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Abstract

A total of 76 participated in one experiments designed to investigate how broad genre information and valence influences understanding, liking and perception of complexity in art in general, and how understanding of art influences the complexity perception in particular. It was presumed that with information the understanding would increase and complexity would lower. All stimuli were representative pictures with an affective valence: neutral, positive or negative valence. One group rated the sixty stimuli on a seven-point scale for three dimensions: complexity, understanding and liking. The other group rated the same pictures, but prior to their assessment, the participants received broad genre information about each of the pictures. The results indicated significant low correlation between understanding and complexity. However, it was possible to detect the influence of valence on understanding and on complexity, but not on liking perception.

Zusammenfassung

Insgesamt 76 Versuchspersonen nahmen an diesem Experiment teil. Im Allgemeinen wurde der Einfluss der Information und der Einfluss der Valenz auf das Verständnis, die Vorlieben und die Komplexität bei der Kunstwahrnehmung untersucht und ob das Verständnis die Komplexitätswahrnehmung beeinflusst. Es wurde erwartet, dass mit der Information das Verständnis steigen und die Komplexitätswahrnehmung sinken würde. Alle verwendeten Stimuli waren repräsentative Bilder mit affektiver Valenz: positiv, negativ oder neutral. Eine Gruppe schätzte die sechzig Bilder auf einer sieben stufigen Skala für die Dimensionen: Verständnis, Komplexität und Vorliebe ein. Die andere Gruppe erhielt vor Einschätzung der Bilder die ausführliche Information über jedes einzelne Bild. Die Resultate zeigten die niedrige aber signifikante Korrelation zwischen Verständnis und Komplexitätswahrnehmung. Es wurde der Einfluss der Valenz auf Verständnis und Komplexität gefunden.

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1. Introduction

Relevance (Significance)

The art is a part of all cultures, everywhere in the world. Art is a particular study path and playing of reality, a product of imaginative activity or public consciousness of culture as a person and of all humanity. The art is ubiquitous and omnipresent because it encompasses certain characteristics which generate pleasant and gratifying impressions (Belke, Leder & Augustin, 2006). “Art is used to convey fundamental spiritual, ethical, and philosophical meaning and it serves diverse economic, social, political, and symbolic functions all around the world” (Cattaneo, Lega, Gardeli, Merabet, Cela-Conde & Nadal 2014, p. 443).

In this work it was attempted to find out what characteristics or dimensions are activated in the aesthetic perception of art in general, and the effect of information and valence on the difficulty (or complexity) and the insight (or understanding) in representational pictures in particular. The following synonymic rows were used for complexity: difficulty, intricacy or complicacy. As for understanding such terms as insight, comprehension or knowing were employed.

Background

The idea for this thesis was prompted by the research of Cattaneo, Lega, Flexas, Nadal, Munar & Cela-Conde (2013), they used transcranial direct current stimulation (tDCS) to stimulate left prefrontal dorsolateral cortex while people were rating how much they liked artworks and photographs. The stimulation prompted an increase in the approval of pictorial and not transcendent stimuli (Cattaneo et al., 2014). There was an obvious explanation: directing attention to aesthetic qualities of representational stimuli.

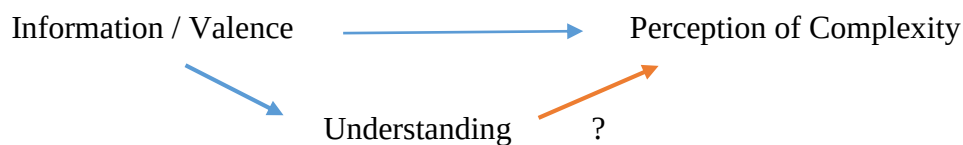
Gerger et al. (in prep) also used the same tDCS procedure to stimulate left prefrontal dorsolateral cortex while participants evaluated how much they enjoyed artworks. They found

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that stimulation increased understanding. They also determined that stimulation decreased complexity ratings, a finding that was rather unexpected. These results raised a question of how and whether the complexity and understanding are interrelated and whether it is a bilateral or unilateral process. This experiment field has not been broadly researched.

Aim and Goals of this Work

A detailed and in-depth study was attempted in order to further the contemporary expertise around the aspect of art perception in general and tests were completed to determine whether providing information lowers perceived complexity in particular. Another goal was to find the correlation between difficulty of image and its comprehension and how they are interrelated. Lastly, another goal was to obtain a more accurate understanding of the function of aesthetic processing.



The impact of some facts about art on perception of complexity and understanding was studied as well as the effect of insight in representational art on the perception of image difficulty. In literature we describe complexity as subjective and objective. Likewise, this work reviews the connection among this two kind of difficulty in three types of emotional visual images (negative, positive and neutral) varying in liking value and individually appraised comprehension and difficulty. Finally, analyses were conducted taking into consideration the gender differences and the interest in art.

Novelty and Credibility of the Proposed Methods

In this experiment, there are two groups of participants: the first group had no information, the second one received broad genre information to foster the rating of liking, complexity and understanding for the representational paintings. There were three categories of paintings: those

with positive valence, negative valence and neutral valence, as showed in pre-study by Gerger et al.'s (in prep). The major research interest lies in the discovery of the impact of understanding in the art on the perception of complexity and how it is related. It was expected that broad genre information would increase understanding and would decrease the perception of complexity. The objective complexity, gender differences and emotions before and after the experiment as well as art knowledge of participants were also investigated.

Scope and Structure

This thesis is comprised of an introduction, theoretical overview and practical section, analysis and interpretation of the results as well as discussion.

The theoretical section will offer an insight into the “cognitive processing model of aesthetic experiences by Leder, Belke, Oeberst and Augustin (2004)” (Belke et al., 2006, p. 116) in order to study the interrelation of perceptual analyses (complexity) and evaluation (understanding) and their impact on aesthetic judgment. The way the information influences the perception of art shall be further reviewed and such constructs as complexity and understanding will be studied in depth.

In order to fully appreciate art, a person should be able to comprehend it. Understanding is vital to art as difficulties arise from lack of understanding when it comes to rating or enjoying it. Chapter 2.2 Understanding in Art briefly touches upon the top-down mechanism that contribute to understanding. Another theoretical framework that explains understanding in art was proposed by Bullot and Reber (2012). The two researchers blended together the historical and psychological viewpoints on art. Studies of art and its acknowledgement in the psychological approach are based on psychological techniques and neuroscientific methods. The focal point of psychological approach lies in the complex cerebral anatomy and the mind's processes and largely overlooks the other approach to art that perceives the historical background and references vital for creating and appreciating the works of art. These two

approaches contradict each other in their research procedures established for analyzing the art and its appreciation. Bulot and Reber (2012) suggested that art-historical frames of references that include chronological events, *modus operandi* of the artist and his/her spiritual reasoning must leave a certain indelible mark in the work of each artist. When human beings receive this information they may process it through three well-defined steps of art conception: “basic exposure” of viewer to art, *factive* argument based on “artistic design stance” and aesthetic comprehension of artwork resulting from the ability to analyze the art-historic background (Bulot & Reber, 2012). They combined the mental and historical approaches to art. The mental perspective uses the techniques of neuro- and psychological discipline in art research. The psychological approach brought about by the mental sphere and the brain’s processes when used for art research disregards the historical perspective that pays special attention to the historical background in the creating and comprehension of artistic work. These two outlooks led to a research conflict in the analysis of art. Bulot and Reber (2012) reasoned that art-historical relations, which contain epoch-making occurrence, artists’ behavior, and cognitive operation, give causal facts in all artwork (Bulot & Reber, 2012).

Chapter 2.3 introduces different studies that examined effects of various types of information on perceptions of artworks. The data outcomes of these researches were controversial. Drawing upon the theories of Temme (1992), Specht (2010) and Swami (2013) it was deemed appropriate for the purposes of this thesis that the experiment will utilize broad genre information 350 to 650 characters in length.

Chapter 2.4 describes “the visual complexity in art within the framework of Berlyne’s collative-motivation model” (Marin & Leder, 2013, p. 4). Berlyne’s model posits that human beings do not like difficult or simple stimuli, and, as a general rule, they tend to choose the medium complexity (Marin & Leder, 2013). The term complexity shall be understood as “the number and variety of elements” (Marin & Leder, 2013, p.14), or degree of intricacy (Berlyne, 1970). In accordance with Forsythe, Nadal, Sheehy, Cela-Conde and Sawey (2011) and Marin

and Leder (2013) the compression algorithms were used as “objective measures of complexity to images” (Marin & Leder, 2013, p. 3), see Chapter 2.4.1.

Chapter 2.5 Abstract vs. Representational stimuli postulates the reasons why non-abstract pictures were used during the experiment. It was also decided that all pictures will be shown in free-viewing mode.

Viewing a painting causes a range of emotions. Particularly, the impact of gender on emotional processing by visual (Cela-Conde, Ayala, Munar, Maestú, Nadal et al., 2009; Sharp, van Goozen & Goodyer, 2006) stimulus has been broadly described in the scientific literature (Marin & Leder, 2013). It was also very necessary to account for the mood and gender differences of participants, see chapter 2.6.

At any rate, the knowledge of art may also cinch the relationship between the painting and perception of it. The more knowledge and information a viewer has about an artwork the greater the increase in his/her understanding may be. This thesis relies upon various means for assessing art knowledge: for instance, representational and supplementary awareness about the existing art-schools and painters, or scales of interest, i.e. how frequently does one go to art galleries and so on.

Various means for measuring the familiarity with artwork were utilized: for example, illustrated pictures or knowledge of a painter and his artistic style, or interest in art, i.e. how many times does a person visit art seminars or galleries and so on (Belke et al., 2006) have been defined in Chapter 2.6.

The practical part states the problem of the research and hypotheses as well as outlines the sampling methods, stimuli material and procedures.

Firstly, the data analysis looked at the descriptive statistics for three dimensions: complexity, understanding and liking and then for each type of valence: neutral, positive and

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negative. Afterwards, the univariate two-way ANOVA statistics methods and correlation analyses were utilized. The data analysis for each hypothesis was described separately. Additional analyses were carried out for such control variables as art knowledge, art interest, mood and correlations between subjective and objective measures of complexity.

In the discussion section the conclusions were drawn based on the analyses. The data analysis strongly suggested that understanding and complexity correlate with each other. Another main finding were the influence of valence on understanding, on complexity, but not on liking.

In the conclusion, the findings and drawbacks of the experiment were presented along with the justifications for further experimental tweaks in the future and more specific research of the correlation between complexity and understanding.

2. Theoretical Framework

2.1 Aesthetic Processing

According to particular research data, the individual aesthetic experience has been the focal topic of psychology of the aesthetic research since the end of the 19 th century. Understanding of artworks is not simply a transfer of an established opinion, but encompasses the assessment of the current picture which evokes an incomplete impression and leaves room for further interpretation. It is believed that the part of the pleasure one gets from looking at an artwork is comprised of the feeling of understanding the meaning and significance of the depicted art as well as understanding in general (Leder, Carbon & Ripsas, 2006).

A short time ago Leder et al. (2004) offered “a model of aesthetic experience” (see Fig. 1).

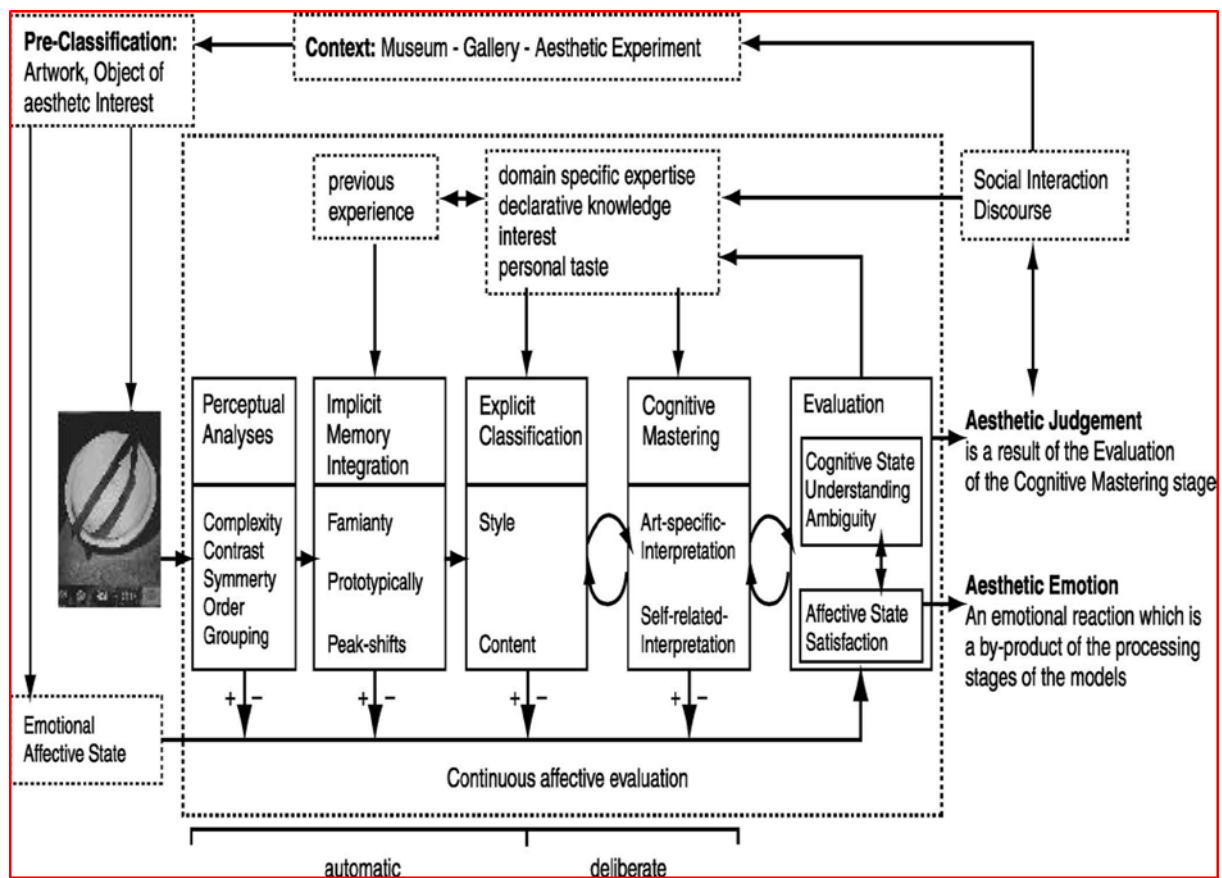


Fig. 1. “A model of aesthetic experience” (Leder et al., 2004, p. 492)

In this model there are five levels that describes the aesthetic process: “perceptual analyses, implicit memory integration, explicit classification, cognitive mastering and evaluation” (Belke et al., 2006, p. 116).

This thesis will largely focus on the interrelation of perceptual analyses, and, in particular, on such components as complexity and evaluation (understanding) and their relationship and their correlations.

Any painting or sculpture is assessed at the perceptual level. The bulk of psychological studies on artworks was centered on the perception related to art. Nevertheless, such simple variables, as a rule, influence the aesthetic preferences in perception. Thus, it was proven by a lot of studies that the tested persons favor one object over the other when only one perceptual parameter is changed. A series of perceptual features were studied with regard to such aesthetic preferences. During this stage a crucial role is assigned to the visual information processing in the occipital lobe of the brain (Leder et al., 2004).

The influence of complexity on visual choice was measured in different experiments (Berlyne, 1970). The information theory was the basis for Frith and Nias (1974) (cited in Leder et al., 2004) research on complexity which ensured objective assessment of complexity sets. Nevertheless, original paintings normally be unlike on a great amount of elements. However, the most studies showed, that an average level of difficulty were choose. “This was interpreted by the arousal potential resulting from visual stimulation, preferred at a moderate level” (Berlyne, 1970, 1974; cited in Leder et al., 2004, p. 495). Impact of complexity, nonetheless, depends on the accommodation standard of a subject. The concept of arousal was revised and challenged (Martindale, Moor & Borkum, 1990) and also the examination of another components like power, illumination, or size were controlled. During perception the processing of variables takes place quickly, effortlessly and on the sensory level (Leder et al., 2004).

The important outcome of this model is the concept of artwork. This is achieved at the cognitive processing stage which crosses over with the assessment stage, where the sensory and cognitive systems launch a trigger signal facilitating the subsequent processing and formation of aesthetic judgments and aesthetic emotions. In this model the understanding and grasping the meaning are of vital importance. Moreover, the additional information that aids in interpretation enhances the aesthetic pleasure derived from admiring the art works (Leder et al., 2006).

The present thesis will introduce an experiment of how the broad genre information and valence influence the perceptions of complexity by means of representational paintings.

The stages of cognitive processing and assessment are closely related because they build a feedback loop. The results of cognitive assessment are constantly analyzed to ensure the successful processing that leads to understanding. Thus, the stage of aesthetic perception assessment is aimed at measuring its success. Besides, with the help of the feedback loop, there is also an additional information processing that is taking place. When the subjective assessment is viewed as unsuccessful, the processing of data may be redirected to the previous stages (Leder et al., 2004).

In the subsequent chapters the studies on understanding and complexity in art will be reviewed in more detail.

2.2 Understanding and Liking in Art

Russell (2003) proposed that a person should build a sense of painting for understanding and pleasure of art, this also largely depends on how the picture has been understood. Leder et al. (2004) demonstrated it first of all for abstract, modern styles of art where the viewer has to put considerably more effort into processing of information. It has been shown empirically that

the modern non-traditional art demands a lot of attention and processing from the observer, moreover, the lay art persons, in general, seem to favor the modern art less than the more conservative traditional art forms (Bordens, 2010).

A comparatively straightforward explanation of comprehension accumulation was the creation of self-reliant data. It is generally resorted to by a naïve observer, who makes the connection in his/her mind between the picture and his/her own life or circumstances. As an illustration, the naïve viewer linked Monet's "La Gare St. Lazare" with his own penchant for a train journey and obtained satisfaction from this artwork (Leder et al., 2004). Altogether, Martindale et al. (1990) clarified these mechanisms that explain enjoyment and understanding. They showed that a stimulus can trigger a lot of associations. They stipulated that semantic connections and incidental memory allusions help understand a work of art (Leder et al., 2004).

Zeki (1999) proved that the brain activation, responsible for rewarding, is important for art understanding. Ramachandran and Hirstein (1999) declared their belief that the answer of perceptual dilemma is self-rewarding. Leder et al. (2004) reported that one way to identify the cognitive processing in the brain is a neuropsychological study, which is still very limited.

Notwithstanding, Blood and Zatorre (2001) checked affective reactions to favorite musical work, and supported the observational finding that intense artistic knowledge is gear to awakening of this part of brain. This arousal brings about the cognitive and non-cognitive "distilling" and when it comes to gratification it may be correlated to the sensations of eating sweets or engaging in sexual activities (Leder et al., 2004).

In order to prove the top-down processing Cupchik (1992) in several of the studies which included such variables as special skills or knowledge of art and stipulated that there variables are the clue to art knowledge. Temme (1992) carried out his experiments in museums and found that some facts or news about picture are needed for better aesthetic experiences. He showed also that this information should be neither short nor long. In Leder et al.'s (2004) model the

information about artwork or its painter may increase the art appreciation. One more information set for top-down outcome came from “elaboration” researches. Millis (2001) reported that liking value for pictures grew for elaborate titles. He showed that the pictures with one title were understood better than pictures without a title. His explanation was that the title gives the value and makes the picture more meaningful and removes the suspense. Russell (2003) demonstrated the same results through paintings. The top-down effects were described also by Leder (2001), who found that some facts about originality of the stimulant influence the correlation of liking and familiarity (Leder et al., 2004).

Bulot and Reber (2012) affirm that the fundamental aesthetic perception is negligible: the understanding of art cannot be explained only by means of historical epoch or background, for example, the appreciation derived from pictures could be the same for original and fake works of art. Alternatively, Bulot and Reber (2012) recommended another aspect of aesthetic perception, called “design stance”, where the person starts to draw a conclusion about the artwork on the ground of noticed and unnoticed visual details, which are ending in the artwork. It helps human beings analyse the causative-consecutive and historic facts about the artwork: for example, its source of origin or author, or to enquire about the psychical or emotional condition of the painter at the time his work was being created, namely: the aim, plan or state of the painter’s mind. According to the “design stance” it will be possible to get the final approach of artistic perception and understanding, which includes conclusions about artwork based on a concept or theory and emotional reactions on this factive thinking (Swami, 2013).

If a person is fully aware of art and understands the use of “the design stance” for interpretation of artwork, then the feeling and the expertise with art-historical association and understanding of artwork will be higher. This higher perception of painting is based on comprehension. Aesthetes or experts achieve the meaningful aesthetic comprehension of artwork on the basis of the art historical information and this allows them to interpret the position and the role of the painting in the art-historical context. Besides, it is critical not to

overlook the vast range of elements that are included in the artistic understanding process by different theories for example normative or scientific. The goal normative mode of the art is to determine and appraise the treasures of artwork and their value (Bullot & Reber, 2012).

The Bullot and Reber's (2012) "psycho-historical conception" has many analogies with Leder et al.'s (2004) "model of aesthetic experience". However, the artwork could be understood without "psycho-historical conception", to be more exact, the art could be completely understood by elementary choice of favorite artworks, where the people just say if they like this picture or not. This is a critical point. Besides, Bullot and Reber (2012) proposed that complete explanation of artistic perception cannot be full, if the stimuli that were used in research of artworks were very far-off or clashed with the art-historical background. "Consequently, most current studies on aesthetic appreciation assume that responses to stimuli in the absence of the art-historical context will be identical to the appreciation of artworks from a design stance mode" (Swami, 2013, p. 2). Nevertheless, the next chapter will present some studies that disprove this point of view (Swami, 2013).

There have been numerous studies that examined the impact of individuals' art-historical knowledge on aesthetic experiences (e.g., Cupchik, Shereck & Spiegel, 1994; Kirk, Skov, Hulme, Christensen & Zeki, 2009; cited in Swami, 2013).

As it is evident from the foregoing, understanding of art is crucial due to the emotional response evoked while appreciating art. What helps us understand better? What kind of information is needed for that purpose? How comprehensive should it be? These and other questions and relevant studies will be reviewed in the following unit.

2.3 Influence of Information

Does information influence the perception? If yes, what kind of information does it more? Do

different pictures have similar influence? These and other questions about influence of information will be reviewed below.

Numerous studies have been conducted to research the impact of different kinds of information on perceptual experience in art. However, the ultimate findings of these researches contradict each other. For instance, Smith, Bousquet, Chang and Smith (2006) supplied facts about a target artwork with marks but nothing was given about the painting. The viewing times for participants were also manipulated. Neither marks nor time manipulations gave any definitive answers on how the participants make an assessment of the painting. “ In a non-empirical essay, sociologist and artist Schwartz (2007) suggests that any written information accompanying visual artwork necessarily detracts from the visual experience elicited by the artwork itself, because it forces the viewer to attend to the textual information provided” (Specht, 2010, p. 194).

However, many researchers furnished valid data that some facts about the picture can change participants’ answers about it. For example, Franklin, Becklen and Doyle (1993) showed that different titles for a single artwork led to different associations and influenced the individual’s responses based on them. Similar findings were demonstrated by Russell and Milne (1997). They showed that the pictures with inscription were rated as less abstract and the pictures without a title were rated as more significant. The same results with titles were found by Millis (2001) (Specht, 2010).

The experiment from Kruger, Wirtz, Van Boven and Altermatt (2004) demonstrated that when participants trusted a piece of poetry or an image had taken more time and effort to create, they demonstrate it higher degree of liking, value and quality. In Silvia’s study (2005) two groups were shown the same piece of poetry; first one read the poem, and the second one received “contextual” facts about the poem. It was determined that the second group had more

concernment in the poetry than the first group. The explanation of these results relies on the point that facts about the poem increase the understanding of it (Swami, 2013).

The presence of titles (Russel & Milne, 1997) or descriptive facts (Russel, 2003) in researches with abstract art made it more meaningful. Millis (2001) also experimented with the titles and proved that long titles (“elaborative”) increase liking and interest, because they help explain the artwork in comparison to “descriptive” titles.

Leder et al. (2006) demonstrated that long facts (“elaborative titles”) deepen the comprehension of nonrepresentational artworks. He also showed that long information did not influence the liking ratings. The times of viewing were manipulated: in a one-second presentation, where short (“descriptive”) titles were played, a big role was devoted to understanding when compared to the long facts, although the situation was reverse when the viewing time was ten seconds. These conclusions pointed out the fact that names of artworks facilitate and guide the interpretation of an artwork (Swami, 2013).

Temme (1992) tried to establish the amount and kind of information preferred by museum visitors and the effect of information on aesthetic appreciation. The participants were asked about facts and information that they received. 87 % said that this increased their enjoyment of the paintings, and 3 % reported a decrease of enjoyment, 10 % felt it had no effect. Similar results were reported by Temme (1983, cited in Temme, 1992).

Temme (1992, study 1) examined three groups of students, who saw color paintings for 45 seconds and read slides with labels (no info; info before, info after slides). He indicated that a large part of information was better grasped and comprehended when this information had been provided at the very beginning (before the picture and not after it). It seems that information has indeed an enhancing effect on the appreciation ambiguous paintings. 79 % of visitors answered that with the facts about paintings their pleasure and satisfaction of it grew.

In the second study Temme (1992) analyzed the need of information. He examined 390 museums visitors, who answered 140 multiple-choice questions. The need of information was overall mean 4.42 (7-point scale). He found significant difference between expert and naive. The naive participants were the ones that had a higher need of information. He also showed what kind of information was appreciated. The most popular were catalog (81%), explanatory labels (75%), folders (71%) and slide programs (58%). The visitors were asked what type of information available at the exhibitions they had used. Most visitors used the explanatory labels (92%). The total amount of available information was judged as enough by 59% of the visitors, and not enough by 22 %. Nobody said there was too much information.

In studies three and four (Temme, 1992) the length of information was investigated. Museums visitors participated in the studies. They saw the paintings and then read and rated the labels. The labels had different length of information (89/360/660/1550 characters). The shortest version consisted of the name of the artist, years of birth and death, title, technique, and size of original painting. In the longer version, information was given about art-historical school, iconography, biographic aspects of the artist, intentions of the artist, and his working method. The results demonstrated that shortest version was not popular, the visitors preferred more information on explanatory labels than is usually given. However, the difference between long and short interpretation was significant. The optimal amount of information ranged from 350 to 650 characters. The visitors preferred the intermediate length and they admitted that too much information decreased the aesthetic appreciation.

Swami (2013) in his study 1, used different kinds of facts about art and used unlike styles. He studied how these components influence the artistic perception. He used four types of information: no information, title information (only title), broad genre information (title, author, some facts about biographic aspects of the painter, about art-historical school, and his working method) and content-specific information (facts about art-historical school, iconography, biographic aspects of the artist, intentions of the artist, and his working method with the

enhanced interpretation of artworks provided). He reported that the longest version of facts such as “content-specific” had the most influence on comprehension and artistic perception, but only for abstract images. The same effect was not found for representational paintings.

The inscription on the picture helps to identify and interpret it. Sometimes it also creates tension between the picture and its name. There are two solutions: the first one is to modify the visual composition and definition of the pictures’ name until they correlate, the second way is the fit ascertain between title’s meaning and configuration. Kreitler and Kreitler (1972; cited in Leder et al., 2006) thought that it is a necessary component of artistic perception. Franklin, Becklen & Doyle (1993) checked this hypothesis and used pictures with different titles. The test persons saw two artworks with a title twice: the first time the authentic title was presented and during the second time - a fictional one. It was a two-part experiment. In the 1st part the artworks were shown with either real or imaginary title. In the 2nd part the same pictures were presented, but under different title conditions: first, pictures had the same title as in 1st part and the second pictures were presented with a fabricated title. It was found that substitution of inscription moved the definition of the picture close to the semantic title’s content. Therefore, it was shown that the semantic process had been changed while the title had no effect on the visual process (Leder et al., 2006).

Millis (2001) tested the influence of various titling factors. He used photos and images to measure the ratings for liking, interest, emotions and understanding. He created “descriptive and elaborative titles”, which enhanced the understanding of the one and the other component. “Elaborative titles” determined a definition or a symbolic explanation of the scene. However, “elaborative titles” showed more impact on artistic perception than “descriptive titles”. It was seen as increasing the artistic knowledge through elaboration. Millis (2001) thought that the titles help to enrich and make the images consistent. However, he assumed that only inscription can make the artistic experience higher (Leder et al., 2006).

Leder et al. (2004) argued that this can be very critical, because pre-categorization of an item as a work of art can be an essential factor for artistic appreciation. Moreover, in Millis's research "the analysis of aesthetic experience as a combination of four variables did not show which of the aspects of aesthetic experience changed due to the elaboration effect" (Leder et al., 2006, p. 179).

Russel (2003) made the identical study. He tried to prove "Bartlett's concept of effort after" (Bartlett, 1932; cited in Leder et al., 2006, p. 179). In a line with Bartlett's concept Russel (2003) showed that the ratings of sense-making (meaningfulness) and the ratings of aesthetic value were higher if the artworks were presented with more information (he made two sessions: during the first session paintings were presented, in the second session the same pictures with details such as title, name of the painter and some extra facts about art were demonstrated). Russel used only abstract and semi-abstract images (Leder et al., 2006).

In summary, it was determined through both laboratory and field (within museums) studies that the majority of participants reported more enjoyment of the paintings when they read accompanying "explanatory labels" or "content-specific" information before viewing "artistically ambiguous" paintings. It was also reported that with information the understanding, enjoying and rating scales would be higher. The "need for information" was found to be essential and the participants preferred intermediate length of information (Specht, 2010).

Nevertheless, these studies did not provide a definitive answer about the role that the complexity of the artwork has in shaping aesthetic experiences. This question will be showed in details in the next chapter.

2.4 Visual Complexity in Art

It is a well-established fact that the organization and complexity have had an impact

on the person's assessment of fairness, especially in art, since the Classical era (Nadal, Munar, Marty & Cela-Conde, 2010).

A lot of disciplines, including psychology, extensively studied the phenomenon of complexity because of its importance to person's connections with the world. Scientific works on complexity in art provided a lot of opposite findings and conclusions. It can be the result of different frameworks or experiment designs. Marin and Leder (2013) affirmed that one of the components of complexity is its "multidimensionality". In their opinion it must be very well controlled in experiments, because it has more power in subjective ratings than symmetry or grouping (Marin & Leder, 2013).

In line with Marin and Leder's ideas (2013) the focal point of this thesis shall be "on the number and variety of elements" (p.1), that are present only in non-abstract images.

A lot of research has been done lately in line with Berlyne's concept with the focus on the question of what kind of components play an important role in influencing the person's choice of one particular impulse over the other? One of the key elements significant for the hedonic value was identified as complexity that is why it has been studied in the current thesis (Marin & Leder, 2013).

By reference Berlyne's model (1960, 1967, 1971, 1974; cited in Martindale, Moore & Anderson, 2005) built a powerful theory, which has held a dominant position in art researches for a long time. "According to the theory, preference for a stimulus is determined by its arousal potential, that is, by the amount of nonspecific reticular-system arousal that the stimulus produces" (Martindale et al., 2005, p. 83). Hypothetically, the Wundt curve can depict the connection between two points: arousal potential and choice (preference), i.e. the impulse or stimulus, which had an intermediate level of arousal was the most preferred. If arousal capability grows to middle position, the choice grows from indifference to the highest ratings in liking (Martindale et al., 2005).

In line with the theory, the propensity towards a certain impetus was established by its “arousal potential”, namely, by the quantity of the wide-ranging grid-like system arousal that the stimulus generates (Martindale et al., 2005). Martindale et al.’s research (1990) showed that the smallest size was the most preferable if the stimuli were very complex. Nevertheless, in the fourth experiment they found the opposite was true. The main conclusion of Martindale et al. (1990) was that the components of choice integrate not in an additive approach, but in a specific technique where the most meaningful component dominates over other components. As an illustration, if an image differs in size and complexity, the complexity will be mostly preferred and size will be set aside. Nevertheless, if an image differs in complexity and meaningfulness, then the meaningfulness takes over and complexity will be ignored to some degree (Martindale et al., 2005).

Berlyne (1960, 1971, cited in Marin & Leder, 2013) found that the participants liked neither simple nor sophisticated stimuli choosing instead a medium complexity ones under normal circumstances of arousal (Marin & Leder, 2013).

Berlyne (1971, cited in Nadal et al., 2010) succinctly stated that participants choose medium complexity due to their brain processing: they analyze how many elements an image is comprised of, and whether it is heterogenic, symmetrical or not and so on and afterwards the viewer opts for an average level of intricacy.

In order to prove this hypothesis there were many conducted experiments which used various visual materials as a stimulus. Sometimes there were simple geometric figures (Katz, 2002; Vitz, 1966, cited in Nadal et al., 2010) or created shapes (Heath, Smith, & Lim, 2000; Markovic & Gvozdenovic, 2001; Stamps, 2002, cited in Nadal et al., 2010). The complexity in these studies has been precisely formulated and objectively quantifiable. Other experiments utilized real paintings such as abstract artworks (Krupinski & Locher, 1988, cited in Nadal et al., 2010), or portrays (Saklofske, 1975, cited in Nadal et al., 2010), or just one class of abstract

images, for example, cubism (Nicki, Lee, & Moss, 1981, cited in Nadal et al., 2010) or symbolic paintings (Messinger, 1998, cited in Nadal et al., 2010). All these experiments were unable to execute a simple calculation of complexity. In both researches the number of participants in the experiments was very low (fewer than 8 participants) and the stimuli set was also very limited (sometimes as few as 5 images) and it is a very significant and critical restriction. In addition, most studies used a correlation method that limited the causal relationship between complexity and artistic perception (Nadal et al., 2010).

Nadal et al. (2010) reported that the analysis of earlier researches shows rather-substantial difference in conclusions. Some of these results partially proved the anticipated Wundt curve. Others showed that complexity boosted the preferences. Yet other ones found that when the images' complexity increased, the ratings subsequently sank. They thought that two arguments can reconcile these fundamental differences: firstly, different stimuli were used in previous researches, secondly, the mismatched techniques were used to operate, manipulate and calculate the complexity (Nadal et al., 2010).

The notion of arousal may be instrumental in closing the gap in the research of the aesthetics. Arousal is the pivotal point of some theories of emotions. Nevertheless, the experiments in line with Berlyne's concept do not perceive arousal as a separate component; these studies measured neither subjective nor objective arousal level (Marin & Leder, 2013). With regard to integrate concept of arousal and, empirically, in the examination of complexity, the present thesis submits to research the "complexity within the context of Russell's (1980) circumplex model of affect" (Marin & Leder, 2013, p. 3).

According to this model arousal and pleasantness are perceived as two separate aspects of affect that are capable of characterizing a multitude of various emotions. This model greatly facilitates cross-modal comparisons because of its straightforwardness and better suitability in the realm of visual fields (Marin & Leder, 2013).

The question therefore stands as to how could fluctuations in complexity be measured so that they reflect the way people grasp the complexity notion (Marin & Leder, 2013)? Which mathematical calculations or techniques precisely pinpoint the complexity in such a manner that reveals for sure how people recognize the complexity? This question will be demonstrated in the next paragraph.

2.4.1 Measures for Visual Complexity

An image has psychological and mathematical complexity and methods on how to measure them have been of interest to various researchers for a long period of time (Attneave & Arnoult, 1956; Chipman, 1977; Garcia, Badre & Stasko, 1994; Hochberg & Brooks, 1960, cited in Forsythe, Nadal, Sheehy, Cela-Conde & Sawey, 2011). The attained measurement system was usually based on calculating methods, for example, how many details, boundaries, edges, lines, corners and so on did the image contain (Forsythe et al., 2011).

The most widely-spread technique to measure complexity was the participants' ratings on how they perceive the image as difficult or not difficult. A large number of people were interviewed in order to determine the complexity. Nevertheless, these methods were not entirely correct. Forsythe, Mulhern & Sawey (2008) showed that unknown or strange impetuses were believed as more difficult than they actually were. A possible answer for this phenomenon was that complexity was assigned a higher level at the beginning of the visual processing; subsequently, after some time and provided that the stimuli had certain symmetry or when the participants were shown duplicates or similar images, the complexity levels would drop down eventually. "Top-down" processing recognizes patterns in a stimuli set and the viewer does not need such a long time to find the answer, because the minutiae will be discounted as superfluous and unnecessary, thus, the perceived difficulty will decrease. A compacted file is comprised of a series of numerals or symbols which depict its structure. This series is the degree

of data composition. If a picture is simple or uniform one with fewer details, then there are few series of elements and they are often repeated. For compounded images there is a plethora of elements and they are unreliable (Forsythe et al., 2011).

Some experiments, where the compression methods were utilized, showed that “JPEG and GIF compression formats” had a correspondence with individual complexity ratings. In these experiments the presentation time for images varied from a couple of seconds to an indefinite viewing time suggesting that “GIF / JPEG compression formats” and individual’s complexity judgments are not based on time (Marin & Leder, 2013).

In addition, Forsythe et al. (2008) showed that objective complexity did not correlate with familiarity as determined by the compressed file size. It might be deduced that this is a better control method than subjective judgment that can be influenced by the familiarity (Marin & Leder, 2013).

Donderi (2006) demonstrated that the context “of Algorithmic Information Theory (AIT)” can explain the strength and validity of paintings compression methods for forecasting of the own classifications of complexity. The AIT integrates the computation and information theories: “Algorithmic complexity is defined in terms of the length of the shortest algorithm in any programming language, which computes a particular binary string” (Aksentijevic & Gibson, 2012, p. 6). Donderi (2006) added also that data compression technique examined visual details of a picture, as explained by a bit string data, with the purpose to compact it under existing conditions that creates a correct copy of the original input realizable. “The size of the resulting compressed data file correlates positively with the complexity of the input image. Simple images contain more redundant information that can be represented by a shorter string of bits, yielding a smaller file size than more complex images” (Marin & Leder, 2013, p. 4).

A few compressions methods demonstrate very well similarity of rating of subjective

complexity. The “GIF compression” could be used for images with colors’ restrictions and if image has sharp line or edges changes (Forsythe et al., 2011).

2.5 Abstract vs. Representational Stimuli

Artwork researchers demonstrated that an inexperienced layperson or an art neophyte generally chooses the representational paintings over abstract ones, because abstract art nudges each viewer to have his own interpretations. When the information or a title was provided for a work of abstract art, its meaningfulness increased. For instance, Malevich’s “White Square” showed a typical abstract concept of form and devoid of color. Sometimes only a title, certain facts or participants’ background can help to understand the meaning of an abstract painting. On the contrary, the non-abstract art could be understood apparently from what was depicted in the picture (Leder et al., 2006).

Russell (2003) examined representational and abstract paintings and found that realistic art is usually preferable to abstract art. His explanation of this was that representational images are more realistic and more purposeful and need little clarification or elucidation. When the persons are customarily inclined to choose the images of nature that are more meaningful, conventional or structured, the study of these pictures alone will not provide us with answers on how crucial the visual complexity is in influencing the perception of beauty (Forsythe et al., 2011). This thesis is focused on how representational classes of paintings are affected by either no information or broad genre information (title, author, some facts about biographic aspects of the painter, his working method and about art-historical school).

2.6 Control Variables

2.6.1 Gender Effects and Emotions in Art

Males and females have different reactions to similar stimuli, and their emotional processing techniques and their real reasons vary greatly. Particularly, gender effects related to processing of visual stimuli and their emotional reactions have been broadly reported by numerous experiments (Marin & Leder, 2013).

Bradley, Codispoti, Sabatinelli and Lang (2001) calculated the gender emotional response by viewing of pictures which contained either neutral or sentimental impulse. The researchers showed that women had negative reactions to disgusting images and the whole content was ignored, whereas men showed more interest in the pictures with sexual content. These results proved that males and females feel differently in similar situations that can serve as a guide to different emotions (Bradley et al., 2001).

Additionally, the pictures with vegetables or fruit were rated for complexity by gender and it was found that males and females showed different emotions and gave different ratings. The study of perception of aromas also uncovered gender differences (Marin & Leder, 2013). Interestingly, in general, females rated unpleasant films as less pleasant and more arousing than males (Bradley et al., 2001).

The above described examples confirm that females concentrate their attention on emotional stimuli to a greater degree than males and for that reason, this thesis will analyze the gender of the people and supply the reaction of males and females independently from each other.

Emotions in Art. The “affect infusion model” (Forgas, 1995) stipulates that the affective impact on the assessed opinions increases depending on the quality of the stimulus processing, i.e. how effective and useful it is. Experimentally, the studies of mood have always established a connection between processing requirements and affect influences on the opinions drawn. As a result, emotional dominations are an integral part of abstract artworks because these paintings

are very abnormal, unclear and equivocal and this art calls for another category of processing. One interpretation of this was offered by Bower (1981, cited in Belke et al., 2006) via his “affect-priming-principle”. This concept posits that when people are in a good mood, they will often remember positive things or will have agreeable associations and versa and these phenomena can increase or indirectly lower the subjective ratings. Nevertheless, the studies to test this hypothesis have been relatively rare (Belke et al., 2006).

Belke et al. (2006) reported that it is essential to measure the participant’s initial emotional condition as visiting an art exhibition is a very positive one. They stipulated that that this positive feeling at the very beginning will indirectly influence the subsequent positive emotional state. Besides, negative emotions will most certainly decrease the subjective ratings. The validity of the experiment will be higher when the emotional state is duly measured and controlled (Belke et al., 2006).

The artistic appreciation included not only the cognitive components but, more importantly, feelings and emotions. In Leder et al.’s (2004) model the changing of emotional state was shown and this process is a continuous one. They initially suggested that the usual emotional state is positive, for example, at the exhibitions, in a gallery or in art-related circumstances. In addition, they thought that a viewer can constantly access the results of emotional analysis. They suggested that the outcome of each stage in their model can lower or improve the emotional condition. Continuous advances in mental mastering outcomes can change the emotional conditions for the better, and, consequently, a person will derive satisfaction, enjoyment or pleasure (Leder et al., 2004).

Leder et al. (2004) in their model postulates that aesthetic appreciation is subject to the primary affective condition of the viewer. As a result, the affective state of the test persons prior to the test and afterwards were estimated. Forgas (1995) demonstrated that the emotional mood

of a rater will reasonably impact the assessment of such stimuli that require exacting and effective processing (Belke et al., 2006).

Marin and Leder (2013) reported that in the early experiments only neutral images were utilized and the more powerful and emotionally charged stimuli were discounted; moreover, a lot of studies completely shunned such powerful images. That means that stimuli or images with different level of complexity were used whereas the emotional component, which these stimuli produced, was ignored (Marin & Leder, 2013).

Marin and Leder (2013) deemed it a critical problem because affective content of impulse, image or stimulus regulates the initial neural process of optical details.

In accordance to this point of view, this thesis will use the representational pictures with an emotional context. It will utilize three types of affected stimuli, namely: with a bad (negative content), good (positive) or neutral charge.

The emotional reaction was usually studied through short intervals of presentation time. Nevertheless, some researchers showed that understanding process needs significantly more time. To illustrate this point, Smith and Smith (2001) conducted their study at a museum and established that a mean observation time equals to 27.2 seconds (Marin & Leder, 2013).

Due to the earlier experiments' determination that the observation time had no impact on aesthetic perception (McWhinnie, 1993; Smith, Bousquet, Chang & Smith, 2006), this experiment similarly did not use a time limit: the participants worked at their own pace. Therefore, in order to examine objective aesthetic sequences and to enhance the validity of the data, it was decided that there will be no time limit in this experiment as well.

2.6.2 Art Knowledge and Interest in Art

The person's understanding and numerous facts about art style or painting can influence the connection between the art perception and abstractness. If a person has a lot of information

or special education or other knowledge of art, then his/her understanding and appreciation of art will be higher. The persons used their past experience and it helps (Bordens, 2010).

However, Belke et al. (2006) reported, that a viewer's knowledge of art influences how the information will be processed and how the images will be rated. Cela-Conde et al. (2009) found the importance of knowledge in art in their practical studies.

Belke et al. (2006) reported that art experts had a better ability to discern the abstract artworks than naïve viewers because experts had a special sophisticated pattern that facilitates an excellent semantic understanding of the art. However, Leder et al. (2006) thought that the degree of art education may be critically important, because sometimes added information can have a negative impact on artistic ratings. Art experts already have the specialized education and for them it is a routine process. On the opposite end of the spectrum are the naïve viewers, who have no special skills or knowledge of art, so they benefit from the facts and information about an artwork. However, the impact of information also depends on the past experience of a viewer and his education (Belke et al., 2006).

This research work relied upon a multitude of techniques to assess the art knowledge. Art knowledge was examined as the extent of representational and supplementary expertise one has about existing art-schools and painters or artists. The scales of measured interest in art, for instance, how frequently a person attends art exhibitions, helped determine an indicator for the innate predisposition of people to come into contact with the art (see also Leder et al., 2004). This indicator is vital in view of the additional demands on the viewer that the modern art places when it comes to pinpointing the actual meaning amidst works of art with the extreme degree of obscurity (Belke et al., 2006).

Upon thorough examination of theoretical framework described in the scientific literature the research experiment was designed and set forth in the practical part of this work.

3. Experimental Framework

3.1 Methods

Participants

The test participants were recruited through the VPMS online system. The test persons took part in the experiment freewill and had no compensation. By participating in the experiment, psychology students have covered part of their academic load. All participants were tested in a small group of not more than four persons (or by themselves). The people had the normal ability to perceive the color or images, others wore glasses or contact lenses to that purpose.

Altogether 76 participants were tested, (40 females). The age range of the sample was between 18 and 55 years ($M = 26.87$, $SD = 8.63$). Practically all participants were students of the Psychology Department of the University of Vienna.

Stimuli

Sixty four stimuli were valued in the current testing. They were comprised of copies of famous realistic fine art paintings. There were different object depicted in all of the images: from herbs, pets, countryside, sea or nature to persons shown in everyday activity. In these stimuli sets there were artworks of various art schools: impressionism, realism, and postimpressionism. Artworks that depicted brand names or erotic scenes were omitted in the stimuli set. Only 64 stimuli were chosen from a set of 350 representational artworks for the purposes of this experiment. Specifically, they were already rated for positive, negative or neutral affect. All pictures had an emotional valence as classified by Gerger et al.'s (in prep) pre-study. There were 20 positive, 20 negative and 20 neutral for testing phase and 4 neutral pictures for the training phase. Each image was approximately 1000 x 768 pixels and had original JPEG format.

Procedure

It were used a program E-Prime 2 ® Psychology Software Tools (see Fig. 2). The experiment was comprised of four parts: pre-test PANAS, main testing, which had training and testing phases, post-test PANAS and art knowledge questionnaire (KIF_V1).

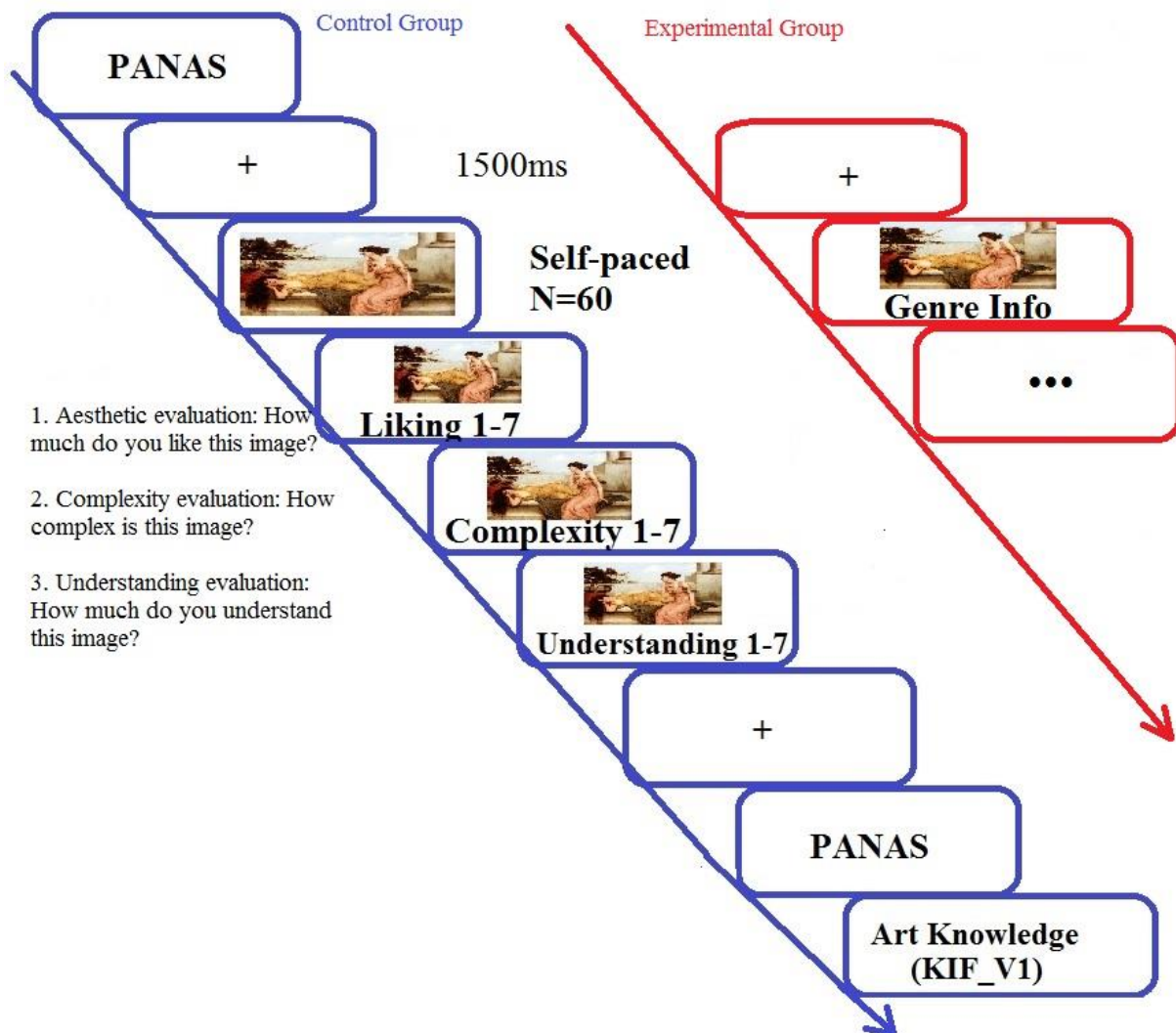


Fig. 2. Procedure

There was no time limit, so each participant answered in self-paced manner. After each image a cross in the middle of screen was shown for 1500 ms., then another image would pop up automatically. Therefore, each image was demonstrated for the duration of time that the participant required to make his/her answer. The participants needed to press a key from 1 to 5 for pre- and post-test, and a key between 1 and 7 in main testing. Two groups were tested:

control group, which had no information and experimental group, which received broad genre information. Test persons were examined individually or separated into small groups.

Each participant was welcomed upon arrival and made to sign an informed consent form that he/she agreed to take part in the experiment. Then the goal, title and the conditions of experiment were explained. After that the participants read the instructions one more time on the computer screen.

Pre-test PANAS: to determine the initial “emotional state of the test person the Positive and Negative Affect Schedule (PANAS) by Watson, Clark and Tellegen” (1988, cited in Belke et al., 2006, p. 122), it was presented for the first time in their German version from Krohne, Egloff, Kohlmann and Tausch (1996).

The questionnaire measure two affective aspects, namely “Positive Affect (PA) / Negative Affect (NA)” which point to the test person’s present emotional state. Pursuant to PANAS, the two aspects PA and NA are correlated and encompass an array of various affects. The PA characterizes such affective states as eagerness, alertness and degree of engagement and NA describes the impassiveness and distress. These parameters can be chosen by the test person in line with a five-point scale that ranges from “not at all” to “extremely” when it comes to the person’s agreeing or disagreeing with these statements. The following instructions were transferred in the pre- and post-testing: “What is your current mood?” or “How do you feel in this very moment?” (Belke et al., 2006, p. 122).

Main Testing: at the beginning there was a training phase, which consisted of four practice trials when every test person got familiarized with the task. Upon completion of training phase came the testing itself, which was comprised of only sixty representational paintings for control group and sixty representational paintings with the broad genre information (title, painter, small description of the art; the length of information was approximately 350-500 sines) for experimental group.

Each image was shown in the 19-inch monitor (1280 x 1024 pixels). Participants, being 50-60 cm away from the monitor; they received an instruction to see at the artwork so long as they need to and then press “Enter”, when they finished looking at the picture. The experimental group received a broad genre information about this painting (title, painter, some information about him, the representation, and the style). They received the same instruction and they should read also the information about it. When the viewer pushed the enter-key the image was shown one more time, but smaller in size and at the bottom of the screen one of three grading scales was displayed (Marin & Leder, 2013). For their answers the test persons had to use a keyboard. Participants pressed the numeric symbol that conformed with their comprehension of the earlier shown trial. They were described as follows: “I do not like it at all” had number 1 and “I like it very much” should be evaluated with 7. Three rating scales for each image should be completed with items from 1 to 7. After completing each scale a cross would appear in the middle of grey screen for 1500 ms. and subsequently the next image appeared.

Dependent variables: In current experiment, the impact independent variables such as the Information and the Valence were examined for the dependent variables (three different seven-point scales), “which covered cognitive as well as affective aspects of aesthetic processing” (Leder et al., 2006, p. 180):

- (a) Liking, pointed out the degree to which the test persons favored the paintings;
- (b) Complexity (Viewers were instructed with explicit information. The term complexity was understood to be “the number and variety of elements” (Marin & Leder, 2013, p. 14): more elements, more complexity). Test persons received “a definition of complexity as the amount of detail or intricacy” (Forsythe et al., 2011, p. 55);
- (c) The understanding was assessed by the specific parameter which was the degree to which the test subjects claimed to have grasped the artistic objective of the painter (Leder et al., 2006).

Understanding and Complexity

Every image was appraised on a “7-point Likert scale” in three dimensions: LIKING (from “dislike” to “like very much”), COMPLEXITY (from “very simple” to “very complex”), and UNDERSTANDING (from “not understandable” to “very understandable”). Each of three ratings were present in the same order for each viewer and the instructions read as follows: for aesthetic evaluation: “How much do you like this image?” for complexity evaluation: “How complex is this image?” and for understanding evaluation: “How much do you understand this image?” Each viewer was instructed that it was important to give his/her own subjective rating spontaneously (Marin & Leder, 2013).

Post-test PANAS: After main testing, each participant underwent and completed PANAS one more time to examine the mood change and the effect of experiment.

Art knowledge: To determine the level of knowledge about art, the participants filled out online the art interest questionnaire (Kif_V1). This questionnaire consisted of three parts: the 1st. section measured the common interest for art for example: “do you visit art galleries or art workshops” (Belke et al., 2006). The 2nd section tested specific knowledge about art (for example, where was Salvador Dali born or who painted the Sistine Chapel in Vatican?). The 3rd section presented ten reproductions of paintings and the knowing of pictures’ titles, painter’s name and the artistic style were tested.

Objective complexity: To measure the objective components of complexity with data compression (see also Marin & Leder, 2013; Forsythe et al., 2011). Each image was saved in a JPEG format, then it was transformed into GIF via Adobe Photoshop software. The following specifications were used for each picture: “palette local selective, colors 256, forced black and white colors, no transparency, dither diffusion 75%, exact colors and normal order of lines” (Marin & Leder, 2013, p. 6). The duration of experiment was 40-60 minutes, after that the test persons were dismissed.

3.2 Question of Research and Hypotheses

This thesis is an attempt to expand and deepen the existing knowledge of the nature of art perception in general and, in particular, it strives to establish whether providing information lowers perceived complexity. Moreover, it aims at determining how understanding and perception of complexity are interrelated. Another goal of this thesis is to receive new facts which may better explain how the aesthetic processing is working. Here the effects of information on complexity and understanding were studied as well as the influence of understanding art on the perception of complexity. Additionally, the relationship between objective and subjective complexity were tested in three kinds of emotional visual material (positive, negative and neutral) modulating in subjectively rated liking, understanding and complexity. Finally, the impact of gender and knowledge in art were also evaluated.

To outline the estimates and experimental hypotheses of the present thesis:

The present experiment measured how appraisal of liking, complexity and understanding alternate between conditions with the broad genre information versus without information. Giving the broad genre facts to the participants could increase the style-related elaboration and help to understand an image better (Belke et al., 2006). As an outcome, aesthetic perception would be higher for the images with extra information.

In accordance with the “art – historical context” (Bullot & Reber, 2012) and a “cognitive processing model of aesthetic experiences” (Leder et al., 2006): that is, furnishing test subjects with data or descriptions of artworks should greatly facilitate the grasp (comprehension) of the art.

- 1) Information will influence complexity, understanding and liking rating scores:
 - 1a) With information, complexity rating scores will be lower;
 - 1b) Without information, complexity rating scores will be higher.

Understanding and Complexity

- 1c) Without information, understanding rating scores will be lower;
- 1d) With information, understanding rating scores will be higher.
- 1e) Without information, liking rating scores will be lower;
- 1f) With information, liking rating scores will be higher.

In accordance with multidimensionality of complexity: Russell's (1980) "circumplex model of affect" and Berlyne's (1970) "model of intermediate complexity" the next hypotheses are proven; it is expected that understanding will increase and complexity will decrease:

- 2) Complexity and understanding will be correlated, i.e.:
- 1a) If understanding is low, then complexity will be higher;
 - 1b) If understanding is high, then complexity will be lower.

In accordance with gender effects and the „affect infusion model" (Forgas, 1995)

- 3) Influence of Valence:
- Positive stimuli will receive higher rating by liking and understanding than neutral or negative.

4. Results

4.1. Descriptive statistics

Ratings by Group. Changes in response scales of understanding, complexity and liking for the representational images with broad genre information in general and by valence in particular was the main question. Answers based on individual experiences for each image were obtained and the numerical mean was calculated across all viewers like it was done in the previous experiments (Marin & Leder, 2013). In order to examine the influence of information on the liking, understanding and complexity ratings, the following manipulations were performed: Each person got the mean score for the three valence levels. This means, for participant 1 were added the scores given to the 20 positives, and divide them by 20. Then were added the scores given to the 20 neutral, and divide them by 20. Then were added the scores given to the 20 negative and divide by 20. The same has been done for all participants in both groups and for the 3 response scales separately. Based on these averages the descriptive statistics and subsequently, the main (ANOVA, correlations) statistics were calculated. The outcomes were showed in Table 1.

Table 1. Descriptive Statistics: Means for complexity, liking and understanding by group

Ratings	Group	N	M	SD	Percentile 25	Percentile 50	Percentile 75
Complexity	No info ^a	38	4.34	.90	3.66	4.50	4.91
	With Info ^b	38	4.43	.62	4.05	4.54	4.85
	Total	76	4.38	.77	3.75	4.52	4.80
Understanding	No info	38	4.85	.71	4.33	4.71	5.33
	With Info	38	5.08	.75	4.35	5.21	5.59
	Total	76	4.96	.73	4.37	5.03	5.45

Liking	No info	38	3.83	.82	3.16	3.85	4.27
	With Info	38	4.08	.73	3.38	4.01	4.43
	Total	76	3.95	.78	3.29	3.93	4.42
^a The Group received no information about pictures							
^b The Group received broad genre information							

The ratings scores of complexity, understanding and liking are higher for the group, which received the broad genre information. The lowest rating scores were present in the group without information for liking. The highest rating scores were evident in the group with broad genre information for understanding.

Ratings by Group by Valence Analyses were performed of average scores, by group (with broad genre vs no information) and by valence (positive, negative, neutral) and the results were presented in Table 2.

The rating scores of complexity, understanding and liking by group by valence are higher in the group, which received the broad genre information except for rating scores for complexity negative and rating scores by understanding positive. The means are listed below as follows.

Table 2. Descriptive Statistics: Means for complexity, liking, and understanding by group by valence

	Valence	Group	N	M	SD	Percentile e 25	Percentile e 50	Percentile 75
Complexity	Positive	No Info	38	3.77	1.22	2.74	3.75	4.68
		With Info	38	4.02	.76	3.40	3.88	4.63
		Total	76	3.89	1.02	3.30	3.83	4.64
	Negative	No Info	38	4.86	.88	4.44	4.78	5.43
		With Info	38	4.76	.82	4.23	4.80	5.38
		Total	76	4.81	.85	4.35	4.80	5.40

	Neutral	No Info	38	4.38	.91	3.66	4.50	4.91
		With Info	38	4.53	.65	4.21	4.65	5.11
		Total	76	4.45	.79	3.80	4.60	5.10
Understanding	Positive	No Info	38	5.71	.77	5.19	5.75	6.30
		With Info	38	5.69	.96	5.05	5.80	6.50
		Total	76	5.70	.866	5.08	5.75	6.39
	Negative	No Info	38	4.14	.98	3.49	4.13	4.90
		With Info	38	4.69	.96	4.15	4.73	5.35
		Total	76	4.41	1.00	3.66	4.53	5.09
	Neutral	No Info	38	4.67	.82	4.11	4.50	5.23
		With Info	38	4.78	.72	4.24	4.88	5.36
		Total	76	4.73	.769	4.15	4.80	5.30
Liking	Positive	No Info	38	4.22	1.30	3.34	4.15	5.01
		With Info	38	4.49	.93	3.95	4.40	5.16
		Total	76	4.35	1.13	3.46	4.32	5.15
	Negative	No Info	38	3.33	1.02	2.69	3.40	4.03
		With Info	38	3.54	1.17	2.54	3.50	4.50
		Total	76	3.44	1.09	2.61	3.48	4.19
	Neutral	No Info	38	3.92	.82	3.31	3.95	4.54
		With Info	38	3.96	.70	3.30	3.98	4.45
		Total	76	3.94	.757	3.31	3.95	4.49

The smallest rating scores were obtained for the group without information by liking by negative stimulus. The biggest rating scores were present in the group without information by understanding by positive stimulus.

With regard to complexity response scales, the group with broad genre information rated the positive and the neutral stimulus higher than the group without information.

The broad genre information described the complexity rating as more difficult.

With regard to understanding response scales, the positive pictures with or without information were understood better than neutral or negative.

With regard to liking response scales, the positive stimuli were rated higher than neutral or negative. The negative pictures were at least rated independently from the information.

4.2. Test of Hypothesis 1: influence of information on rating scales

All data were analyzed using SPSS-PC Version 22 (Bühl, 2014). Alpha level was set at $p < .05$ for all analyses of variance (ANOVA).

4.2.1. Complexity

Information shall influence complexity response scale:

- 1a) With information, complexity rating scores will be lower;
- 1b) Without information, complexity rating scores will be higher.

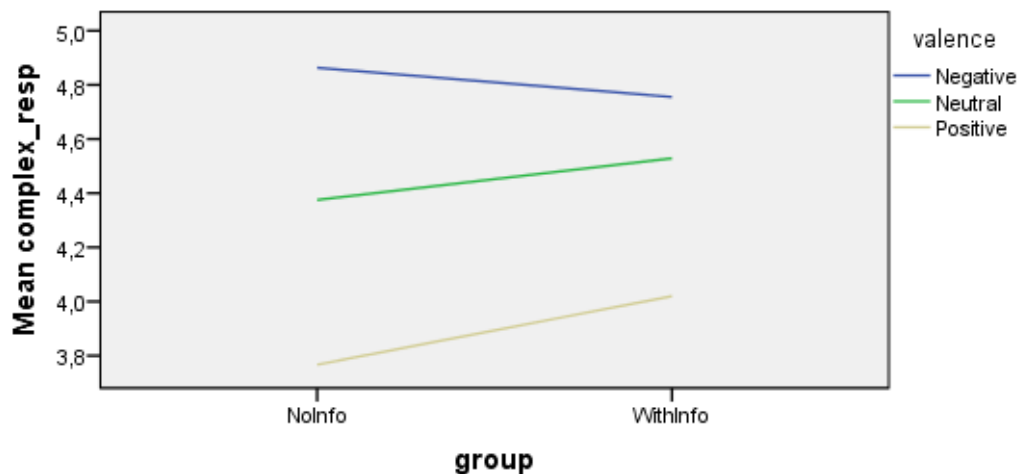


Fig. 3a Average means for Complexity by Valence by Group

The information (Fig. 3a) increases the complexity ratings for neutral and for positive stimulus. For negative stimulus the information decreases the complexity.

A series of two-way ANOVA (univariate analyses of variance) with two Factors Group (info vs no info) as a between-subject factor and Valence (different charges: plus (positive), minus (negative) or null (neutral)) as a within-subject factor, showed the main significant effect of Valence $F(2, 227) = 17.494, p < .001$. “The main effect of Group” $F(1, 227) = .298, p = .585$ or interaction between Group and Valence $F(2, 227) = 1.032, p = .358$ were not significant.

The valence plays a role for complexity perception. It is depend on positive, negative or neutral stimuli.

4.2.2. Understanding

Information will influence understanding response scale:

- 1c) Without information, understanding rating scores will be lower;
- 1d) With information, understanding rating scores will be higher.

The information (Fig. 3b) increases the understanding by stimuli with a negative valence. For neutral or positive valence it is not important.

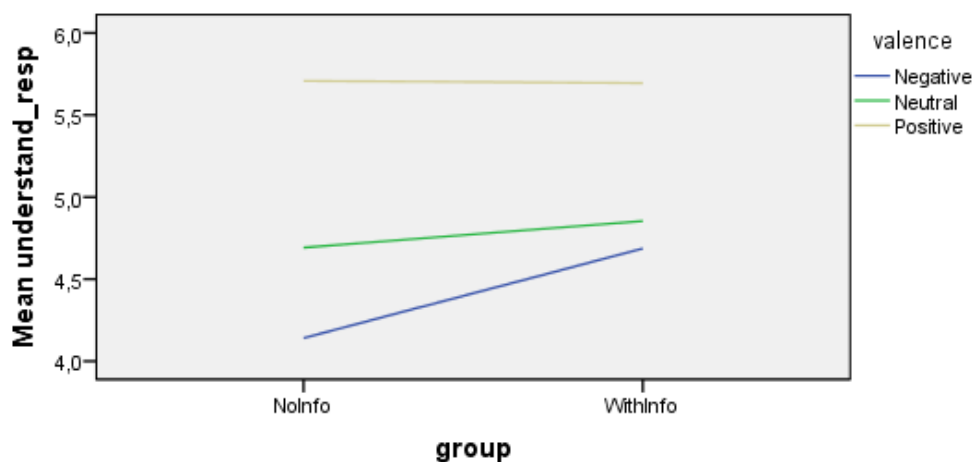


Fig. 3b. Average means for Understanding by Valence by Group

A further univariate two-way ANOVA for Understanding as dependent variable showed by Levene's test of equality of error variances p-value as .431, therefor the variances were homogeneous. “The results of the analysis revealed that the main effect of Valence was not significant” $F(2, 227) = .289, p = .749$. The same can be said for Group $F(1, 227) = 2.804, p = .095$. However, “there was a significant interaction between Group and Valence” $F(2, 222) = 4.728, p = .010$.

“The one way ANOVA showed a significant between-groups difference” for understanding of negative images $F(1, 75) = 5.997, p = .017$. This reflects that providing information improved the understanding of negatively valenced artworks, but not of neutral or positively valenced ones.

4.2.3. Liking

Information will influence liking response scale:

- 1e) Without information, liking rating scores will be lower;
- 1f) With information, liking rating scores will be higher.

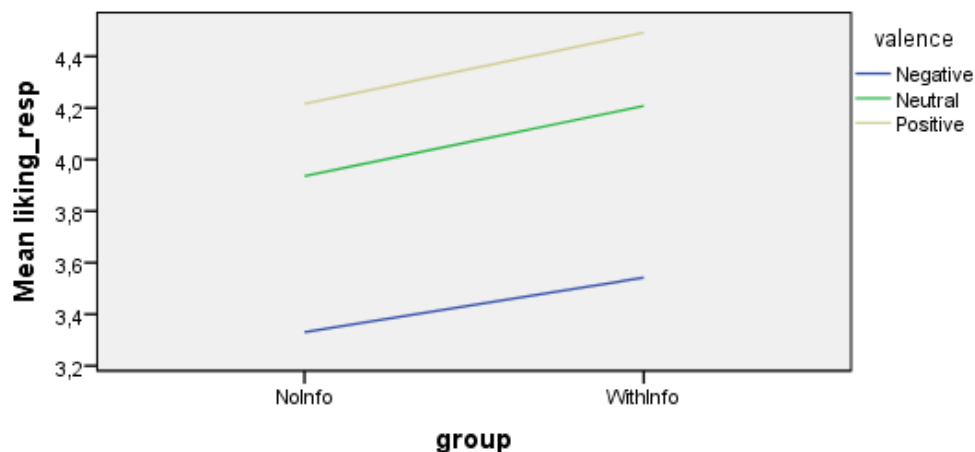


Fig. 3c. Average means Liking by Valence by Group

The information (Fig. 3c) increases the liking scores for all kinds of pictures. A series of “univariate analyses of variance” (two-way ANOVA) with two Factors Group (info vs no info) as a “between-subject factor and Valence (positive, negative, neutral) as a within-subject factor”, showed the main but not significant effect of Valence $F(2, 227) = .795, p = .453$. The main effect of Group $F(1, 227) = .346, p = .557$ or interaction between Group and Valence $F(2, 227) = 2.011, p = .136$ were also not significant.

4.3 Test of hypothesis 2: correlation between understanding and complexity

Complexity and understanding will have a correlation, i.e.:

- 1a) If understanding is low, the complexity will be higher;
- 1b) If understanding is high, the complexity will be lower.

Pearson Correlation revealed low significant correlations between variables (Table 3).

Table 3. Correlations

		Complexity	Understanding	Liking
Complexity	Pearson Correlation	1	.350**	.398**
	Sig. (2-tailed)		.002	.000
	N	76	76	76
Understanding	Pearson Correlation		1	.378**
	Sig. (2-tailed)			.001
	N		76	76
Liking	Pearson Correlation			1
	Sig. (2-tailed)			
	N			76

**. Correlation is significant at the 0.01 level (2-tailed).

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Pearson Correlation by Valence revealed low to highly significant correlations between variables (Table 4). The low correlations were established between understanding and complexity neutral $r = .254$, $p = .027$.

Table 4. Correlations by Valence

	Complexity_Pos	Complexity_Neg	Complexity_Neu	Understanding_Neg	Understanding_Neut	Understanding_Pos
Complexity_Positive	1	,427**	,767**	,480**	,382**	-,015
		,000	,000	,000	,001	,898
N		76	76	76	76	76
Complexity_Negative		1	,772**	,215	,167	,264*
			,000	,062	,150	,021
N			76	76	76	76
Complexity_Neutral			1	,367**	,254*	,119
				,001	,027	,307
N				76	76	76
Understanding_Negative				1	,830**	,290*
					,000	,011
N					76	76
Understanding_Neutral					1	,529**
						,000
N						76
Understanding_Positive						1
N						

** . "Correlation is significant at the 0.01 level (2-tailed)"

* . "Correlation is significant at the 0.05 level (2-tailed)"

Partial correlations for Understanding and for Complexity by Group (No Info vs. With Info) by Valence (Positive vs. Negative vs. Neutral) revealed low to highly significant correlations between variables (Table 5).

The low correlations were found between understanding and complexity negative $r = .243$, $p < .05$, also, there was a correlation between understanding and complexity neutral $r = .249$, $p < .05$. No significant relationships for positive stimuli were found.

Table 5. Partial correlations by Group by Valence

Control Variables		Complexity_Pos	Complexity_Neg	Complexity_Neu	Understanding_Neg	Understanding_Neu	Understanding_Pos
Group	Complexity_Positive	1.000					
	Complexity_Negative	.439**	1.000				
	Complexity_Neutral	.765**	.784**	1.000			
	Understanding_Neg	.467**	.243*	.356**	1.000		
	Understanding_Neutral	.376**	.173	.249*	.844**	1.000	
	Understanding_Pos	-.014	.264*	.120	.304**	.531**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

4.4. “Relations between Subjective and Objective Measures of Complexity as a Function of Valence”

To find the connections between objective and subjective measures of complexity it was crucial to measure the relations between objective and own classifications of complexity. For each image were calculated the average. Participant’s subjective ratings of complexity were correlated with the 2 measures of compression technique (GIF and JPEG). Spearman

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correlations showed, that human judgments correlated significantly with GIF ($r_s = -.255$, $p = .049$), and not significantly with JPEG compression ($r_s = -.240$, $p = .065$).

The calculating in table 7 were made separate. It were presented for the subjective complexity averages with different valences (positive, negative, and neutral), “GIF compression more frequently was the larger correlate”. GIF was a correlate for images with neutral valence ($r = .063$, $p < .05$). Jpeg was also a correlate for images with neutral valence ($r = .075$, $p < .01$).

Forsythe et al. (2011) suggested that computerized methods are very similar in design that is why they correlate with each other.

Table 7. Correlations Subjective vs. Objective Complexity by Valence

		Complexity _Pos	Complexi ty_Neg	Complexi ty_Neutr	GIF by Size	JPEG by size
Complexity_Pos	Pearson Correlation	1	,427**	,767**	-,302*	-,273*
	Sig. (2-tailed)		,000	,000	,019	,035
	N	76	76	76	60	60
Complexity_Neg	Pearson Correlation		1	,772**	-,340**	-,373**
	Sig. (2-tailed)			,000	,008	,003
	N		76	76	60	60
Complexity_Neutr	Pearson Correlation			1	-,429**	-,409**
	Sig. (2-tailed)				,001	,001
	N			76	60	60

GIF by Size	Pearson Correlation				1	,953**
	Sig. (2-tailed)					,000
	N				60	60
JPEG by size	Pearson Correlation					1
	Sig. (2-tailed)					
	N					60

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

4.5 Control Variables

4.5.1 Positive and Negative Affect

Analyses were performed on sum rating scores separately for positive and negative affect. A repeated-measures ANOVA was carried out on rating scores for Emotions (positive vs. negative) and Session (pre-test vs. post-test) as within-subject design and two factors Group (no info vs with info) and Sex (male vs female) as between-subject design.

Results of “Levene's Test for Equality of Variances” (Bühl, 2014) for the all Panas’ scales (negative / positive, pre /post) showed a p -values far greater than $\alpha = 0.05$, therefore the variances are homogeneously. It were “found a significant main effect” of Session, $F(1, 72) = 16.376$, $p = .000$, and a significant interaction between Session and Sex $F(1, 72) = 4.444$, $p = .039$. The significant interaction between Session and Group or Session, Group and Sex were not find.

A further repeated-measures ANOVA showed main effect of Emotions $F(1, 72) = 315.798$, $p = .000$. The interaction between Emotions and Group were not significant $F(1, 72) = .016$, p

= .901. It were also not found the interaction between Emotions and Group or Emotions, Group and Gender.

The outcome presented, that the viewers had positive emotions. The main effect of session showed, that the experiment had also an effect. The interaction between session and sex showed, that after experiment the positive emotions decrease by males.

4.5.2 Art Knowledge and Interest in Art

Art knowledge: The correct answers were a sum for each scale and afterwards the art interest and art knowledge scales were added up (Belke et al., 2006). A T-test for independent samples was carried out on z-standardized sum scores with Group (no info vs. broad genre info) as between-subjects factor. “Levene's Test for Equality of Variances” (Bühl, 2014, p. 322) for the scale art interest $p = .0661$ and for the scale art knowledge $p = .092$ showed a p -values far greater than $\alpha = 0.05$, the variances are therefore homogeneous. Independent samples t -test showed non-significant difference between group in art interest scores $t(74) = .215$, $p = .831$ and non-significant difference between group in art knowledge scores $t(74) = -1.898$, $p = .062$.

No significant difference was found neither art knowledge nor art interest scales. The both groups were similar. It were the naive participants.

5. Discussion

The main aspect of this work was the study of a unilateral process of how understanding impact the knowledge of complexity if the facts or valence are made available. Furthermore, the relation “between objective and subjective” (Marin & Leder, 2013, p. 3) methods for measuring complexity was analyzed. In addition, based on the model by Leder et al. (2004), such vital components as mood, knowledge and interest in art that can greatly impact the perception of art in general were also taken into consideration.

The suggested first hypothesis about the influence of information has been not confirmed by the results of this study. The analysis showed that the broad genre information has no effect neither for understanding, nor for complexity, nor for liking. Outwardly it seems that these results are rather unexpected because they are not substantiated by other findings (Marin & Leder, 2013). Broadly speaking, these results are not consistent with previous work showing that information has an effect on understanding (Leder et al., 2006; Millis, 2001; Russell, 2003; Russell & Milne, 1997; Swami, 2013) or on liking (Silvia, 2005). The findings of the present work are limited by the fact that there was no parallel version for broad genre information as in the studies by Millis (2001) or Leder et al. (2006) where they had resorted to elaborately made-up and descriptive titles for illustrations in order to confirm the influence of information. This drawback should be addressed in the future research. It was nevertheless established that information affects the perception of positive, negative or neutral stimuli in different ways. Positive stimuli with information by complexity ratings were perceived as more complex. This thesis confirmed that the information decreased the perception of complexity by negative or by neutral stimuli. The situation was reverse in understanding capacity. The understanding with information increased for neutral stimuli and, especially, for negative ones. Positive stimuli were understood similarly with or without the information.

The second hypothesis about interaction between understanding and complexity has been accepted with the outcome of current research. The examination of the second hypothesis showed low correlation between understanding and complexity in general. Besides, there was low correlation between understanding and complexity for stimuli with neutral and negative valence.

The study of the control variable about the interrelation between subjective and objective complexity partially corresponded with the results derived by Marin and Leder (2013) that human subjective judgments correlate with image compression GIF and JPEG. In contrast to Marin and Leder (2013) the correlations for representational paintings were found. This work found low positive correlations for individual perception of complexity and archived compact GIF- file volume (Marin & Leder, 2013), what was in a line with Forsythe et al. (2011). Both measures GIF and JPEG correlate with one another which corresponded with the results of Forsythe et al. (2011).

However, the present work showed, that the results depends on the valence of artwork. Broadly speaking, positive, negative or neutral artworks has the greatest impact on understanding and complexity, which in turn affects aesthetic appreciation. The non-cognitive composition of stimuli fine-tunes the initial neural working of visual characteristics (Marin & Leder, 2013). In this work were used the stimuli, that were strongly emotionally expressive (positive, negative and neutral). The experimental measuring of current assumptions with realistic complexity images were reported. The research confirmed the third hypothesis. The major achievement of this study was establishing the influence of valence. It has a significant influence for complexity and understanding, but not for liking judgments. This outcome is in the line with “the affect infusion model” (Forgas, 1995) that explains that the stronger the valence, the more impact it has on the judgments and the more tangible and productive the distilling of the stimuli. One ostensible interpretation of this is furnished by “the affect-priming-principle” which states that if a person is in a good mood, the positive associations and “top-

down” working will be brought into action and they will be indirectly impacting the stimuli (Belke et al., 2006). In the line with the Leder et al. (2004) it is noted that the primary emotional viewer’ state plays an important role by artistic perceptions (Belke et al., 2006). The results confirmed that the participant’s emotional state was more positive than negative. Consequently, the emotional condition of the viewers before and after the test-phase were measured. One of significant result of the session was the finding that the experiment had an effect on the participants. It serves as one more reason why it is so critical to evaluate the humans’ affective state because of its positive influence especially in the natural environment like a gallery or an exhibition (Leder et al., 2004). Hence, positive artistic participations have a primarily positive impact on mood and, as a general rule, lead to the positive emotional state of the participant who shows more openness to researches and polling. If the initial emotional state of the participant is negative, then his/her artistic ratings will be lower than among the positive participants. It is particularly true for artificial environments such as laboratory (Belke et al., 2006). It is likely the most plausible explanation for the interaction between session and gender: the male participants felt less positive at the end of session. Therefore, this control of positive and negative affect usually refines the ecological validity (Belke et al., 2006).

Upon reviewing the results of the control variable analyses it should be noted that both groups (art knowledge and art interest) were identical. Thus, it is safe to assume that both groups were comprised solely of naive participants, therefor the both group were similar in their art knowledge and art interest.

6. Conclusion

The goals and objectives stated in this thesis have been achieved. In particular, this thesis was an attempt to expand and deepen the existing knowledge of the nature of art perception in general and strived to establish whether providing information lowers perceived complexity in particular. Furthermore, this work examined the possibility of interdependence between understanding and perception of complexity. A conclusion may be drawn based on the analyses that the interrelation between understanding and complexity is not mediated by the information, but mediated by valence.

At least, it could be added that this work provides the framework for further investigation of the research question why the information increases the perception of complexity which corresponds with the top-down processing theory. Accordingly, “top-down” processing facilitates sense-making mainly due to the fact that the eyes can discount the trifling minutiae of an image which in turn decreases the complexity (Marin & Leder, 2013). It is perhaps due to such information that we are unable to overlook these minute details and, as a consequence, the perception of complexity increases. However, this proposition had not been thoroughly and diligently tested and presents a lot of questions for the subsequent experiments. These questions shall remain answered in next experiments. For example, it is not clear what kind of broad information influence the understanding and complexity. For instance, in order to clearly establish that this type of information has the impact, a parallel version for broad genre information (as in the research of Millis (2001) or Leder et al. (2006) with elaborative and descriptive titles for illustrations) should be made. This broad genre information needs to be further investigated to determine what type of it has an effect and will influence complexity or understanding. Another limitation of the study was the absence of expert’s ratings. Both groups were comprised of naive participants who had no previous extensive knowledge of art. It would

also be desirable to involve experts into checking the influence of understanding on complexity perception.

The results of the thesis may have practical value for the teaching of art or for galleries. Notwithstanding all of the above, the researchers of aesthetic appreciation might deem it necessary to conduct additional sets of experiments to positively establish the influence of understanding on perception of complexity in art.

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Supporting Information

Figure

Fig. 1. A cognitive processing model of aesthetic experiences (Leder et al., 2004).

Fig. 2. Procedure.

Fig. 3a. Average means for Complexity by Valence by Group.

Fig. 3b. Average means for Understanding by Valence by Group.

Fig. 3c. Means Liking by Valence by Group.

Table

Table 1. Descriptive Statistics: Means for complexity, liking and understanding by group.

Table 2. Descriptive Statistics: Means for complexity, liking, and understanding by group by valence.

Table 3. Correlations.

Table 4. Correlations by Valence.

Table 5. Partielle correlations by Group by Valence.

Table 7. Correlations Subjective vs. Objective Complexity by Valence.