AUTHENTICITY AND THE 255 SHADES OF GRAY

An interdisciplinary research into aesthetics

Master Thesis

Arts and Culture Studies

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CONTENT

1. PREFACE

1.2 Introduction

Isolated from each other, both sociology and neuroscience have investigated the arts and art appreciation. What art is, how it is appreciated and what people appreciate about it appear to be complex phenomena. Each academic field has its own distinct view on art with varying degrees of inter-consistency. Sociology theorizes that social differences are the cause of variation in how people appreciate art and sees the definition of art and the value of artworks as cultural constructs created through social interaction (Benjamin, 2008[1936]; Bourdieu & Nice, 1980; Bourdieu, 1985). What people appreciate and why they appreciate it is therefore the result of social and cultural influences (e.g. family, society; Bourdieu & Passeron, 1990). On the other hand, neuroscience speaks of universal laws of art perception, ingrained in our brain, that cause people to appreciate art in a universal fashion. Specifically, neuroscience argues that perception of the intrinsic properties of a painting (e.g. contrast value, colour grouping and colour distribution) determine the aesthetic experience (Ramachandran & Hirstein, 1999).

These views seem to be at odds, although they might also be two sides of the same coin. Since the academic fields have worked in isolation from each other, it is uncertain how their findings can be compared or related. For example, what one academic field leaves unexplained may be explained by the other, or the workings of neurological and social factors may be mutually dependent.

1.2.Research question

From the possible interaction of neuropsychological and social factors affecting art appreciation follows the research question:

To what extent do contextual and intrinsic aspects of artworks influence art appreciation?

1.3. Relevance

In order to further develop understanding of art and art appreciation, interdisciplinary studies need to be conducted. From both the academic field of psychology (e.g. Lin and Thomas, 2002) and sociology (e.g. DiMaggio, 1997), suggestions have been put forward for (the scientific relevance of) communication and collaboration. The academic fields could benefit from each other's research findings and methodologies. For instance, psychology and neuroscience could profit from sociology's knowledge of social processes in perception

and evaluation and differentiation between social classes. Sociology, on the other hand, might benefit from (neuro)psychology's insights into the mechanisms that underlie the similarities and differences between people. It is the intention of this study to carry out that recommendation and take a small step towards bridging the gaps between academic fields by taking a multi-angle view on art and art appreciation.

In the future, a fuller understanding of aesthetics and its mechanisms could prove useful outside the academic realm as well. For instance, the research results might be of some assistance to government policy makers, advertisers and designers in making informed decisions. Figures on universal and (social) context dependent aspects of aesthetics in general, and artistic objects in particular, could be of use to advisers and decision makers in supporting their argumentations for the quality of art and their relative value for social groups. Designers, on the other hand, might benefit from the research by using the results to help guide the designing process of the aesthetic appearance of an object. It is the purpose of this study to attempt to take a small step in that direction.

1.4. Organization

The thesis is organized in six chapters, of which this is one, and a bibliography. (2) The following chapter formulates a theoretical framework from both the sociological and neuropsychological perspective, each with their own expectations, ending in a possible explanation of their differences and overlaps. (3) Next, the methodology is described to test these expectations. This chapter contains the formulation and defence of the proposed research method; the operationalization of the concepts described in the previous chapter; the hypotheses that are formulated from the expectations from the previous chapter; the experimental setup; description of the data and data collection; data reconfiguration; ending with the description of the method of analysis. (4) Chapter four contains the results of the study. The results are separated in descriptive statistics of the data; results from within-subjects analyses; results from between-groups analyses; and results from between-subjects analyses. (5) This is followed by an evaluation of the hypotheses in the conclusion. (6) The thesis closes with a discussion. This chapter is separated in a description of the limitations of the study; the implications of the study; proposals for further research; and closing remarks.

2. THEORETICAL FRAMEWORK

2.1. Sociology

2.1.1. Socialisation and social differentiation

From a sociological perspective, it is the socio-cultural context of the artwork that gives it meaning and value. According to Bourdieu (1985; Bourdieu & Nice, 1980) it is not really the artwork itself that has value. It is the interactions between prominent actors (e.g. renowned institutions) that promote and associate with or disassociate from artworks and artists that cause value (i.e. cultural value/prestige and financial value) to increase or decrease. This social production of value can also be linked to social differentiation in art preferences (Bourdieu, 1985, 2013). According to Bourdieu (2013), value and meaning of art are produced through social interaction, whereas art simultaneously functions as a method for socialisation. Namely, art is used by people to form social classes; show their social class; and differentiate themselves from other social classes. Through their upbringing, education, and other social experiences, people develop dispositions of evaluation that are distinct for their social class. People's evaluations of artworks, and how these are affected by the review of a critic or the biography of the creator, depend on their particular set of cognitive schemata, values and tastes and tastes instilled by their socialization from early childhood onwards (i.e. *habitus*). For instance, for those with little to no knowledge of art, technicalities of style and period are unimportant and their appreciation is less affected by criticism of an unfamiliar professional (Bourdieu, 1990). Social classes are not truly homological in their dispositions of evaluation and art preference (i.e. each class its own kind of art) (Tampubolon, 2008; Peterson & Simkus, 1992) and research show that, instead of high culture (e.g. the reigning art style), socialization is progressively more a result of age and education (Van Eijck & Knulst, 2005). It is therefore not surprising that, education and age, as indicators of acquired knowledge and dispositions, have a positive relation with people's consumption (e.g. visiting the theatre, music concerts or museums: Lizardo & Skiles, 2008; López-Sintas & Katz-Gerro, 2005; López-Sintas & Álvarez, 2004) and appreciation (Berghman & Van Eijck, 2009; Bryson, 1996; Chan & Goldthorpe, 2007; Lizardo & Skiles, 2008; Silva, 2006; Tampubolon, 2008; Tampubolon, 2010; Van Eijck, 2001; Van Eijck, 2012) of art forms that require knowledge and experience.

2.1.2. Value of the artwork and authenticity

According to Benjamin (2008[1936]), art's value comes from the *aura* of an artwork. The aura of an artwork can be described as the conventional interpretation of the material (e.g.

place of exposition, lighting, physical condition) and immaterial aspects (e.g. authenticity, producer, owner, how it is described by renowned actors) produced through social interaction. Seeing the painter as an artistic genius and the artwork as a product of a unique individual expression is therefore of great influence on peoples appreciation. Though Benjamin (2008[1936]) argued that, because of technical reproducibility (e.g. printing of images of artworks) and loss of consensus of art value (e.g. loss of a clear cannon of art), artworks are losing their aura or at least a universal aura, it can be said that these material and immaterial aspects still influence people's appreciation of artworks. For instance, research shows that the artwork's physical aspects (e.g. properties of - and distances between objects, words and bodies) and subjective aspects (e.g. internalized cognitive schemas and conventions through which people interpret what they encounter) influence how people interpret and value the artworks they perceive (Griswold, Mangione & McDonnell, 2013). Following this rationale, class differentiation in art appreciation is indeed caused by differences in internalized cognitive schemas and conventions between classes (Bourdieu, 1990).

Following the argumentation of Benjamin (2008[1936]) and research findings (Griswold et al., 2013), one could expect that perceiving an artwork as authentic (i.e. genuine product of an educated professional) influences appreciation. Authenticity can be defined as the correct identification of the authorship, provenance or origins of an artwork, the genuine article. That the artwork is a product of artistic genius and expresses the proper values, ideals and beliefs is the connotation of the conceptual label of authenticity (Dutton, 2003). The content and significance of this connotation is the product of the creation of meaning through social interaction (Benjamin, 2008[1936]; Fine, 2003; Handler, 1986; MacNeil & Mak, 2007). Therefore, because in Western art the artist is valued besides the artwork (Benton & DiYanni, 2012), labelling the artwork as the genuine product of an educated professional artist increases the observers' level of appreciation (Berghman & Van Eijck, 2012; Hawley-Dolan & Winner, 2011). This effect is stronger for the older and higher educated, because their internalized experience resulted in dispositions to value the genuine article over work produced by less prestigious artists or amateurs (Berghman, 2013). However, the effects are small and the switching of labels between paintings of professional artists and amateurs still leads to overall preference for the professional paintings, only somewhat less pronounced than when the labeling of the paintings were correct or absent (Hawley-Dolan & Winner, 2011).

In short, people's embodied experiences, similar across individuals of a group through social interaction, influence their art appreciation. For authenticity, this means that association with previous positive experiences of genuine artworks increases appreciation of artworks labeled as authentic. From the sociological perspective, the strength and valence of authenticity and other symbolic features (e.g. critical review) are expected to positively correlate with age and education, as indicators of embodied experiences.

2.2. Psychology and Neuroscience

2.2.1. Differentiation in psychology

Art and aesthetics is also a research subject in the academic domain of psychology and research in this field supports the proposition that differentiation in art appreciation is correlated with education. For instance, Hekkert and Van Wieringen (1996a) show difference in appreciation for original representative paintings versus black-and-white, abstract, and black-and-white abstract versions of those paintings between senior art students and non-art students. Similar to Bourdieu's (1990) theory, cognitive differences between participants are expected to be the cause of these variations in art appreciation. In this case, the training of the art experts was argued to result in the development of particular dispositions towards art.

Other research indicates why experts and laymen appreciate art differently. Another experiment by Hekkert and Van Wieringen (1996b) revealed that laymen appreciation correlates with their familiarity with the artwork and with what it depicts. On the other hand, experts base their evaluation on how original the artwork is in comparison to their experience (Hekkert & Van Wieringen (1996b). Although these cognitive differences are evident and clearly linked to the quality and quantity of previous cultural experience, original representative paintings are overall still preferred by both experts and non-experts over their black-and-white and/or abstract counterparts (Hekkert & Van Wieringen, 1996a). This raises questions on the effect of artworks' formal features and similarities across people of different groups.

2.2.2. Neuroesthetics and Universal laws

Cognitive development and influence through social interaction appear to govern art appreciation, though underlying universal laws appear probable. The existence of such laws could for instance explain why participants can discern, with a higher success-rate than

expected by chance, original paintings from altered copies (Locher, 2003). Or why participants generally prefer abstract paintings from renowned painters when they were asked to choose between them and counterparts selected on resemblance made by primates, elephants and small children (Hawley-Dolan & Winner, 2011).

The existence of universal a-priori laws could be found in neurophysiology. Neurologists Ramachandran and Hirstein (1999), though acknowledging cultural and personal differences, suggest such a universal basis in art and aesthetics. If one considers that humans are a product of biological evolution, one would expect that there could be laws of aesthetics, which have an evolutionary rationale and therefore result in specific neurophysiology. Ramachandran and Hirstein are not alone in this; Zeki (2001) also suggests a common neurophysiological ground for aesthetics from which aesthetic differentiation could arise. A neurophysiological basis could explain why objects definable as art were made no less than 250.000 years ago and why also Neanderthals produced art (Appenzeller, 1998).

Experiments with brain scanning techniques provide evidence for these expectations. For instance, when participants are scanned who are asked to evaluate images of artworks and non-art images selected on similarity, different brain activity is indeed visible. The viewing of artworks resulted in activity in reward-related brain regions and the non-art images did not produce such effects (Lacey, et al., 2011). Different brain patterns emerge in participants when different painting types are shown (e.g. abstract or representative; Kabawata & Zeki, 2004; Lengger, Fischmeister, Leder, & Bauer, 2007; Vartanian & Goel, 2003). Another experiment resulted in systematic differences in brain activation between original paintings and compositionally altered versions (Vartanian & Goel, 2003).

2.2.3. Intrinsic properties, the effect of contrast

Evidence for the existence of universal a-priori parameters of aesthetics can also be found in experimental psychological research. Several studies show universal effects of intrinsic properties (e.g. form, objects depicted, contrast, colour hue) of an artwork on art appreciation. For instance, when contrast (i.e. difference in value of a shared aspect between objects) within artworks is lowered, appreciation decreases across all participants (Ewald & Krentz, 2012; Krentz & Earl, 2013; Tinio & Leder, 2009). An object is also more appreciated when there is more (compared to less) contrast (i.e. colour contrast and/or luminosity contrast) between the object in question and its background (Reber, Schwarz & Winkielman, 2004; Reber, Winkielman, & Schwartz, 1998). Evidence for the universality of

the effect of the intrinsic property of contrast is provided by showing that both infants and adults prefer higher contrast to lower contrast versions of artworks (Krentz & Earl, 2013).

The fact that both infants and adults prefer higher over lower contrast in art is in line with expectations derived from the theory of neuroaesthetics (Ramachandran & Hirstein, 1999). Because it is logically evolutionary rewarding (i.e. enhances subjects' chances of survival) to be able to see contrast (e.g. differentiate between the red apple and the green leafs), it is expected that seeing contrast results in rewarding affect in the observer. Theoretically, this could explain the effect of contrast on art appreciation (Ewald & Krentz, 2012; Krentz & Earl, 2013; Reber, Schwarz & Winkielman, 2004; Reber, Winkielman & Schwartz, 1998; Tinio & Leder, 2009). It could therefore be expected that the effect of contrast is universal across people from various social classes.

2.3. Interaction: an explanation of academic differences

2.3.1. Paradox between differentiation and universality

Even though Ramachandan and Hirstein (1999) postulated a neurological grounding for aesthetics, they recognise peoples' difference in art appreciation due to cultural and personal (cognitive) differences. Rightly so, Tyler (1999) questions the proposed neurophysiological laws and doubts whether they are collectively exhaustive and expects the existence of non-neurological factors. Both sociology and neuropsychology provide robust research results that seem to be at odds with each other, yet neither offers an explanation for this paradox.

2.3.2. Somatic Marker Theory

The paradoxical discrepancies between the universal and the particular through the intrinsic aspects and the social context of the artwork could find its explanation in the *somatic marker theory* of Damasio (2000; 2004; 2006). Damasio hypothesizes that, because the human being is a product of evolution in which everything functions for the survival and reproduction of the organism, it is the physical state of the body proper that guides cognition and consciousness. The body proper attempts to maintain a relatively stable optimal condition (i.e. *homeostasis*). Therefore a person's reactions are guided by somatic signals in order to promote and maintain this condition. For instance, when blood-sugar levels drop, chemical and electrical signals are sent to activate a sensation of hunger, which results in a conscious craving for food (Damasio, 2000; 2004; 2006).

In other words, cognition is guided by body-states. The body proper reacts to internal (i.e. visceral or muscle-skeletal) or external (i.e. sensory) input that leads to a somatic affect, which either has a positive or negative effect on the body's (ability to maintain) homeostasis. The relative effect of the input depends on the body proper's state prior to the input. The somatic change causes the neural effect that is commonly called 'emotion'. This emotion guides physical and cognitive reactions to the sensory or visceral input. In short, body states function as markers for proper psychic and cognitive actions and reactions (Damasio, 2000; 2004; 2006).

Because body states build on one-another and due to the brain's plasticity in general and it's long-term memory in particular, the sum of somatic markers determines how human beings define, value and categorize the world around them. Situations or actions that caused specific somatic reactions will be categorized under the same marker and causation will be inferred from somatic reactions that repeatedly follow each other. To promote a stable cognitive model, resulting body states from a particular situation or action that are in dissonance with the prior body states that were the result of a similar situation or action are vetoed or ignored through rationalization. In summary, by repeated lateral and chronological association and dissociation between somatic markers, a stable somatic and cognitive model of one's surroundings is formed that ensures an efficient maintenance of the body's homeostasis (Damasio, 2000; 2004; 2006).

Because human beings are physically quite similar, share surroundings, live in groups and raise their young, their interpretation of and reaction to somatic markers overlap to a large extent. People teach their children what and what not to do and how to do it and reward and punish them for it. People are able to communicate and have the capacity for empathy, which makes the sharing of interpretations and explanations of body states possible. This enables a shared model of reality and codes of conduct (Damasio, 2000; 2004; 2006).

2.3.3. Grounding sociological and neuropsychological theory of aesthetics

Damasio's (2000; 2004; 2006) somatic marker theory could explain differentiation between cultures, subcultures, classes and other social groups (lateral and historical) as well as universal traits. Through contextual differences and variation in length and intensity of communication and interaction between individuals within the layers of society (e.g. humanity, cultures, classes, subcultures, social groups and families), variation between and consistency within groups concerning (the development of) cognitive dispositions (Bourdieu,

1990), values and conventions (e.g. value of an object's authenticity; Griswold, Mangione & McDonnell, 2013) are to be expected. Damasio's (2000; 2004; 2006) theory appears to have the capacity to ground Bourdieu's theory of social production of meaning and value (1985; Bourdieu & Nice, 1980) and its reproducibility (Bourdieu & Passeron, 1990) and explain the observed differentiation in art taste (Berghman & Van Eijck, 2009; Bryson, 1996; Chan & Goldthorpe, 2007; Lizardo & Skiles, 2008; Peterson & Simkus, 1992; Silva, 2006; Tampubolon, 2008; Tampubolon, 2010; Van Eijck, 2001; Van Eijck, 2012) and art consumption (Lizardo & Skiles, 2008; López-Sintas & Katz-Gerro, 2005; López-Sintas & Álvarez, 2004) of people with various backgrounds. At the same time it can justify the universal preference for basic elements of sensory input, like contrast (Ewald & Krentz, 2012; Krentz & Earl, 2013; Tinio & Leder, 2009; Van Dongen, 2013) because of their fundamental and a priori importance to our survival.

That said, it must be kept in mind that it is unclear to what extent human biology is pliable. Shared biology allows for similarities and dissimilarities in somatic marker configuration, which could be the explanation of shared and contrasting dispositions within and between social groups. On the other hand, primal biological features are expected to form a static base, though they might also change with embodiment of experiences. For example, the positive effect contrast perception could over time decrease in strength in environments with a low risk of predator attacks and famine.

Thus, from sociological, neuropsychological theory and their grounding in Damasio's somatic marker theory (2000; 2004; 2006) two clear expectations can be drawn. First, basic elements of sensory input (e.g. contrast) universally influence how an object is evaluated. Second, through interpretation and evaluation, influenced by social interactions, dispositions are developed (e.g. what is valued how) that are expected to correlate with peoples' background characteristics (e.g. age and education) and cause extrinsic elements of the artwork (e.g., authenticity) to influence art appreciation. Differentiation in this effect is to be expected between people with different background characteristics.

2.4. Research Purpose

The purpose of this research was therefore the investigation of the effects of a suggested universal aspect, a suggested contextual and culturally differentiated aspect, and their interaction effects on art appreciation. Contrast is such a suggested universal (Ramachandran & Hirstein, 1999) and previous research has provided evidence for

contrast's universality (Krentz & Earl, 2013; Tinio & Leder, 2009: Van Dongen, 2013). Authenticity is a suggested contextual aspect and previous research has provided evidence for the positive effect of presenting artworks as the genuine work of professional artists (Berghman & Van Eijck, 2012; Hawley-Dolan & Winner, 2011).

From theory and previous research, it was expected that the effect of contrast is constant across participants, while the effect of authenticity correlates with background characteristics of the participants. Sociological and cognitive research concluded that age, art expertise, level of education, and cultural participation are differentiating factors. Therefore, it was this study's aim to test to what extent the effects of contrast and authenticity on art appreciation can indeed be considered as universal or socially contingent, respectively.

3. METHODOLOGY

3.1. Research Method

To test to what extent and how socially contingent *appreciation of art is influenced by contrast and authenticity in relation to background characteristics*, an empirical, quantitative method was the logical choice. The research was carried out with the use of a forced choice paradigm experiment. The experiment was created in Qualtrics (www.qualtrics.com) and contained stimuli that showed two copies of one artwork pair-wise. Two attributes (i.e. contrast and authenticity) of artworks were manipulated in two ways (i.e. heightened or lowered contrast and labeled 'original' or 'forgery'), which results in four groups of stimuli. 1) Normal-contrast copies labeled 'original' versus 'forgery'; 2) high-contrast versus low-contrast copies, both labeled 'unknown'; 3) high-contrast 'original' versus low-contrast 'forgery' and 4) high-contrast 'forgery' versus low-contrast 'original'. Background characteristics that have been shown to differentiate when it comes to art consumption (e.g., age and education level) (Lizardo & Skiles, 2008; López-Sintas & Katz-Gerro, 2005; López-Sintas & Álvarez, 2004) and art appreciation (Berghman & Van Eijck, 2009; Bryson, 1996; Chan & Goldthorpe, 2007; Lizardo & Skiles, 2008; Peterson & Simkus, 1992; Silva, 2006; Tampubolon, 2008; Tampubolon, 2010; Van Eijck, 2001; Van Eijck, 2012) were used as control variables to the universality of the effects of contrast and authenticity.

The reasoning behind the forced choice paradigm is twofold. First, with only small contrast alterations or elaboration on the artworks authenticity, the difference in preference between copies of a single artwork would probably have been small. Second, other factors could have influenced preferences when copies of one artwork were not shown simultaneously, but serially. For instance, familiarity with the artwork when seeing the second copy, after having previously seen the first copy, would most likely disturb the effect of contrast and/or authenticity. Therefore, one stimulus needed to contain two artworks from which participants have to choose one.

3.2. Concept Operationalization

Appreciation, contrast, *authenticity, art*, *familiarity with* art and *socioeconomic background* were the main concepts of this research. Appreciation can be defined as *that which the participant prefers or likes*. It was not the intention to measure the level of appreciation per artwork, but preference of one version of the artwork over its counterpart. Appreciation

could therefore be measured by making participants choose between the two images in a stimulus with the question “Which picture do you like better?”.

Paintings were used as representatives of visual *art*. Art can be defined as the “application of skill and taste to production according to aesthetic principles: the conscious use of skill, taste and creative imagination in the practical definition or production of beauty: works of art” (Webster, 1976, p. 122). Whether an object is or is not art can also be said to be determined by credible individuals and prestigious institutions the field of art (Bourdieu, 1980; Bourdieu & Nice, 1985) such as art history books, critics, or museums. To ensure the objects’ artistic legitimacy, paintings were selected from art museums. This is because all objects could at face value be seen as products of the use of “conscious skill, taste, and creative imagination” (Webster, 1976, p. 122) and the museum deemed it as a work of art (Bourdieu, 1980; Bourdieu & Nice, 1985).

Contrast was defined as the difference in values between two objects. By this definition, the level of luminosity contrast in a painting is the amount of difference in dark (i.e. dark coloured to black) and light (i.e. light coloured to white) areas. The level of luminosity contrast of the paintings was assessed through the use of Adobe Photoshop CS5. Of each painting, contrast histograms were acquired, which showed the shades of grey ranging from 0 (completely black) to 255 (completely white).

Authenticity was defined as a contextual property, perceived by the viewer that deems it as original artwork made by a proper artist (Dutton, 2003). When an artwork is presented and perceived as an original and genuine product of a person that can be defined as an artist, it can be called authentic. Following the denotation of correctly ascribing the artwork to its proper author, one could expect it to have the connotation of sincerity and expression of proper values, ideals and beliefs (Dutton, 2003). Although other research uses the denotation of professional artists in comparison to amateurs (Berghman & Van Eijck, 2012) as a label of authenticity, the connotation is expected to be similar. When two copies of the same painting are shown while one of which is presented as the original and the other as a forgery, the former can be said to have authenticity while the latter does not.

Familiarity with art was defined as the level of one’s affiliation with art, which could range from art expertise to art consumption. Familiarity was measured in 4 ways. 1) *Art knowledge;* the participants’ self-report of knowledge of art. 2) *Art interest*; the participants’ self-report of interest in art. 3) *Art education*, the self-reported estimate of average hours spent weekly on art education during high school; level of art education; and level of art history education after high school. 4) *Art consumption,* a particular kind of cultural

participation, measured as how often the participant annually visited art galleries or art museums and the estimation of average annual art gallery or museum visits with parents or other family until the age of 18.

Socioeconomic background was defined as a set of indicators identified by theory (Bourdieu, 2013) and previous research (Berghman & Van Eijck, 2009). These indicators were 1) the participant's age; 2) annual household income; 3) highest level of completed education; 4) highest level of completed education of the father; and 4) highest level of completed education of the mother. Because of possible gender differences, participants' sex was also categorized under *socioeconomic background*.

3.3. Hypotheses

From theory (Benjamin, 2008; Bourdieu & Nice, 1980; Bourdieu, 1985) and previous research (Berghman & Van Eijck, 2012; Hawley-Dolan & Winner, 2011) the hypothesis was deduced that, when contrast is unaltered, the copies of paintings labelled as authentic are preferred over the counterparts that are presented as forgeries:

1.0 *Artworks labelled as authentic are favoured over their counterparts that are labelled as forgeries.*

From the definition used for this study, the value of authenticity is theorized to be a cultural product of social interaction (Benjamin, 2008[1936]) and research shows that the influence of authenticity more strongly affects the older and higher educated (Berghman, 2013). Therefore, a positive correlation with participants' socioeconomic background characteristics and art appreciation was expected:

1.1 The size of the effect of authenticity has a positive correlation with participants' socioeconomic background .

1.2 The size of the effect of authenticity has a positive correlation with participants' familiarity with art.

Because the ability of discrimination in visual data (i.e. seeing contrast) is considered a basic element that can be said to follow the evolutionary rationale of a rewarding (survival chance enhancing) effect (Ramachandran, & Hirstein, 1999) it was expect that, if the measure of contrast influences art preference (Ewald & Krentz, 2012; Krentz & Earl, 2013; Tinio & Leder, 2009; Van Dongen, 2013) it should be universal across humanity:

2.0 *High-contrast artworks are favoured over their low-contrast counterparts.*

2.1 The size of the effect of contrast does not interact with participants' socioeconomic background .

2.2 The size of the effect of contrast does not interact with participants' familiarity with art.

When the effects of contrast and authenticity are both at work in the presented stimuli, interaction effects are expected. In one set of stimuli, the high-contrast copies were labelled as authentic and the low-contrast counterparts as fake. In a second set of stimuli, the high-contrast copies were labelled as fake while the low-contrast counterparts were labelled as authentic. Using the label free effect of contrast as comparison one would expect that:

3.0 The preference for high-contrast artworks labelled as authentic is higher than the preference for high-contrast artworks lacking the label of authenticity.

The preference for high-contrast artworks labelled as fake is lower than the preference for high-contrast artworks lacking the label of authenticity.

3.4. Experiment Setup

Digital reproductions of paintings from European and American museums were used to form a sample of western art. Paintings were randomly selected from large museums with a digitized collection[*]. The paintings were diverse in style, period of production and nationality of the artist. Both highly familiar (e.g. Mona Lisa) and unfamiliar paintings were selected for the sample. The styles of the paintings ranged from highly realistic to pure abstract and were produced in a period between 1500 and 2010 A.D. Via Adobe Photoshop CS5 the of level luminosity contrast of the paintings was measured to ensure a normal range of contrast levels in the painting sample. In total, 80 paintings were selected for use in the experiment.

In order to create high-contrast versions of the paintings, Adobe Photoshop CS5 was used for manipulation of the 255 shades of grey of the original artworks. The dark shades (i.e. 0-127) were made darker and light shades (i.e. 129-255) were made lighter. The shades at the ends of the first (64) and third (191) quartiles were decreased and increased by 15 shades respectively. Adobe Photoshop CS5 ensured that the changes were progressively smaller towards the extreme values (0 and 255) and the neutral value (128). At the extreme and neutral values no changes were made. The decrease and increase were reversed for low-contrast versions (see figure 3.1).

[*] These museums were: Museum Boijmans, Rotterdam, the Netherlands; Stedelijk Museum, Amsterdam, the Netherlands; Rijksmuseum, Amsterdam, the Netherlands; Louvre, Paris, France; Guggenheim, New York, United States.

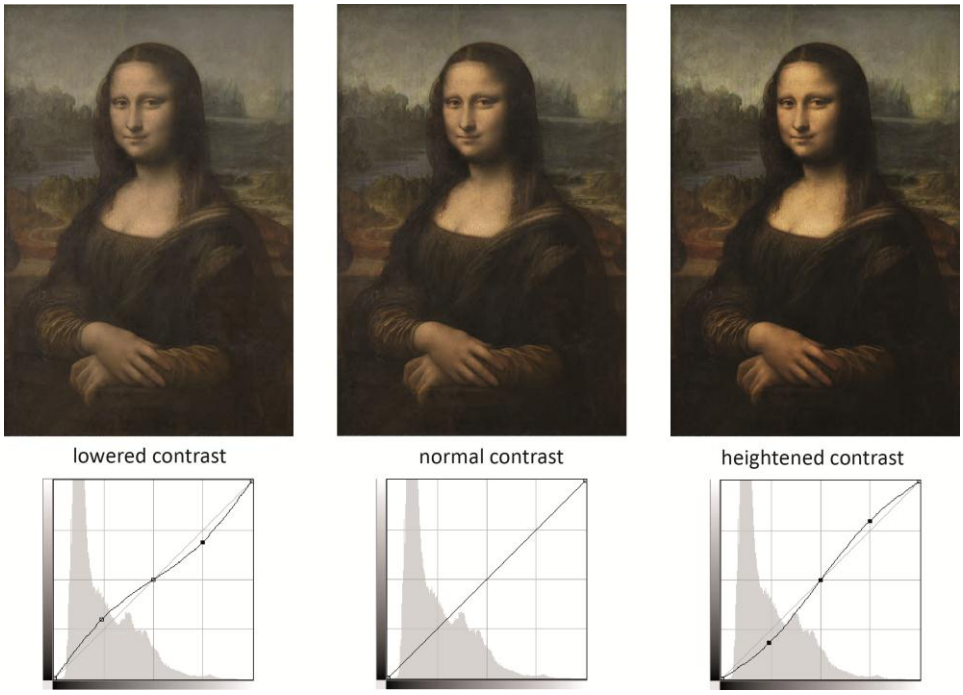

Figure 3.1. *Example of contrast manipulations with corresponding contrast histogram. The horizontal axis represents the input gray values. The vertical axis represents the output gray values.*

The experiment showed copies of paintings pair-wise that did or did not differ in contrast level and did or did not have an authenticity label. Paintings were randomly assigned to four conditions (see Table 3.1.). 1) Both copies of the same painting with the same (original) contrast level, one copy labelled as 'original' and the other labelled as 'forgery'. 2) Both copies of the same painting were labelled as 'unknown', one copy with heightened and the other with lowered contrast. 3) Of the two copies of the painting, one's contrast level was heightened and labelled as 'original' while the other's contrast level was lowered and labelled as 'forgery'. 4) This condition was the other way around. Of the two copies of the paintings one's contrast level was heightened and labelled as 'forgery' while the other's contrast level was lowered and labelled as 'original'.

Table 3.1.

Title, artist and production year of the paintings, sorted by condition

Condition	Title	Artist	Year
1	Het oude stadshuis te Amsterdam bij winter	Abraham Beerstraten	1639
1	Storm op de Hollandse kust	Ludolf Bakhuizen	1682
1	Le port de Rotterdam	Paul Signac	1907
1	Rivierlandschap met Ruiters	Aelbert Cuyp	1653
1	Stilleven met vruchten, fluitglas en mandfles	Juriaan van Streek	1700
1	stilleven met asperges	adriaen coorte	1679
1	interior of a collector's cabinet	Cornelis de Baellieur	1650
1	Ijsgezicht voor Dordrecht	Jan Josefszoon van Goyen	1644
1	Ijsvermaak	Henderick Avercamp	1615
1	vanitas stilleven	Gerrit van Vucht	1658
1	Das Schaf	Franz Marc	1913
1	Kleurencompositie nr. 6 (Bos)	Jacoba van Heemskerck van Beest	1913
1	Montagnes aux écritures	Jaap Wagemaker	1960
1	Schilderij	Piet Ouborg	1931
1	verre et bouteilles	Juan Gris	1911
1	Danger de la Force	Francis Picabia	1947
1	Kleurencompositie nr. 100	Jacoba van Heemskerck van Beest	1918
1	Doorlopen naar buiten	René Daniëls	1987
1	Septemberdag	Leo Gestel	1913
1	zonder titel	Klaas Kloosterboer	2007
2	De oude beurs te Amsterdam	Job A. Berckheyde	1670
2	Interieur van een boerendeel met gezelschap aan tafel	Pieter de Bloot	1640
2	Susanna en de beide grijsaards	Dirck van Delen	1640
2	Mona Lisa	Leonardo Da Vinci	1503

Condition	Title	Artist	Year
2	Rural landscape	Dirck	1650
2	Abraham en de engelen	Aert de Gelder	1680
2	Stilleven met citroen, druiven, en glazen	Abraham van Beijeren	1640
2	Late bezoekers van Pompeï	Carel Willink	1931
2	Italiaans landschap met twee herderinnen	Johannes van der Bent	1670
2	Interieur van de kunstenaar	James Ensor	1930
2	bloeiende appelboom	Piet Mondriaan	
2	eyes in the heat	Jackson Pollock	1946
2	Koffiepot	Daniël den Dikkenboer	1955
2	Nus dans la forêt	Fernand léger	1909
2	schneesturm auf dem meer	Joseph Mallord	1844
2	Accumulation Renault no 109 II	Arman	1969
2	Egoïsme	Francis Picabia	1947
2	Launisch	Vasili Kandisky	1930
2	Image IV	Fletcher Benton	1975
2	The landscape of silence	Azade Köker	2010
3	De pleisterplaats; een ruiter voor een hoeve	Barent Gael	1800
3	Riviermond met schepen	Hans Goderis	1625
3	De golf van Napels met op de achtergrond het eiland Ischia	Josephus Augustus Knip	1818
3	portret van charles rappoport	Kees van Dongen	1920
3	Rust op de vlucht naar Egypte	Jan Brueghel	1600
3	De Pannekoeckebackerij	Pieter Aertsen	1560
3	De bleekzuchtige dame	Samuel van Hoogstraten	1660
3	Nachtwacht	Rembrandt van Rijn	1642
3	farao’s dochter vindt mozes in biezenmandje	Ferdinand Bol	1655
3	Military parade day during the empire	Adrien Dauzats	1810
3	compositie no.11	Piet Mondriaan	1913

Condition	Title	Artist	Year
3	Flower	Yayoi Kusama	1954
3	Lyrisches	Vasili Kandisky	1911
3	positano	Leo Gestel	
3	Stilleven met ken, pijp en wijnglas datering onbekend	Daniël den Dikkenboer	
3	Bord de l' Oise à Vadencourt	Auguste Herbin	1912
3	Gewonde duif	Constant	1951
3	Ober-Weiman	Lyonel Feiniger	1921
3	zonder titel	Klaas Kloosterboer	1990
3	Via sheen	Kenneth Noland	1968
4	Faun en nimf	Titiaan	1540
4	Stilleven met schelpen	Balthasar van der Ast	1640
4	de windstoot	Willem van de Velde	1650
4	Portret van een stel in een landschap	Frans Hals	1622
4	Stilleven met koperen ketel	Francois Bonvin	1883
4	Grot met herders en vee	Nicolaes Pieterszoon Berchem	1654
4	Gezicht op Overschie bij maanlicht	Johan Jongkind	1872
4	De Zomer	Arent Arentz	1620
4	De terugkomst van de ooievaar	Theo van Hoytema	1891
4	portrait of the artist	Ignacio Zuloaga	1931
4	Counterpointed Grey	JCJ VANDERHEYDEN	2008
4	grijze boom	Piet Mondriaan	
4	Mon Premier amour	Man Ray	1952
4	recumbent form (groen en geel)	21arbara hepworth	1947
4	structuur III	peter struycken	1939
4	Compositie met kleurvlakjes	Piet Mondriaan	1917
4	Icebox	Peter Saul	1961
4	Discs	James Rosenquist	1965

Condition	Title	Artist	Year
4	Ratten und Melonen	Markus Lüpertz	1984
4	Werkgruppe II- Das haben wir noch nie so gemacht!	Sigmar Polke	1982

The experiment was made in Qualtrics (www.qualtrics.com) and consisted of three parts. The experiment started with a short introduction and instructions (Appendix A). This was followed by the randomized 80 stimuli of the experiment (see figure 3.2). To control for lateral biases the two copies of paintings in the stimuli will be left-right counter balanced. The experiment finished with a short questionnaire about familiarity with art and *socioeconomic background* (Appendix B).

Figure 3.2. *Example of a condition 4 experiment question using a representational painting*

3.5. Data collection

Power analyses reveal a requirement of 134 participants. Previous research with contrast (Van Dongen, 2013) indicated a strong effect for contrast in within-subjects analyses. A power analysis (β=0,2) for the main effect of contrast (η^2=0,5) revealed a requirement of six participants. Estimated slightly smaller, the main effect of authenticity (η^2=0,3) required nine participants. Analysis for between-group ANOVA analyses (R^2=0,1) revealed a requirement of 116 participants. 134 participants were required according to power analysis for multiple regression analysis (R^2=0,1). To compensate for the possibility of missing values and necessary exclusion of participants, the aim of the experiment was to include around 150 participants.

Via Amazon's Mechanical Turk (www.mturk.com), 150 participants were recruited. The online workforce program Mechanical Turk offers a global network of potential participants. From Mechanical Turk, random samples with a specific number of participants can be requested for surveys, questionnaires, and computer screen experiments. Research shows that Mechanical Turk is as reliable as laboratory research or even more so through higher internal validity (e.g. through the absence of the possible influence of the researcher). Multiple participations are kept to a minimum through credit card connected user ID's. To sum up, samples from Mechanical Turk, in comparison to lab research, have lower rates of dishonest responses, lower risks on subject pool contamination and a higher heterogeneity (Paolacci, Chandler, & Ipeirotis, 2010).

3.6 Data reconfiguration

In order to prepare the data for analyses, it was reconfigured in several ways. Participants scored either 1 or 0 on each of the 80 stimuli. Per stimulus, this depended on which copy they had selected as the one liked better (e.g. either high-contrast or low-contrast). This data was reconfigured into four ratios, one per experiment condition. Participants' scores on each condition were added up and divided by the number of stimuli in the condition (i.e. 0-20/20), resulting in a value between 0,0 and 1,0. Per condition, these values revealed the ratios of participants' choice for one of the copy types (e.g. high-contrast 'original'). In order to be able to use the participants' choice for the other copy types, the ratios were copied and recalculated. Specifically, each ration was subtracted from 1,0. For instance, in the high-contrast 'original' – low-contrast 'forgery' condition, a participant scored 0,8 on preference

for the high-contrast 'original' paintings and, therefore, scored 0,2 on preference for the low-contrast 'forgery' counterparts.

In order to make a *factorial repeated-measures ANOVA* possible, a support variable had to be created. The data reconfiguration of the four conditions resulted in eight ratios, though nine were needed for a *repeated measures ANOVA.* The fifth condition would have been *normal-contrast 'unknown' – normal-contrast 'unknown'* on which statistically each participant would score 50/50. Therefore, a ninth ratio was added for each participant with a score of 0,5. This is a justifiable adjustment, because it has a purely neutral value and only serves as support for the analyses.

Data on background characteristics of the participants was also reconfigured. Data driven binning of familiarity with art and socioeconomic background variables was performed to increase reliability between-group analyses.

3.7 Method of Analysis

Variations of *General Linear Model* were used to analyse the acquired data. To test the effect of contrast, the effect of authenticity and their interaction, a 3*3 *factorial repeated-measure ANOVA* (see table 3.5.) was used with the nine ratios that followed from the data reconfiguration. Six dependent t-tests were used to analyse the contrasts between the four experiment conditions. Individual between-group ANOVA's were used to test the effects of the four conditions in relation to the variables of socioeconomic background. Regression analyses were used to test the effect of the four conditions in models using the familiarity with art variables.

Table 3.5**.**

Factors and dimensions of proposed repeated measure ANONA.

		Dimensions	
Factors	Contrast		Authenticity
1	Heightened contrast	1	Original
	Heightened contrast	2	Forgery
	Heightened contrast	3	Unknown
2	Lowered contrast	1	Original
	Lowered contrast	2	Forgery
	Lowered contrast	3	Unknown
3	Normal contrast	1	Original
	Normal contrast	2	Forgery
	Normal contrast	3	Unknown

4. RESULTS

4.1 Participant statistics and predictor binning.

In total, 190 people participated in the experiment, though only 136 completely finished it. Of these participants, 71 were female (52,2%) and their average age was 36,48 (*s*=12,98) with a minimum of 19 and maximum of 75. They all resided in the United States of America, though a few were born in Brazil (N=1), Germany (N=3), Philippines (N=3) and the United Kingdom (N=1). *Some College* (N=47) was the median of the participants' highest level of completed education (see table 4.1.). In order to make both meaningful and statistically usable groups, the education level variable was recoded in a binary variable with the values *low education level* (High School / GED – Some College; N=71) and *high education level* (2-year College Degree – Doctoral Degree; N=65).

Table 4.1.

Highest completed level of education of participants

Education Level	**Frequency**	**Percent**	**Cumulative Percent**
High School / GED	24	17,6	17,6
Some College	47	34,6	52,2
2-year College Degree	21	15,4	67,6
4-year College Degree	36	26,5	94,1
Masters Degree	7	5,1	99,3
Doctoral Degree	1	0,7	100,0
Missing	0	0,0	
Total	136	100,0	

Some College (N=28) was also the median of the highest level of education completed by the participants' father (see table 4.2.). Again, in order to make both meaningful and statistically usable groups, *father's education level* was recoded into a binary variable with the values *low education level* (Less than High School – Some College; N=82) and *high education level* (2-year College Degree – Professional Degree (JD, MD); N=51).

Table 4.2.

Highest completed level of education of the participant's father.

Education Level	**Frequency**	**Percent**	**Cumulative Percent**
Less than High School	9	6,6	6,7
High School / GED	45	33,1	40,0
Some College	28	20,6	60,7
2-year College Degree	9	6,6	67,4
4-year College Degree	29	21,3	88,9
Masters Degree	9	6,6	95,6
Doctoral Degree	2	1,5	97,0
Professional Degree (JD, MD)	4	2,9	10,.0
Missing	1	0,7	
Total	136	100,0	

Some College (N=26) was also the median of the highest level of education completed by the mother (see table 4.3.). Similarly, in order to make both meaningful and statistically usable groups, *mother's education level* was recoded in a binary variable with the values corresponding for *low education level* (Less than High School – Some College; N=76) and *high education level* (2-year College Degree – Doctoral Degree; N=60).

Table 4.2.

Highest completed level of education of the participant's mother.

Education Level	**Frequency**	**Percent**	**Cumulative Percent**
Less than High School	5	3,7	3,7
High School / GED	45	33,1	37,0
Some College	26	19,1	56,3
2-year College Degree	19	14,0	70,4
4-year College Degree	24	17,6	88,1
Masters Degree	15	11,0	99,3
Doctoral Degree	1	0,7	100,0
Missing	1	0,7	
Total	136	100,0	

The median of the participants' annual household income was *$30.000 - $39.999* (N=21) (see table 4.4). In order to make both meaningful and statistically usable groups, *income* was binned to three groups with the values corresponding for *low income* (less than $29.999; N=51), *average income* (between $30.000 and $69.999; N=51) and *high income* ($70.000 and more; N= 31).

Table 4.4.

Annual household income.

Income in Dollars	**Frequency**	**Percent**	**Cumulative Percent**
under 20,000	25	18,4	18,4
20,000-29,999	26	19,1	37,5
30,000-39,999	21	15,4	52,9
40,000-49,999	13	9,6	62,5
50,000-59,999	9	6,6	69,1
60,000-69,999	8	5,9	75,0
70,000-79,999	10	7,4	82,4
80,000-89,999	5	3,7	86,0
90,000-99,999	7	5,1	91,2
100,000-109,999	5	3,7	94,9
110,000-119,999	2	1,5	96,3
120,000-129,999	2	1,5	97,8
130,000-139,999	1	0,7	98,5
150,000+	2	1,5	100,0
Missing	0	0,0	
Total	136	100,0	

On their familiarity with art, participants' scored an average of 65 (*s*=25,64) on interest in art, with a minimum of 1 and a maximum of 100. On knowledge of art they score an average of 35,84 (*s*=24,46), with a minimum of 0 and a maximum of 100. The median of weekly average of hours of art education during high school was *2 to 3 hours* (N=42) (see table 4.5). The *high school art education variable* was binned in two groups; 1) *near to none* (1 hour a week or les; N=66); and 2) *some* (between 2 and 8+ hours a week; N=70).

Table 4.5.

Estimation of weekly average of art education during high school.

Hours of art education	Frequency	Percent	Cumulative Percent
None	12	8,8	8,8
1 or less	54	39,7	48,5
2 to 3	42	30,9	79,4
4 to 5	18	13,2	92,6
6 to 7	3	2,2	94,4
8 or more	7	5,1	100
Missing	0	0,0	
Total	136	100,0	

The median of art education after high school was *1 to 3 individual courses* (N=46) (see table 4.6). The *high school art education variable* was binned in two groups; 1) *none* (no art education after high school; N=76); 2) and *some* (between some individual courses and 4-year college degree; nN60).

Table 4.6.

Art education after high school.

Education	Frequency	Percent	Cumulative Percent
None	76	55,9	55,9
1 to 3 individual courses	46	33,8	89,7
2-year College Degree	6	4,4	94,1
4-year College Degree	8	5,9	100,0
Missing	0	0,0	
Total	136	100,0	

The median of art history education after high school was *1 to 2 individual courses* (N=42) (see table 4.7). The *art history education variable* was binned in two groups; 1) *none* (no art history education after high school; N=88); 2) and *some* (between some individual courses and 4-year college degree; N=48).

Table 4.7.

Art history education after high school.

Education	**Frequency**	**Percent**	**Cumulative Percent**
None	88	64,7	64,7
1 to 3 individual courses	42	30,9	95,6
2-year College Degree	3	2,2	97,8
4-year College Degree	3	2,2	100,0
Missing	0	0,0	
Total	136	100,0	

The median of last year's art gallery and museum visits was *1 or 2 times a year* (N=68) (see table 4.8). The *art consumption variable* was binned in two groups; 1) *none* (no visits; N=62); 2) and *some* (between once a year and once a week; N=74).

Table 4.8.

Visitations of *art gallery and museum in the last year.*

Frequency of visits	**Frequency**	**Percent**	**Cumulative Percent**
Not at all	62	46,6	46,6
1 or 2 times	68	50,0	96,6
Once a month	5	3,7	99,3
Once a week	1	0,7	100,0
Missing	0	0,0	
Total	136	100,0	

The median of on annual average of art gallery and museum visits with parents or other family until the age of 18 was *1 or 2 times a year* (N=75) (see table 4.9). The *childhood art consumption variable* was binned in two groups; 1) *none* (no visits or unknown by participant; N=49); and 2) *some* (between once a year and once a month; N=86).

Table 4.9.

Estimation of annual *art gallery and museum visitations until the age of 18.*

Frequency of visits	**Frequency**	**Percent**	**Cumulative Percent**
Unknown	11	8,1	8,1
Not at all	38	28,1	36,2
1 or 2 times	75	55,6	91,8
Once a month	11	8,1	100,0
Missing	0	0,0	
Total	136	100,0	

The data driven variable binning resulted in six variables of socioeconomic background and seven variables of familiarity with art. Socioeconomic background consisted of one nominal variable (i.e. sex); four ordinal variables (i.e. education level, father education level, mother education level and income); and one interval variable (i.e. age). Familiarity with art consisted of five ordinal variables (i.e. high school art education, art education, art history education, art consumption and childhood art consumption); and two cardinal variables (i.e. interest in art and knowledge of art).

4.2 Descriptive and diagnostic statistics of experiment conditions

Descriptive statistics of the ratio scores revealed a preference of more than 50% for all experiment conditions (see table 4.10). On the level of individual paintings, five scored below an average preference of 50% and only one score as low as 0,29 (*s*=0,46). However, five out of 80 paintings was not enough to warrant analysis on individual paintings. The measurement of skewness reveals that the three conditions with the contrast manipulation have more values above than below the mean. The opposite is true for the condition with only the authenticity manipulation. Measurement of kurtosis reveals that only condition 3 has more around the mean than normality would predict, while the others have more scores in the tails than normality would predict.

Table 4.10.

Descriptive statistics of ratio scores of the four experiment conditions.

Condition	N	Mean	Std.D.	Skewness (std. Error)	Kurtosis (std. Error)
1. Normal-contrast 'original'	136	0,67	0,17	0,14 (0,21	- 0,72 (0,41)
2. High-contrast 'unknown'	136	0,75	0,19	-0,79 (0,21)	-0,27 (0,41)
3. High-contrast 'original'	136	0,84	0,17	-1,29 (0,21)	1,40 (0,41)
4. High-contrast 'forgery'	136	0,68	0,25	-0,73 (0,21)	-0,44 (0,41)

Box plots (figure 4.1) reveal that only the *high-contrast 'original'* condition has two outliers. None of the conditions show extreme outliers or sufficient outliers to warrant case removal, data transformation or score adjustment.

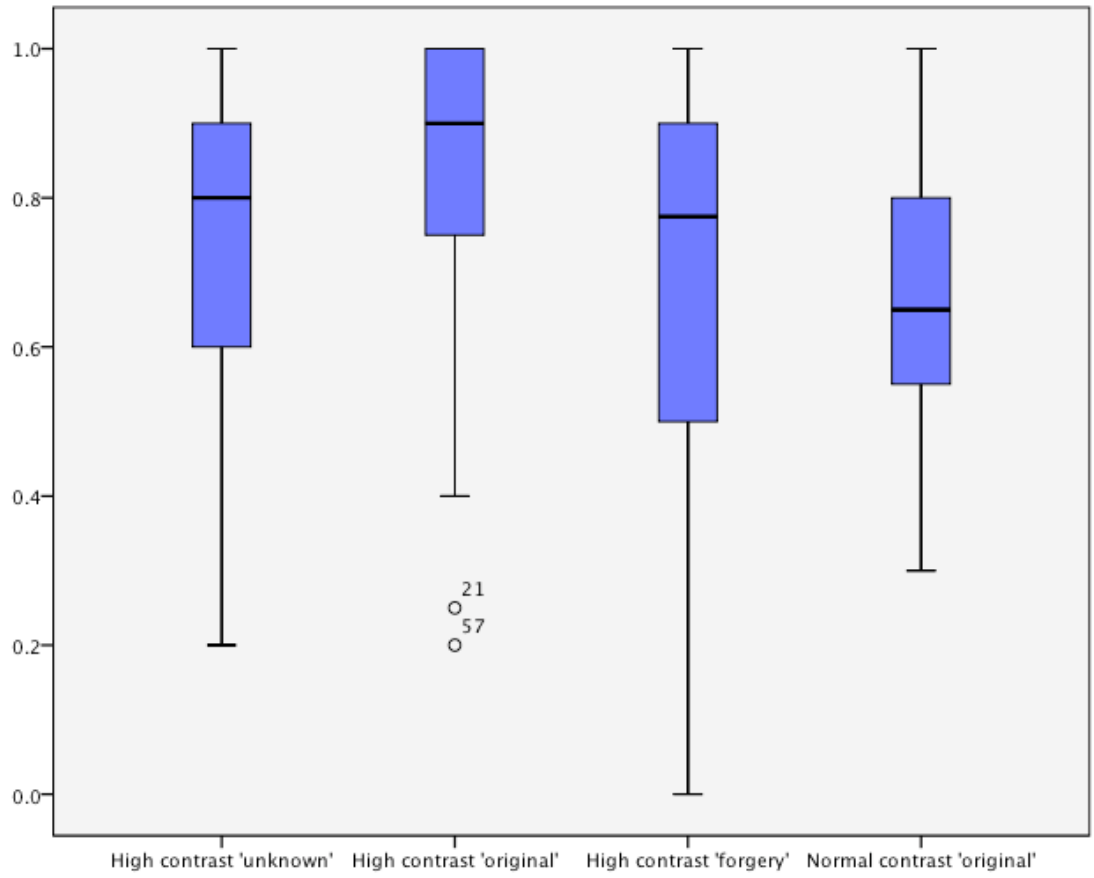

Figure 4.1. Box plots of the ratio scores of the four conditions

Cross tabulation of the four experiment conditions revealed no reasons for concerns for future multicollinearity (*r<0,9)* and no unexpected results. Correlations between the conditions were significant on all counts. The only negative correlations were between conditions 1 and 2 and 1 and 4, which is to be expected, because conditions 2 lacked the authenticity manipulation and condition 4's authenticity manipulation was the opposite of condition 1. In summary, all outcome variables meet expectations and did not require initial transformation or the adjustments of proposed analyses.

Table 4.11.

Cross tabulation of the four experiment conditions. .

Condition	**1.**	**2.**	**3.**	**4.**
1. Normal contrast 'original	1			
2. High contrast 'unknown'	-0,17**	1		
3. High contrast 'original'	0,15*	0,73**	1	
4. High contrast 'forgery'	-0,39**	0,76**	0,47**	1

* Correlation is significant at the 0,05 level (1-tailed).

** Correlation is significant at the 0,01 level (1-tailed).

4.3. Within-subjects analyses: factorial repeated measures ANOVA and contrasts

The main effects of contrast and authenticity and their interaction were tested with a *3*3 factorial repeated measures ANOVA*. Statistics revealed no violation of assumptions and significant main effects and interaction. In general, high-contrast copies of paintings were preferred over their low-contrast counterparts ($F(2, 135)=272,88$, $p<0,001$, $\eta^2=0,67$) and paintings labeled as original were preferred over their counterparts labeled as forgery ($F(2, 135)=118,18$, $p<0,001$, $\eta^2=0,47$). Also, contrast and authenticity significantly interact with each other ($F(4,540)=33,29$, $p<0,001$, $\eta^2=0,19$). This indicates that, under the assumption of total randomness, there is a probability of less than 0,1% to find results with a similar or higher inconsistency with H_0.

A line graph provides a closer look at the interactions possible (figure 4.2). The graph shows that the effect of authenticity is much stronger without the contrast manipulation and that the effect of contrast is only slightly altered with when authenticity is added. Noteworthy, high-contrast 'forgery' paintings were slightly more appreciated over normal-contrast 'original' paintings, although this difference was not significant.

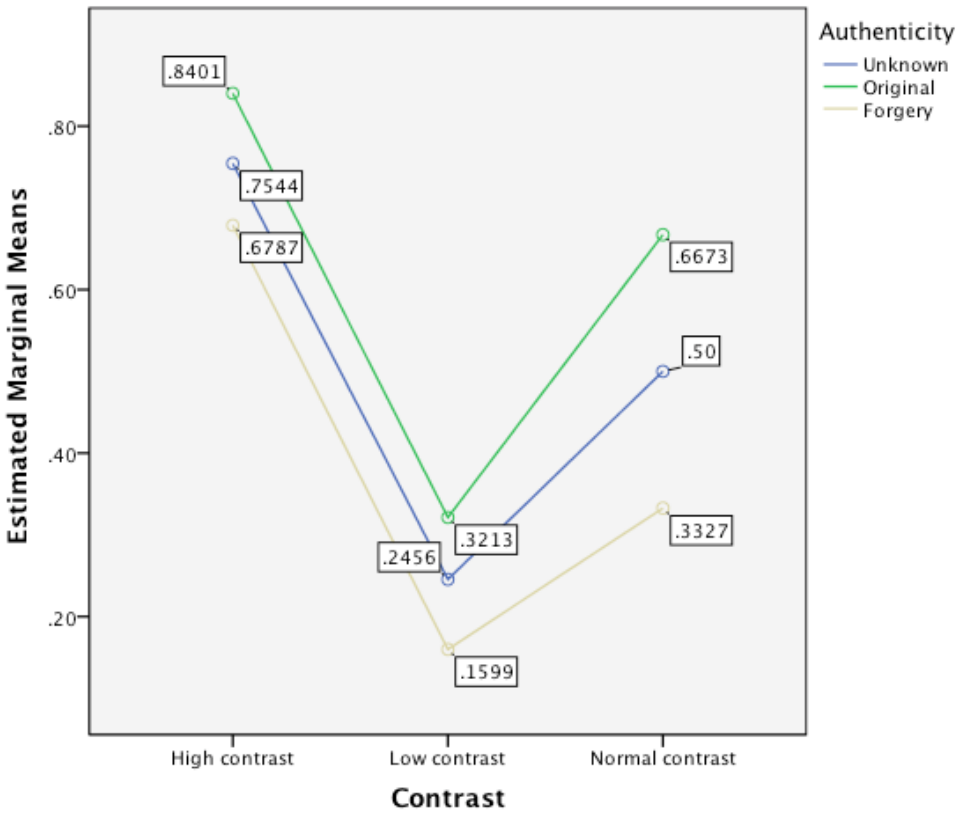

Figure 4.2. *Estimated Marginal Means of Contrast * Authenticity*

Contrasts between conditions were analyzed with paired samples dependent t-tests. Comparison of mean ratio scores revealed that, in all but one way, conditions significantly differed from one another. There was no significant difference in participant preference for high-contrast 'forgery' paintings and normal-contrast 'original' paintings. For all other conditions, high-contrast 'original' (*M*=0,84) was preferred over high-contrast 'unknown' (*M*=0,75); both high contrast 'original' and 'unknown' were preferred over high-contrast 'forgery' (*M*=0,68); and both high-contrast 'original' and 'unknown' were preferred over normal-contrast 'original' (*M*=0,67). Even with a Bonferroni correction to control for the familywise error rate these differences remained significant.

Table 4.12.

Dependent t-tests of paired sample of experiment conditions.

Pair	Conditions	t-statistic	df	Significance
1.	High contrast 'unknown' * High contrast 'original'	-7,21	135	<0,001
2.	High contrast 'unknown' * High contrast 'forgery'	5,41	135	<0,001
3.	High contrast 'unknown' * Normal contrast 'original'	20,67	135	<0,001
4.	High contrast 'original' * Normal contrast 'original'	8,99	135	<0,001
5.	High contrast 'original' * High contrast 'forgery'	8,21	135	<0,001
6.	High contrast 'forgery' * Normal contrast 'original'	0,07	135	0,71

However, testing of assumptions revealed that all t-tests had a significantly non-normal distribution ($D(136)$, 0,1 – 0,2, $p<0,05$), indicating a possibility of false-positives. Therefore, non-parametric *Wilcoxon signed-rank tests* were used as well. These test revealed similar results. High-contrast 'original' (*Mdn*=0,90) was preferred over high-contrast 'unknown' (*Mdn=0,80),* z=-6,66, $p<0,001$; both high contrast 'original' and 'unknown' were preferred over high-contrast 'forgery' (*Mdn=0,77),* z=-7,20, z=-5,30, $p<0,001$, respectively; and both high-contrast 'original' and 'unknown' were preferred over normal-contrast 'original (*Mdn*=0,65)*,* z=-7,40, z=-3,54, $p<0,001$, respectively. Also, no significant difference was found between preference for high contrast 'forgery' paintings and normal contrast 'original' paintings, z=-1,08, p=0,282. In summary, next to significant main effects and the interaction, five out of the six experiment condition comparisons revealed significant differences.

4.4. Between-groups and subjects analyses: one-way ANOVA and ANCOVA

One-way ANOVA's and ANCOVA's were used to examine differences in the experimental condition results in relation to each individual variable of socioeconomic background. Variance in each of the experimental conditions was measured between groups of level of education; father's level of education; mother's level of education; annual household income; and sex. Covariance was measured between the experimental conditions and age, because age was measured on interval level. Interaction variables were made for a more comprehensive testing of socioeconomic background. These interactions were: level of education * father's level of education; level of education * mother's level of education;

level of education * annual household income; and level of education * sex. In total, ten separate analyses were performed for each experimental condition.

Analyzing the variance in condition 1, normal-contrast 'original', yielded no significant results. No significant results (p>0,05) were observed on all the socioeconomic background variables and the interaction variables (see table 4.13).

Table 4.13.

Analyses of (co)variance in condition 1. Normal-contrast 'original'.

Socioeconomic background variable	**SS**	**df**	**F**	**Significance**
Level of education	0,01	1	0,29	0,59
Father's level of education	0,09	1	1,90	0,09
Mother's level of education	0,02	1	0,80	0,37
Annual household income	0,03	2	0,06	0,95
Sex	0,05	1	2,15	0,15
Age	0,00	1	0,01	0,92
Education * income	0,02	2	0,25	0,71
Education * Education father	0,01	1	0,29	0,59
Education * Education mother	0,02	1	0,50	0,48
Education * Sex	0,40	1	1,20	0,28

The analyses of variance in condition 2, high-contrast 'unknown', yielded no significant results. No significant results (p>0,05) were observed on all the socioeconomic background variables and the interaction variables (see table 4.14).

Table 4.14.

Analyses of (co)variance in condition 2. High-contrast 'unknown'.

Socioeconomic background variable	**SS**	**df**	**F**	**Significance**
Level of education	0,01	13	0,12	0,73
Father's level of education	0,12	1	3,37	0,07
Mother's level of education	<0,01	1	0,01	0,93
Annual household income	0,07	1	1,02	0,36
Sex	<0,01	2	0,01	0,94
Age	0,13	1	3,49	0,06
Education * income	0,01	1	0,10	0,91
Education * Education father	0,05	2	1,48	0,23
Education * Education mother	0,09	1	2,35	0,13
Education * Sex	0,03	1	0,95	0,33

The analyses of variance in condition 3, high-contrast 'original', yielded no significant results. No significant results (p>0,05) were observed on all the socioeconomic background variables and the interaction variables (see table 4.15).

Table 4.15. *Analyses of (co)variance in condition 3. High-contrast 'original'.*

Socioeconomic background variable	**SS**	**df**	**F**	**Significance**
Level of education	0,02	1	0,61	0,44
Father's level of education	0,03	1	1,23	0,27
Mother's level of education	0,01	1	0,02	0,88
Annual household income	0,03	2	0,53	0,59
Sex	0,01	1	0,08	0,78
Age	0,05	1	1,95	0,17
Education * income	0,02	2	0,31	0,74
Education * Education father	0,06	1	1,99	0,16
Education * Education mother	0,08	1	2,84	0,10
Education * Sex	0,01	1	0,10	0,75

The analyses of variance in condition 4, high-contrast 'forgery' yielded one significant result. The interaction between level of education and mother's level of education ($F(1,121)=4,39$, $p=0,04$, $\eta^2=0,04$) was the only variable for which a significant result was observed (see table 4.15). The interaction indicates a significant difference between respondents with a highly educated mother who themselves have a high versus a low level of education. The high education levels combination has significant less appreciation for high-contrast 'forgery' than the combination of low education level with higher educated mother (see figure 4.3).

Table 4.15. *Analyses of (co)variance in condition 4. High-contrast 'forgery'.*

Socioeconomic background variable	**SS**	**df**	**F**	**Significance**
Level of education	0,01	1	0,08	0,78
Father's level of education	0,01	1	0,12	0,73
Mother's level of education	0,13	1	2,11	0,15
Annual household income	0,17	2	1,39	0,25
Sex	0,06	1	0,91	0,34
Age	0,13	1	2,16	0,14
Education * income	0,03	2	0,23	0,79
Education * Education father	0,09	1	1,47	0,23
Education * Education mother	0,27	1	4,39	0,04
Education * Sex	0,11	1	1,69	0,19

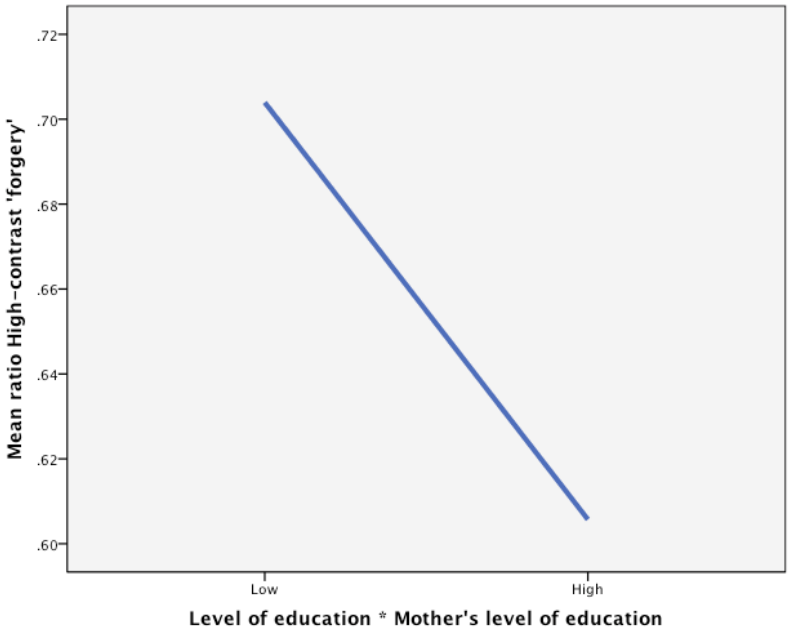

Figure 4.3. Condition 4, *Level of education*Mother's level of education interaction.*

However, multiple comparisons were carried out, which inflates the familywise error rate. Since 10 tests have been carried out for each condition, this error rate results in a 40% chance of a type I error, instead of 5%, with α=0,05. Therefore, to control for this error rate inflation, the Bonferroni correction set the criterion of significance on 0,005. Unfortunately, this caused none of the analyses of variance to yield significant results.

Due to violation of assumptions, the analyses were repeated with non-parametric tests. Although none of the analyses violated the assumption of homogeneity of variance, nearly all distributions were non-normal. Therefore, all the between-group analyses of the four experiment conditions were repeated with the non-parametric *Kruskal-Wallis* test. However, the variable of age was excluded, because no non-parametric test of covariance exists. This was not considered a problem, since age was also used as a control variable in the regression analyses.

These analyses reveal results similar to the parametric tests. None of the variables of socioeconomic background showed group difference in ratio score of the experiment conditions normal-contrast 'original' (table 4.16), high-contrast 'unknown' (table 4.17) and high-contrast 'original' (table 4.18). Again, only the interaction between level of education and mother's level of education showed a significant group difference on the ratio score of preference for high-contrast paintings labelled as 'forgery' (table 4.19). However, this result too disappears when corrected for multiple comparisons.

Table 4.16.

Non-parametric analysis of variance in condition 1. Normal-contrast 'original'

Socioeconomic background variable	**df**	**Chi-Square**	**Significance**
Level of education	1	0,28	0,59
Father's level of education	1	1,23	0,25
Mother's level of education	1	0,10	0,75
Annual household income	2	0,04	0,98
Sex	1	3,36	0,07
Education * income	2	0,50	0,78
Education * Education father	1	0,93	0,37
Education * Education mother	1	0,01	0,91
Education * Sex	1	0,56	0,53

Table 4.17.

Non-parametric analysis of variance in condition 2. High-contrast 'Unknown'

Socioeconomic background variable	**df**	**Chi-Square**	**Significance**
Level of education	1	0,45	0,50
Father's level of education	1	1,93	0,17
Mother's level of education	1	1,01	0,29
Annual household income	2	1,62	0,47
Sex	1	0,11	0,74
Education * income	2	1,21	0,55
Education * Education father	1	0,89	0,37
Education * Education mother	1	2,59	0,11
Education * Sex	1	0,77	0,78

Table 4.18.

Non-parametric analysis of variance in condition 3. High-contrast 'original'

Socioeconomic background variable	**df**	**Chi-Square**	**Significance**
Level of education	1	1,16	0,28
Father's level of education	1	0,33	0,57
Mother's level of education	1	0,11	0,75
Annual household income	2	0,81	0,67
Sex	1	0,29	0,59
Education * income	2	1,18	0,56
Education * Education father	1	0,59	0,44
Education * Education mother	1	1,46	0,23
Education * Sex	1	0,54	0,46

Table 4.19.

Non-parametric analysis of variance in condition 4. High-contrast 'forgery'

Socioeconomic background variable	**df**	**Chi-Square**	**Significance**
Level of education	1	0,02	0,96
Father's level of education	1	0,10	0,75
Mother's level of education	1	3,11	0,08
Annual household income	2	1,99	0,37
Sex	1	0,10	0,75
Education * income	2	0,25	0,88
Education * Education father	1	0,07	0,79
Education * Education mother	**1**	**5,01**	**0,03**
Education * Sex	1	0,15	0,69

4.5. Between-subjects analyses: hierarchical regression analyses

Regressions analyses for each of the experimental conditions were carried out with the variables of familiarity with art. Regression was chosen over single correlation analyses, because of the possibility of suppression. Namely, in a regression model a predictor's beta weight can be greater than the zero-order correlation with the outcome variable, because the possible influences of other predictors are controlled. Also, familiarity with art might come with age and the relative importance of the variables was irreducible from theory. Therefore, regression analyses were conducted with participants' age as a control variable and the familiarity with art variables were added to the model in blocks. 1) The first model tested only age; 2) in the second model familiarity with and knowledge of art were added; 3) in the third model high school art education and art education and art history education were added; 4) and in the final model art consumption and childhood art consumption were added.

The regression analysis with experiment condition 1, normal-contrast 'original', yielded no significant results. The variables of familiarity with art contributed in none of the models to explaining the variance in the ratio score of the experiment condition (see table 4.20). Assumptions of normality, multicoliniarity and homoscedasticity were met. Also, diagnostic statists reveal that the absence of significant results was not caused by undue influence of individual cases on the regression parameters.

Table 4.20.

Experiment condition 1. Normal-contrast 'original' regressed on familiarity with art.

	B	β	R^2	ΔR^2	***P***
Model 1			0,006	0,006	0,39
Constant	0,70				<0,001
Age	-0,001	-0,075			0,39
Model 2			0,025	0,019	0,36
Constant	0,65				<0,001
Age	<-0,01	-0,09			0,31
Interest in art	<0,01	0,14			0,23
Knowledge of art	<-0,01	-0,001			0,99
Model 3			0,028	0,003	0,73
Constant	0,65				<0,001
Age	<-0,01	-0,09			0,34
Interest in art	<0,01	0,15			0,21
Knowledge of art	<-0,01	-0,01			0,93
High school art education	-0,15	-0,04			0,64
Art education	-0,05	-0,02			0,91
Art history education	0,02	0,05			0,72
Model 4			0,032	0,004	0,85
Constant	0,65				<0,001
Age	<-0,01	-0,09			0,31
Interest in art	<0,01	0,17			0,18
Knowledge of art	<-0,01	-0,01			0,94
High school art education	-0,16	-0,05			0,62
Art education	-0,01	-0,02			0,88
Art history education	0,02	0,06			0,69
Childhood art consumption	0,01	0,02			0,86
Art consumption	-0,02	-0,07			0,50

The regression analysis with experiment condition 2, high-contrast 'unknown', yielded no significant results either. None of the models revealed significant explanation of the variance in the ration score of the experiment condition (see table 4.21). Also, prior to

model-insertion, none of the variables showed a significant effect. Diagnostic statistics indicate that the absence of significant results was not caused by influential cases. Also, no noteworthy violations of the assumptions of normality, multicoliniarity and homoscedasticity were observed.

Table 4.21.

Experiment condition 2. High-contrast 'unknown' regressed on familiarity with art.

	B	**β**	***R²***	**Δ *R²***	***P***
Model 1			0,009	0,009	0,27
Constant	0,81				<0,001
Age	<-0,01	-0,07			0,27
Model 2			0,04	0,028	0,18
Constant	0,88				<0,001
Age	<-0,01	-0,09			0,34
Interest in art	<-0,01	-0,13			0,28
Knowledge of art	<0,01	-0,06			0,63
Model 3			0,07	0,032	0,16
Constant	0,90				<0,001
Age	<-0,01	-0,09			0,26
Interest in art	<-0,01	-0,12			0,29
Knowledge of art	<0,01	0,05			0,70
High school art education	-0,16	-0,04			0,66
Art education	-0,06	-0,16			0,21
Art history education	-0,02	-0,05			0,72
Model 4			0,09	0,025	0,13
Constant	0,92				<0,001
Age	<-0,01	-0,09			0,32
Interest in art	<-0,01	-0,16			0,19
Knowledge of art	<0,01	0,05			0,72
High school art education	-0,01	-0,02			0,79
Art education	-0,06	-0,15			0,26
Art history education	-0,02	-0,05			0,73
Childhood art consumption	-0,01	-0,11			0,24
Art consumption	0,06	0,15			0,12

The regression analysis with experiment condition 3, high contrast 'original', yielded no significant results. In none of the models did the variables of familiarity with art contribute to explaining the variance ratio score of the experiment condition (see table 4.22). Also, none of the variables showed a significant effect prior to model-insertion. The absence of noteworthy violations of the assumptions of normality, multicoliniarity and homoscedasticity indicate that the insignificance of the models is not a result of a loss of power. Also, diagnostic statists reveal that the absence of significant results was not caused by undue influence of individual cases on the regression parameters.

Table 4.22.

Experiment condition 3. High-contrast 'original' regressed on familiarity with art.

	B	β	R^2	ΔR^2	***P***
Model 1			0,005	0,005	0,43
Constant	0,81				<0,001
Age	<-0,01	-0,07			.43
Model 2			0,009	0,004	0,76
Constant	0,87				<0,001
Age	<-0,01	-0,06			0,51
Interest in art	<0,01	-0,05			0,67
Knowledge of art	<0,01	0,09			0,46
Model 3			0,031	0,02	0,71
Constant	0,87				<0,001
Age	<-0,01	-0,06			0,52
Interest in art	<0,01	-0,06			0,63
Knowledge of art	<0,01	0,14			0,28
High school art education	0,01	0,04			0,69
Art education	-0,07	-0,19			0,15
Art history education	0,02	0,07			0,62
Model 4			0,050	0,024	0,65
Constant	0,879				<0,001
Age	<-0,01	-0,06			0,49
Interest in art	<0,01	-0,07			0,56
Knowledge of art	<0,01	0,14			0,27
High school art education	0,02	0,06			0,51

	B	β	R^2	Δ R^2	*P*
Model 4 (continued)			0,050	0,024	0,65
Art education	-0,07	-0,19			0,15
Art history education	0,03	0,09			0,51
Childhood art consumption	-0,02	-0,06			0,62
Art consumption	0,08	0,22			0,22

Finally, the regression analysis with experiment condition 4, high contrast 'forgery', yielded no significant results. Neither in the models nor prior to model insertion did the familiarity with art variables contribute to explaining the variance in the ratio score of the experiment condition (see table 4.23). The assumptions of normality, multicoliniarity and homoscedasticity were met, indicating that the lack of results was not due to loss of power. Again, diagnostic statists reveal that the absence of significant results was not caused by undue influence of individual cases on the regression parameters.

Table 4.23.

Experiment condition 1. High-contrast 'forgery' regressed on familiarity with art.

	B	β	R^2	Δ R^2	*P*
Model 1			0,005	0,005	0,44
Constant	0,73				<0,001
Age	<-.001	-0,07			0,44
Model 2			0,040	0,035	0,19
Constant	0,83				<0,001
Age	<-0,01	-0,05			0,53
Interest in art	<-0,01	-0,14			0,22
Knowledge of art	<0,01	-0,05			0,69
Model 3			0,060	0,02	0,31
Constant	0,85				<0,001
Age	<-0,01	-0,07			0,43
Interest in art	<-0,01	-0,13			0,26
Knowledge of art	<0,01	0,03			0,79
High school art education	-0,03	-0,07			0,45
Art education	-0,03	-0,07			0,61
Art history education	-0,05	-0,09			0,52

	B	β	R^2	Δ R^2	*P*
Model 4			0,082	0,022	0,27
Constant	0,88				<0,001
Age	<-0,01	-0,07			0,44
Interest in art	<-0,01	-0,16			0,19
Knowledge of art	<0,01	0,03			0,79
High school art education	-0,02	-0,05			0,61
Art education	-0,03	-0,052			0,69
Art history education	-0,04	-0,07			0,60
Childhood art consumption	-0,08	-0,14			0,26
Art consumption	0,08	0,16			0,36

In summary, none of the regression models in the hierarchical regression analyses yielded significant explanations for the variance in the preference for paintings in the four experiment conditions.

5. CONCLUSION

Results from the 104 analyses performed on the experimental data confirmed six of the eight hypotheses. The within-subjects analyses reveal a less than 0,1% chance of finding the effect of authenticity on art appreciation with a size of η^2=0,47 or larger under the assumption that everything happens by chance and the study is repeated several times (H_0). Therefore, it is safe to assume that authentic artworks are more often than not preferred over their forged counterparts (confirmation of hypothesis 1.0). However, in the observed sample, the effect of authenticity is statistically homogenous and results indicate that variations in the population are random (rejection of hypotheses 1.1 and 1.2). If we were to overlook the Bonferroni correction, then the results reveal less preference for forged paintings with increased contrast by people with a high level of education and a mother with a high level of education than people with a lower level of education combination. Under these extreme circumstances this could be seen as a partial confirmation of the hypothesis that the effect of authenticity positively correlates with people's socioeconomic background (hypothesis 1.1).

The three hypotheses concerning the effect of contrast are all confirmed. The results show a less than 0,1% chance that the found (η^2=0,67) or extremer effect of contrast is findable under the assumption that everything happens by change. Thus, the hypothesis is confirmed that artworks with increased contrast are favored over their lower contrast counterparts (hypothesis 2.0). Also, the effect of contrast is statistically homogenous across the sample, indicating for the population that differences in effects related to indictors of socioeconomic background and familiarity with art are random (hypotheses 2.1 and 2.2).

The results of contrast tests between the results of the individual experiment conditions led to the confirmation of the last two hypotheses. With a less than 0,1% chance of finding these or extremer results under the assumption of randomness, also the hypotheses concerning the authenticity-contrast interaction can be confirmed. Preference for paintings with heightened contrast did increase when they were labeled as 'original' (hypothesis 3.0) and decreased when they were labeled as 'forgery' (hypothesis 4.0). Noteworthy, there was no statistical difference between preference for heightened contrast 'forgery' paintings and normal-contrast 'original' paintings. Also, contrary to its strength without the contrast manipulation, the effect of authenticity added and detracted little, though still significant, from the effect of contrast.

In summary, both contrast and authenticity affect appreciation for paintings, irrespective of people's socioeconomic background and familiarity with art.

6. DISCUSSION

6.1. Limitations

Although all but two of the hypotheses were confirmed, the results should be interpreted in light of the limitations of the experiment and the data. This experiment has resulted in a positive effect for contrast and authenticity on the preference for paintings indifferent to participant characteristics. However, this might be caused by particularities of the experiment design and data composition.

6.1.1. Experiment & stimuli

The stimuli and the design of the experiment have six prominent limitations. 1) Only European and American paintings were used for the experiment. The effect of contrast and authenticity has therefore nothing to say about paintings from non-western cultures or other forms of art. For instance, appreciation for conceptual art (e.g. Duchamp's pissoir) might not be influenced by manipulation of contrast, though more strongly influenced by its authenticity. Thus, this study can only proclaim that contrast and authenticity affect appreciation for European and American paintings.

2) Biases through experimental paradigm. In the experiment, with each stimulus participants had to choose between two variations of one painting. If participants needed to rate each painting individually on a visual analogue scale, there might have been greater differences between participants and the effects of contrast and authenticity might have been weaker. This possibility was indeed considered for this study, though, in order to control for confounding factors, the forced-choice paradigm was still the best option.

3) Relativity and error in measurement and manipulation of contrast. Each painting is unique in its frequency and spatial distribution of luminosity related pixels (i.e. shades of gray), although Adobe Photoshop CS5 only gives the frequency but not the spatial distribution of these pixels. Concretely, paintings might vary in contrasts between adjacent objects in their composition, while measurement reveals no difference. Also, the contrast manipulation was absolute in its configuration of pixels with a particular shade of gray. Because paintings varied in their frequency distribution, the contrast manipulation was different for each painting. On the other hand, this error and relativity was countered by a selection of a wide selection of paintings varying in frequency distribution of shades of gray.

4) Other artwork features might have been altered by the contrast manipulation. It is impossible to alter luminosity contrast in Adobe Photoshop CS5 without also altering colour contrast. Also, the contrast manipulation could have caused gray shades in the

extremities (i.e. blacks and whites) to converge, combining several shapes into one. This might have resulted in added effect, strengthening or weakening the apparent effect of contrast. However, this can be expected to be controlled by variance in gray shades distribution of the paintings and using increased, decreased and normal contrast levels for the experiment.

5) Error in connotation of the authenticity label. The paintings were only labelled as 'original', 'forgery' or 'unknown' with no guaranty that the participants would perceive the connotation. For instance, it was only expected that the paintings with the 'original' label would be interpreted as original artworks, made by proper and respected artists. Therefore, a margin of error in the effect of authenticity of this study is to be expected. On the other hand, none of the participants left comments concerning misinterpretation or disregard of the authenticity label.

6) Participant biases due to obviousness of the experiment. The experiment used straightforward questions, no filler questions were used and in experiment condition 1 the paintings were exactly the same, apart from their label of 'original' or 'forgery'. Also, a collection of 80 original-forgery painting pairs might have seemed unrealistic to participants. This might have lead participants to answer with regard to what they thought the experiment was about, instead of their preference for the paintings. However, no final comments given by the participants confirmed this, making it unnecessary to include this limitation in the formulation of the implications of this study's results.

6.1.2. Data: participants and analyses

The data of the experiment has six limitations that warrant consideration. 1) All the participants resided in the United States of America during their participants and nearly all were born there. A cultural bias towards authenticity might have caused the lack of socioeconomic background differentiation. The same goes for the effect of contrast, though this is theoretically less likely (e.g. Ramachandran & Hirstein, 1999). Therefore, the study's results on the effects of contrast and authenticity can only be credited to people of the United States of America.

2) Small sample size. There were not enough participants to allow for between-group analyses with more than three groups. Although variable binning still resulted in meaningful groups, greater social nuance between participants might have been possible with a larger sample size. Thus, the low number of participants could have caused lack of between-group differences. On the other hand, according to power analyses, enough

participants were included tot detect, for instance, a covariance between age and the effects of contrasts and authenticity. It is therefore more likely that, if they existed, group-differences would be smaller than assumed for the power analyses, which could be observed with a larger sample size.

3) Lack of scores on the familiarity with art variables. This made proper regression analyses of the results of the experiment conditions on the variables of familiarity with art impossible. Only a few of the participants had completed an art or art history college education and even less visited art galleries and museums more than twice a year. Also, familiarity with and knowledge of art were measured by self-report of the participants, making them prone to error. In other words, it is impossible to say the effects of contrast and authenticity are unaffected by people's familiarity with art from this study alone.

4) Violations of the assumption of normality. Initial diagnostics of the data revealed non-normal distribution of the frequencies of the participant scores on the four experiment conditions. Also, the dependent t-tests and analyses of variance showed these violations of the normality assumption. This might have resulted in a loss of power, causing a type II error in the between-group analyses. However, under these circumstances, non-parametric tests should compensate for this loss of power and the increased change of false-negative results.

5) Conservatism of the Bonferroni correction. On several occasions, corrections were necessary for multiple comparisons, to control for the familywise error rate. Although the Bonferroni correction is the most conventional, it is also very conservative (i.e. results in loss of power and increases the probability for type II errors). Therefore, the Bonferroni correction might have caused a false-negative in the only between-group result that was significant prior to adjustment. However, use of other corrections, like the Šidák correction (Šidák, 1967), has a similar effect on the results.

6.2. Implications

In light of the study's results and limitations, it can be said that both contrast and authenticity affect United States citizens' appreciation of European and American paintings. Without physical differences, the paintings that are labelled as the original work will more likely than not be preferred over a forgery, which is in line with expectations (Benjamin, 2008; Bourdieu & Nice, 1980; Bourdieu, 1985) and previous research (Berghman & Van Eijck, 2012; Hawley-Dolan & Winner, 2011). When the paintings vary in level of contrast, the paintings with high contrast will overall receive preference over their lower contrast

counterparts. This is also as expected by theory (Ramachandran & Hirstein, 1999) and previous research (Ewald & Krentz, 2012; Krentz & Earl, 2013; Tinio & Leder, 2009; Van Dongen, 2013).

The effect of authenticity loses potency when it is combined with the effect of contrast (figure 4.2.). Preference for high-contrast paintings increases only slightly when they are labelled as an original work of art; and the high-contrast painting that is described as a fake is still preferred over the low-contrast original. Also, there is no difference in appreciation for authentic paintings with original level of contrast and fake high-contrast paintings. This could be interpreted as evidence for the fundamentality of the effect of contrast. In other words, because the effect of contrast results from a primal biological feature (Ramachandran & Hirstein, 1999) and the effect of authenticity is dispositional (Bourdieu, 1990), it is plausible that the prior has precedence over the later.

6.3. Further research

Deducing from the limitations and implications of this study, several avenues for further research can be suggested. With regards to this particular experiment, it needs to be repeated to confirm its results and gain a reliable indication of the actual effect sizes of contrast and authenticity. Paintings could be categorized in different styles to investigate differences of the effect of contrast and authenticity. Also, to test the extent of the effect of contrast and authenticity, the experiment needs to be repeated with other types of art (e.g. drawings and sculptures) from other cultures (e.g. art from Asia) as stimuli. Finally, to test the extent of differentiation; the experiment needs to be conducted on participant samples from various cultures and levels of familiarity with art.

Similar studies can be suggested with a different design. An evaluation paradigm can be used for a more comprehensive insight in socioeconomic background and art familiarity differences in relation to the effects of contrast and authenticity. Also, the experiment can be conducted on site instead of via computer screen. For instance, asking people to rate the same or physically altered (reproductions of) paintings in a museum and none art related venues (e.g. coffee shops).

Variations of contrast and authenticity should be investigated as well. Next to luminosity contrast, the effect of colour contrast can be investigated. Also, conceptual contrast lends itself for investigation, for example, by increasing or decreasing differences of adjacent shapes (e.g. sharp edges of a rock on a soft edged pillow). Authenticity, on the

other hand, can be investigated by placing an honouring or dishonouring description of the artist next to the painting. Other possibilities are mentioning its owner, location, or monetary value. In light of Duchamp's signed pissoir, controversy and conventionality can also be investigated. For instance, by describing the artworks as (un)conventional and against or in line with the current fashion.

In short, the possibilities for further research are legion.

6.4. Closing remarks

One can speculate on the results from this study. If the results can be generalized, then they reveal that a museum or gallery does not only display art, but it also, through the connotation of authenticity (Dutton, 2003), increases its hedonic value. Labels describing the artwork are therefore not only informative. Everything, from the type of location to the kinds of other people that are looking at it, could be capable of increasing or decreasing the appreciation of the viewer. On the other hand, variations in background or the illumination could increase or decrease contrasts in a painting, which changes its hedonic value. Also, changes in contrast in a photograph or how a painting is restored could influence the appreciation of those that perceive it.

The former effects are expected to be a product of social interaction, while the later should be the results of evolution. This paradox might find its solution in our shared biology, with a universal basis and a capacity to internalize and share experiences, which guide evaluation of future events (Damasio, 2000; 2004; 2006). In other words, the appreciation of visual art is a product of both neurological and social mechanisms, which could be two sides of the same coin. Therefore, and interdisciplinary perspective is necessary – one that incorporates both neuroscience and cultural sociology – if a comprehensive understanding of art appreciation and culture in general is to be attained.

7. BIBLIOGRAPHY

Appenzeller, T. (1998) ART: Evolution or Revolution? *Science,* 1451

Benjamin, Walter. (2008[1936]). *The work of art in the age of its technological reproducibility, and other writings on media*. Cambridge, MA: Belknap Press.

Benton, J. R., & DiYanni, R. (2012). *Arts and Culture: An Introduction to the Humanities* (4 ed., Vol. 2). New Jersey, Verenigde Staten: Prentice Hall.

Berghman, M. (2013). *Context with a capital C. On the symbolic contextualization of artistic Artefacts.* (PhD. Thesis). KU Leuven, Leuven

Berghman, M., & van Eijck, C.J.M. (2009). Visual arts appreciation patterns: Crossing horizontal and vertical boundaries within the cultural hierarchy. *Poetics* , 348–365.

Berghman, M., & van Eijck, C.J.M. (2012). Beeldende Kunst in een Symbolisch Context. In M. Elchardus, *Cultuursociologie Buiten de Lijnen* (pp. 349-367). Arnhem: Terra - Lannoo.

Bourdieu, P. (1985). The market of symbolic goods. *Poetics, 14*(1), 13-44.

Bourdieu, P. (1990). *The Logic of Practice*. Redwood: Stanford University Press

Bourdieu, P. (2013). *Distinction: A social critique of the judgement of taste*. routledge.

Bourdieu, P., & Nice, R. (1980). The production of belief: Contribution to an economy of symbolic goods. *Media, Culture & Society, 2*(3), 261-293.

Bourdieu, P., & Passeron, J. C. (1990). Reproduction in education, society and culture. London: Sage.

Bryson, B. (1996). " Anything but heavy metal": Symbolic exclusion and musical dislikes. *American Sociological Review,* , 884-899.

Chan, T. W., & Goldthorpe, J. (2007). Social stratification and cultural consumption: The visual arts in England. *Poetics* , 168–190.

Damasio, A. (2006). *Descartes' Error.* London: Vintage

Damasio, A. (2000). *The Feeling of What Happens.* London: Vintage

Damasio, A. (2004). *Looking for Spinoza.* London: Vintage

DiMaggio, P. (1987). Classification in Art. *American Sociological Review* , 440-455.

DiMaggio, P. (1997). Culture and Cognition. *Annual Review of Sociology,* 263-287

Dutton, D. (2003). Authenticity in art. *The Oxford handbook of aesthetics*, 258-274.

Ewald, O., & Krentz, U. (2012). Beauty and Beholders: Are Past Intuitions Correct?. *Essays in Philosophy*, *13*(2), 5.

Field, A. (2009). *Discovering Statistics Using SPSS.* SAGE Publications Ltd, London.

Fine, G. A. (2003). Crafting authenticity: The validation of identity in self-taught art. *Theory and Society*, *32*(2), 153-180.

G. & C. Merriam Co. (1976). *Webster's Third New International Dictionary .* Encyclopaedia Britannica, Inc.

Griswold, W., Mangione, G., & McDonnell, T. E. (2013). Objects, Words, and Bodies in Space: Bringing Materiality into Cultural Analysis. *Qualitative Sociology*, *36*(4), 343-364.

Handler, R. (1986). Authenticity. *Anthropology today*, *2*(1), 2-4.

Hawley-Dolan, A., & Winner, E. (2011). Seeing the mind behind the art people can distinguish abstract expressionist paintings from highly similar paintings by children, chimps, monkeys, and elephants. *Psychological Science, 22*(4), 435-441.

Hekkert, P., & Van Wieringen, P. C. (1990). Complexity and prototypicality as determinants of appraisal of cubst paintings. *British Journal of Psychology,* 483-495.

Hekkert, P., & van Wieringen, P. C. (1996a). The impact of level of expertise on the evaluation of original and altered versions of post-impressionistic paintings. [nog geen bron] *Acta Psychologica, 94*(2), 117-131

Hekkert, P., & Van Wieringen, P. C. (1996b). Beauty in the eye of expert and nonexpert beholders: A study in the appraisal of art. *The American Journal of Psychology*, 389-407

Kawabata, H., & Zeki, S. (2004) Neural Correlates of Beaty. *Journal of Neurophysiology,* 1699-1705

Kitayama, S., Duffy, S., Kawamura, T., & Larsen, J. T. (2003). Perceiving an object and its context in different cultures A cultural look at new look. *Psychological Science, 14*(3), 201-206.

Krentz, U. C., & Earl, R. K. (2013). The baby as beholder: Adults and infants have common preferences for original art. Psychology of Aesthetics, Creativity, and the Arts, , 1-10. doi: 10.1037/a0030691

Lacey, S., Hagtvedt, H., Patrick, V. M., Anderson, A., Stilla, R., Deshpande, G., . . . Sathian, K. (2011). Art for reward's sake: Visual art recruits the ventral striatum. *Neuroimage, 55*(1), 420-433.

Lengger, P., Fischmeister, F., Leder, H., & Bauer, H. (2007). Functiona neuroanatomy of the perception of modern art: A DC–EEG study on the influence of stylistic information on aesthetic experience. *Brain research,* 93-102.

Lin, S., & Thomas, G. (2002). Development of understanding of popular graphic art: A study of everyday aesthetics in children, adolescents, and young adults. *International Journal of Behavioral Development, 26*(3), 278-287.

Lizardo, O., & Skiles, S. (2008). Cultural consumption in the fine and popular arts realms. *Sociology Compass, 2*(2), 485-502.

Locher, P. J. (2003). An empirical investigation of the visual rightness theory of picture perception. *Acta Psychologica, 114*(2), 147-164.

López-Sintas, J., & Katz-Gerro, T. (2005). From exclusive to inclusive elitists and further: Twenty years of omnivorousness and cultural diversity in arts participation in the USA. *Poetics* , 299–319.

López-Sintas, J. L., & Álvarez, E. G. (2004). Omnivore versus univore consumption and its symbolic properties: Evidence from spaniards' performing arts attendance. *Poetics, 32*(6), 471-491.

López-Sintas, J., & Katz-Gerro, T. (2005). From exclusive to inclusive elitists and further: Twenty years of omnivorousness and cultural diversity in arts participation in the USA. *Poetics, 33*(5), 299-319.

MacNeil, H. M., & Mak, B. (2007). Constructions of authenticity. *Library Trends*, *56*(1), 26-52.

McManus, I. (1980). The aesthetics of simple figures. British Journal of Psychology, 71(4), 505-52

Marković, S. (2010). Aesthetic experience and the emotional content of paintings. *Psihologija, 43*(1), 47-64.

Palmer, S. E., & Griscom, W. S. (2012). Accounting for taste: Individual differences in preference for harmony. Psychonomic Bulletin & Review, 1-9.

Paolacci, G., Chandler, J., & Ipeirotis, P. (2010) Running experiments on Amazon Mechanical Turk. *Judgment and Decision Making,* 411-419.

Peterson, R.A., Simkus, A., 1992. How musical tastes mark occupational status groups. In: Lamont, M., Fournier, M. (Eds.), Cultivating Differences. University of Chicago Press, Chicago, IL, pp. 152–186.

Ramachandran, V. S., & Hirstein, W. (1999). The science of art: A neurological theory of aesthetic experience. *Journal of consciousness Studies*, *6*(6-7), 6-7.

Reber, R., Schwarz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality & Social Psychology Review (Lawrence Erlbaum Associates), 8*(4), 364-382.

Reber, R., Winkielman, P., & Schwarz, N. (1998). Effects of perceptual fluency on affective judgments. *Psychological Science, 9*(1), 45-48.

Rentschler, I., Jüttner, M., Unzicker, A., & Landis, T. (1999). Innate and learned components of human visual preference. Current Biology, 9(13), 665-671.

Šidák, Z. K. (1967). Rectangular Confidence Regions for the Means of Multivariate Normal Distributions. *Journal of the American Statistical Association,* 62 (318), 626–633.

Silva, E. (2006). Distinction Through Visual Art. *Cultural Trends* , 141 –158.

Tampubolon, G. (2008). Distinction in britain, 2001–2004? unpacking homology and the 'aesthetics' of the popular class. *European Societies, 10*(3), 403-428.

Tampubolon, G. (2010). Social stratification and cultures hierarchy among the omnivores: Evidence from the Arts Council England surveys. *the Sociological Review,* 58(1), 1-25.

Tinio, P. L., & Leder, H. (2009). Natural scenes are indeed preferred, but image quality might have the last word. *Psychology of Aesthetics, Creativity, and the Arts, 3*(1), 52-56.

Tyler, W. (1999) Is Art Lawful? *Science,* 673-674

Van Eijck, C.J.M.. (2001). Social Differentiation in Musical Taste Patterns. *Social Forces*, 1163-1185.

Van Eijck, C.J.M. (2012). The impact of religious identity and social orientations on visual arts appreciation. *European Sociological Review, 28*(3), 394-407.

Van Eijck, C.J.M., & Knulst, W. (2005). No More Need for Snobbism: Highbrow Cultural Participation in a Taste Democracy. *European Sociological Review,* 21(5), 513-528.

Vartanian, O., & Goel, V. (2003) Neuroanatomical correlates of aesthetic preference for paintings. *NeuroReport,* 893-897

Zeki, S. (2001) Artistic Creativity and the Brain. *Science,* 51-52

8. Appendices

8. 1 Appendix A: Participant instructions

Thank you for participating in this experiment!

This experiment contains digital reproductions of original and forged paintings, and of paintings of which it is unclear whether they are original or forged.

In each trial you will be shown two pictures and will be asked to indicate which one you appreciate more. Do not take too long to judge which picture you like better, if you cannot choose just follow your intuition. Please wait for the entire pictures to finish loading before making a decision.

The entire experiment will take approximately 25 minutes and you are required to complete it without taking any breaks. After you have seen all the pictures a short questionnaire with background questions will follow. Of course, all data will be analyzed anonymously.

If you are ready, please click on the arrow to start the experiment.

8.2. Appendix B: Participant questionnaire

How interested are you in art?

- 1 - 100 on a visual analog scale.

How knowledgeable are you about art?

- 1 – 100 on a visual analog scale.

What is you gender?

- Male
- Female

What year were you born?

- 1900 through 2006

In which country were you born?

- All know countries

In which country do you reside?

- All known countries

What is the highest level of education you have completed?

- Less than High School
- High School / GED
- Some College
- 2-year College Degree
- 4-year College Degree
- Masters Degree
- Doctoral Degree
- Professional Degree (JD, MD)

What is the highest level of education your mother has have completed?

- Less than High School
- High School / GED
- Some College
- 2-year College Degree
- 4-year College Degree
- Masters Degree
- Doctoral Degree
- Professional Degree (JD, MD)

What is the highest level of education your father has have completed?

- Less than High School
- High School / GED
- Some College
- 2-year College Degree
- 4-year College Degree
- Masters Degree
- Doctoral Degree
- Professional Degree (JD, MD)

What is you annual household income?

- Under $20,000.-
- $20,000 - $29,999
- $30,000 - $39,999
- $40,000 - $49,999
- $50,000 - $59,999
- $60,000 - $69,999

- $70,000 - $79,999
- $80,000 - $89,999
- $90,000 - $99,999
- $100,000 - $109,999
- $110,000 - $119,999
- $120,000 - $129,999
- $130,000 - $139,999
- $140,000 - $149,999
- $150,000+

On average, how many hours per week were spent on art during your high school education?

- None
- 1 or less
- 2 to 3
- 4 to 5
- 6 to 7
- 8 or more

To what extent have you studied art after high school?

- I have not
- Between 1 and 3 individual courses
- 2-year College Degree
- 4-year College Degree
- Masters Degree
- Doctoral Degree

To what extent have you studied art history after high school?

- I have not
- Between 1 and 3 individual courses
- 2-year College Degree
- 4-year College Degree
- Masters Degree
- Doctoral Degree

How many times have you visited art galleries and art museums in the last year?

- Not at all
- 1 or 2 times

- Once a month
- Once every two weeks
- Once a week

Until the age of 18, how many times did you annually visit art galleries and art museums with your parents or other family members? (give overall average)

- I don't know
- Not at all
- 1 or 2 times
- Once a month
- Once every two weeks
- Once a week

Thank you for your participation! If you have any comments please type them in the box below.