UNIVERSITY OF ECONOMICS IN BRATISLAVA

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EFFECT OF MERE EXPOSURE ON SUBJECTIVE PREFERENCES ON ART MARKET

Diploma Thesis

2018 **Marian Tarnavskyi**

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Thesis Supervisor: doc. Ing. Jana Péliová, PhD.

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Anotácia: The Prospect theory defines several phenomena, such as anchoring effect or aversion to losses, which cause deviations from rational behavior of economic agents. Using experimental methods Thesis evaluates the impact of selected behavioral factors on financial decision making.

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Announcement

I confirm, that all literature sources which I used in writing of this thesis are listed in the part "Bibliography" at the end of this document.

ABSTRACT

Have you ever walked around the work of art renowned as a classic, struggling to understand the outstanding price, which critics and general public attribute to it? The current study presents empirical evidence on the impact of mere exposure on subjective preferences towards visual art in the environment, approximated to the real-world art auction setting. Following an extensive literature research, an elaborated experimental design was developed. In accordance to our predictions, the experimental data suggests the 17.5% increase in bidding on the previously exposed art piece, comparing to the control group. Further statistical analysis indicates the low-to-moderate link between the key variables. Based on the experimental data, a logistic model was developed, revealing several important relations between the variables. Research results are discussed in the context of different theoretical approaches to the mere exposure effect with further speculation on practical implications of the study in public and private sectors. The paper is characterized by the following: 83 pages, 2 parts, 8 figures, 7 tables, 7 appendices.

JEL Classification: C91; G41; Z11

Key Words: *mere exposure*; *experimental economics*; *behavioral finance*; *art market*

ABSTRAKT

Už ste niekedy prešli okolo klasického umeleckého diela a snažili ste sa pochopiť vysokú cenu, ktorú mu pripisujú kritici a široká verejnosť? Uskutočnená štúdia poskytuje empirické dôkazy o vplyve jednoduchého vystavenia na subjektívne preferencie týkajúce sa vizuálneho umenia v prostredí, ktoré sa približuje skutočnej aukcii umeleckých diel. Na základe rozsiahleho prieskumu odbornej literatúry sme vyhotovili pokročilé experimentálne riešenie. Údaje experimentálneho charakteru v súlade s našimi predikciami naznačujú, že výška ponúkanej ceny za umelecké dielo, ktorému bola skupina respondentov vopred vystavená, narástla o 17,5% v porovnaní s kontrolnou skupinou. Bližšia štatistická analýza poukazuje na nízku až strednú úroveň spojitosti medzi kľúčovými premennými. Na základe experimentálnych údajov bol navrhnutý logistický model, ktorý odhaľuje niekoľko dôležitých závislostí medzi jednotlivými premennými. Výsledky výskumu uvádzame v kontexte rozdielnych teoretických prístupov k jednoduchému efektu vystavenia s dodatočnou úvahou o praktických dôsledkoch štúdie vo verejnom a súkromnom sektore.

Klasifikácia JEL: C91; G41; Z11

Kľúčové slová: jednoduché vystavenie, experimentálna ekonómia, behaviorálne financie, umelecký trh

Contents

List of Figures and Tables

List of Abbreviations:

EC – Experimental Currency

FPSBA – First-Price Sealed-Bid Auction

FPSB – First-Price Sealed-Bid

PCC – Pearson Correlation Coefficient

TEFAF – The European Fine Arts Foundation

Introduction

Have you ever walked around the work of art renowned as a classic, struggling to understand the outstanding price, which critics and general public attribute to this art work? If so, you have probably asked yourself, how does work of art come to be widely recognized? This question is especially relevant in modern times, when the global art market has reached the record historical value of €51 billion in 2014 (Barrett and Aglionby, FT, 2015), and after a corrective dynamic in recent years, starts showing positive trends of growth once again (TEFAF and Pownall, 2017). Media headlines are imbued with announcements of art pieces sold at record values, with a recent example being $450.3 million paid for "Salvator Mundi" by Leonardo Da Vinci in November 2017 (Crow, WSJ, 2017). So what may alleviate the price of art to such extend?

A large number of prior academic research (Cutting, 2003; Cutting, 2007; Kruglanski et al, 1986; Kunst-Wilson & Zajonc, 1980; Reber et al., 1998; Furnham and Walker, 2001; Leder, 2001; Brickman et al, 1972; Hekkert et al, 2003; etc.) claims that subjective preferences towards a visual object are affected by phenomenon known as mere exposure effect, which was first introduced formally by Robert B. Zajonc in his seminal 1968 work. Importantly, if such a phenomenon takes place, it would be reflected on the price formation on art markets. In this paper, we will explore the impact of the mere exposure effect on subjective preferences towards art objects, in context of art market environment. With this purpose, after a thorough literature research, an elaborated experimental design was created and its outputs modeled, analyzed and discussed.

The first part of the paper will provide an extensive analysis of the theoretical knowledge in the related areas. Given the complexity and cross-disciplinary character of the study, the research question will be approached from multiple perspectives, corresponding to the chapters in the Theoretical Part of the research: mere exposure effect in context of cognitive psychology; mere exposure effect in behavioral economics and finance; mere exposure effect and aesthetic preferences towards visual objects; general characteristic of price formation and profitability on the art markets.

In the third part of the paper, we discuss methodological aspects of the present research and provide a detailed explanation for the experimental design. After that, we will turn to the analysis and discussion of the key experimental findings, and then conclude by providing some practical and policy implications of the research results as well as certain directions for the further research in the area.

1. Literature Overview

1.1. Mere Exposure Effect

In 1968, Robert B. Zajonc has published a study, revealing that repeated exposures to visual neutral stimuli, such as unfamiliar words and Chinese characters, led to those stimuli being rated more highly on Likert scales than similar stimuli that had never been exposed. Asked to guess the meaning, the more times subjects saw a specific character the more positive meaning they assign to it. The results, clearly violated the classic notion of a rational behavior. Zajoc (1968) himself defined this peculiar phenomena: "Mere repeated exposure of the individual to a stimulus is a sufficient condition for the enhancement of his attitude toward it. By 'mere exposure' is meant a condition which just makes the given stimulus accessible to the individual's perception."

With the publication of Zajonc's (1968) work, the exposure effect became a topic of investigation in mainstream psychology (Bornstein, 1989). However, evidence of the mere-exposure effect was available even before Zajonc's renown work throughout 1960s. For instance, British psychologist Edward B. Titchener has documented a similar phenomenon and speculating on the "glow of warmth" felt in the presence of familiar stimuli (Titchener, 1910). Maslow (1937) conducted a series of experiments concluding that "in general, sheer repetition […] causes a greater liking for the familiar thing or activity".

Such phenomenon was later named the *mere exposure effect*, although terms *exposure effect* and *familiarity principle* may also be found throughout the literature, marking the identical concept[1].

As it will further be elaborated on, Zajonc's experimental concept has been repeated countless times with many sorts of variations, such as changing stimulus type, stimulus complexity, presentation sequence, exposure duration, stimulus recognition, etc. The effect holds across various perception types (e.g., Jakesch and Carbon 2012, Pliner 1982, Anand, Holbrook, and Stephens 1988). The evidence exists on the effect's impact in various domains, e.g. social judgements (Moreland and Zajonc, 1982), brand attitudes and advertisement (Ruggieri and Boca, 2013; Janiszewski, 1993; Janiszewski and Meyvis, 2001; etc.), aesthetic preferences (Reber, Schwarz and Winkielman; 2004). The mere exposure effect has been witnessed across cultures (Smith & Bond, 1993) and even across species (e.g., Zajonc et al, 1974; Zajonc et al, 1975). The extensive research on the issue, has established the mere-exposure effect as a robust and important social psychological phenomenon (Harrison, 1977), which endures as a fairly replicable (Bornstein, 1989).

[1] The given terms will be used interchangeably in the given paper

The amount of academic research spawned to tackle the problematics of the mere exposure effect during 1968-1987 allowed Robert F. Bornstein to conduct a meta-analysis of 134 articles in 1989. Such an approach enabled to perform a systematic examination on how certain methodological and subject variables (e.g., stimulus complexity, exposure sequence and duration, stimulus recognition, age of the subjects, etc.) impacted the "exposure-effect relationship". This, in turn, allowed to create a solid foundation for assessing the theoretical models explaining the phenomenon. Bornstein (1989) highlights the notion that, after the publication of Zajonc's (1968) monograph, majority of studies conducted in the area utilize methodologies, which are similar and/or derived from Zajonc's methods and procedures, reducing between-studies variance and enabling the use of meta-analysis techniques.

Among the other findings, Bornstein (1989) argues that stimuli perceived without awareness produce substantially larger exposure effects than do stimuli that are consciously perceived. Also, the author reveals an inverse relationship between stimulus recognition accuracy and the magnitude of the effect. These findings contributed to the increased research in the area of unconscious stimuli in the following years.

We may consider Bornstein's (1989) meta-analysis in itself to be an important and comprehensive contribution to the academic discourse on the exposure effect. However, the author articulates the questions, that remained insufficiently addressed: "Although Zajonc (1968) suggested that mere exposure will result in an increase in positive affect toward a stimulus, he did not specify the dimension in which this hypothesized affective reaction will be manifest". The amount of studies addressing this issue (e.g., Kail & Freeman, 1973; Saegert & Jellison, 1970; Zajonc, Crandall, et al., 1974; Zajonc, Markus, et al., 1974) was not sufficient at the time for making justifiable conclusions. Therefore, it was not completely clear, in which way the "positive affect towards a stimulus would be manifested" (Bornstein, 1989): would the repeated exposure contribute to stimulus' increase in likability, goodness, fairness, etc., or the combination of these? Second important issue, evoked by Bornstein (1989) is how and why the exposure effect occurs.

Approaching these last questions through research of the relevant literature, we may conclude that neither the nature of the affect generated nor the process whereby preference for a stimulus increases as a function of repeated exposures is fully understood.

Among the explanations for the mere exposure effect that are widely discussed, we may consider the following two rival theoretic approaches: the set of two-factor models (nonspecific activation model, familiarity-attribution model, fluency-attribution model) an a dual-process theory.

A *dual-process theory* (Groves and Thompson, 1970), also called an uncertainty reduction account (e.g., Lee, 2001), approaches the sources of mere exposure effect from a different prospective. The classical dual-process model claims that the perceptual fluency may be determined by a function of sensitization and habituation. Sensitization builds up throughout initial exposures to a stimulus, after a certain point, declines with each consecutive exposure. Habituation, in its turn, is a response that increases at a marginally decreasing rate with each consecutive exposure. Habituation factor is influenced by stimulus intensity (less intense stimuli cause stronger, and more rapid, habituation) and the interval between exposures (low interval accelerates the habituation process).

The dual-process hypothesis assumes that different stimulus complexities would lead to different extent of processing fluency (Groves and Thompson, 1970). The studies exist that confirm such allegation. For instance, Shapiro (1999) observes a change of processing fluency by manipulating the complexity of a product display (i.e. by adding an inconsistent background scene).

Lee (2001) hypothesized that, with an increase of exposure frequencies, subjects would become increasingly aware of the manipulation with exposure, adjusting their previously misattributed assessment. If the mere exposure effect was based purely on the misattribution account, then a parallel patter of adjusted assessment would be observed. Otherwise, if uncertainty reduction is playing role in the phenomenon, the affective assessments would be even more elevated. Experimental results by Lee (2001) asserted that misattribution account may be accountable for exposure effects in the cognitive judgements domain, but not in affective judgements domain (effectively confirming the second part of the hypothesis). Such results are reminiscent to those of Newell and Shanks (2007), who rejected the correction hypothesis.

A different theoretical approach to explaining the mere exposure effect assumes that the processing manipulations (e.g., exposure) lead to a change in the cognitive perception of a stimulus, it often called *two-factor model* in the literature. *Nonspecific activation model*, *familiarity-attribution model*, *fluency-attribution model* belong to the category of two-factor models.

The *nonspecific activation* hypothesis (Mandler, Nakamura, & Van Zandt; 1987) assumes that manipulations with stimuli exposure do not evoke any affective reactions, but "merely produce the grater accessibility" for the manipulated stimuli by creating and activating a cognitive representation of it. Consequently, such representation may be linked to any judgement related to the stimulus. The *familiarity-attribution model* (Bonanno and Stiller; 1986) presumes that processing manipulations with a stimulus may evoke a sense of familiarity, which is considered to

be affectively neutral. Still, depending on the context, such feeling of familiarity may influence an array of judgmental decisions.

Perhaps the most well-known explanation for the mechanism of mere-exposure effect would be the *fluency-attribution model* (Bornstein and D'Agostino, 1994), also known as *perceptual-fluency account*. This theory is sometimes called a "two-step account of the mere-exposure effect" in the literature, although, such description may be applied to a broader set of theories (Winkielman and Cacioppo, 2001).

According to the perceptual-fluency account, previously presented stimuli are easier to encode and process than are novel or unfamiliar stimuli. In addition to this, after the stimulus is exposed a number of times to the subject, he/she will usually be unaware of their enhanced ability to process the stimulus. Therefore, this ease of processing is interpreted by the individual as liking (Bornstein & D'Agostino, 1994), triggering the exposure effect.

After reviewing a number of previous studies, Robert Zajonc (Zajonc, 1980) concluded that affective processing may operate separately from cognitive processing (i.e., emotions can be influenced when no conscious processing has taken place). Later, these findings were replicated, and the theory developed by the following studies (Saemon et al, 1983(a); Saemon et al, 1983(b); Bornstein and D'Agostino, 1994; etc.).

In their 1981 study, Larry L. Jacoby and his colleague Mark Dallas (1981) conducted 6 experiments, reinforcing the belief, that repeated exposure of a stimulus increases not only perceptual recognition and recognition memory, but also perceptual fluency. Such results argue in favor of the first part of the perceptual-fluency account (i.e. previously presented stimuli are easier to process). Interestingly, the authors approach the issue of perceptual recognition and perceptual fluency from a slightly different angle, leaving the academic discourse on exposure effect out of their focus.

Larry L. Jacoby and his colleagues studied dissociation of memory and awareness through the patients with Korsakoff's syndrome (Jacoby, 1983; Jacoby and Witherspoon, 1982; etc.). "Amnesiacs reveal savings in their objective performance of a task even though they are not aware of remembering". Subsequently, Jacoby and Witherspoon argue that dissociation between of memory and awareness is revealed in "normal" subjects as well (Jacoby and Witherspoon, 1982).

In the context of the second part of the perceptual-fluency account (i.e. relation between perceptual fluency and increase in "liking"), we may turn to Reber et al (1998), Winkielman and Cacioppo (2001), Whittlesea (1993) and others. For instance, Reber et al. (1998) suggest that perceptual fluency, manipulated by means, other than repeated exposure, should also result into

increase in liking. The authors present the results of three experiments, that relied on three distinct ways to facilitate the recognition of the stimulus (visual priming, figure-ground contrast, exposure duration), concluding that the preference for neural stimuli may be influenced by manipulations other than stimulus repetition.

Winkielman and Cacioppo (2001) asserted the close link between processing dynamics and affect. The authors conducted two experiments, exposing their subjects to series of neutral visual stimuli, while manipulating their processing ease and assessing the affective reactions with facial electromyography (EMG). The results support a connection between a high fluency and positive affective reactions.

For a classical example of a study, asserting the fluency/attributional model, we may turn to Bornstein and D'Agostino (1992). In two experiments, nonrepresentational stimuli (polygons or "Welsh figures") as well as representational stimuli (i.e. photographs of college-age women) were exposed to the subjects at different exposure frequencies: subliminal-level frequency (duration of the exposure: 5 milliseconds) and supraliminal-level frequency (i.e. optimal for the conscious perception: 500 milliseconds). During the second phase of the experiment, the subjects made liking and recognition judgements, presented with a pair of visual images: one, that was exposed to them, and second, which has never been presented to them.

At subliminal levels, stimuli are presented so rapidly that it would appear as though the subjects had seen nothing at all (Bornstein and D'Agostino, 1992). Therefore, presented with a stimulus, which was exposed at subliminal levels, subjects could not recognize it. However, the liking ratings for previously presented stimuli were significantly higher than those for the new stimuli.

Interestingly, even though, at supraliminal levels, subjects could indicate which stimulus they recognized, the liking ratings between previously presented stimuli and new stimuli did not differ. According to Bornstein and D'Agostino's hypothesis, at the supraliminal levels, subjects could readily attribute their perceptual fluency to the greater number of previous exposures. The subjects' brains automatically adjusted their liking ratings, and the mere exposure effect did not trigger. Therefore, at the subliminal levels, subjects cannot identify the source of their perceptual fluency, so they would misattribute it as a greater liking. Alternatively, as noted by the authors, supraliminal stimulus simply become boring for the participants, resulting in lower ratings on the scale of liking.

Certain following studies (e.g., Monahan et al, 2000; Winkielman and Cacioppo, 2001; Newell and Shanks, 2007; Wänke and Hansen, 2015; Graf and Landwehr, 2015; Topolinski and Strack, 2009) questioned the validity of the fluency-attribution model, or proposed different approaches towards its elements. For instance, Winkielman and Cacioppo (2001) has proposed the *hedonic*

fluency model. It claims that processing facilitation, evoked by means like repeated previous exposure, elicits a genuine affective reaction, which is, most importantly, positive (hence, authors call their model a "hot" account). This aspect goes in contrast with the previously mentioned model, which assumed that the change in experienced reaction after the processing facilitation has no genuine affective consequences (i.e. are neutral). Winkielman and Cacioppo (2001) hypothesized that more fluent stimulus processing may be hedonically marked (i.e. characterizing pleasure) because it may indicate on a positive dynamic either within a cognitive system, or in the world. Further, the authors assumed that any effects on subjective judgement resulted from the processing ease shall be dependent on a judgmental context. Therefore, processing ease in a "positive context" would enhance positive perception of a stimulus and vice versa. The validity of the *hedonic fluency model* by Winkielman and Cacioppo (2001) was further supported by studies like Fang, Singh and Ahluwalia (2007), but questioned in more recent studies (Montoya et al, 2017).

Relative Processing Fluency prospective (Wänke and Hansen, 2015) predicts that, perceptual fluency is most evident, when it is experienced apart from a comparison standard. In other words, the current level of an experiential state of the subjects may have less of an impact on judgments than its change from an initial level (Wänke and Hansen, 2015). The authors provide the main reasons for such hypothesis. Given the informative value of the fluency mechanisms that represent certain cues helping us navigate in the environment (for discussion, see e.g. Schwarz & Clore, 2007), such cues must be detectable. As they would need to stand out against all other stimuli in the environment. Thus, identification of the relevant cues, through the mechanisms of fluency serves an adaptive purpose. So far, only a few studies included variables relevant to this hypothesis, preventing proper evaluation of the relative processing fluency model (Montoya et al, 2017).

According to *embodiment theory*, fluency is enhanced by repeated simulation of motor responses specifically associated to a stimulus (Topolinski and Strack, 2009). Through the repeated exposure such motor responses become more and more trained, and thus – increasingly fluent. For instance, exposure to words triggers the motoric response mechanisms related to reading and pronouncing those words. Topolinski and Strack (2010), acting in the framework of the embodiment theory, managed to neutralize exposure-induced fluency by blocking the sources of fluency variations (e.g., covert pronunciations for verbal stimuli), thus reassuring the validity of the theory.

Topolinski (2012) argues that while stimulus-specific motor simulations (or *reenactments*) play an important role in functioning of implicit memory and familiarity, such process occurs independently of subjective recollection. Author managed to provide evidence for such hypothesis by achieving an experimental environment, were mentally sane participants would recognize the

stimulus without showing physiological responses associated with familiarity. Noteworthy, not all recent studies support such an approach (e.g., Montoya et al, 2017).

Monahan and his colleagues (2000) conducted two experiments in attempt to examine potential *diffuse* effects, created by the exposure effect, conducting two experiments. As a result, they created a new theory explaining the mechanism of how the mere exposure effect occurs. In their first experiment, Monahan et al. divided subjects in two groups: *single exposure condition* and *repeated exposure condition*. In the first group, subjects saw 25 different subliminal stimuli, shown for a single instance each, while subjects in the *repeated exposure condition* saw 5 different subliminal stimuli, five times each. Then participants were asked to assess their mood state (no reference to stimuli was made). Subjects in the *repeated exposure condition* reported themselves to be in a more positive mood on average than those in the single exposure condition. Hence, the authors created a hypothesis, by which a mere repetition of stimuli was sufficient for enhancing the mood of the subjects. This "diffuse happiness" may consequently be projected on the stimuli, triggering the exposure effect.

With the aim of testing this hypothesis, Monahan and his colleagues (2000) conducted a second experiment with the identical exposure conditions. However, in the second phase of the experiment, subjects were asked to rate different types of stimuli: previously exposed at a subliminal level (*old*); new stimuli, that resembled the *old* (*novel similar*); and novel stimuli, that were unrelated to the *old* (*novel different*). In both exposure conditions (i.e. at *single exposure condition* and *repeated exposure condition*) the *old* stimuli obtained the highest ratings, followed by the *novel similar* and the *novel different* on the last place.

Monahan et al (2000) argue, that although the perceptual fluency/attributional model may explain the results of the second experiment, it can't account for the fact that in the *repeated exposure condition* test group all types of stimuli obtained a higher score in comparison with the *single-exposure condition* test group. Based on such observation, the authors claim that the *diffuse happiness*, created through repeated exposure, enhance the liking of all stimuli, regardless of whether previously experienced or not. But still, the effect is amplified in case of previously exposed stimuli and for those similar to the previously exposed.

Butler, Berry and Helman (2004) highlight distinctions between the seemingly related phenomena: mere exposure and repetition priming. According to the authors, and also following the argument of Tulving and Schacter (1990), a repetition priming is a phenomenon, which characterizes a facilitation in processing previously exposed stimuli. Butler et al (2004) initially assumed that the mere exposure effect constitutes an example of repetition priming. According to

the empirical data, gathered by the authors, the mere exposure effect can't be triggered with the real words, unlike in case of the repetition priming.

Furthermore, s single exposure is sufficient to enable repetition priming but not mere exposure. Conversely, whereas increasing the number of study exposures seems to have relatively little effect on repetition priming (Jacoby & Dallas, 1981 - cited in Butler et al, 2004), there is evidence that the same manipulation seems to increase the size of the mere exposure effect (e.g., Bornstein & D'Agostino, 1992), albeit nonlinearly (Bornstein, 1989). Given these aspects, Butler et al (2004) claim that mere exposure may constitute "a special affective form of repetition priming".

In spite of numerous attempts to describe a comprehensive model capturing the mechanisms triggering mere exposure effect, no common academic consensus was established. Furthermore, in a fresh meta-analysis, published by Montoya et al (2017), the authors argue that none of the existing models can adequately account for the new findings in the area. Montoya et al (2017) expanded on Bornstein's (1989) methodology and conducted a meta-analysis of 268 curve estimates from 81 scientific papers. The authors reasserted the positive slope and negative quadratic effect of the mere exposure effect for the visual stimuli that were exposed for the duration of less than 10 seconds or more than 1 minute.

The evidence exists on the cases when repeated exposure of stimuli leads to less liking. Such an effect may be observed in several cases. The mere exposure effect appears to be the most potent under a mediocre number of exposures, after 10-20 instances of exposure the change in attitude slows (e.g., Zajonc, Shaver, Tavris, & Van Kreveld, 1972; Bornstein, 1989; Bornstein, Kale, & Cornell; 1990). Some researchers have argued that decrease in liking accelerates (and may be even reversed) beyond a certain *boredom threshold* (Kail & Freeman, 1973). Bornstein, Kale, & Cornell (1990) explain three dimensions of such boredom threshold: a) complexity of a stimulus (relatively simple stimuli become boring more quickly than do complex ones); b) exposure redundancy (the exposure effect is enhanced by use of brief exposures); c) number of exposures (downturn in affect after 10-20 exposures).

Another setting, under which repeated exposure would lead to decrease in affective feelings towards the stimuli was identified by Brickman, Redfield, Harrison, and Crandall (1972). In the first experiment (Brickman et al, 1972), undergraduate-subjects were exposed to an audio segment of a rock-and-roll song from the 1960s, at varying number of exposures (0 up to 10 times). After this, the subjects listened to a 3-5 sec fragment of the given song and were asked to rate their satisfaction with it. Surprisingly for the authors, higher number of exposures lead to decrease in liking. After the

experiment, the researches noticed that many of the participants expressed the dislike of the "antiquated" style of the musical compositions used in the study.

The results of the first experiment inspired Brickman et al (1972) to create a hypothesis, which would be tested in their following experiments. According to the hypothesis, initially negative attitude towards the stimulus may be intensified by the repeated exposure. In order to test this theory, the authors created a new experimental setting, under which participants were exposed to abstract paintings, that they have previously rated (either positively, neutrally or negatively). The outcome of the experiment confirmed the working hypothesis: participants with neutral or positive attitude towards the painting have had their affection enhanced, following the exposure, while the participants with a negative initial attitude towards the stimulus came to appreciate the painting even less in course of the experiment[2].

The *negative mere exposure hypothesis* was supported by other research like Perlman and Oskamp (1971); Crisp, Hutter and Young (2009). However, Zajonc, Markus, and Wilson (1974), rejected the hypothesis. They claimed that in experimental studies like Brickman et al (1972) the exacerbation of negative attitude was obtained via association, hence dissatisfying the basic conditions for the mere exposure.

1.2. The Role of Mere Exposure Effect in Financial Decision-Making

Psychological theory has the potential to inform and direct economic research (Alter and Oppenheimer, 2006). Still, there is a demand for more theoretical approaches and testing of the effects of feelings on financial decisions and aggregate outcomes of these decisions (Hirshleifer, 2015). As it was established in previous chapter, the mere exposure phenomenon is related to the concept of cognitive fluency. A set of literature exists on the topic of cognitive fluency playing role in the investment and financial decision making. We shall approach this issue from a prospective of a phenomenon known as *home bias*.

From the prospective of classical theory, a rational investor would certainly benefit from international diversification of his/her assets. In reality we observe a substantial deviation from such notion, as people tend to invest into familiar, ignoring the basic principles of the portfolio theory. Kang and Stulz (1997) noted that that even though the barriers for international investing have been decreased dramatically, the number foreign shareholders was still limited and considerably smaller than one could expect. After analyzing the foreign stock ownership in Japan for the period from 1975 to 1991, the authors concluded that a strong bias towards investing into a home country

[2] Such hypothesis is supported by more recent study of Meskin et al (2013).

existed. We may come across similar findings in other papers, including the regional-level investing (e.g., Coval and Moskowitz, 1999; Feldstein and Horioka, 1980).

Some studies highlighted the notion that the existing explicit investment barriers (otherwise called *transaction costs*) are no longer big enough to account for the observable portfolio investment allocation (e.g., French and Poterba, 1991; Cooper and Kaplanis, 1994; Tesar and Werner, 1995). Therefore, an increasing number of authors started pointing at the implicit barriers for investing, like political risk differences across countries (e.g., Kang and Stulz, 1997) and information asymmetries (e.g., Low, 1993[3]; Merton, 1987). At the time, the "Economist" magazine has published an article named "Stay-at-home shareholders" (1996), which claimed that since many of the factors hampering foreign investments (e.g., capital controls, opaque market conditions, etc.) have been failing, especially in the emerging markets, investors would purchase foreign shares in record numbers. "If they do not, economists may have to diversify into their theories" (the Economist magazine, 1996).

Surveying the investors in Japan and the U.S. in 1989-1990, Schiller et al (1991) were able to present survey evidence, arguing that investors tend to be more optimistic about their own market (i.e. future stock prices) than their foreign counterparts. Kilka and Weber (2000) have reached a similar conclusion after surveying American and German business students. Strong and Xu (2003) documented another instance of such a behavior among the investors.

Huberman (2001) argued that "people simply prefer to invest in the familiar", as investors feel more comfortable putting money in something they can readily recall, see or access. After analyzing the geographic distribution of the stockholders of seven U.S. Regional Bell Operating Companies at the end of 1996, the author concluded that investors do not optimize along objective risk-return trade-offs. The argument of "investors betting on familiar assets" echoes with some other prior theoretical assumptions (e.g., Merton, 1987). We may even go further and assume that "investing into familiar" refers not only to domestic country, but also to domestic regional unit, or the firm, in which investors are employed (e.g., Morgan[4], 1997).

For the theoretical basis for "betting on the familiar" from the behavioral prospective, we may turn to Heath and Tversky (1991) and the *competence hypothesis.* Authors claimed that under a constant judging probability, people preferred the bets in the area where they perceived themselves more knowledgeable and competent. But more importantly in our context, Heath and Tversky (1991) reinforced the idea that the willingness to bet may depend on more than a subjective perception of likelihood.

[3] As cited in Kang and Stulz (1997).
[4] As cited in Huberman (2001).

Consequently, a link between the feeling of familiarity and the perceived risk was clarified (Weber et al, 2005; Borges et al, 1999; Cao et al, 2009, etc.). For an example, Weber et al (2005) established that the familiarity of asset names has strong effect on investors' perceptions of risk (making it lower) and of return (making it higher). Asset name familiarity also affects perceived competence of an investor. The evolutionary basis for such behavior may be that familiar stimuli are usually understood better, thus reducing risk. Or else, subjective feeling of familiarity may be propelled by the prior experience, characterized by absence of adverse consequences of interaction (Hirshleifer, 2015).

Similarly, Richards (2014) claimed that familiarity is one of the factors pushing investors to chase shares with familiar names, in particular, and provoking a set of judgmental biases like halo effect and mere exposure effect. As it was discussed in Section 1.1.3, a widely-accepted hypothesis stipulates that familiarity is caused by the perceptual fluency, the ease of neural processing (i.e. the two-factor theories of mere exposure effect).

For the link between mere exposure effect, subjective feeling of familiarity and subjective valuation process we may turn to Alter and Oppenheimer (2008). The authors claim that in response to uncertainty (e.g., absence of the reference point) that individual faces during the valuation process, he/she relies on the *ubiquitous metacognitive cue of fluency* to determine the value of certain items (i.e. currency, consumable items). In addition to this, Alter and Oppenheimer (2008) concluded that people tend to attribute higher value to the easily-processed goods, than to their less easily processed analogs, which are otherwise identical.

A noteworthy study by Alter and Oppenheimer (2006) investigated the influence of the cognitive fluency on short-term price fluctuation in both laboratory and field environments. The authors found out that "fluently named" stocks (i.e. easier to pronounce or memorize) robustly outperformed "disfluently named" stocks in all experimental instances. In the first experiment, Alter and Oppenheimer (2006) were manipulating the fluency of fabricated stocks by having different groups of subjects estimate the future performance of stocks that had been prejudged (by the other experimental group) to have simple or complex names. The results suggested that the participants anticipated "fluently named" stocks to appreciate, while "disfluently named" ones to fall in price. However, these judgements were made solely on the basis of stock names, without any informational background to support the decision-making process.

Such a considerable deviation from reality may have questioned the validity of the experimental results, therefore the outcome should have been replicated in a more ecologically valid conditions. With this purpose, Alter and Oppenheimer (2006) designed the second study, seeking to

demonstrate that fluency of share's name may serve as a valid predictor of the early performance on the stock market. The authors hypothesized that when a company releases shares for the first time investors do not have much of a relevant diagnostic information in their disposal to back up their investment decisions. Hence, the fluency of the stock's name may be a predictor for its future price developments in a short-term, while over time additional factors are more likely to contribute the price fluctuations.

Testing the given hypothesis, Alter and Oppenheimer (2006) compared the participants' ratings of the stock name complexity with the actual performance of these stocks on the NYSE for one week, six months and one year. As the authors expected, the complexity of share's name could predict its performance at the one-week mark, but was unreliable, when forecasting the six-month and one-year marks. In the third experiment, Alter and Oppenheimer (2006) decided to use only company's three-letter stock ticker code as a predictor of stock's future performance. Consistent with the line of study, shares with pronounceable ticker codes outperformed the other group of stocks in a short-term, although such effect diminished over time.

Alter and Oppenheimer (2006) went as far as claiming that while many economists attempted to develop complex mathematical models predicting short-term price fluctuations for decades (and ultimately failed), their simple, cognitive approach to modeling human behavior would outperform these complex models. Proving the connection between subjective cognitive fluency and price formation is important, since this issue constitutes an element of the research question "what is the influence of the mere-exposure effect on the price formation on the art market".

The specific influence of the *mere-exposure effect* on the financial decision making is also documented by the scientific research as well as the financial practitioners (e.g., Zweig, 2007; Clark, 2015; Hirshleifer, 2015), although it is most often reviewed in a more general context of other behavioral biases (e.g., Hirshleife and Teoh, 2008). As it was mentioned before, at this point it is wildly accepted that the mere-exposure effect prompts a tendency to invest in financial instruments that are somehow familiar to the investor. Often times, such investing behavior, skewed by the attraction to the familiar, may deteriorate the investment returns.

One instance of such behavior was described in the book "Your Money and Your Brain" (Zweig, 2007). The author highlights the notion of the so-called *celebrity stocks*, a term coined up by the American economist David Hirshleifer. These stocks are characterized by overexposure on the market, which would inevitably bring their overpricing and consecutive collapse. Regardless of the good performance from the side of the business issuing these shares, its relatively inelastic stock

won't be able to sustain an increasing number of investors, once the pricing of the shares goes beyond the adequate level. Therefore, "over the long run, familiarity breeds failure (Zweig, 2007)."

Interestingly, celebrity stock tends to underperform the market by two to five percent annually (Clark, 2015). And even this does not prevent many actors on the financial market from ignoring the better-valued alternatives that may not be comfortingly familiar to the investors. Hence, the importance of investment behavior based on reliable and balanced information is emphasized.

Hirshleife and Teoh (2008) draw a line between the mere exposure effect and the availability heuristics (Tversky and Kahneman, 1973) in their impact on the capital markets. The authors hypothesize that both phenomena should influence the participation in markets and the amount of attention that stocks receive in a comparable way. According to Hirshleife and Teoh (2008), mere exposure contributes to the emergence of the so-called *availability cascades,* as repeated exposure to a firm or to a financial transaction would make the interaction more appealing. Availability cascades are defined as "a self-reinforcing process of collective belief formation by which an expressed perception triggers a chain reaction that gives the perception increasing plausibility through its rising availability in public discourse (Kuran and Sunstein, 1999)". The theory of the availability cascades may offer a plausible explanation for market disruptions like security market bubbles and waves of corporate events.

There mere exposure effect may mediate the functioning of financial markets in other ways. For example, the firm performance (i.e. return on assets and cash flows from operations) improves abnormally after its CEO wins a high-profile managerial award, generating long-term positive returns, which are not driven by the endogenous characteristics of the company (Koh, 2011). Other case may be the *celebrity investors* (i.e. investors with exposure on the media), who impact the financial markets and the stock prices, creating a *celebrity premium* - excess return on stocks traded by the celebrity investors (Bay and Amundsen, 2012; Shahidi, 2012). Thirdly, advertising of financial instruments affects investors' fund and portfolio choices, even though the advertisements usually do not disclose the features of the investment, important from the rational viewpoint. Therefore, fund advertisement tends to draw individual investors towards portfolios with higher fees and higher risk (Cronqvist et al, 2006).

Fang and Peress (2009) document the breadth of information circulation and media coverage effects on stock returns: the evidence suggests that stocks with no media coverage have a trading premium, on average, 0.20% per month (somehow reminiscent results in Chan (2003). Such result persists even after accounting for other risk factors (e.g., market size, liquidity, momentum). Authors themselves provide two main explanations on the issue: an *impediments-to-trade*

hypothesis (i.e. media coverage would represent an arbitrage opportunity only if large impediments normally prevent rational agents from trading) and the *investor recognition* hypothesis (Fang and Peress, 2009). The former is of a particular interest in our case, as it stipulates, following the theoretical assumptions of Merton (1987), that in informationally incomplete markets, stocks that are less recognized need to offer higher returns to the investors, in order to compensate their holders for being imperfectly diversified.

The investor recognition paradigm seems to align in its outcome with the intuitive hypothesis related to the exposure effect: if well-exposed stocks have higher demand (e.g., for the reason of increased familiarity), than the less-exposed stocks should offer higher returns in order to stay competitive on the financial market. However, as the research in the field of cognitive psychology suggests, we may want to take into account the context of the media exposure (i.e. positive or negative), number of exposures and other particular factors, in order to distill the effect of the mere exposure in case of media coverage. To my knowledge, no such research was done so far.

1.3. Art Market and Pricing of Art

Markets of art are distinguished from other markets by a unique set of features and characteristics. Most importantly, the art market is characterized by hierarchy of submarkets (Gérard-Varet, 1995). The primary art market constitutes the lowest level of hierarchical structure. The primary market is characterized by excessive supply, as there are more individuals willing to sell the products of their artistic labor, than there are entities (galleries, exhibitions or consumers) seeking to acquire such works. The probability that a creator's work will transfer from primary to secondary market is also low (Singer, 1990). The secondary market is more concentrate, with relatively smaller number of established artists' works, promoted by galleries, auction houses, individual dealers, on one side and private or public collectors on the other. Transactions most often take place in English auctions, and the informational asymmetry is the essential profit-allowing feature of the market (Gérard-Varet, 1995; Ashenfelter and Graddy, 2003). At the top of the secondary market hierarchy, an international market is managed by several auction houses (e.g., Christie's, Sotheby's, Bonham's, etc.) in recognized art centers in London, New York, Paris, Hong Kong. A restricted number of buyers ("ultra-high net worth individuals", museums, etc.) may participate in this segment of the market.

Addressing the complex issue of art pricing, we may notice, that value of the art piece is not linked primarily to production costs or income of enterprises, therefore, price fluctuations on the art markets tend to be unpredictable (Baumol, 1986). In his widely-debated article, Baumol (1986) suggests that on the art markets, there is feeble or no price equilibrium, for several reasons:

- Unlike on the stock market, objects on the art market are usually unique[5] - even two works of a same artist would not constitute perfect substitution
- The owners of the most expensive art pieces de facto, hold a monopoly over a unique asset
- Certain transactions on the art market may take place as rarely as once per century
- While the prices on stock exchange is, generally, public information, prices on the stock exchange are frequently known only to the counterparties and the mediator entity
- Art markets are deprived of the usual price determination indicators (e.g, based on the future performance of the stock issuer)

Baumol (1986) goes as far as claiming that prices on art market "float more or less aimlessly", and that the uncertainty is exacerbated by "following collectors' fads and manias"[6]. However, if Baumol's approach was justified, there would be no way of explaining, for instance, the existence of pre-auction art appraisals. At the same time, Bauwens and Ginsburgh (2000) show that appraisals, although systematically biased, predict art prices quite well on average. Such findings prove that art prices are not as random as Baumol's advocates may claim.

On the other hand, it is widely accepted that the price formation on the art markets is influenced by a variety of factors. Extensive literature review suggests, that it is possible to group majority of such factors into following categories: reputation of an artist, properties of the artwork (including aesthetic quality), characteristics of the market and its participants, macroeconomic and financial market factors (Sagot-Duvaroux et al, 1992; Becker, 1998; Duret-Robert, 1976; Frey and Pommerehne, 1989; Goetzmann, 1993; Campos and Leite Barbosa, 2008; etc.).

First of all, there are factors related to *the artist's fame* and his perceived role in the art history. This aspect is largely determined at any point of time by a minority of people – large collectors, gallery owners and critics. Regardless of their direct participation in art market transaction, actions of such group are closely followed and considered as a reference (Gérard-Varet, 1995; Candela and Scorcu, 1997).

Sagot-Duvaroux et al (1992) note that by purchasing an art object, the buyer obtains several kinds of utility (functional, civic, ostentatious and financial)[7]. Such utility is positively linked to artist's renown, and directly depends on buyer's degree of knowledge. On the other hand, "star phenomenon" (Rosen, 1981) may be explained as a way of saving information costs, and also by the general growth of wealth, emergence of new communication channels.

[5] Sometimes to a degree, depending on a segment (e.g., photography, printmaking)
[6] Following the interpretation of Baumol (1986) by Candela and Scorcu (1997)
[7] Such approach to utility from art echoes with a more recent model presented by Mandel (2009)

Second set of factors, influencing the price of representational art, is related to *quality of the work* in question. Aspects of artistic quality like harmony, homogeneity, subject are taken into account and are largely influenced by our subjective aesthetical judgement (Duret-Robert, 1976; Renoult, 2016). However, certain common aesthetical trends are present as well[8]. With approximately equal artistic quality, the price of the art pieces will vary, depending on size (generally - increase, with decreasing marginal rate) and materials used (Sagot-Duvaroux et al, 1992; Scorcu and Zanola, 2011). These last two variables are among factors based on objective facts. Naturally, the price of an art piece would also depend on whether or not it is genuine. Any doubts concerning the origin of art work may decrease its value dramatically.

Third set of factors may be defined as *characteristics of the market*. Prices on art, as on any other asset, are dictated by the relation between supply and demand which, in turn is defined by relative rarity of an art object (Baumol, 1986; Duret-Robert, 1976). Rarity may be objective, as some artists do not produce much (e.g. Jasper Johns). In addition to this, death of an artist would make supply scarce and inelastic. But scarcity on the art market can also be artificial (Gérard-Varet, 1995). For instance, it is historically known that first French market dealers (Durand-Ruel, Vollard, etc.) bought all the works of artists they represented, thus creating monopoly in that particular niche. Such practice is applied by big art dealers and galleries today (Moulin, 1992)[9]. Interestingly, the "*paradox of scarcity*" (Duret-Robert, 1976) states that prices on art will not grow infinitely with decreasing supply: if the work of an artist becomes too scarce, market demand may switch to the closest substitute – works of less renown artists.

Art market, as any other market is largely defined by its actors: buyers and sellers. Speaking about the latter, prices on art vary between different galleries and auction houses. In case of art galleries, bigger galleries tend to set higher prices on market, due to their (galleries') higher fixed costs and broader access to clients with higher purchasing power (Winkleman, 2015). Also, the common perception on the market suggests that representation by big gallery automatically translates into quality of the artwork (Gérard-Varet, 1995). Similar trend, although to a lesser extent (Sagot-Duvaroux et al, 1992), characterizes the behavior of the big auction houses, which have greater capacity to gather big buyers and elevate prices of auctioned art work through competition between bidders.

Speaking of the buyers on the art market, renown and big buyers have an advantage over anonymous and small buyers, having more space for price negotiation, in addition to obvious

[8] E.g. woman portraits are systematically more valued than man portraits; landscapes with water are more expensive than other landscapes; etc. For more speculation, see Renoult (2016)
[9] As cited in Gérard-Varet (1995)

advantage of having more resources at their disposal. Sagot-Duvaroux et al (1992) highlights that different buyers would seek different types of utility from art works (e.g., an individual willing to decorate his house and a curator seeking to expand his/her collection).

Finally, prices on art market are influenced by *macroeconomic and financial market indicators*. Demand for art has to be positively linked to income (as art is considered to be luxury good). Therefore, a growth of the market should be observed during an economic boom, while during the economic downturn the market should slow. Sagot-Duvaroux et al (1992) note that French art market was on decline between 1973 oil crisis and the mid-1980s, when French economy started to recover. Considering the supply on the art market to be relatively inelastic (Candela and Scorcu, 1997), increase in demand would push the prices upwards. We may have followed this trend recently, when the art markets hit the record high in total sales in 2014 due to higher-priced works (McAndrew, 2014).

Following the link between demand for art and wealth, "rates of return on other assets" as a positively-correlated variable was present in study Frey and Pommerehne (1989)[10] among factors claimed to explain price movements on the art market. Equity markets affect the art market with a lag of approximately one year (Chanel, 1995). Some studies have documented absence of long-term connection between markets (Ginsburgh and Jeanfils, 1995; Chanel, 1995), while others did find a strong long-term link (Goetzmann, 1993).

Concerning the profitability of investment in art markets, the opinions diverge. Judging on a risk-return criterion, investment in art compares unfavorably to an investment in traditional financial assets (Frey and Pommerehne, 1989 (cited by Gérard-Varet, 1995); Pesando, 1993; Bakhouche and Thebault, 2011; Renneboog and Spaenjers, 2012). Following studies, focusing on the second half of XX century and present times, managed to establish that art market returns rivaled the returns on the traditional financial markets (Goetzmann, 1993; Chanel et al. 1992; Mei and Moses, 2002). It is claimed by some, that only well-developed art portfolios may be persistently profitable (Sagot-Duvaroux et al, 1992). At the same time, well-developed art portfolios are established to be characterized by low risk levels (Chanel et al. 1992; Pesando, 1993; Mei and Moses, 2002).

Empirical research in the relevant domains is complicated by the unclear nature of the research object (Hayn-Leichsenring, 2017). In order to address the research question, the definition of art needs to be comprehended. There are several approaches to define art. Among them:

[10] As cited by Gérard-Varet (1995)

- *Essentialistic* approach (Bell, 1913), although implying mainly paintings in the speculation, postulates that the essence of art may be distilled merely to the materialistic medium in which it (the art) is expressed;
- The *Intentionalistic* approach[11] argues that the defining feature of art is the expression of emotion;
- According to the *Institutionist* theory[12], "an item is an artwork (1) if it is a candidate for appreciation and (2) if it is presented to the *art world* by authorized representatives" (Dickie, 1974);
- Under *Functionalism*, an artwork is a social construct that has to fulfill a specific purpose of representation[13];
- *Organicist* theory[14] claims that art is a "class of organic wholes" (Weitz, 1956), consisting of distinguishable, interconnected elements in their causally effective relations which are embodied in some sensuous form;
- *Voluntarist* theory, as pointed out by D. Parker[15], art is "[...] the provision of satisfaction through the imagination, social significance, and harmony".

Among the popular approaches for defining art nowadays, it is important to highlight *Anti-Essentialism*. Weitz (1956) pointed out that the nature of the concept of "art" is such that it does not have a certain set of binding necessary properties. At the same time, all the existing approaches for defining art fail to include certain aspects of the subject. Therefore, according to Weitz, art is an "open concept" (i.e., its application is emendable), and the proper definition of the concept of art is not possible.

Developing the anti-essentialistic approach to defining art, the *cluster account* approach[16] is set to combine all previously presented approaches. Following Weitz (1956), there is no generally accepted definition for art. Advocates of the cluster account argue that it is indeed impossible to categorize each and every approved art piece by the sole theory. Instead, by identifying an object as an artwork, the justification for such denotation shall be investigated post hoc.

Summing up this part of speculation, there is no established way to exactly determine if an object is an art piece or not. Therefore, as Hayn-Leichsenring (2017) points out, the selection of "art" object in empirical experiments often are not explained properly, or even do not match study's objectives.

[11] E.g., works of Ducasse, as discussed in Tomas (1952)
[12] Described comprehensively by Sclafani's (1973) critique on G. Dickie's work
[13] For further speculation on the issue, see Goodman (1968)
[14] Works by A. C. Bradley, as pointed out by Weitz (1956)
[15] Parker (1953), cited in Weitz (1956)
[16] As proposed by Gaut (2005).

1.4. Mere Exposure and Aesthetical Judgement of Visual Stimuli

As it was determined, aesthetic preferences play an important role in price formation on the art market. In order to approach the research issue, it is important to understand the link between cognitive easing (exposure effect in particular) and aesthetic preferences, especially those of visual art objects.

Mental aesthetic processing is a topic that seems to resist a unified approach while illustrating a complex range of issues (Jacobsen, 2006). Research suggest that aesthetic experience and judgements are influenced by a range of factors. As it was established by prior findings, some of these factors are related to object: symmetry (Berlyne, 1971; Jacobsen and Höfel, 2002), complexity (Berlyne, 1970), novelty, visual proportion (Locher, 2003). Other factors are originated from subjective emotional state and degree of interest in the stimulus (Berlyne, 1971; Konecni, 1979). Additionally, aesthetic responses differ in relation to social status, educational, historic, cultural background, as well as to presence of financial interest (Konecni, 1979; Ritterfeld, 2002; Jacobsen, 2002). Naturally, there are many other factors in play[17].

The cognitive easing and mere exposure effect are among known factors influencing subjective familiarity and aesthetic judgement (Höfel and Jacobsen, 2003; Leder et al, 2004; Reber et al, 2004; etc.). Repeated exposure and increased duration of exposure have been claimed to increase aesthetic liking of an art object by some research (Kruglanski et al, 1986; Kunst-Wilson & Zajonc, 1980; Reber et al., 1998; Furnham and Walker, 2001; Leder, 2001; Brickman et al, 1972; Hekkert et al, 2003), unless the exposed object is characterized as trivial or simple, in which case, prolonged exposure invokes boredom and, consequently, causes negative trend in aesthetic liking (Berlyne, 1970).

Cutting (2003, 2007) claimed that mere exposure contributes to maintaining artistic cannon. The author believed that mere exposure transforms into cultural generalization, when we talk about cannon art (e.g., works of the French impressionists), as we perceive objects and attitudes towards them unconsciously through their repeated presence in our everyday lives. The empirical evidence of Leder (2001) proves that familiarity with van Gogh paintings positively correlates with subjective aesthetic judgment. However, it is possible to strongly hinder mere exposure effect, when the stimuli exposed are introduced as fakes of van Gogh's pieces.

Interestingly, more exposure to an art work does not always lead to an increase in subjective aesthetic liking. Addressing the interaction between mere exposure and "bad" visual artworks, Meskin et al (2013) established, that exposing the subjects to art objects, which are branded as "bad

[17] For further speculation, see e.g. Jacobsen (2006)

art" by art critics, would decrease subjective liking. These result go in line with hypothesis stating that if the exposed stimulus is initially judged with dislike, repeated exposure to it would actually exacerbate the negative judgement (Brickman et al, 1972).

Marin and Leder (2013) compared subjective esthetic judgements (familiarity, pleasantness, arousal and complexity) and objective complexity indicators for two sets of visual stimuli representing a similar semantic content (representational artworks and environmental scene photographs presented for 25 s). They documented that the emotional response, spanned by pleasantness and arousal, was similar in these two groups. Furthermore, they reported a stronger negative link between complexity and arousal in artworks than in environmental scene photographs. The authors furthered their approach in the following studies (Marin and Leder, 2015).

However, it is important to note, that although the persistent influence of mere exposure effect was established for a range of stimulus types, its results with art pieces in the experimental setting were not always consistent (Leder et al, 2004; Stang, 1974). Therefore, there is an ongoing discussion regarding the extent of impact of mere exposure effect on domain of art.

In his meta-analysis, Bornstein (1989) reviewed the prior studies on the relation between stimulus complexity and mere exposure effect. He established that six out of nine articles documented stronger mere exposure effects for complex stimuli than for simple ones, and that the effect was especially relevant for the art works. However, the results of his meta-analysis showed an effect size of only –.03 for relationship between familiarity and liking of paintings, drawings, and matrices[18]. Interestingly enough, Bornstein's meta-analysis is evoked as an argument both by advocates (Cutting, 2003) and by critics (Leder et al, 2004) of the "mere exposure to art".

Several models aimed at guiding empirical aesthetic research have been established so far (Leder et al., 2004; Jacobsen, 2006; Chatterjee and Vartanian, 2014; Graf and Landwehr, 2015; Redies, 2015; Hayn-Leichsenring, 2017, etc.). These models, however, mostly focus on subjects, or on a particular facet of esthetic experience, trying to replicate a certain type of cognitive processing experimentally. To my knowledge, only Hayn-Leichsenring (2017) attempted to implement an approach to modelling empirical studies involving art, focusing on an artwork-stimulus itself.

For instance, based on a set of previous models, Chatterjee and Vartanian (2014), claim that the key cognitive mechanisms evoked by aesthetic experience may be schematically mapped by an interaction between three neural system approximations: sensory-motor, emotion-valuation and meaning knowledge circuitry. The model was named "the aesthetic triad" (Chatterjee and

[18] For comparison, the other effect sizes were: .22 for ideographs, .37 for photographs of people, .41 for polygons, and .49 for names, etc. (Bornstein, 1989)

Vartanian, 2014) (Figure 1). The authors also highlight the notion that aesthetic experiences are distinguished from other evaluative encounters by the context, in which objects of experience are encountered (e.g., as art pieces), and by appraisals that focus on object rather than outcomes of an encounter.

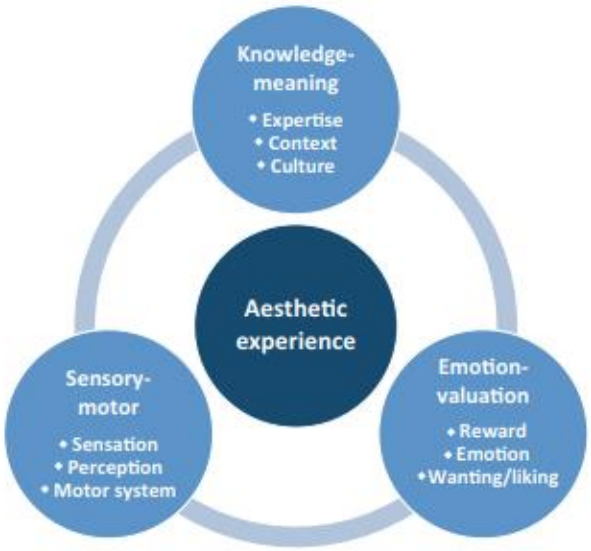


Figure 1. The aesthetic triad. Source: Chatterjee and Vartanian (2014)

2. Goals and Methodology

The essential goal of this paper is to explore the impact of mere exposure of a visual art object on subjective preferences towards it in the environment, approximated to such in the real-world art markets. Several partial goals also correspond to main purpose of the paper. In course of research priority will be given to the following partial goals:

- Extensive cross-disciplinary review of prior research conducted in the relevant scientific areas
- Conceptualization, development and utilization of an elaborated experimental design, aiming to fulfill the key research goal
- Analysis of significant factors influencing subjective preference under a current experimental design
- Providing general implications of the research results for public and private sectors

Therefore, theoretical and methodological approaches will be selected in accordance to the research goals stated above. Given the particularities of the experimental design, addressed in the second part of the paper, the key research question may be defined as follows: "Will previous exposure to an art object enhance subjective willingness to bid on it within the auction environment?"

Given the interdisciplinary character of the research question, experimental method was chosen as a methodological tool for approaching it. Although the first formal economic experiment was published in 1948[19], formal experiment as a method has only recently gained a conventional status in economics (Oswald, 2010), and, by extension, in finance. Relatively put, we may define such recent point to be year 2002, when V. Smith was awarded the Nobel Price "for establishing experiments as a tool for empirical economic analysis" (Nobel Media AB, 2002). As Oswald (2010) noted, experimental economics is among the fastest growing areas in economics today, when the divide between economics, psychology, and political science is blurring. Indeed, it would be overwhelmingly hard to model the decision-making behavior of individuals given that our research question is based on cross-roads between finance, behavioral economics, cognitive psychology and, to an extent, aesthetics.

The complexity of economic life, dictated by countless simultaneously changing variables, makes it challenging to determine the character of cause-effect relationships clearly, often leaving us with several plausible explanations. According to Nikiforakis (2010), it is this difficulty of establishing causality by non-experimental data that drives the need for experimental method in economics. The key feature of experimental method is the potentiality of executing control over the numerous factors, varying only the essential for the study endogenous elements. Linking this notion to the current study, it was important to determine the presence and impact of the mere-exposure phenomenon in the context of art markets, with the previous exposure being the key variable, while keeping the other intervening factors[20] minimized, if not eliminated.

With our experimental method characterized as *laboratory experiment*, to an extent, to which university classroom may be defined as a laboratory. On one hand, the experimental subjects (i.e. university students) are acting in their natural environment, which is one of defining features of the field experiments. On the other hand, the given environment allows for sufficient control over the state of nature, which approximates the setting to laboratory conditions. An unparalleled control in our case refers to regulating the information at disposal of the subjects, and appropriately directing subjects' behavior. Yet another advantage of the experimental studies is the opportunity for replication that they provide. With keeping the experimental design fairly simple, there is enough space for future repetition and modification. Replication is important, if we seek to establish beyond reasonable doubt the causal relationship between the variables in question (Nikiforakis, 2010).

[19] Chamberlin (1948), as highlighted by Nikiforakis (2010)
[20] E.g., personal preferences, wealth, etc., for further details, please see "Experimental Design" part

While designing the experiment, three conditions should be met in order to claim causal inferences between focus treatment and the effect (Johnson and Reynolds, 2016). First of all, the *covariation* must be assured, demonstrating that alleged cause does covariate with supposed effect. In the context of our experimental design, it means showing the link between presence of mere exposure effect and price of art piece. Second, the proper time order must be followed, i.e. the cause should precede the effect. Third condition, by far most challenging, is to eliminate the confounding factors interfering into the relations between focus treatment and effect.

Going further into experimental mechanics, Johnson and Reynolds (2016) focus our attention on a set of basic characteristics of a classical experimental design, based upon which, the experimental design in this study was developed:

- The two groups of subjects must be established: experimental group (which receives the experimental treatment) and control group (where subjects do not undergo the treatment manipulation). This is done in order to ensure the causal inferences as well as control the interfering factors.
- Researcher randomly assigns subjects into the groups, ensuring randomization. This is done in order to minimize difference between several experimental group (for instance, between treatment and control groups).
- The researcher must determine the conditions, under which the experimental treatment will be administered, and should act in accordance with such considerations, as to insure the complete control over the test factor.
- Another factor under control of the experimenter is the environment of the experiment: time location, as well as other physical aspects. Again, the importance of control over experimental environment is dictated by the necessity to minimize the influence of confounding factors.
- Final feature of the classical randomized experimental design, as speculated on by Johnson and Reynolds (2016), is measurement of the experimental effect both before and after the treatment is executed. This allows for a more precise measure of the causal impact.

Drawing the parallel with the current experimental design, all the above-given features but the last one are kept. The specifics of the researched phenomenon (i.e. the exposure effect) prevent us from taking the pre-experimental measures. Naturally, it would make no sense asking subjects to bet on art pieces they haven't seen. At the same time, exposure to the painting would largely coincide with the experimental treatment, therefore negating the advantage of conducting the experiment with a control group. Given the absence of pre-experimental measures, our experimental design (as it will be explained in the next Chapter) approaches a *posttest design* subcategory of the classical randomized experiments.

Keeping in mind the advantages of experimental method, we should keep in mind its drawback and limitations. Although the skepticism towards the usage of experimental method in economics and finance has subsided, it has not disappeared completely (Nikiforakis, 2010; Oswald, 2010; Davis et al, 1993). Most common criticism of experimental method involves arguments regarding low stakes of action, common issues related to internal and external validity, etc. Experimental research must frequently balance between what may be feasibly accomplished (in terms of time and money-related efforts, adherence to ethical standards, etc.) and what would be done in a perfect-case scenario in order to investigate a certain hypothesis (Johnson and Reynolds, 2016). Following C. Plott's (1982) argument on this matter, although laboratory processes are simple in comparison with the real world, those are still the real processes, involving real people obtaining real and substantial utility by following real rules. The reality of the experimental method makes it interesting. Friedman and Sunder (1994) contribute to the discussion, claiming that trying to replicate the complexities of field environment in a laboratory is futile, and as in case of any other experimental discipline, in our case simplicity enhances control. The issues specifically related to our experimental design would be addressed here and in the next Chapter.

As in our case, most experiments use students as participants (Nikiforakis, 2010). There are several reasons for this: [1] Students are smart and are capable of understanding abstract instructions and complex problems. This minimizes data loss due to the confusion. [2] University students as a group are fairly homogeneous, thus the experiment may be replicated on various instances with little threat to internal validity. [3] It is easier and a lot cheaper to create quasi-monetary incentive (i.e. academic subject points) for students than for other population groups. [3] Most importantly, given our academic environment, students are the most readily available group. Still, conducting the experiment with the student subjects only opens space for potential selection bias.

Granting subjects real utility throughout the experiment is essential for approximating the experimental environment to the real world (Nikiforakis, 2010; Friedman and Sunder, 1994). Perfectly, the incentive should be monetary. However, in the current experimental design it was decided to use the academic performance evaluation points as incentive for participation. In order to determine whether such a substitution would hold efficient, we may take the prospective of the *induced value theory* (Friedman and Sunder, 1994). Academic points as a reward medium (under the existing experimental design) satisfies all three conditions for inducing specified characteristics in experimental subjects: [1] Monotonicity – students prefer more points to less, since greater amount of points increases their chance to successfully pass the academic course and improves their overall academic record. [2] Salience – the amount of points received by the subjects depends on

their actions (and on the actions of others). [3] Dominance – according to the experimental design, changes in subjects' utility from the experiment come mainly from the reward medium and other influences (experience of participation, etc.) are negligible. Noteworthy, the research exists claiming that the size of the utility stakes has limited impact on behavior of the subjects (Cameron, 1999; Nikiforakis, 2010).

In order to approximate our experimental design to the natural conditions, an auction mechanism was incorporated into the experiment. Auctions are widely utilized by sellers in situations where there is no precise estimation of the buyers' true values for an item (including, where bidders do not know each other's values (Easley and Kleinberg, 2010), which holds particular relevance in case of art markets. As it was mentioned in the theoretical part, on the secondary art market, transactions over art pieces mainly take place through auctions, and the market is dominated by big auction houses (Gérard-Varet, 1995; Singer, 1990; Ashenfelter and Graddy, 2003; etc).

Auctions are usually modeled as noncooperative games played by utility maximizing bidders. The participants are expected to seek for equilibrium strategies (in the context of Nash equilibrium), in which, accounting for everyone else's actions, no bidder can act better than he/she is presently doing by altering the strategy of action (Guala, 2005). Overall, auction theory, a sub-field of game theory, is among most applicable frontier mathematical economic branches (McAfee and McMillan, 1987). Furthermore, auctions play an important role in empirical economic research, as they embody a simplified buyer-seller interaction, representing more complex forms of economic interactions (Friedman and Sunder, 1994). Hence, on many occasions auctions are used as a method of studying markets and their underlying network structure (Easley and Kleinberg, 2010).

Among simpliest auction designs, a first-price sealed-bid auction (FPSBA)[21]. In such a design, all bidders simultaneously submit their „sealed bids" to the seller[22]. After all bids are collected, the auctioneer documents them and announces the winner (i.e. the highest bid). The winner receives the auctioned object and pays the full value of his/her bid. While relatively simple, the sealed bid auctions hold certain equivalence to other auction designs (Milgrom, 1989; Easley and Kleinberg, 2010).

For instance, the Dutch auction design appears to differ from the sealed-bid auctions substantially: the auctioneer calls prices, starting with the highest price and proceeding to successively lower ones. Each bidder listens to the prices called and accepts the highest tolerable

[21] Interestingly, McAfee and McMillan (1987) highlight the identical nature of the FPSBA and public tenders for procurement.

[22] Bids are usually written down on a special form and given to the auctioneer in a sealed envelope – hence the term (Easley and Kleinberg, 2010).

price if this has not yet been done by other bidders. On the contrary, according to the English auction design, the auctioneer begins with the lowest acceptable price (the *reserve* price) and consequtively solicits higher bids from the participants until no one is willing to further increase his/her bid. Then the item is sold to the highest bidder. Vickrey (1961) draws the line between the sealed-bid, Dutch and English auctions.

Vickrey (1961) notes that despite the seemingly more complex format of Dutch auction, a bidder who is planning his strategy in advence would face an identical problem in both sealed-bid and Dutch auctions. He claims that regardless of the calculation method, a single genuine option opened for the bidder is determining the highrest price, at which he is willing to claim the auctioned object. Therefore, based on the Nash equilibrium, the winning price (and by extension, the winer) would stay the same in the both auction types. Still, it was establshed that in small-stackes laboratory conditions participants tend to pay lower prices in Dutch auction than in sealed-bid auction. Among possible explanations: the Dutch auctions discourage „planning" by the participants (Milgrom, 1989). Regarding the link between sealed-bid and English auctions, Vickrey (1961) observes that the outputs of the latter type may be achieved by means of the former. Under the sealed-bid design, the only modification to be made for such result is awarding the auctioned object to the highest bidder for the price of *second-highest* bid.

It is important to gather as much relevant information as efficiently possible through the post-experimental surveys. Questions included into the given survey (see Appendix C) are related to gender of a participant, his/her level of engagement into the experiment, clarity of the given instructions, prior auction experience, his/her true preferences and whether or not he/she recognized any of the featured paintings. Also, the participants will be asked to briefly describe their bidding strategies during the experiment. The subjects' risk attitude will be measured by methodology applied by representative SOEP survey in Germany (Leuermann and Roth, 2012). Such methodology was used in a number of prior studies, including Dohmen et al., (2005) and Aarbu and Schroyen (2014).

For the guidance on further manipulation on experimental data, we may turn to Friedman and Sunder (1994) and Guala (2005). The first step of analysis is elimination of the unreliable and/or faulty data (e.g. subjects have not carried out the results properly). The remaining data is to be put in order and analyzed statistically. The data obtained through experimental method will be further formalized, using the classic statistical techniques. With this purpose, statistical software (i.e., IBM SPSS Statistics 23) will be utilized. We mainly use several statistical techniques. First, a chi-square test will be used in order to explore the differences between the frequencies between the key variables. Second, a logistic model will be developed on basis of data gathered.

2.1. The Experimental Design

In the following section, the experimental design used for researching the impact of exposure effect on the prices on art market will be described and a detailed explanation of the underlying elements will be provided.

2.1.1. General Characteristics of Experimental Design:

- List of requisites: classroom with a computer and projector; a digital presentation (in a „MS PowerPoint" format); bidding forms (see Appendix B), experimental instruction (see Appendix A), post-experimental surveys (see Appendix C); an envelope; pen; watch with a time-keeper.

- Estimated duration: 10 minutes. De facto duration (average, across all the sessions): 7 minutes. The duration of the experiment is to be kept short in order to avoid experimental mortality and/or demand effects resulted from boredom, task repetition, etc.

- Number of rounds: a single round. It is considered that one experimental round will suffice for measuring the treatment effect and gather the data required. The advantages of keeping the experiment short time-wice were given above. Additionally, this factor would prevent the subjects from learning by repetition.

2.1.2. Controlling the Environment: Auction Simulation

The framework for the experimental design in our case may be partly identified as the *first-price sealed-bid auction* (FPSBA), whereas participants simultaneously submit their offers and the highest bid wins the auction. Here, several moments should be concidered in order to specify this particular FPSBA design among all the others: [1] The number of bidders is not hidden from the participants; [2] There is no reservation price; [3] The winning bid is announced; [4] There are no opportunities for further negotiation after the auction.

The given auction design was chosen for several reasons. First and foremost, such a design may be conducted easily, posing fewer challenges from the practical wievpoint. FPSBA requires less improvising from the auctioneer-experimenter, which also contributes to uniformity of outcomes across the sessions. Second advantage of FPSBA is its quickness. As it was indicated previously, the experiment is designed to last for a minimal efficient amount of time in order to minimize experimental mortality as well as prevent subjects from learning by repetition. Third, FPSBA is rather straigtforward and easier to learn. Thus, the disadvantage of experimental subjects with no prior auction experience would be reduced.

First-price sealed-bid auction may also decrease the effect of several cognitive biases, strongly associated with other auction types (e.g., bidder's curse, endowment effect, sunk cost fallacies, anchoring and availability heuristics etc.). This is due to a single-round characteristic of the auction design. Finally, FPSBA was used in empirical economic research on many instances, thus it would be less complicated to base our research design upon the prior empirical studies[23].

The main disadvantage of implementing FPSBA into the given context is, of course, its differences with the English auction format[24], in which most transactions on the secondary art market are held. Noteworthy, English auction may also be represented by second-price auction designs. However, in our case a trade-off between auction format accordance and simplicity was made. Furthermore, complete procedural autenticity is not our primary goal , since the auction part of an experiment would constitute, to an extent, a *cover task* for the subjects, disquising the purpose of experimental session and minimizing the demand effects of experimental design.

2.1.3. Controlling the Main Variable: Previous Exposure

The key experimental treatment of the current experimental design is *previous exposure*. Therefore, prior to the FPSB-auction session, each treatment group was shown an art work from the *selection pool* (more on the selection pool in the next chapter). Essentially, such prior exposure constitutes the only difference between treatment group and experimental group. The circumstances of exposure to the chosen art object are designed as follows: a group of undergraduates would be regularly exposed to the same art object on a weekly basis. More specifically, the painting will be regularly shown to the subjects during academic lectures, as the image would appear projected on the wall before the presentation with lecture materials begins.

This way, the subjects would be indoctrinated with a moderate number of exposures (8-12 instances) at a controlled duration (10 seconds). As the substantial part of academic research on effects of mere exposure suggests, both number of exposures and exposure duration are functions represented by an inverted U-shaped curve (Bornstein, 1989) and have an impact on the magnitude of mere exposure effect. Designing both factors at the selected frequency levels would objectively place us on the upper part of the curve, minimizing the influence of negative exposure[25] on the subjects.

[23] For further discussion on the prior implementation of FPSBA in empirical economic research, see Friedman and Sunder (1994).
[24] Most noticeably – procedural contrasts, but also differences regarding approaches to optimal bidding strategies, etc. For further discussion, you may turn to Easley and Kleinberg (2010)
[25] Due to the factors such as boredom, stimulus recognition, etc., which were discussed in the theoretical part.

From the pool of selected artworks, painting "Lady's Cove, Langland Bay, England" (A. Sisley, 1897)[26] was randomly chosen for prior exposure. Average subject in a treatment group was exposed to the picture 10 times on a regular weekly basis before the auction simulation part of the experiment commenced. Approximate duration of each exposure equaled 10 seconds.

It is essential that attention of subjects isn't intentionally drawn to the painting while it is exposed. Thus, it is expected that subjects would have lower chance to actively memorize the painting. Adverse consequences of such active memorization may skew the output of the auction session due to demand effects (characteristics) of the experimental design (Friedman and Sunder, 1994). More specifically, such effects arise from subject's efforts to help (or hinder) the experimenter. Since our experimental design draws relation between participation in experiment and academic success of the subjects, it is only natural that subjects would seek to uncover the purpose of experimental session. Under such scenario, it is expected that subjects would systematically and voluntarily bid higher on the previously exposed picture (e.g., guessing that the lecturer may test their attentiveness to the lecture material). In order to control the variable of active memorization, a correspondent question will be included into the post-experimental questionnaire.

2.1.4. Controlling the Environment: Selection of an Art Object

For the purposes of study, two art objects will be featured in the experiment. Selecting such objects has proven to be a challenging task. First of all, our decision has fallen on the paintings as an art medium, as this field is most comprehensively researched. Also, market of paintings constitutes the biggest share of visual art market overall (TEFAF and Pownall, 2017). While choosing an art object, we should attempt to select paintings, which would be previously unknown to the subjects, given that subjective familiarity would interfere with our treatment. Also, the art objects evoking positive association should be chosen. As it was discussed in previous parts of the thesis, exposure to "bad art" may actually reduce subjective preference (Meskin et al, 2013).

Further, while selecting art pieces conforming the given experimental concept, we face dilemma regarding the level of similarity between two paintings. On one hand, we need to choose two paintings that will be as identical as possible, in order to reduce subjective aesthetical preferences of participants. A real threat for internal validity would be, if due to distinguished features of the two art objects, participants would base their bids on aesthetical preferences related to painting characteristics. On the other hand, the two art objects should be different to an extent by which they do not appear subjectively identical, as this factor would diminish the effect of the main treatment variable (i.e. previous exposure).

[26] See Figure 2 on p. 46

The second part of the given dilemma may be solved more easily. Indeed, on the art market (especially when it goes to original paintings) there are no perfect substitutes (e.g. Baumol, 1986). Therefore, selecting visually different paintings will not be a problem. The first part of the dilemma is far more challenging, though, as there are many factors to pay attention to while comparing the two artworks. For the purposes of current study, the following factors were considered when selecting comparable art works:

- Author of the painting and period of the author's creative life
- Style and art movement of the objects as well as its genre
- Media (i.e. type of paint, surface material, etc.) and size of the painting
- Objects depicted, their proportions and complexity of the paintings
- Color gamut of the art pieces
- Relative popularity of the paintings

In order to narrow down our search, we should apply each criterion consequently. First of all, it appears reasonable to choose two artworks of the same artist, in order to reduce the difference in subjective liking. Such reduction effect would be multiplied, if we manage to choose the paintings executed in the same genre, with the same technique, with similar color gamut, depicted objects and their proportions, etc. Second, one of the paintings should not be substantially more popular than the other, for the reasons related to subjective recognition, as discussed above.

Factors, such as complexity of the painting, may be somehow more complicated to control. For the purposes of the experimental design, two pictures with similar digital compression size were chosen, based on research of Yu and Winkler (2013), who documented a strong correlation between spatial information (SI) measures and compression-based complexity measures of visual images.

Figure 3: "Bristol Channel from Penarth, Evening" (A. Sisley, 1897)

Figure 2: "Lady's Cove, Langland Bay, England" (A. Sisley, 1897)

After a careful consideration, two paintings were selected for the purposes of experiment, they are "Lady's Cove, Langland Bay, England" and "Bristol Channel from Penarth, Evening" (please, see Figure 1 and 2). Both paintings were created by Alfred Sisley, who is considered to be a relatively less represented French impressionist (Cutting, 2006). The decision to choose works related to French Impressionism was motivated by the conventionally positive reputation of this art movement. Both selected pictures were created in 1987, both feature similar color gamut and technique. More importantly, both pictures feature similar objects and proportions. Prior studies in the field of aesthetics (Renoult, 2016) indicate that we tend to positively perceive painted natural (as opposed to urban) landscapes, especially if they depict water. Another factor possibly contributing to positive perception is that landscapes depicted are European[27].

On the other hand, both pictures feature "mirroring proportions" as well as minor visual details, by which they may be readily distinguished one from another. We anticipate that participants will not be familiar with the pictures, however, this factor will be controlled by the post-experimental survey. The picture, which will be exposed to the treatment group will be chosen randomly. Noteworthy, during the auction simulation the real names of picture will be changed to generic indicators (i.e. "Picture A" and "Picture B") as the evidence exists on cognitive processing changes due to presentation of artworks together with their titles (Leder et al, 2004; Leder et al, 2006).

2.1.5. Controlling the environment: Adaptation of the FPSBA Framework

It is important to note that in order to better suit the experimental environment, the FPSBA framework will be modified. First major difference arises from the mechanism, by which the "currency" will circulate. As it was explained in part "Methodology" of the thesis, we will use

[27] A debated hypothesis suggests that people tend to perceive depictions of their native natural biomes more positively (Renoult, 2016).

ECTS academic points as experimental currency. Throughout the experimental session, a participant will be able to obtain 10 ECTS points in total, 5 of which will be granted as "initial endowment" and the other 5 will only be obtainable, if a subject places the highest bid (i.e. "wins the picture"). Thus, the amount of gained utility would depend on subject's actions.

Participants would place their bids denominated in so-called "experimental currency" (EC). It will be explained to the subjects that their initial endowment of 5 ECTS points may be exchanged into "experimental currency" at rate [1 ECTS point = 1000 EC]. Such manipulation was implemented in order to approximate experimental conditions to the real-world environment. Also, this will allow for greater variance of the placed bids.

Another important distinction attributed to our experimental design is that we create additional restrictions on bidding. Participants would place the bids for two paintings simultaneously, and sum of two bids should exceed 1000 EC. Also, given that initial endowment equals 5000 EC, the sum of two bids should not exceed 5000 EC. This lower limit was implemented in order to disincentivize subjects from risk-avoidance strategies, in case they will not uncover the optimal bidding strategy. Therefore, if b_a and b_b represent, respectively a subject's bids for "*Painting A"* and "*Painting B"*, a constraint for bidding under the given experimental design may be formalized in Formula 1:

Formula 1: $$(b_a + b_b) \in [1000; 5000]$$

Speaking about the optimal bidding strategy, we may observe that since the highest bids win additional ECTS points, participants should put the maximum amount of EC to one of the paintings (i.e. "go all in") maximizing their utility. Therefore, if we denote subject's utility as *U*, the optimal strategy for bidding under the current circumstances may be formalized in Formula 2:

Formula 2: $$\max U = \begin{cases} b_a = 5000 \\ b_b = 0 \end{cases} .OR. \begin{cases} b_a = 0 \\ b_b = 5000 \end{cases}$$

We expect that a number of participants will discover the optimal strategy. As a result, we would get a number of equally high bids (i.e. 5000 EC) for each painting, which all would be the winning bids. In order to solve this inconsistency, we eliminate the limit for the number of winning bids, i.e. all the highest bids will win the auction and will be awarded with bonus ECTS points. It is important to communicate this notion with the participants during the experimental session, since it has a substantial impact on development of bidding strategy from a viewpoint of a bidder.

Finally, in order to decrease pressure on the participants, we would set the rule stating that all the participants will be able to keep their initial endowment (i.e. final balance of non-winning

bids equals to 5 ECTS points), while all the winning bids will receive 5 ECTS points extra to their initial endowement (i.e. final balance of winning bids equals to 10 ECTS points). Such distribution creates sufficient stimulus for the students to maximize their utility.

2.1.6. Controlling the environment: Manipulation Sequence and Timing

In this part, the sequencing and timing as well as manipulation order will be described by combining all the previously introduced elements of experimental design. As it was mentioned beforehand, the experiment de facto begins with the exposure of an art object (i.e. painting, randomly chosen from the pool of two) to the treatment group. After ten instnaces of regular controlled exposure, an auction sessions will be held with the treatment group as well as with the control group, while the latter was not subjected to the prior exposure. Naturally, there will be no difference in auction sessions between control and treatment groups.

The auction session start with a brief introduction, each participant will be distributed with sheets containing detailed procedual instructios (see Appendix A), a bidding form (Appendix B) and post-experimental survey sheet (Appendix C). It is important that experimenter maintains neutral and calm voice. Complicated and/or emotionally-marked expressions shall be avoided both in the experimenter's speech and in the distributed materials in order to ensure the internal validity (Friedman and Sunder, 1994). Participants will be nudged to occupy the front seats of the lecture-room by placing the instructions and bidding forms respectively. However, no specific record will be kept on where the participants seat, since according to previous research this particularity has shown no effect (Cutting et al, 1999).

After the experimental setting is introduced and procedural formalities are settled, the experimenter proceeds with reading the instructions out loud. The process will be accompanied by the digital presentation, projected on the wall, containing identical information. Therefore, subjects would have three sources of learning the instructions: [1] distributed sheets; [2] experimenter reading the information sheets out loud; [3] slides of the digital information. We expect that such mechanism would reduce subjects' confusion during the learning process. In addition to this, subjects will be explicitly asked not to communicate with each other and follow the instructions carefully. After the experimenter finished reading the instruction, we will offer the participants an opportunity to ask instructions-related question.

When the phase of explaining the instructions is over, the two featured pictures will be projected onto a large screen by a projector, and participants would have 1 minute in order to place their bids into the previously distributed bidding form. It is important to grant sufficient amount of

time for bidding in order to minimize the time pressure on subjects[28]. The two paintings will remain projected for the duration of bidding process. A ten-seconds warning will be given to the participants before the minute runs out for facilitation purposes.

After the bidding phase is over, the bidding forms will be collected and participants will be asked to fill out the post-experimental questionnaires. In the meantime, the bids will be evaluated in order to determine the winning bids. When the bids are calculated and the post-experimental surveys gathered, the experimenter will announce the winning bids, concluding the experimental session. All the experimental materials will be preserved for further study.

2.1.7. Experimental Design: Addressing the Common Pitfalls

Friedman and Sunder (1994) provide a list of common nuisances in experimental design, which may threaten the internal and external validity. It is advised that such potentially adverse factors are checked before the experiment commences. These pitfalls are listed below and followed by specific context from our experimental concept:

- **Experience and learning:** subject's ability to learn and adapt their behavior to the created environment. In case of our experimental design, the issue is addressed by conducting the auction simulation in a single session. Also, the bids for two featured paintings will be collected simultaneously.
- **Non-institutional interactions:** participants' behavior may be influenced by interactions outside our control. Addressing this nuissance, participants will not be aware of experiment taking place beforehand. Also, we will make sure that participants do not communicate nor coordinate their actions during the session. Naturally, brief timespawn of the experiment contributes to negating this nuissance as well.
- **Fatigue and boredom:** behavioral changes nay result from fatigue and/or boredom. Again, short duration of the experiment as well as real incentives to perform well and untypical setting are expected to reduce this risk.
- **Selection biases:** unrepresentative behavior of the subjects due to biased subject selection. On one hand, subject selection was relatively randomized, given that experimental sessions were held with full undergraduate academic groups. Still, several moments are worth mentioning in this regard: [1] all experimental subjects are students; [2] it is anticipated that not all subjects would be interested in art in the real-life environment.

[28] Time constraints may interfere with the decision-making processes resulting in a more intuitive than a rational decision (see e.g. Peters & O'Connor, 1979; Zakay & Wooler, 1984; Förster et al., 2003; Kocher and Sutter, 2006; etc.)

- **Subject and group idiosyncracies:** unrepresentative results due to participant's packground, temperament or unusual behavioral patterns reinforced by the group. Subject idiosyncracies will be minimized by participants randomization. Group idiosyncracies will be reduced by controlling the communication and cooperation between subjects.
- **Demand effects:** arise from subjects' efforts to help (or hinder) the experimenter. This particularity is tackled by introducing the cover task (i.e. the auction session) into the experimental session, which is anticipated to draw subjects' attention.

With the common experimental pitfalls tackled, we may claim that the elaborated experimental design presented in this chapter allows us to see true prefferences of the subjects, mediated through auction-approximated environment and through mere exposure effect. Given the relative similarity between the two featured paintings we expect to see equally distributed bids for the test group (i.e. „fifty-fifty" for the two paintings). In case of the treatment group, we would anticipate a slight bias towards bidding on previously exposed picture, marking the impact of mere exposure effect. At the same time, too strong of a difference would question the internal validity of the experimental design, since there are many unrelated to exposure factors potentially influencing preference and price formation on the art market.

2.1.8. Logistic Model Development

An appropriate way to model the preference towards the exposed painting with regards to the data available is using logistic model approach. Dependent variable of the model – preference for the exposed painting is bivariate, i.e. equals 1 if subject bided higher on the exposed painting and 0 if he/she bided otherwise. It is assumed that several factors may influence preference towards biding higher on the previously exposed painting. Data on these factors will be gathered through post-experimental survey (see Apendix C). For the purposes of model development, the data from the category "strategic approaches towards bidding" will be coded into three subcategories: 1 for "All-in", 2 for "Preference-based" and 3 for all other strategies. Also, the data from category "Risk tolerance" would be reclassified: 1 for low risk tolerance (0% and 20%), 2 for moderate risk tolerance (40% and 60%) and high risk tolerance (80% and 100%)[29].

3. Results and Discussion

The results of the experiment divide in several ways. In this part, the experimental output will be analyzed, modeled and discussed in context of prior research and general policy implications. Firts, participants' demographics will be described, following by the analysis of association between the previous exposure and preference towards a previously exposed painting. Then we present results of

[29]For more information on regressors, see Chapter 2.3. "Results and Discussion".

the post-experimental survey data in context of our hypothesis. Important part of this chapter is presenting results of the logistical model developed based on the experimental output. Finally, the implications of our results will be explored.

Experimental Demographics: A total number of 102 students (48 male and 54 female subjects) has participated in the experiment (please see Table 1), from whom 61 participant underwent the prior experimental treatment (i.e. were exposed to the selected picture at the regular basis). Total of 2 instances of experimental mortality were registered[30]. Noteworthy, treatment group was composed of students with international background, while control group was predominantly Slovak by its ethnical composition.

	Treatment Group	Control Group	Total
No of Participants	61	41	102
Exp. Mortality	-1	-1	-2
Total	60	40	100

Table 1: Experimental Demographics by group

Distribution of bids: 70% of the subjects in the treatment group bid higher on the previously exposed painting (comparing to 52.5% of subjects that preferred the same painting in the test group). Such results are interesting primarily for two reasons. First of all, we see a clear difference in preferences for the exposed painting between two groups. As predicted, previous exposure has increased subjective liking of subjects toward the stimulus, which resulted into preference in bidding. Secondly, we can observe that, in the test group, the distribution of preferences is close to equal. Meaning that the two featured paintings are indeed comparable.

In order to further explore the link between preference of the exposed painting and exposure factors, we've conducted Chi-square test including between the binomial variables "Exposure" (1 if data entry from the treatment group, 0 if data entry from the control group) and "Preference to exposed" (1 if data entry bid higher on previously exposed painting, 0 if data entry bid on the other painting). Table 2 draws our attention to discrepancies from the expected count. Pearson Chi-Square equals 3.153 (P-value = 0.07578), therefore we may claim significance of the indicator at the 10% confidence level.

[30] In both cases, subjects arrived late to experimental session and failed to understand the essential instructions, which is reflected in their bids as well as in the post-experimental survey responses.

			Exposure		
			0	1	Total
PrefExposed	.0	Count	19	18	37
		Expected Count	14.8	22.2	37.0
	1.0	Count	21	42	63
		Expected Count	25.2	37.8	63.0
Total		Count	40	60	100
		Expected Count	40.0	60.0	100.0

Table 2: Crosstabulation of "Preference to Exposed" and "Exposure" variables

Symmetric measures table between the variables "Preference to Exposed" and "Exposure" (Table 3) suggests low-to-moderate relation (Phi-value = .178) between the two variables at 10% significance level. Such result goes in pair with our anticipations regarding the impact of the mere exposure effect on subjective bidding preferences. Given such results, we may conclude that the robust association between the previous exposure and preferences towards the previously exposed painting exists.

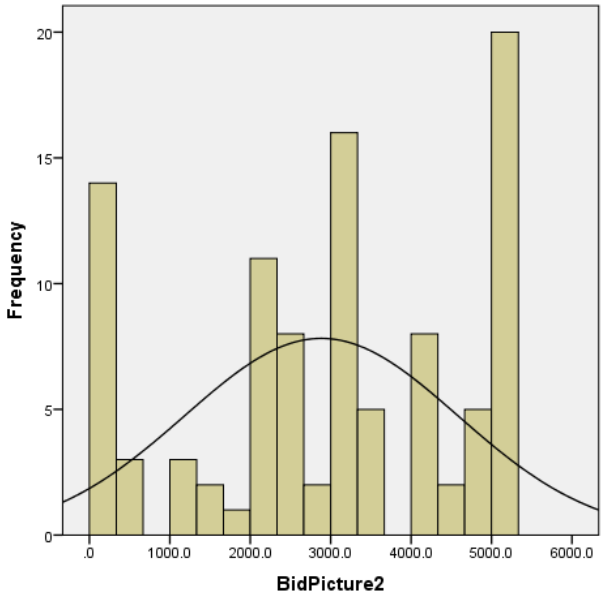
		Value	Approximate Significance
Nominal by Nominal	Phi	.178	.076
	Cramer's V	.178	.076
N of Valid Cases		100	

Table 3: Symmetric measures between variables "Preference to Exposed" and "Exposure"

An important issue regarding the data on the amount bid for each of the featured paintings is that it does not follow normal distribution. The experimental design incentivized participants to adopt "All-in" strategy, therefore we may observe disproportional data allotment on the edges of the distribution (Figures 4 and 5). Formal analysis through Shapiro-Wilk test (Table 4) confirms our observations, rejecting the H_0 (i.e. dataset is normally distributed) at 0.05 confidence level.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BidPicture 1	.141	100	.000	.878	100	.000
BidPicture 2	.122	100	.001	.901	100	.000

Table 4: Normality test for data on the bids



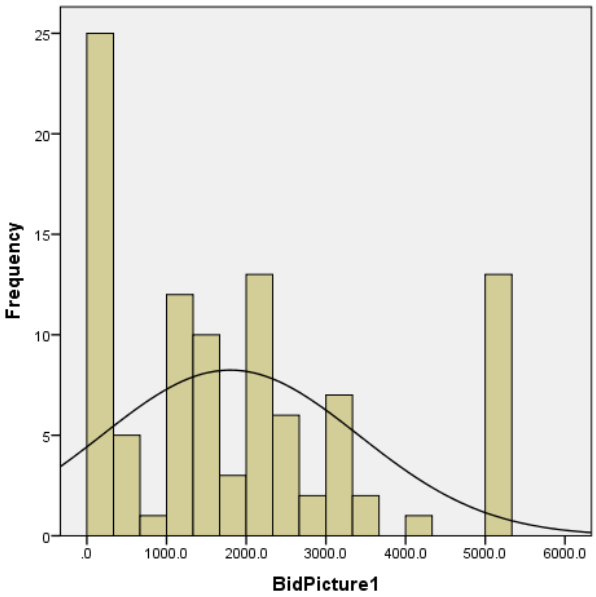


Figure 4 (left): Distribution of bids for Picture 2

Figure 5 (right): Distribution of bids for Picture 1

Engagement and Clarity: According to the post-experimental survey data (see Appendix D), the average participation engagement level stays at 78.4%, while clarity of the given instruction was assessed by the participants at 86.1%. Such results are satisfactory given the benchmark of 80% (i.e. 8 out of 10 by the survey scale) for both factors, stated by Friedman and Sunder (1994). Therefore, we may claim that experimental formalities were presented to the subjects in a manner sufficient for securing internal validity. Additionally, the high engagement level suggests low subjective boredom threat to the experiment. Only 27 subjects across all groups (27%) stated that they have participated in auction before.

Recognition of the featured paintings: Surprisingly, mere 6 subjects from the treatment group (10% from the group) claimed that they recognized at least one of the paintings. Furthermore, only 2 subjects from the treatment group (3.33% from the group) indicated that one of the paintings was shown to them during the relevant lectures. Other answers from this category were either unspecified, or referred to unrelated academic subjects (e.g. art classes, academic subjects from the previous semesters, etc.). For comparison, a single respondent from the control group (2.5% from the group) has claimed the recognition of the featured paintings.

At the same time, given the selection particularities of the featured paintings, actual chance that the exact same paintings were exposed to the subjects before the experiment is rather small. It is possible to assume that, in regards to non-art related background of the subjects, the featured paintings may have been confused with other piece of Impressionist landscape genre. Such output is rather unanticipated given the prolonged exposure duration as well as its regular repetitive

character. Still, the fact that the featured paintings remained generally unrecognized complies with the classic preconditions for the mere exposure effect (Zajonc et al, 1972).

Although the percentage difference across the test and treatment groups (2.5% against 10% respectively) may be unrepresentative due to limited data sample, we may hypothesize that some of the subjects in the treatment group managed to recognize the familiar painting without remembering the exact circumstances of the prior exposure.

True preferences: A total of 72 subjects across all experimental groups (72% of all subjects) declared that their bids reflected the true preferences regarding the featured paintings. 43 of these subjects belonged to the treatment group (constituting 71.67% of the treatment group total). Such data suggests that at least 28% of all participants were willing to put their preferences on sacrifice in order to adopt the optimal bidding strategy. At the same time, we may observe that the relative proportions in the given category remained unchanged in regard to experimental treatment. This allows us to assume that availability of prior exposure condition on average does not influence subject's willingness to bid against his/her preferences.

Risk Tolerance. Distribution of data regarding the subjects' attitudes towards risk is reflected in Fifure 6. As we may observe, compiled data on all groups approaches the normal distribution. At the same time, subsets of treatment and test groups are distributed somehow differently. Subjects in the treatment group were more risk-seeking in comparison to the test group, on average. However, such distribution is not necessarily a result of the treatment, given moderate test samples. The same reason prevents us from applied more advanced statistical techniques to the given data.

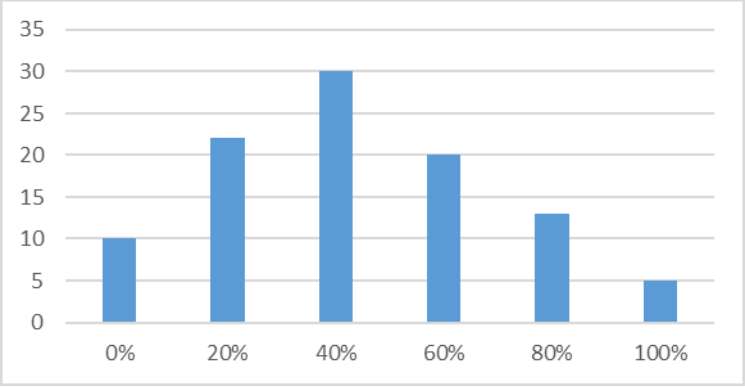


Figure 4: Distribution of risk tolerance – compiled sample

Common bidding strategies. As it was described in Experimental Design part, subjects were asked to briefly characterize their bidding strategies. The data gathered may be grouped into several categories in order to formalize subjects' strategic decisions:

- "Preference-based bidding" (30% of the treatment group; 40% of the test group): participants in this category indicated that their bidding strategy was based primarily on subjective aesthetical preferences
- "All-in" (35% of the treatment group; 35% of the test group): this group of subjects managed to successfully identify the optimal bidding strategy
- "Hoping to bid high enough" (15% of the treatment group; 12.5% of the test group): subjects under this category bid more on one of the paintings explaining their strategy by "hoping that their bid will be high enough". It is hard to specify whether their strategy was analysis- or strategy-based.
- "Equal distribution" (8.33% of the treatment group; 2.5% of the test group): subjects under this category specifically indicated the incentive to distribute the bids equally
- ""Random or unspecified strategy" (11.67% of the treatment group; 10% of the test group): subjects fallen under this category indicated random distribution of their bids or did not specify their strategy

The experimental data shows us small variation in distribution of non-optimal bidding strategies across the subjects. Still, we would restrain from conclusions in this particular case, since some categories are characterized by a vague specification (i.e., "Hoping to bid high enough"). More interestingly, the data suggests that introduction of the treatment variable on average had no effect on the ability of the subjects to determine the optimal bidding strategy (34.43% of the treatment group; 34.15% of the test group).

Correlation Coefficients: The dataset, based on the formalized experimental results, which was used for correlation analysis and development of the logistic model, may be found in Appendix D. First, we want to explore the correlations between the elements of logistic regression. The data on bivariate correlation may be found in Appendix E. For description of the variables, please see Appendix F. When analyzing the correlation coefficients, we may note a strong positive link between the variables "Engagement" and "Clarity" (PCC = 0.553; sig., at the 0.01 level (two-tailed)). Since the variable "Clarity" has is characterized by higher correlation with the dependent variable (0.269; sig., at the 0.01 level (two-tailed)), the variable "Engagement" (correlation with dependent variable equals 0.163) may possibly be dropped from the model with further specification. Another significant correlation coefficient links dependent variable with variable "true pref" (i.e. whether the bid distribution reflected true preferences of the subject; PCC = 0.332;

sig., at the 0.01 level (two-tailed)) and will be further explored later. A significant link between the dependent variable "second bid higher" and "Recognized" (PCC = 0.210; sig., at the 0.05 level (two-tailed)) may be distorted in the model given small sample of subjects recognizing one of the featured pictures.

As previously shown by the Chi-square test, the link between "exposure" and the dependent variable "second bid higher" is only significant at 10% level (PCC = 0.178; Sig. (2-tailed) = 0.077). A similar confidence interval characterizes the negative correlation between the dependent variable and category "risk" (PCC = -0.194; Sig. (2-tailed) = 0.053). A link between variables "exposure" and "clarity" (PCC = 0.216; sig., at the 0.05 level (two-tailed)) may be explained by the presence of international students in the treatment group. Such a relation appeared since the experimental instructions provided for both groups were given in English. A significant relation between "auct. before" and "exposure" variables (PCC = -0.239; sig., at the 0.05 level (two-tailed)) may appear due to higher percent of control group subjects having prior auction experience (i.e. 40%, in comparison with 18.33% in treatment group). Another significant correlation may be spotted between the variables "clarity" and "true pref" (PCC = 0.275; sig., at the 0.05 level (two-tailed)).

Logistic Regression: Given that our sample consists of 100 observations, from which 63 entries have biding preference towards exposed painting, a hypothetical "Null-model" predicting that all subjects will prefer exposed painting will be correct in 63% of cases. Therefore, 63% rate of successful predictions would be the reference point for our future logistic models.

Outputs for the unrestricted model are displayed in Tables 5 and 6. Omnibus tests of coefficients (Chi-square = 25.558; Sig. = 0.008) for the unrestricted model as well as Hosmer and Lemeshow test (Chi-square = 7.021; Sig. = 0.534) suggest a significant improvement in goodness of fit in comparison with the null-model. Nagelkerke R-Square value for the unrestricted model equals 0.308. The unrestricted model has successfully predicted 77% of cases overall, including 59.5% of the 0 values in the dependent variable (Table 5).

			Predicted		
			Second bid bigger		Percentage
	Observed		.0	1.0	Correct
Step 1	Second bid bigger	.0	22	15	59.5
		1.0	8	55	87.3
	Overall Percentage				**77.0**

Table 5: Classification Table for Unrestricted Model

For the detailed information on the variables in the unrestricted model, please see Appendix G. Data from Appendix G suggest the positive link between the dependent variable and all the

included variables except of dummy variables for “risk” category. However, most of the variables are characterized by low significance. Furthermore, 95% C.I.for EXP(B) boundaries suggest that there may be no significant relationship between the predictor variables and the predicted value at all. It is also apparent that the variable “recognized” distorts the output of the model significantly, possibly due to the small number of observations. For purposes of further specification of the model, the variables with least significance will be reduced.

Specifying the model, we concluded that three best predictors for the dependent variable are “clarity”, “true pref” and “exposure”. Tables 6 and 7 describe such a specified model. Again, in case of the second model Omnibus tests of model coefficients (Chi-square = 16.575; Sig. = 0.001) as well as Hosmer and Lemeshow test (Chi-square = 3.097; Sig. = 0.876) certify a significant improvement in goodness of fit in comparison with the null-model. However, the predictor strength of the restricted model suffers: Nagelkerke R-Square = 0.209; overall percentage of successfully predicted cases = 69% (see Table 6).

			Predicted		
			Second bid bigger		Percentage
	Observed		.0	1.0	Correct
Step 1	Second bid bigger	.0	18	19	48.6
		1.0	12	51	81.0
	Overall Percentage				**69.0**

Table 6: Classification Table for Restricted Model

Furthermore, as Table 8 suggests, only variable “truepref” remains significant at 95% confidence interval. The other variables do not reach 90% threshold. 95% confidence intervals for EXP(B) suggest the same result. Noteworthy, the individual significance of the variables “clarity”, “truepref” and “exposure” increases with elimination of other variables.

In order to better understand the predictive power of the restricted model, we explore the ROC curve (Figure 7). Area, covered by the curve represented by the predicted probability from the restricted model covers 0.737 points, with the common confidence threshold being 0.8 or higher. This means that predictive power of the restricted model is moderate, and further improvement is needed. Interestingly, the unrestricted model covers the exact same area (i.e. 0.737 points), although the ROC curve takes a different shape (Figure 8).

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Clarity	.207	.133	2.422	1	.120	1.230	.948	1.598
truepref	1.363	.493	7.649	1	.006	3.909	1.488	10.274
exposure	.669	.467	2.052	1	.152	1.952	.782	4.874
Constant	-2.555	1.135	5.065	1	.024	.078		

Table 7: Variables in the Unrestricted Model

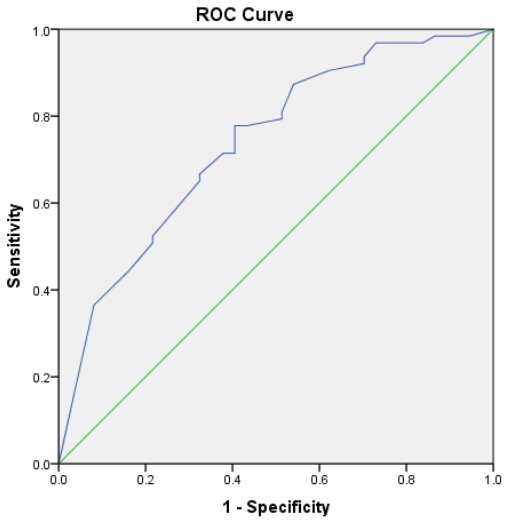


Figure 6: ROC curve for restricted model

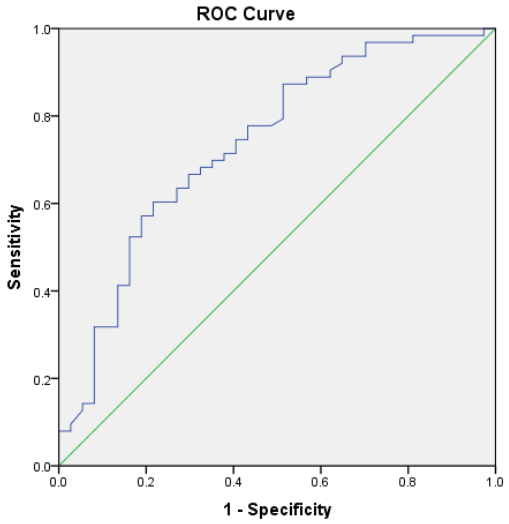


Figure 5: ROC curve for unrestricted model

Discussion of the model: Although the developed logistic model is characterized by a moderate predictive power, we may draw several conclusions based on its results. First, the majority of the factors expected to may have influence on the preference towards a certain painting were not statistically significant. Among such factors: subjective level of engagement in the experiment, gender, prior auctioning experience, risk attitude and bidding strategy. At the same time, particularities of the sample do not allow us to adequately assess the impact of the variable "recognized" (i.e. if the subject recognized one or more paintings).

Second, among the best predictors of the dependent variable: whether or not a subject bid based on his/her true preferences, clarity of the instructions given and, most importantly, previous exposure to the featured picture. Interestingly, the logistic model revealed positive impact of the three above-mentioned variables on the dependent variable. Now we will discuss all three discovered relations.

Speaking of the positive effect of true preference-based bidding on preference towards the exposed paintings, we may actually interpret the results in two different ways. First interpretation would be that all subjects actually prefer the second painting, for unspecified reasons. Such notion is detrimental to the internal validity of experimental design, as it diminishes the link between the

prior exposure and preference towards previously exposed object. An argument against such interpretation would be the experimental data on the control group, which (as it was discussed before) indicates on the even distribution of preferences in biding (52.5% of the subjects in the control group preferred the exposed picture, while in treatment group such percentage amounted to 70%), although the number of subjects willing to sacrifice their true preferences for purpose of winning has remained unchanged across experimental and treatment groups.

The other interpretation of the effect in question may be perceived in context of our main hypothesis. Research on the mere exposure effect suggests that prior exposure enhances subjective liking (Zajoc, 1968; Bornstein, 1989, etc.). Therefore, based on increased subjective liking, subjective preference may be modified, resulting into genuine preference towards the previously exposed painting. Such an interpretation goes in line with fluency-attribution model of the mere exposure effect (Bornstein and D'Agostino, 1994; etc.), whereas the processing ease of the familiar stimuli, caused by the prior exposure, is interpreted by an individual as liking (or the true preference, in our case).

The positive effect by clarity of experimental instructions on the probability of choosing the previously exposed picture also echoes with the prior research in the area (e.g., Litt et all, 2011). In this regard, we may turn to embodiment theory of mere exposure effect (Topolinski and Strack, 2009; etc.). Topolinski and Strack (2010), managed to neutralize exposure-induced cognitive fluency by blocking the sources of fluency variations. Similarly, we may assume that lower clarity of experimental instructions creates a condition, which reduces or forces out cognitive ease, induced by the prior exposure, effectively negating the impact of the mere exposure effect.

Finally, the positive link between previous exposure to the featured picture and biding preference on the exposed picture, essential to our study, is reinforced by the model, which also goes in line with our prior Chi-Squared analysis of the data. The model, however, out in question significance of this variable. Further specification of the model would require an extension of the data sample, which, in turn, may increase the significance of individual regressors. Moreover, as discussed above, the exposure effect may mediate the preference towards the exposed painting in other ways. All-in-all, based on the Chi-squared analysis of the experimental data, we claim that our research hypothesis was confirmed, and previous exposure to a painting has an impact on subjective preference towards it, formalized through mechanism of auction bidding. In its turn, according to our results, the effect itself may be characterized as small-to-moderate. Our results go in line with the prior research in the area (Cutting, 2003; Cutting, 2007; Höfel and Jacobsen, 2003; Leder et al, 2004; Reber et al, 2004; etc.).

Based on results presented by the current study, future research may adjust the experimental design and/or expand the sample. Although under the given experimental design we manage to

identify subjective preferences towards featured paintings quite well, one vector for improvement would be eliminating the ceiling for bids, or at least disincentivize the "all-in" strategies, in order to reach normal distribution of the bids. This will allow for more precise analysis of the extent of the mere exposure effect, enabling the analysis of "by how much", rather than just "if". Addressing the issue of limited subject pool, future experimental design may focus on a single painting, rather than on a pair of paintings. However, such approach seems to be possible only if the previous suggestion is somehow implemented into the design.

Policy Implications: A conventional wisdom exists suggesting that government or private sector interventions into the art market are necessary and beneficial in improving the chances of survival or guaranteeing a desired level of quality in the arts (Lingle, 1992). Results of the current study reinforce this notion insofar as the interventions provide continuous exposure of the targeted artworks to the public.

Following Cutting (2003; 2007) regular exposure to an art work contributes to the formation of artistic canons. As our study shows, mere exposure of a certain art object influences subjective preferences towards the object and its subjective valuation, even when these factors are formalized through auction bidding mechanism. Therefore, we may claim that providing wide and regular exposure to national art should increase public interest in art overall (through enhancing subjective preferences), contributing to development of art collectionism culture, auction culture, interest in outstanding art creators. Ultimately, as a result of increasing demand for national art and sound conditions on the art market, the prestige of the national art market will grow internationally.

According to the prior research in area of art markets (e.g., Sagot-Duvaroux et al; 1992), demand for art has to be positively linked to income. Therefore, a growth of the market should be observed during an economic boom, while during the economic downturn the market should slow. In the current context, this means that efforts aimed at bolstering the value of art via its exposure should be most efficient when executed at times of economic growth, as the effect of such effort will be multiplied.

Speaking of art market investors and collectors, exposure of their assets to the public will positively impact value of these assets, for the reasons discussed above. Therefore, such agents should intend to expose the art under their disposal at exhibitions, open catalogues, media, social networks, etc. Such practices are not a novelty for the global auction houses, which start the information campaigns promoting certain artists or art objects well before the actual auction trading takes place.

Conclusions

Repeated exposure and increased duration of exposure have been claimed to increase aesthetic liking of an art object by some research (Kruglanski et al, 1986; Kunst-Wilson & Zajonc, 1980; Reber et al., 1998; Furnham and Walker, 2001; Leder, 2001; Brickman et al, 1972; Hekkert et al, 2003). However, it is important to note, that although the persistent influence of mere exposure effect was established for a range of stimulus types, its results with art pieces in the experimental setting were not always consistent (Leder et al, 2004; Stang, 1974) and is still a debatable subject. Importantly, if such a phenomenon takes place, it would be reflected on the price formation on art markets.

The current study contributes to set of prior literature, presenting empirical evidence in favor of the proponents' side of the argument. Following an extensive academic literature research, an elaborated experimental design was conceptualized and successfully utilized with purpose of empirically exploring the impact of mere exposure of a visual art object on subjective preferences towards this object in the environment, approximated to such in the real-world art markets. In accordance to our predictions, the experimental data suggests the 17.5% increase in bidding on the previously exposed art piece, in comparison to the control group. Further statistical analysis indicates the low-to-moderate link between the key variables.

Based on the experimental data, a logistic model was developed, exploring an impact of a number of variables on the inclination to bid higher on the previously exposed picture. Although the model requires further specification and/or extension of the sample size, it has revealed several important relations between the variables. Apart from the link between previous exposure and enhanced preference towards exposed object, the links between inclination to place higher bid on the previously exposed painting and (a) clarity of the experimental instructions provided; as well as (b) bidding decisions that reflected genuine subjective preferences. The relations revealed may be perceived in context of different theoretical approaches explaining the mechanisms of the mere exposure effect, most notably, fluency-attribution model and embodiment theory.

In the context of broader implications of the study, we claim that providing wide and regular exposure to art would increase its asset price by enhancing the subjective aesthetic preference. Such practices are not a novelty on the contemporary art market, with auction houses and big galleries starting the information campaigns promoting certain artists or art objects well before the actual transaction takes place.

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Appendix A: The Experimental Instructions

Instructions

Introduction:

You are now participating in an experiment, which is a part of a Master thesis. In this experiment you will earn experimental currency (EC), which will be later exchanged into performance evaluation points for this academic course, at rate:

$$\mathbf{1\ 000, -}\boldsymbol{EC} = \mathbf{1}\ \boldsymbol{point}$$

The amount earned depends on your decisions during the experiment as well as on decisions of the other participants.

Confidentiality of your decisions and personal data is assured. The experiment takes approximately 15 minutes.

Procedure:

Now the experiment rules and procedures will be described:

- You are taking part in an art auction simulation. Two art pieces (paintings) are auctioned: painting 1 and painting 2 (will be shown later)
- You are endowed with 5 000,- EC (five thousand):

$$\boldsymbol{Initial\ endowment} = \mathbf{5\ 000}$$

- You will distribute this amount by placing two bids for each painting (**bid1 – painting 1**; **bid2 – painting 2**), spending your experimental currency
- The sum of the two bids must be higher than 1 000,- EC (one thousand) and lower than 5 000,- EC (five thousand); as this is your budget limit:

$$\mathbf{1\ 000} \leq (\boldsymbol{bid1} + \boldsymbol{bid2}) \leq \mathbf{5\ 000}$$

- As long as you follow the above-mentioned constraint, you can bid any amount for each painting (e.g., 0 points, 2500 points, …5000 points)
- The highest bid for each picture wins. The winner of each picture earns 10 000,- EC (ten thousand):

$$\boldsymbol{final\ income}\ (\boldsymbol{winner}) = \mathbf{10\ 000}$$

- In case the result is a tie, each winning bidder earns points for a particular bid
- All the other participants keep their initial endowments:

$$\boldsymbol{final\ income}\ (\boldsymbol{others}) = \mathbf{5\ 000}$$

- On your desk you can find the bidding form (see the depiction below). You can now pick them up:

Bidder No _	Your Name: _
Bid 1: _	
Bid 2: _	

- You are assigned with a "Bidder Number" (upper left corner on the depiction); please memorize your bidder number
- You will have 1 (one) minute to place both your bids into the form; a 10 seconds warning will be called
- When the minute runs out, you will place your form face down and forms will be collected
- After the bidding forms are collected and the bids are evaluated, the results will be announced
- At the end of the session, you will pick up post-experimental survey sheets (the other A4 sheet lying down on your desk) where you would indicate your "Bidder Number" (will be given on the bidding form) for identification purposes

Summary:

$$\boldsymbol{Initial\ endowment = 5\ 000}$$

$$\boldsymbol{1\ 000 \leq (bid1 + bid2) \leq 5\ 000}$$

max bid(s) win

Winner **earns** **10 000 EC**

Others earn 5 000 EC

Please do not communicate with the other participants and follow the instructions carefully.

Appendix B: Bidding Form

Bidder No _	Your Name: _
Bid 1: _	
Bid 2: _	

Appendix C: Post-experimental survey

Post experimental survey

Indicate your Bidder No: ___

1. *On the scale 1 to 10 indicate your engagement in the experiment (10 = max engagement):*

   ___

2. *On the scale 1 to 10 assess clarity of the instructions given (10 = perfectly clear):*

   ___

3. *Have you recognized any of the paintings?*

a) Yes
b) No

If yes, specify from where: _____

4. *Did your choice reflect your preferences? (i.e., did you really liked the picture for which your bid was higher more?):*

a) Yes
b) No

5. *Briefly characterize your strategy: How did you distributed bets between paintings?*

   _____

6. *Indicate your gender:*

a) Male
b) Female

7. *Have you participated in auctions before?*

a) Yes
b) No

8. Imagine you had won 100 000 Euros in a lottery. Almost immediately after you collect, you receive the following financial offer from a reputable bank, the conditions of which are as follows: ***There is the chance to double the money within two years. It is equally possible that you could lose half of the amount invested***.

What fraction of the 100,000 Euros you would choose to invest?

a) 0,- €
b) 20 000,- €
c) 40 000,- €
d) 60 000,- €
e) 80 000,- €
f) 100 000,- €

Appendix D: Data

Bid #1	Bid #2	Engag	Clar	Recogn	truepr	Gen	auctbef	risk	SBB	exp	BS
5000	0	9	10	0	1	0	0	1	0	0	1
2500	2500	10	10	0	1	0	0	2	0	0	3
0	5000	8	9	0	1	1	1	3	1	0	1
2500	2500	7	5	0	0	0	0	2	0	0	3
3000	2000	6	8	0	0	0	0	2	0	0	3
0	5000	10	8	0	1	0	1	1	1	0	1
1000	0	8	7	0	0	0	0	2	0	0	3
3500	1500	7	9	0	0	0	1	2	0	0	3
0	5000	9	10	0	0	1	1	2	1	0	1
2600	2000	5	5	0	1	0	0	1	0	0	2
1500	3500	10	10	1	1	0	1	3	1	0	2
3000	2000	5	5	0	1	0	0	2	0	0	2
2000	3000	7	10	0	1	0	0	2	1	0	2
3500	1500	7	9	0	1	1	0	3	0	0	2
1000	4000	7	10	0	1	1	1	3	1	0	3
5000	0	9	10	0	1	1	1	2	0	0	1
0	5000	8	8	0	1	1	1	2	1	0	1
0	5000	7	6	0	1	1	1	2	1	0	1
1000	3000	5	5	0	1	0	0	1	1	0	2
1000	3500	10	8	0	1	0	0	1	1	0	2
5000	0	5	5	0	1	1	1	2	0	0	1
5000	0	5	5	0	0	1	1	1	0	0	1
0	5000	6	5	0	0	1	0	2	1	0	1
1900	3000	6	5	0	1	1	1	1	1	0	2
1500	3000	7	8	0	1	1	1	3	1	0	2
1500	3500	8	9	0	1	0	0	3	1	0	2
2900	2100	7	9	0	1	0	0	2	0	0	2
1500	3000	7	9	0	1	0	0	2	1	0	2
2000	3000	8	10	0	1	0	0	3	1	0	2
2000	3000	7	10	0	1	0	1	3	1	0	2
0	5000	10	10	0	0	0	0	3	1	0	1
2000	2500	10	10	0	1	0	0	3	1	0	2
5000	0	10	10	0	1	1	0	2	0	0	1
5000	0	10	10	0	0	1	0	3	0	0	1
1000	4000	10	10	0	1	1	0	1	1	0	2
5000	0	9	9	0	0	0	1	2	0	0	1
2000	2000	7	7	0	1	0	1	1	0	0	3
1000	4000	5	10	0	1	0	0	1	1	0	3
3000	2000	7	6	0	0	0	0	2	0	0	3
3000	1700	5	7	0	0	0	0	2	0	0	3
500	4500	10	8	0	1	0	0	2	1	1	3
900	1100	9	10	0	1	0	0	1	1	1	2

Bid #1	Bid #2	Engag	Clar	Recogn	truepr	Gen	auctbef	risk	SBB	exp	BS
0	5000	8	10	1	1	1	0	1	1	1	3
2000	3000	7	8	0	1	0	0	2	1	1	2
1000	4000	8	10	1	1	0	0	2	1	1	2
99	4900	3	9	0	1	0	0	1	1	1	2
1000	4000	10	10	0	1	0	0	2	1	1	2
2500	2500	8	8	0	0	0	0	1	0	1	3
2500	2500	10	10	0	0	0	0	3	0	1	3
5000	0	10	10	0	0	1	1	3	0	1	1
5000	0	10	10	0	1	1	0	2	0	1	1
1500	3500	10	10	0	1	0	0	1	1	1	2
0	5000	7	9	0	1	1	0	1	1	1	1
0	5000	10	10	0	1	1	0	3	1	1	1
500	500	6	5	0	1	1	0	2	0	1	3
2510	2490	8	9	0	1	0	0	1	0	1	2
3000	2000	9	10	0	1	0	0	2	0	1	2
3000	2000	9	9	0	1	0	0	1	0	1	3
2000	3000	5	10	0	1	0	0	1	1	1	2
0	5000	9	10	0	1	1	0	2	1	1	1
0	5000	10	9	0	1	1	1	2	1	1	1
100	4800	10	9	0	0	1	1	2	1	1	3
1	4999	10	10	0	1	0	1	1	1	1	1
2000	3000	10	10	0	1	0	0	2	1	1	3
1800	2500	10	10	0	1	0	0	2	1	1	2
1800	2700	7	7	0	0	1	1	2	1	1	3
1500	1000	8	8	0	0	1	0	1	0	1	3
40	4950	10	10	1	1	1	0	1	1	1	1
1000	4000	10	10	0	1	0	1	1	1	1	2
1000	4000	10	10	0	1	1	0	3	1	1	3
500	500	9	10	0	1	1	1	2	0	1	3
0	5000	10	10	0	1	1	0	2	1	1	1
2000	3000	9	10	0	1	1	0	2	1	1	2
5000	0	5	5	0	0	1	0	1	0	1	1
1500	2000	7	10	1	1	0	0	1	1	1	2
1000	4000	10	9	0	0	1	0	3	1	1	3
3000	2500	6	4	0	0	1	0	1	0	1	3
2800	2200	5	8	0	1	1	1	2	0	1	2
5000	0	9	9	0	0	0	0	2	0	1	1
0	5000	4	9	0	0	1	0	2	1	1	1
1500	3000	7	9	0	1	1	0	2	1	1	2
1500	3500	7	10	0	1	1	0	2	1	1	3
1000	2000	5	4	0	0	1	0	1	1	1	3
500	500	5	8	0	0	1	0	2	0	1	3
1528	2851	7	9	0	1	1	0	2	1	1	2
0	5000	10	10	0	0	0	0	1	1	1	1
0	4999	6	8	0	1	0	0	2	1	1	1

Bid #1	Bid #2	Engag	Clar	Recogn	truepr	Gen	auctbef	risk	SBB	exp	BS
0	5000	9	9	0	0	0	1	1	1	1	1
5000	0	10	10	0	0	1	0	1	0	1	1
2000	3000	8	10	0	1	0	0	2	1	1	3
500	4500	8	10	0	1	0	0	1	1	1	2
0	5000	6	10	0	1	1	0	2	1	1	1
2000	3000	8	6	0	1	1	0	3	1	1	2
2000	3000	5	7	0	1	1	1	2	1	1	3
4000	1000	5	9	0	1	0	0	1	0	1	3
5000	0	5	8	0	1	1	1	3	0	1	1
0	5000	10	8	0	0	1	0	2	1	1	1
0	5000	5	10	1	1	0	0	2	1	1	1

Appendix E: Correlation Table

		Engagement	Clarity	Recognized	true pref	Gender	auct before	risk	Second bid bigger	exposure	Bidding_Strategy
Engagement	Pearson Correlation	1	.553**	.064	.027	-.045	-.008	.172	.163	.113	-.152
	Sig. (2-tailed)		.000	.527	.788	.655	.937	.087	.104	.262	.130
	N	100	100	100	100	100	100	100	100	100	100
Clarity	Pearson Correlation	.553**	1	.174	.275**	-.141	-.084	.187	.269**	.216*	-.132
	Sig. (2-tailed)	.000		.083	.006	.160	.407	.062	.007	.031	.192
	N	100	100	100	100	100	100	100	100	100	100
Recognized	Pearson Correlation	.064	.174	1	.175	-.107	-.079	-.058	.210*	.144	-.083
	Sig. (2-tailed)	.527	.083		.081	.291	.437	.569	.036	.153	.411
	N	100	100	100	100	100	100	100	100	100	100
true pref	Pearson Correlation	.027	.275**	.175	1	-.092	-.008	-.002	.332**	.018	-.059
	Sig. (2-tailed)	.788	.006	.081		.364	.934	.985	.001	.859	.562
	N	100	100	100	100	100	100	100	100	100	100
Gender	Pearson Correlation	-.045	-.141	-.107	-.092	1	.227*	.194	.032	.172	-.175
	Sig. (2-tailed)	.655	.160	.291	.364		.023	.053	.756	.088	.082
	N	100	100	100	100	100	100	100	100	100	100
auct before	Pearson Correlation	-.008	-.084	-.079	-.008	.227*	1	.123	.000	-.239*	-.164
	Sig. (2-tailed)	.937	.407	.437	.934	.023		.223	.996	.017	.102
	N	100	100	100	100	100	100	100	100	100	100
risk	Pearson Correlation	.172	.187	-.058	-.002	.194	.123	1	.054	-.194	-.028
	Sig. (2-tailed)	.087	.062	.569	.985	.053	.223		.591	.053	.784
	N	100	100	100	100	100	100	100	100	100	100
Second bid bigger	Pearson Correlation	.163	.269**	.210*	.332**	.032	.000	.054	1	.178	-.140
	Sig. (2-tailed)	.104	.007	.036	.001	.756	.996	.591		.077	.165
	N	100	100	100	100	100	100	100	100	100	100
exposure	Pearson Correlation	.113	.216*	.144	.018	.172	-.239*	-.194	.178	1	.060
	Sig. (2-tailed)	.262	.031	.153	.859	.088	.017	.053	.077		.551
	N	100	100	100	100	100	100	100	100	100	100
Bidding_Strategy	Pearson Correlation	-.152	-.132	-.083	-.059	-.175	-.164	-.028	-.140	.060	1
	Sig. (2-tailed)	.130	.192	.411	.562	.082	.102	.784	.165	.551	
	N	100	100	100	100	100	100	100	100	100	100

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

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

Appendix F: Variables

"Engagement" – level of subjective engagement in the experiment (10-point scale).

"Clarity" – subjective assessment of the clarity of experimental instructions given (10-scale).

"Recognized" – bivariate: 1 if subject recognized at least one of the featured paintings; 0 if otherwise.

"True pref" – bivariate: 1 if placed bids reflected the true preferences of the subject; 0 if otherwise.

"Gender" – bivariate: 1 if male; 0 if female.

"Auct before" – bivariate: 1 if subject has prior auction experience; 0 if otherwise.

"Risk" – subjective risk-attitude, categorical: 1 if low risk tolerance; 2 if moderate risk tolerance; 3 if high risk tolerance.

"Second bid bigger" – bivariate: 1 if the subject bid higher on the previously exposed painting; 0 if otherwise.

"Exposure" – bivariate: 1 if subject underwent experimental treatment; 0 if otherwise.

"Bidding Strategy" – subject's strategic approach towards bidding: 1 if "All-in"; 2 if "Preference-based"; 3 if other.

Appendix G: Variables in Unrestricted Model

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Clarity	.120	.181	.438	1	.508	1.127	.791	1.607
truepref	.887	.582	2.318	1	.128	2.427	.775	7.599
exposure	.794	.557	2.028	1	.154	2.211	.742	6.591
Engagement	.108	.155	.486	1	.486	1.114	.823	1.508
Recognized	20.081	14910.894	.000	1	.999	526045660.206	.000	.
Gender	.397	.578	.472	1	.492	1.487	.479	4.614
auctbefore	.317	.577	.302	1	.583	1.373	.443	4.257
risk			.171	2	.918			
risk(1)	-.261	.798	.107	1	.743	.770	.161	3.677
risk(2)	-.287	.699	.169	1	.681	.750	.191	2.952
Bidding_Strategy			3.725	2	.155			
Bidding_Strategy(1)	.465	.596	.607	1	.436	1.591	.495	5.120
Bidding_Strategy(2)	1.342	.696	3.717	1	.054	3.826	.978	14.970
Constant	-3.121	1.705	3.350	1	.067	.044		