – which are in the front half. However, these are not significant after Bonferroni correction. Two of these were also significant, without Bonferroni correction, between rating the artwork as good and standing on this point.

Figure 10. *Heat map of the correlation between Beautiful/ Liking and Movement*



Note. The cells with a red frame were significant $p < .05$. However, after Bonferroni correction none of the results was significant; $p < 0.05/100$.

Mean Standing-location Data, Art Ratings and Expertise Assessment

Descriptive Results. The above grid-based analysis did not lead to notable differences in expertise or art ratings. However, to consider the standing position with a more precise, but also general measure, we then considered the average standing position as calculated from the raw (millimeter-based) positions from the body-movement data. This considered both the average position on the y (how far back from the painting) and x (how far to the side) axes, as well as standard deviation (analyses in the next section) as a rough measure of general amount of movement around the means. This also provided a continuous variable for correlation-based analyses with the various artwork measurements.

The descriptive data of the mean standing position and amount of movement (SD) can be found in Table 11. It can be seen that people are standing around 1.8 meters away from the painting and centered in front of the painting ($M = 1058.62$ mm), the almost exact calculated center of the room, which is 1.057 meters away from the left wall. On average participants moved around half a meter to and away from the painting and a bit less (277.77 mm) from side to side.

Table 11

Mean and SD of the mean standing position and amount of movement in mm

Variables	<i>M</i>	<i>SD</i>
Standing position; far:close (y_M)	1814.41	393.85
Standing position; left:right (x_M)	1058.62	130.88
Amount of movement; far:close (y_SD)	489.55	214.09
Amount of movement; left:right (x_SD)	277.77	135.80

Note: ** $p < 0.01$; * $p < 0.5$; the variable standing position is the mean of the accurate y and x values of each participant, and the amount of movement the standard deviation of these.

Table 12

T-test comparison between the two expertise groups in the Standing Position and Amount of Movement

<i>Variables</i>	<i>Group</i>	<i>M</i>	<i>SD</i>	<i>Df</i>	<i>t</i>	<i>p</i>
Standing position; far:close (y_M)	0	1719.62	407.87	37	-0.348	.730
	1	1836.07	389.38			
Standing position; left:right (x_M)	0	1082.67	87.35	37	1.122	.269
	1	1035.78	160.95			
Amount of movement; far:close (y_SD)	0	496.62	207.00	37	0.206	.838
	1	482.56	225.77			
Amount of movement; left:right (x_SD)	0	278.77	132.51	37	0.044	.965d
	1	276.83	142.29			

Note: ** $p < 0.01$; * $p < 0.5$; 0... low art knowledge group; 1... high art knowledge group. The variable standing position is the mean of the accurate y and x values of each participant, and the amount of movement the standard deviation of these.

A group-wise t-test comparison (Table 12) showed no differences between the two groups in their standing position and their amount of movement.

Average standing position and Ratings/Expertise. All correlation results between the average standing position and the variables from the surveyed variables are displayed in Table 13-16. The correlation results indicated that the closer participants were on average to the painting, the more they found the artwork interesting ($r = -.263, p = .029$), stimulating ($r = -.280, p = .021$), and felt enthusiastic ($r = -.242, p = .043$), while they were less aware of their body ($r = .249, p = .034$). Participants who were standing more to the left, rated the artwork more active ($r = -.289, p = .021$), strong ($r = -.301, p = .018$), collecting ($r = -.238, p = .049$), felt more negative emotions ($r = -.252, p = .037$), and the room has less influenced the way they have encountered the artwork ($r = .364, p = .002$).

Table 13

Kendall tau-b correlation between Standing Position and Art Appraisal

	close:far	left:right
beautiful	-.209	.019
active	-.118	-.289*
strong	-.044	-.301*
familiar	-.145	.034
significant	-.207	.132
serious	-.133	.025
dynamic	-.014	-.218
strong effect	-.179	-.147
interesting	-.263*	-.042
collecting	-.102	-.238*
good	-.165	.091

Note: ** $p < 0.01$; * $p < 0.05$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Table 14

Kendall tau-b correlation between Standing Position and Emotional & Cognitive Experience

	close:far	left:right
stimulates me	-.280*	-.044
confused me	-.092	.071
awesome	.133	-.133

enthusiastic	-.242*	-.074
changed my mind	-.173	-.134
about the art meaning		
aware of my body/ actions	.249*	-.203
knowledge	-.105	-.016
novelty	.059	-.123
moved me	-.158	-.067
The intention of the artist	-.166	.049
emotional stimulated	-.082	-.174
positive emotions	-.038	-.008
negative emotions	.077	-.252*

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Table 15

Kendall tau-b correlation between Standing Position and Questions regarding the relationship between movement and room

	close:far	left:right
The room has influenced the way I've encountered the artwork.	-.006	.364**
I was aware of my physical approach to the artwork.	-.136	.070
I was aware of my movement in front of the artwork.	.109	-.044
I have dealt with my distance to the artwork.	-.012	-.009

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Table 16

Kendall tau-b correlation between Standing Position and Art interest & knowledge and viewing time

	close:far	left:right
art interest	.012	-.157
art knowledge	.154	-.118

viewing time	-.045	.109
--------------	-------	------

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Exploratory regressions—what ratings predict where we stand? As a final exploratory analysis for the raw standing position, multiple regressions for all participants were run to predict the mean y- (Table 17) and x-coordinates (Table 18). The included variables to predict the coordinates, where the ones that had been significant in the above correlation table. For the mean y-coordinate (distance to the artwork) the included variables were: ‘aware of my body/ actions’, ‘stimulates me’, ‘enthusiastic’, and ‘interesting’. These variables were used to predict the mean y-coordinate (Results see Table 15). These variables did not significantly predict the mean y-coordinate and none of the four variables were independently significant predictors.

The multiple regression to predict the mean x-coordinate used the variables ‘The room has influenced the way I've encountered art.’, ‘collecting’, ‘negative emotions’, ‘strong’, and ‘active’. These variables predicted statistically significant the mean x-coordinate (Table 16). The only variable that added statistically significant to the prediction was ‘The room has influenced the way I've encountered art.’ ($p = .016$).

Table 17

Multiple Regression for the predictions of the mean y-coordinate

<i>Predictors</i>	<i>b</i>	<i>SE b</i>	<i>β</i>	<i>t</i>	<i>p</i>
interesting	-2242.741	5595.179	-.090	-0.401	.691
stimulates me	-4025.644	3986.595	-.177	-1.010	.320
enthusiastic	-4924.224	4811.742	-.224	-1.023	.314
aware of my body/ actions	5480.560	3240.278	.280	1.691	.100

Note. Model based on forced entry method. $F(4, 33) = 2.635$, $p = .052$, $R^2 = .492$

Table 18

Multiple Regression for the prediction of the mean x-coordinate

<i>Predictors</i>	<i>b</i>	<i>SE b</i>	<i>β</i>	<i>t</i>	<i>p</i>
active	-4044.765	2094.174	-.351	-1.931	.062
strong	-991.410	1678.588	-.097	-0.591	.559
collecting	1762.555	1778.129	.186	0.991	.329
negative emotions	-760.089	1265.707	-.088	-0.601	.552
The room has influenced the way I've encountered the artwork.	3632.334	1434.677	.436	2.532	.016

Note. Model based on forced entry method. $F(5, 32) = 3.634$, $p = .010$, $R^2 = .602$

Amount of movement (Standard Deviation) and Ratings/Expertise. The same analysis as done for mean x- & y- coordinates was also done for the standard deviation of the raw movement data, which – as already mentioned – can be seen as an indicator for how much participants moved. The correlation for all participants of the variables of the questionnaire and the SD of the two coordinates are displayed in Table 19-22.

Table 19

Kendall tau-b correlation between Amount of Movement and Art Appraisal

	close:far	left:right
beautiful	.067	.205
active	.069	.016
strong	.103	.034
familiar	.163	.019
significant	.157	.188
serious	-.153	-.058
dynamic	.248	.092
strong effect	.121	.102
interesting	.087	.143
collecting	-.077	.056
good	-.018	.184

Note: ** $p < 0.01$; * $p < 0.05$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Table 20

Kendall tau-b correlation between Amount of Movement and Emotional and Cognitive Experience

	close:far	left:right
stimulates me	-.233	-.184
confused me	.198	.168
awesome	.056	-.066
enthusiastic	.009	.162
changed my mind	.053	.276*
about the art meaning		
aware of my body/ actions	-.148	-.108
knowledge	.266*	.191
novelty	.138	.191
moved me	-.082	.000
The intention of the artist	-.145	.108
emotional stimulated	-.135	-.132
positive emotions	-.107	-.044
negative emotions	.008	-.207

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Table 21

Kendall tau-b correlation between Amount of Movement and Questions regarding the relationship between movement and room

	close:far	left:right
The room has influenced the way I've encountered the artwork.	.092	.077
I was aware of my physical approach to the artwork.	.344**	.174
I was aware of my movement in front of the artwork.	-.011	-.148
I have dealt with my distance to the artwork.	.261*	.126

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

Table 22

Kendall tau-b correlation between Amount of Movement and Art interest & knowledge and viewing time

	close:far	left:right
Viewing time	.142	-.047
Art interest	.124	.100
Art knowledge	-.008	.085

Note: ** $p < 0.01$; * $p < 0.05$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 31$

The results showed for all participants that the more movement between the front and the back of the room the higher the values in the variables: ‘knowledge’ ($r = .266, p = .027$), ‘I was aware of my physical approach to the artwork.’ ($r = .344, p = .005$), and ‘I have dealt with my distance to the artwork.’ ($r = .261, p = .028$). For the amount of movement between left and right the only significant result indicated that the more movement the more participants changed their mind about the art meaning ($r = .276, p = .022$).

Exploratory regressions—what ratings predict how much we move? As above, multiple regressions were run to predict the SD of the y- (Table 23) and x-coordinates (Table 24) from the significant correlated variables. For the dependent variable SD of the y-coordinate the variables ‘I have dealt with my distance to art.’, ‘knowledge,’ and ‘I was aware of my physical approach to the artwork.’ were used. These variables statistically significantly predicted SD of the y-coordinate (Table 23). However, none of these variables independently added significantly to the prediction.

The multiple regression ran to predict the SD of the x-coordinate had the independent variable ‘changed my mind about the art meaning’. This variable statistically significantly predicted the SD of the x-coordinate (Table 24).

Table 23

Multiple Regression for the prediction of the SD y-coordinate

<i>Predictors</i>	<i>b</i>	<i>SE b</i>	<i>β</i>	<i>t</i>	<i>p</i>
knowledge	2799.687	2334.691	.206	1.199	.239
I was aware of my physical approach to the artwork.	3626.068	2818.987	.268	1.286	.207
I have dealt with my distance to the artwork.	1427.578	2178.245	.133	0.655	.517

Note. Model based on forced entry method. $F(3, 34) = 3.932$, $p = .016$, $R^2 = .508$

Table 24

Multiple Regression for the prediction of the SD x-coordinate

<i>Predictors</i>	<i>b</i>	<i>SE b</i>	<i>β</i>	<i>t</i>	<i>p</i>
changed my mind about the art meaning	3497.396	1162.083	.443	3.010	.005

Note. Model based on forced entry method. $F(1, 37) = 9.059$, $p = .005$, $R^2 = .443$

Discussion

In this study, we investigated the viewing and movement patterns of participants in a natural setting, which comes close to the experience in a museum or art gallery. The viewers were equipped with mobile eye-tracking glasses and then sent into the room to view one painting, where their movement was also recorded. At the end, further questions regarding the artwork's appraisal, the emotional and cognitive experience while viewing the artwork, and the relation between the room and the movement of the viewer were asked, as well as the VAIK to be able to divide the participants in art experts and laymen.

Used Methods

Measurement of eye movement. The recording of the gaze behavior had more gaps in the data compared to the movement measurement. This is due to the fact that it is somewhat unstable and therefore the calibration suffers from this. However, the technical problems of the recording were minimal. The manual coding of the fixations into the 35 cells of the painting allowed a more accurate way to investigate gaze behavior in a natural setting compared to previous studies (see Tatler, Macdonald, Hamling & Richardson, 2016; Mitschke, & Leder, 2017; Pelowski et al., 2018). On the contrary, it is still a rough method, since one cell included different stylistic elements and some forms in this painting overlap several cells.

Measurement of physical movement. The first research goal was to test the newly created method for the measurement of movement patterns. Our experience with it showed that it is an excellently working tool for this purpose, because of its high spacial as well as temporal resolution. In comparison to the eye-tracking data it also had less gaps in the recording, the only missed cases were due to the fact that participants were standing too far away from the artwork. For further research, after adjusting the cameras, the technic would

allow to record the movement in even further distances. However, the spacial resolution would suffer in that case. The implementation of this device in the natural context of a museum and an accurate recording of the movement patterns would be no problem, however, right now the software is limited to one viewer at a time.

How do we Look at Art in an Ecologically Valid “Gallery” Setting and is there a Difference between Expert and Naïve viewers?

One of the research questions was whether differences between art expert and naïve viewers can be found in eye or body movement. Starting with the eye movement, no notable or statistically significant difference were found between the two groups regarding the total time spent looking at the artwork, and on which parts of the artwork they looked on average. Both groups focused more on the middle sections of the painting. This similarity in the gaze behavior could result from various factors. First, it may be that in a natural setting experts and naïve viewers do not differ in their viewing behavior, since peripheral parts can be identified through peripheral vision and the gaze generally moved to the middle. This is in contrast to previous research (see Zangemeister, Sherman, & Stark, 1995; Nodine et al., 1993), which found that art experts have a more holistic viewing pattern. However, it could be that these differences only occur in a laboratory setting, when the head is fixated and does not allow a natural view. Second, it may be that with abstract paintings the viewing behavior is always focused in the middle, which was found by Uusitalo, Simola, and Kuisma (2009) as well as Tatler (2007) and that differences in viewing behavior due to expertise can only be found for representational art. Third, from an art theoretical background, the topic of this specific artwork is the fight of the red and blue form, which happens exactly in the middle three squares of our grid. As a result, it could be argued that art experts are (un-)consciously aware of this and therefore focus on this section. Whereas, naïve viewers just look at the center,

because it is the natural tendency, and not due to any art theoretical background. Fourth, even if our results do not show a difference, there could be still a difference in the gaze behavior on a deeper level, for example which parts of the different forms art experts pay attention to in comparison to art naïve viewers. Another difference could be seen in the sequential viewing behavior, how the artwork is viewed, or which parts capture the attention first, however, this analysis was not done in this master thesis, but would be an interesting aspect for further research.

How do we move in Front of an Artwork in an Ecologically Valid “Gallery” Setting and is there a Difference between Expert and Naïve viewers?

Regarding the results of the movement data, statistically no differences were found between the two groups, neither in their average position, nor in their amount of movement. Viewers were standing right in the middle of the room (1.06 m away from the left wall), centered in front of the artwork and on average around 1.81 m away from the painting, which is almost exactly (9 cm difference) what would have been expected from the preferred visual angle (35°) for large sized paintings by Clarke, Shortess, and Richter (1984). The results indicate that art experts and art naïve viewers tend to stand at around the same position and move around the same amount in front of the painting. It could be that there are differences in how they move on a sequential basis. However, this is not investigated in this study. From the results we found in this study no influence of expertise was found. Since this is one of the first studies investigating the movement behavior in a psychological approach, no theories or previous findings can be supported with these results. Therefore, it can be assumed that other factors may predict movement more than expertise, as described in the following sections.

Do experts rate and experience the artwork different from naïve viewers?

In the analyses of the two groups regarding their aesthetic experience a difference in their interest in art was found. This confirms the VAIK as a reliable and valid method to differentiate between people with more or less art knowledge, because it can be assumed that people with more interest in art also have a higher knowledge of it. No differences between the two groups in their art appraisal and emotional/cognitive experience were detected. This is in contrast to previous findings, which found that naïve viewers appreciated abstract art less than experts (see Pihko et al., 2011; Uusitalo et al., 2009). However, other studies found that aesthetic appreciation depends more on personal preferences and taste (Gartus & Leder, 2014; Leder, Goller, Rigotti, & Forster, 2016; Leder, Ring, & Dressler, 2013) than expertise, which would support our results that expertise is not the determining factor for an aesthetic experience. For the questions regarding the relation between the movement and the room, the two groups did differ significantly in the variable ‘I was aware of my physical approach to the art.’, with higher results in the low art knowledge group. A possible theory why people with lower art knowledge were more aware of their approach could be that because they are not familiar with the situation of viewing art they were thinking more about what they did and were therefore more aware of it than art experts. Here, it could be argued that this should have led to a similar result in the variable ‘I was aware of my movement in front of the artwork.’, since it asks a similar construct about awareness of movement. However, if we consider the German expression of the two questions the meaning of it differs¹⁰.

¹⁰ Engl. “I was aware of my physical approach to the artwork” (German “Ich habe mich bewusst mit meiner physischen Annäherung an die Kunst auseinandergesetzt. “); engl. „I was aware of my movement in front of the artwork.” (German “Ich war mir meiner Bewegungen vor der Kunst bewusst.“)

Do we Look or Stand different if we Appreciate Art in an Ecological Valid “Gallery” Setting?

One aspect of movement and art perception investigated in this master thesis dealt with the connection of liking the artwork and where people looked at or where they were standing. The aspects of art appreciation for which the analysis was done focused on the ratings of how beautiful and how good the artwork was. In the following section the rating of ‘good’ is also described as liking the artwork.

Eye data. Here also the results, which are significant before Bonferroni correction, are discussed to have a general overview of the data. For the eye tracking data, it can be seen that parts of the painting at the bottom right show significant result. However, there do not indicate a consistent direction. Since for liking the artwork the results indicate that the bottom right parts are less looked at. And for thinking the artwork is beautiful one correlation is positive and the other negative, meaning that participants looked more at the bottom left corner when they rated it as beautiful, but for the other cell it was the opposite.

Movement data. For the physical movement positive connections¹¹ between thinking the artwork is beautiful and standing more on the right side close to the artwork and for liking it standing close to it but more in the middle of the room were found. These indicate a positive connection between standing closer to the artwork and having a positive appraisal of it, which supports the theory by Grisworld et al. (2013), who argue that standing closer to the artwork increases the feeling of intimacy and is therefore liked more.

However, all correlation analysis of the two variables and the eye and movement data showed no significant results after Bonferroni correction. Despite, the explained tendencies the probability of an alpha error is very high and therefore we can assume that the viewing behavior or physical movement is not connected to art appreciation.

¹¹ Again, these results are before Bonferroni correction!

Is there a Relationship between the Rating of the Artwork and the Movement in front of it?

The last research question, which is discussed here, deals with the connection between the movement of the participants and their appraisal of the artwork. Thus, the correlations between the ratings of the artwork¹² and the participant movement were considered. We stress again that this is an exploratory study and a first psychological attempt to connect the physical behavior of people while viewing art with their aesthetical experience, and therefore the findings are summarized but no further theories are discussed. Regarding where the viewer was standing, a position closer to the painting was connected to finding the artwork interesting, and the viewer feels stimulated and enthusiastic while looking at it. Interestingly, a position further away was correlated with an increase of awareness of the participants' body positions.

Standing position. Standing more to the left was correlated to rating the artwork as relatively more active, strong, collecting, and feeling more negative emotions. Standing on the right side let the viewer feel more aware of how the room influenced the way they have encountered the art. The results from the multiple regression showed that only the variable 'The room has influenced the way I've encountered the artwork.' is a predictor for how far the viewer is standing to the left or right.

Amount of movement. For the amount of movement to and away from the painting more movement was connected with higher ratings in the variables 'knowledge', 'I was aware of my physical approach to the artwork', and 'I have dealt with my distance to the artwork.'. The only significant result was found for more side to side movement while feeling that participants changed their mind about the meaning of art, which was also the only and therefore best predictor of side to side movement.

¹² Here the variables, which had a significant correlation (without Bonferroni correction) with the movement data are discussed.

The results of the art appraisal, emotional/cognitive experience and the movement cannot be described as showing one line of theory. A lot of different variables are significantly correlated with motion behavior. Therefore, no direct theory can be concluded of it. Despite all these mixed results, it was important to investigate this topic, since it is a first step in this specific field of art perception, and new research approaches can be built up from it.

Caveats and targets for future research

Since this experiment was one of the first approaches to investigate art perception in a natural setting with new motion capturing methods, the design also had its limits. Some aspects which could be improved in further studies are discussed in this section. First, to include a label. This is an important feature, since it is known from previous research, that the viewer approaches the artwork, and as a first step comes closer to the artwork to read the label (Griswold et al., 2013). This would provide a setting, which is even closer to the museum experience. Furthermore, including one more painting would also have this effect. However, this would have been too complicated as a first step, since there are more factors, for example the semantic meaning of the title or a familiarity with the artist, which would have had to be considered, and was therefore not done. Furthermore, questions about the personal preferences and taste – for example for abstract art or a certain color – should be included, because this would allow to control or examine this aspect in relation to art appreciation and in a further step to the eye and body movement. Second, regarding the analysis, the temporal gaze behavior is an interesting aspect, which would provide evidence whether bottom up and top down processes are influenced by expertise. In case that it does, it could be examined if this may also be transferred to physical movement.

To conclude, this study showed that in a natural setting we cannot find any differences between art naïve viewers and art experts in relation to their gaze behavior, movement or rating of the art, as well as no connection between liking the artwork and gaze behavior or movement in front of the painting. Furthermore, it proved that the used methods are an excellent tool to investigate art perception in a natural approach.

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Appendix A

Table 4

Kendall tau-b correlation art knowledge and interest

	art knowledge	art interest
beautiful	-.032	-.041
active	.048	-.050
strong	-.165	-.139
familiar	-.248*	-.155
significant	-.161	-.140
serious	.008	.077
dynamic	.067	.031
strong effect	-.029	.002
interesting	-.173	-.187
collecting	-.031	-.043
good	.008	-.086
stimulates me	-.065	-.129
confused me	.140	.154
awesome	-.136	.034
enthusiastic	-.010	-.045
changed my mind about the art meaning	.063	.079
aware of my body/ actions knowledge	.075 -.005	-.007 -.002
novelty	-.043	-.212
moved me	-.056	-.097
The intention of the artist	.108	-.096
emotional stimulated	-.193	-.290*
positive emotions	-.131	-.280*
negative emotions	-.034	-.047
The room has influenced the way I've encountered the artwork.	.051	-.065
I was aware of my physical approach to the artwork.	-.169	.026
I was aware of my movement in front of the artwork.	.079	-.033
I have dealt with my distance to the artwork.	.034	.030
art interest	.358**	-
viewing time	-.151	-.157

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 30$

Table 9

Kendall tau-b correlation between Art Appraisal and Eye-Tracking

	beautiful	good
A1	-.037	-.219
A2	.107	-.084
A3	.094	-.107
A4	.061	-.154
A5	.077	-.056
A6	.064	-.096
A7	-.134	-.103
B1	.147	.126
B2	.071	-.123
B3	.024	-.067
B4	.022	.027
B5	.101	-.018
B6	.082	.194
B7	-.167	-.104
C1	.270	.028
C2	.194	.101
C3	-.037	.162
C4	-.216	-.040
C5	-.153	-.005
C6	.112	.104
C7	-.070	.039
D1	.276	.039
D2	.071	-.098
D3	-.209	-.223
D4	-.071	-.188
D5	-.290*	-.348**
D6	.086	.114
D7	.070	.189
E1	-.074	-.138
E2	.012	-.126
E3	-.016	-.121
E4	-.047	.124
E5	-.114	.034
E6	-.207	-.262*
E7	.343*	.064
Other	.056	.085

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 36$; For an easier understanding the Figure 9a is presented below. 'Other' means the fixation was outside the provided grid – participants looked not at the painting.

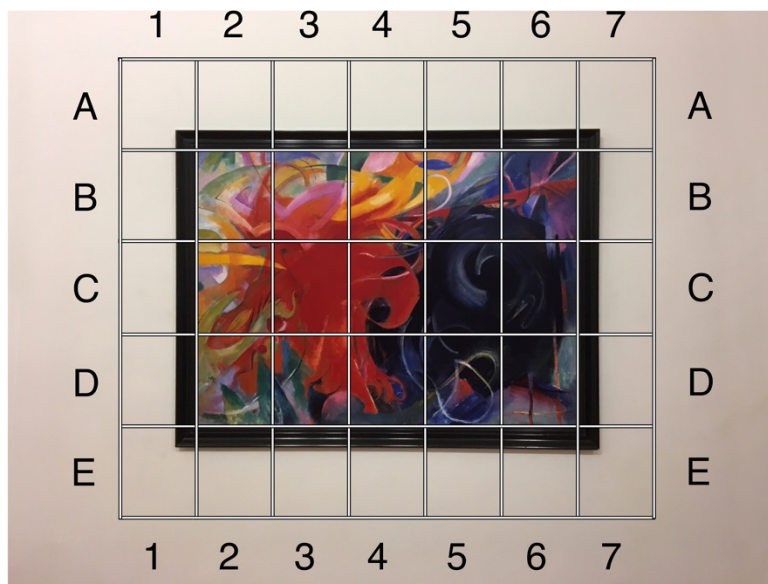
Figure 9a. *Grid which was used to code the fixations*

Table 10

Kendall tau-b correlation between Art Appraisal and Physical Movement

	beautiful	good
1,1		
1,2	.052	.061
1,3	.080	.105
1,4	.246	.234
1,5	-.155	-.107
1,6	-.080	.174
1,7	.215	.191
1,8		
1,9	.284	.259
1,10	.284	.259
2,1		
2,2	-.035	-.055
2,3	-.059	-.048
2,4	.271	.242
2,5	-.068	.042
2,6	-.097	.207
2,7	.154	.136
2,8	.300	.149
2,9	.101	-.008
2,10	.184	.174
3,1		
3,2	.037	-.038
3,3	.072	-.045
3,4	.135	.055

3,5	.077	.040
3,6	-.156	-.019
3,7	-.138	.036
3,8	.048	.024
3,9	-.099	-.199
3,10	.101	.058
4,1		
4,2		
4,3	-.064	-.003
4,4	.289*	.282*
4,5	.038	.200
4,6	-.097	.068
4,7	-.156	-.125
4,8	-.219	-.256
4,9	-.208	-.152
4,10	-.021	-.115
5,1		
5,2		
5,3	-.011	.014
5,4	.141	.110
5,5	.107	-.088
5,6	.032	.054
5,7	.110	.111
5,8	-.045	.010
5,9	-.012	-.089
5,10	-.222	-.190
6,1		
6,2		
6,3	.311*	.306*
6,4	.014	.094
6,5	.221	.130
6,6	.042	.024
6,7	-.085	.195
6,8	.023	.034
6,9	.199	.132
6,10	-.162	-.209
7,1		
7,2	-.056	-.070
7,3	.167	.216
7,4	.358*	.250
7,5	.367*	.267
7,6	.238	.236
7,7	-.084	.162
7,8	-.044	.000
7,9	.037	.223
7,10	.118	.271
8,1		
8,2		
8,3	.113	.095
8,4	.091	.112

8,5	.074	.087
8,6	-.160	-.038
8,7	-.168	.016
8,8	-.211	-.021
8,9	.215	.061
8,10	-.115	-.058
9,1		
9,2		
9,3		
9,4		
9,5		
9,6		
9,7	-.155	-.107
9,8	.052	.191
9,9	.052	.191
9,10		
Other	-.017	.038

Note: ** $p < 0.01$; * $p < 0.5$; **BOLD** marked - significant after Bonferroni correction $p_i < 0.05 / 100$. For an easier understanding the Figure 10a is presented below. 'Other' means participants were standing outside the provided grid.

Figure 10a. *Grid which was used for the coding of the physical movement*

1,1	2,1	3,1	4,1	5,1	6,1	7,1	8,1	9,1
1,2	2,2	3,2	4,2	5,2	6,2	7,2	8,2	9,2
1,3	2,3	3,3	4,3	5,3	6,3	7,3	8,3	9,3
1,4	2,4	3,4	4,4	5,4	6,4	7,4	8,4	9,4
1,5	2,5	3,5	4,5	5,5	6,5	7,5	8,5	9,5
1,6	2,6	3,6	4,6	5,6	6,6	7,6	8,6	9,6
1,7	2,7	3,7	4,7	5,7	6,7	7,7	8,7	9,7
1,8	2,8	3,8	4,8	5,8	6,8	7,8	8,8	9,8
1,9	2,9	3,9	4,9	5,9	6,9	7,9	8,9	9,9
1,10	2,10	3,10	4,10	5,10	6,10	7,10	8,10	9,10

Appendix B

Zusammenfassung

Im Bereich der ästhetischen Evaluation von Kunst konzentrierte sich Forschung hauptsächlich auf verschiedene Aspekte des visuellen Wahrnehmens. Der Faktor Körperbewegung als Einflussvariable wurde währenddessen außer Acht gelassen, was darauf zurück zu führen ist, dass die meisten Studien in diesem Bereich im Labor stattfinden. Die Aufmerksamkeit richtete sich in den letzten Jahren verstärkt auf Unterschiede im Kunsterleben, abhängig davon ob man Kunst in einem Labor oder in einem Museum betrachtet. Diese Studien zeigten, dass es zu gravierenden Unterschieden aufgrund des Umfeldes kam. Daher ist es notwendig eine Methode zu etablieren, wo Kunst in einem natürlichen Umfeld betrachtet, aber gleichzeitig verschiedene Einflussfaktoren kontrolliert werden. Das Ziel dieser Studie bestand darin, eine ökologisch valide Situation zu schaffen, in der es möglich ist, die Körper- und Augenbewegungen des Betrachtens aufzunehmen. Es wurde untersucht, wie Bewegung mit Kunstbewertung in Zusammenhang steht und ob es aufgrund von Wissen über Kunst zu unterschiedlichen Bewegungen kommt. Für dieses explorative Experiment wurde ein hochqualitativer Druck eines abstrakten Kunstwerks verwendet. Für die Aufnahmen der Körperbewegungen wurde eine neue Aufnahmetechnik basierend auf Infrarot und für die Aufnahme der Augenbewegungen, die in diesem Bereich der Forschung übliche Eye-Tracking Brille verwendet. Die Methoden funktionierten sehr gut und erlaubten eine zuverlässige Analyse der Bewegungsdaten. Die Ergebnisse zeigten, dass es keinen Zusammenhang zwischen den Bewegungen und der Bewertung der Kunst und keinen Unterschied in den Augen- oder Körperbewegungen aufgrund von Wissen gab.

Explanation of the study in German

„In dieser Studie interessiert uns, wie Menschen Kunst in realen Kunstgalerieräumen betrachten. Deshalb haben wir einen Raum eingerichtet, der einer Galerie mit Kunstwerken ähnelt. Wir möchten, dass Sie in den nächsten Raum gehen und die Kunst betrachten, wie Sie es normalerweise tun würden, wenn Sie ein Museum besuchen. Sie können sich so lange Sie wollen darin aufhalten und das Kunstwerk betrachten, wie auch immer Sie wollen. Wenn Sie fertig sind, kehren Sie bitte hierher zurück und füllen einen Fragebogen über Ihre Bewertung der Kunst aus. Im Rahmen dieser Studie möchten wir, dass Sie auch eine Eye-Tracking Brille tragen. Auf diese Weise können wir eine bessere Vorstellung davon bekommen, welche Teile des Kunstwerks die Menschen betrachten. Bitte ignorieren Sie so gut es geht und betrachten das Kunstwerk, wie Sie es normalerweise tun würden.“

Questionnaire filled out by the participants

Date _____ Time _____ Dom Eye _____
 Teilnehmer Code. _____

____ : _____ : _____
 Ersten 2 Buchstaben des Geburtsjahr Ersten 3 Buchstaben
 Vornamens der Mutter Ihres Nachnamens

Machen Sie bitte Angaben zu Ihrer Einschätzung der Kunst.*Das Kunstwerk war...*

	Sehr			Weder noch			Sehr		
Schön	☐	☐	☐	☐	☐	☐	☐	☐	Hässlich
Aktiv	☐	☐	☐	☐	☐	☐	☐	☐	Passiv
Kräftig	☐	☐	☐	☐	☐	☐	☐	☐	Schwach
vertraut	☐	☐	☐	☐	☐	☐	☐	☐	distanziert
Bedeutungsvoll	☐	☐	☐	☐	☐	☐	☐	☐	Bedeutungslos
Ernst	☐	☐	☐	☐	☐	☐	☐	☐	Humorvoll
Dynamisch	☐	☐	☐	☐	☐	☐	☐	☐	Statisch
Starke Wirkung	☐	☐	☐	☐	☐	☐	☐	☐	Schwacher Wirkung
Interessant	☐	☐	☐	☐	☐	☐	☐	☐	Langweilig
Vereinnahmend	☐	☐	☐	☐	☐	☐	☐	☐	Nicht vereinnahmend
Good	☐	☐	☐	☐	☐	☐	☐	☐	Bad

Bitte denken Sie daran zurück, wie Sie sich während der Betrachtung der Kunst fühlten.*Ich fühlte ...*

	Überhaupt nicht				äußerst			
mich stimuliert	☐	☐	☐	☐	☐	☐	☐	☐
mich verwirrt	☐	☐	☐	☐	☐	☐	☐	☐
mich ehrfürchtig	☐	☐	☐	☐	☐	☐	☐	☐
Begeisterung	☐	☐	☐	☐	☐	☐	☐	☐
Wie sich meine Meinung über die Bedeutung der Kunst veränderte	☐	☐	☐	☐	☐	☐	☐	☐
Mich meines Körpers / meiner Handlungen gewahr	☐	☐	☐	☐	☐	☐	☐	☐
Erkenntnis	☐	☐	☐	☐	☐	☐	☐	☐
Neuheit	☐	☐	☐	☐	☐	☐	☐	☐
mich bewegt	☐	☐	☐	☐	☐	☐	☐	☐

Date Die Absicht des Künstlers ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Time Dom Eye

Im Allgemeinen fühlte ich...
überhaupt nicht

äußerst

(Emotionale) Anregung ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Positive Emotionen ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Negative Emotionen ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Was hat die Kunst bedeutet?

Bitte denken Sie zurück an das Verhältnis von Kunst und Raum.

Stimme nicht zu

stimme besonders zu

Der Raum hat die Art und Weise wie ich der Kunst begegnet bin beeinflusst.	☐	☐	☐	☐	☐	☐	☐	☐
Ich habe mich bewusst mit meiner physischen Annäherung an die Kunst auseinandergesetzt.	☐	☐	☐	☐	☐	☐	☐	☐
Ich war mir meiner Bewegung vor der Kunst bewusst.	☐	☐	☐	☐	☐	☐	☐	☐
Ich habe mich mit meiner Entfernung zur Kunst auseinandergesetzt.	☐	☐	☐	☐	☐	☐	☐	☐