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A Unified Framework of the Shared Aesthetic Experience

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Abstract

Aesthetic expressions have been seen as the manifest of human culture. The psychology of aesthetics have proposed various models, describing the various phenomena related to aesthetic experience, such as sensory pleasure derived from aesthetic stimuli, emotional response toward aesthetic depiction, cognitive mastering over aesthetic emotion, etc. However, further examination reveals current models have theoretical limits for the explanation of society-wide aesthetic preference due to limited scope of focus. Thus, the current project proposes a new theoretical framework to describe the process through which the society comes to converge on aesthetic preference. Examination of related theories and experimental evidence shows that the convergence process of our aesthetic preference is a function of several inter-related yet independent psychological mechanisms at the perceptual, affective, and cognitive stages of aesthetic processing. The proposed framework can inform future research in general psychology as well as other applications, such as the making of *creative* machines.

Keywords: aesthetics, processing fluency, shared fluency, cognitive mastering, aesthetic emotion, creative system.

Introduction

"As I have said so many times, God doesn't play dice with the world."

-- Albert Einstein (1983, page 58)

Aesthetics has been the epitome of human culture since pre-historic times. The earliest documented artworks emerged during the Paleolithic age in 100,000 years ago (Tedesco, 2007). Many of these ancient rock arts, while rudimentary, were already sacred images reflecting the distinctive cultures of the respective clans (B. D. Smith, 2011). As time progressed, artworks have taken a more and more central place in human culture, representing religious beliefs, political ideals, and essentially our overall cultural systems (Bell, 2009; Merleau-Ponty & Edie, 1964). In the modern era, the power of art has yet to be shaken, with almost trillions of dollars spent on artworks and aesthetics-related goods (World Trade Organization, 2014). Together, the phenomena all point to a seemingly shared aesthetic taste within our society.

How do we, as a society, come to form such aesthetic preferences? Is it the result of "God's magical dice"? Are there certain preferences commonly shared by all human beings? After examining existing psychological models in psycho-aesthetics, the present paper suggests that the phenomenon of shared aesthetic preferences can only be explained through a new unified framework. The framework suggests that we form shared aesthetic preferences through the function of multiple different psychological mechanisms at the perceptual, affective and cognitive stages of aesthetic processing. The following section will first illustrate the deficiencies in existing frameworks for

explanation of this specific phenomenon. Then the section is broken down into four sub-sections, each of which describes psychological mechanisms related to shared aesthetic preferences at different levels of processing.

The framework I propose accounts for the different variables impacting the overall aesthetic experience of an individual that may lead to a shared final evaluation. First of all, at the perceptual level, people have the same analysis mechanisms and preference toward perceptual qualities, such as symmetry, figure-ground contrast, complexity, color preference, across ages and cultures. Through a general adaptation mechanism as illustrated below, group perceptual aesthetic preference may be synchronized. On the cognitive level, due to art education and expectation, trained experts can direct attention to specific perceptual attributes and come to similar aesthetic judgments. Our choice of social groups also affects the degree to which we are exposed to different aesthetic stimuli and thus our aesthetic preference. On the affective level, because of prototypicality of emotion, images depicting essential features of prototypical instances of emotion can lead to similar affective experience and possibly similar aesthetic preference. Finally, social interaction and discourse helps shape the experience. The social interaction facilitates our expectation and the cultural context, contributing to the formation of culturally-specific aesthetic preferences. Social interaction also facilitates an adaptation mechanism, considering that mutual liking among similarly interested individuals allows them to coordinate behaviors and receive shared exposure via shared liking (cf. Reber & Norenzayan, 2010).

The different variables described above may affect or override each other. For example, a beholder might feel an artwork is beautiful at first glance because of

perceptual qualities and therefore chose to examine the content more carefully. However, s/he was then reminded of his/her past memories and felt disgusted about the artwork.

Theoretical Foundation

Processing Fluency Theory

Do we have share a universal preference toward all aesthetically pleasing objects? The question has been debated in the psychology of aesthetics since the founding of the field (Tinio & Smith, 2014, page 8-12).[1] The support for preferential universality has been extensive. Infants have been found to prefer more average and symmetric faces (Rhodes, Geddes, Jeffery, Dziurawiec, & Clark, 2002). Further examination found a similar preference among adults as well (Rhodes, Sumich, & Byatt, 1999). The same result has been found for color preference. Infants' preference toward different colors had been found to be parallel with adults' preference (Bornstein, 1975). A long line of research has been done in search for a set of universally valid rules of aesthetic preference (Silvia, 2012).

Contemporary theorists have attributed the findings to the workings of the complex cognitive mechanism of processing fluency (Reber, Schwarz, & Winkielman, 2004). Reber et al (2004) posit that "aesthetic pleasure" or "beauty" is a function of the beholders' processing fluency, i.e. the degree to which the perceivers can efficiently perceive and comprehend an object. For instance, symmetry helps the beholders to process the content more efficiently and thus increases the amount of aesthetic pleasure the beholders perceive. The theory has since received much experimental support (Alter & Oppenheimer, 2009 for comprehensive reviews; see Chenier & Winkielman, 2009).

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[1] Vorschule de Äesthetik (1876) has been seen as the beginning of the field.

Additionally, the theory can be extended to explain other aesthetic pleasure-related phenomena, such as the "Aha" experience when problem is suddenly solved (Topolinski & Reber, 2010). Accordingly, the reason why scientists feel beautiful about a problem solution is due to the perceived truth in one's judgment and the increased processing fluency it leads to (Topolinski & Reber, 2010).

However, the theory too has its flaws. Repeated exposure supposedly would increase aesthetic pleasure because it helps facilitate processing of the stimuli (Reber et al., 2004). If so, novel objects would unlikely lead to a sense of pleasure because of the additional processing required. In our everyday experience, the phenomenon of society-wide aesthetic preference has been observed. Every year, the fashion industry cycles through a new aesthetic ideal and generates a massive change of aesthetic preference (Coelho, Klein, McClure, & ON, 2004). The change is also observed in the art realm with art history labeled by the different dominating artistic style (Sorokowski, Sorokowska, & Mberira, 2012). The same has been observed in product design (Carbon, 2010), body shape (see Baghurst, Hollander, Nardella, & Haff, 2006; Pettijohn & Jungeberg, 2004 for both male and female body shape changes), etc.

Additionally, the theory by large focuses on the "aesthetic pleasure" of perceivers, with little to say about the creative processes. The entire art creation process has been reduced down to the process of creating more perceptually fluent objects. It is true that most experimental data supporting the theory are concerned with non-artistic stimuli, such as designed chairs (Armstrong & Detweiler-Bedell, 2008). However, it is often observed that designers borrow inspirations from the art world and vice versa (Lynes,

1970). The model is insufficient to explain how we come to share similar aesthetic preferences.

Two-Step for the Dynamic Changes of Aesthetic Appreciation

Carbon (2011) proposed a two-step model to account for the dynamics of aesthetic appreciation change. As figure 1 suggests, the model holds that in aesthetic domains that encourage and recognize continuous stream of innovation, aesthetic preferences of the beholders are changed in a cycle of continuous adaptation. At first step, form fatigue (boredom due to overly familiar exemplars), competition, and social circumstances drive innovators to create exemplar designs that challenge beholders' existing visual habits. Working with trendsetters, innovators promote the innovative works intensively, as beholders *adapt* the new stimuli in their visual habits. As people's taste becomes more stabilized, new creative exemplars come along and start the cycle all over.

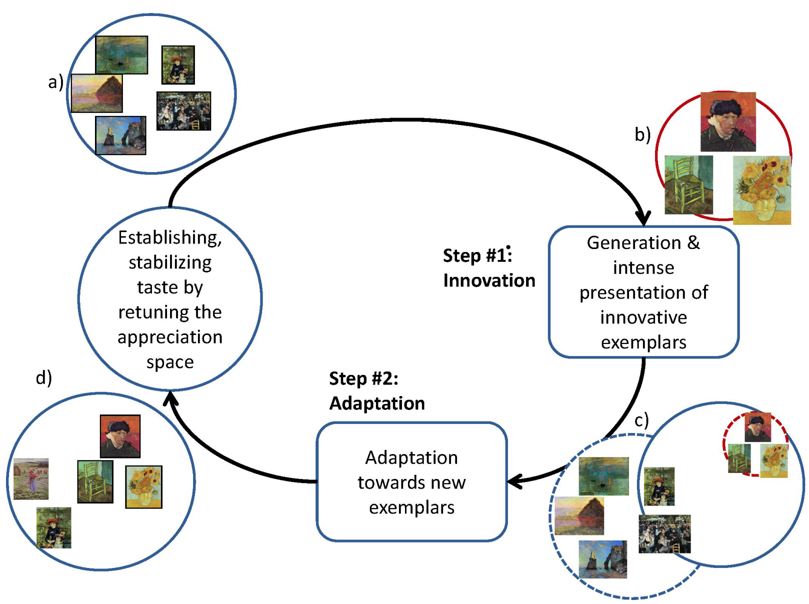

Figure 1: Two-Step model of the Dynamics of Aesthetic Appreciation. Painting by Carbon (2011)

However, strictly speaking, both models are limited in their focus on preference judgment without much explanation for the other psychological states that make up the core of the aesthetic experience (Silvia, 2012). Indeed, most data supporting the process fluency theory have been focusing on experience with non-artistic stimuli and limited time for participants to have a full aesthetic experience (Armstrong & Detweiler-Bedell, 2008). A fundamental tension exists here. On one hand, because of the fast processing time of perceptual variables, experimenters need to restrict the presentation of aesthetic stimuli to conduct empirical analyses of the effects of these variables (S. Kreitler & Kreitler, 1984). On the other hand, people need an extended period of time for other core parts of an aesthetic experience, such as the perception-cognition-emotion interactions, to take place (Leder & Nadal, 2014). While most beholders do spend very short time viewing artworks,[2] creators of the aesthetic objects do view the artworks for a much longer time. Given Carbon's two-step model, it is easy to see that variables impacting processing fluency, such as expectation, are built by creators who have both the perceptual experience and affective/cognitive experience (Reber et al., 2004). An account of other core aspects of the aesthetic experience is nonetheless necessary for a complete understanding of the psychology of aesthetics (Jacobsen, 2010).

[2] As (Leder & Nadal)'s (2014) review showed, average visitors in museums spend less than a minute viewing each artwork.

Information-Processing Model

The information processing model developed by Leder, Belke, Oeberst, & Augustin (2004) helps fulfill one part of the gap. As figure 2 illustrates, the model conceptualizes the aesthetic experience of art-viewing as different information-processing stages, and suggests that processing of each stage leads to its unique outcome (Leder & Nadal, 2014). Accordingly, a beholder starts processing aesthetic objects from the perceptual level, identifying various perceptual qualities of the objects. Then, after identification of the content and style, the beholders add their own self-specific interpretation of the process, leading to the final aesthetic judgment. In addition, affective evaluation of objects starts from the beginning of the experience and continues interacting with the perceptual and cognitive components of the experience.

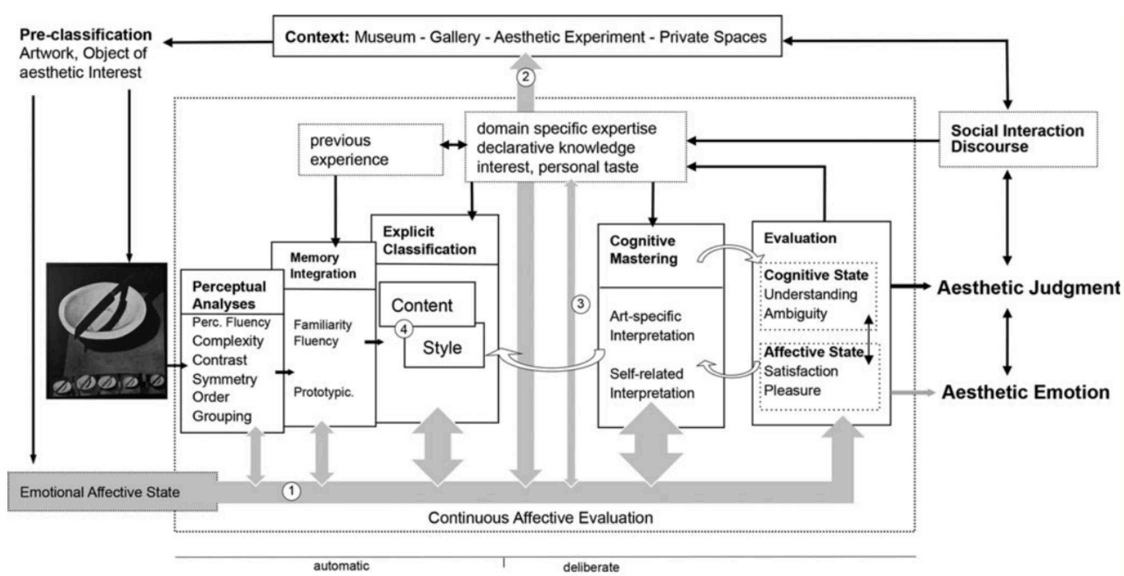

Figure 2: Information Processing Model of Aesthetic Experience (Leder & Nadal, 2014)

However, the information-processing model too has its problems. First of all, the model was created “to understand art-specific cognitive experience” (Leder et al., 2004,

page 489). Therefore, most data supporting the information-processing model so far has been dedicated toward fine art, with a few works dedicated toward other objects of aesthetics, such as designed consumer products, fashion clothing, etc. (Leder & Nadal, 2014). However, it is not to say the model is not flexible enough to incorporate the experience of these objects. Additional works are needed to test its capability in that domain.

Mirror Model of Art-Making and Art-Viewing

The mirror model of art-making and art-viewing developed by Tinio (2013) fulfills another gap of the investigation. Based on empirical studies of aesthetics and creativity, the model interprets the art-making process as a reversed succession of the art-viewing process. As beholders typically come to concern themselves with the creators' intention at the last stage of the processing, creators start the creation process with their intent. Then the creators start developing structural elements of the artwork with techniques such as underdrawing, layering, etc. At the last stage, the creators start fine-tuning perceptual features of the works. The model resolves a constant tension between the cognitive approach and the Gestalt approach, whose scholars argue that "to perceive, a beholder must create his own experience" (Dewey, 2005, page 54). It is also flexible enough to account for artists' aesthetic creation abilities without loss of an understanding of the underlying mechanism.

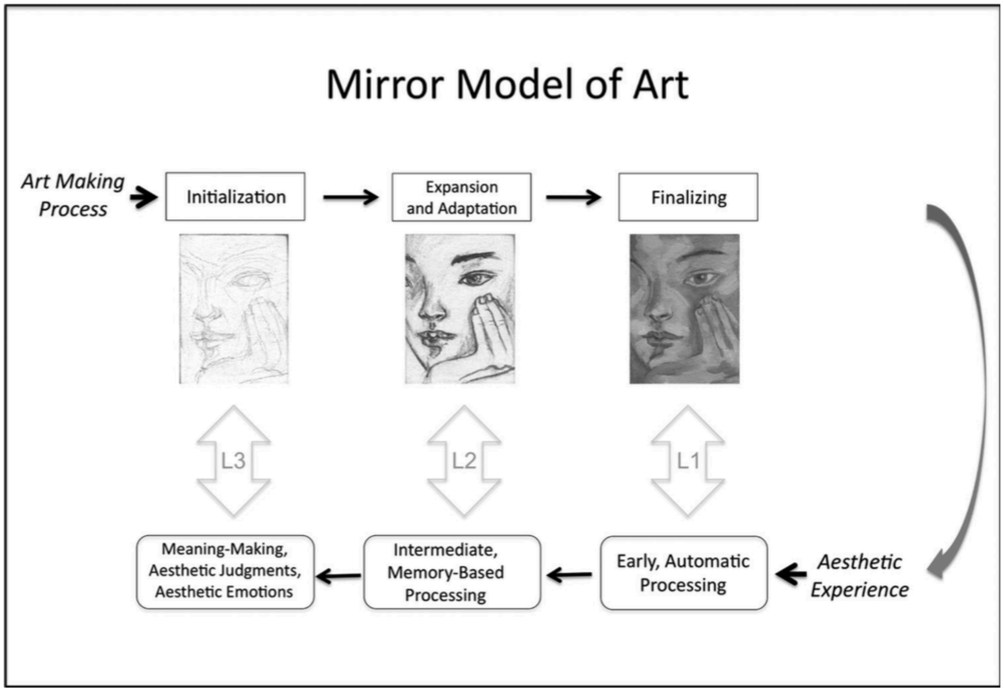

Figure 3: Mirror Model of Art (adapted from Tinio (2013))

To sum, as illustrated above, multiple empirical theories of aesthetics have attempted to investigate the various subcomponents of the psychology of aesthetics. However, given that these components do indeed have an interconnected relationship, a complete account of the psychology of aesthetics is needed to inform future investigations. Thus the current paper presents the above-mentioned unified framework, which accounts for variables that affect group aesthetic preference.

This framework is aimed at understanding the shared aesthetic preference for visual stimuli, including visual arts, the visual experience in viewing artificial products, etc. The present paper uses artists, designers, and creators interchangeably to refer to everyone who engages in the creation process of aesthetically pleasing objects. The framework may be extended to other sensory inputs, given that studies have shown

shared seat areas in the brain among different aesthetic inputs (Nadal, 2013). For the same reason, certain studies cited below may be investigating general psychological phenomenon across domains.

It is true that the aforementioned model may seem complex at first sight. However, complex phenomena call for complex models. Neurological studies have shown that there is no one localized seat area for aesthetic processing (Nadal, 2013). Aesthetic experience is a result of the complex workings among our perceptual, cognitive and emotional mechanisms (Alter & Oppenheimer, 2009).

The following section is separated into four different sub-sections, examining different components of the framework and future challenges.

Perception

The study of our preference for basic perceptual attributes has been part of the psychology of aesthetics since the founding of the field. Early researchers, such as Martin (1906) , focus on testing if different shapes or lines have inherent aesthetic value (Konečni, 2012). Most studies have been found to be difficult to replicate, and the original results may be due to confounding variables, such as the mere exposure effect (Silvia, 2012). Contemporary researchers have conceded that the studies of simple geometric shapes, while valid, have limited implications for generalizing to aesthetic objects (Jacobsen, 2006). However, it is not to say that perceptual qualities do not matter in the aesthetic experience. Rather, they are an important factor in forming our first impression. Their effect may be mediated by other factors, but the effect is still a separate stage in our aesthetic process (Ramachandran & Hirstein, 1999). Indeed, developmental studies on infants (Bornstein, Ferdinandsen, & Gross, 1981; Canfield & Haith, 1991; Rhodes et al., 2002) and neuroimaging studies (Bornstein et al., 1981) have both demonstrate a shared preference for perceptual qualities originated from a shared neural pathway.

By reviewing the influence of prominent perceptual qualities, the present paper demonstrated that people have shared preferences and mechanisms regarding aesthetic objects. Not only so, artists have long known these mechanisms and used them in the creative process to make final products more appealing to the viewers.

Qualities, such as symmetry, figure-ground contrast, complexity, and color preference are reviewed. Studies with presentation time constraints have revealed that

these basic physical qualities are identified early on in the processing of images, and significantly influence aesthetic pleasure when other factors are held constant (Leder et al., 2004). Theoretical accounts have pointed to perceptual fluency as the underlying factor driving the effect of these qualities on aesthetic experience.

Symmetry

Among all the experimental studies on the aesthetic value of object attributes, symmetry is probably one of the most well studied features (Palmer, Schloss, & Sammartino, 2013). Symmetry has been found to be extracted early in the automatic perceptual analyses processes (Locher & Nodine, 2013). The effect of symmetry is found in both traditional artworks and complex abstract patterns (Jacobsen & Hofel, 2002; Julesz, Papathomas, & Phillips, 2006; Leder et al., 2004; Locher & Nodine, 2013). In most studies, participants judged different images of different spatial qualities on scales related to judgment of beauty.

Collectively, these studies have revealed that a general preference for symmetry exists, though with significant individual differences (Jacobsen & Hofel, 2002; Julesz et al., 2006; Leder et al., 2004; Locher & Nodine, 2013). Further examinations of experimental data revealed symmetry is mediated by several other factors, such as complexity (Locher & Nodine, 2013 for a comprehensive review on symmetry; see Palmer et al., 2013). Perceptual fluency has been suggested to be the underlying mechanism facilitating the effect of symmetry on our aesthetic judgments (Reber et al., 2004). According to the theory, symmetry contributes to our feeling of aesthetic pleasure because it can expedite processing of stimuli. Indeed, a recent neuroimaging study by

Norcia, Candy, Pettet, Vildavski, & Tyler (2002) presented symmetric dot patterns to participants while randomly changing the number of dots on either sides as control. The study suggests that the property of symmetry has a localized seat area in the brain in the extrastriate cortex. This particular finding has immense value in showing that the recognition of symmetry and its effect on aesthetic preference may be an inherent mechanism.

Figure-Ground Contrast

Figure-ground contrast is another aesthetic quality which is processed early in the perceptual process (Ramachandran & Hirstein, 1999). Figure-ground contrast refers to the contrast between the figure[3] and the background. In general, studies have found that higher figure-ground contrast contributes to more positive aesthetic response (see Schloss & Palmer, 2011 for review of the effect of contrast). However, as Reber, Winkielman, & Schwarz's (1998) study demonstrated, the effect is mediated by presentation time. The effect of figure-ground contrast was found to be most prominent in short presentation time since it contributes to faster identification and thus faster perceptual processing (Reber et al., 1998).

[3] The figure is usually referred to the emphasis of the image. What the artists' emphasis of an image is often left for interpretation.

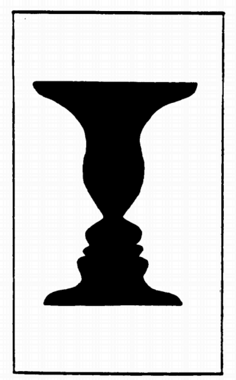

Figure 4: Rubin Vase—A Classic Figure-Ground Contrast Stimuli (Peterson, Harvey, & Weidenbacher, 1991)

Complexity

Visual complexity has been known to contribute to visual aesthetics for decades (Vitz, 1966). Frith and Nias (1974) made visual complexity available for objective evaluation by constructing images with computation. Generally speaking, aesthetic preference has been found to correlate with complexity in an inverted U-shaped function. In other words, people appreciate an object most optimally when it is most varied yet unified.

However, the effect of complexity is dependent on the relevant context and the degree of familiarity. For example, under a bright light, the participants appeared to be more tolerant toward high complexity (Berlyne, 1974). Participants also appeared to grow more tolerant toward complex stimuli after repeated exposure (Snodgrass & Vanderwart, 1980).

Single Color Preference

Color is another significant perceptual variable in the function of aesthetic preferences (Martindale & Moore, 1988). Color has been found to be one of the earliest extracted attributes in processing visual stimuli (Zeki, 1980). Although individual

differences in color preference do exist, contemporary studies point to a shared systematic pattern of preference around three color attributes: hue, saturation, and brightness (Palmer et al., 2013).

Generally speaking, western adults prefer colors of warmer hues than cooler ones (Schloss & Palmer, 2011), colors with higher saturation (Palmer & Schloss, 2010), and colors with higher lightness (McManus, Zhou, & l'Anson, 2011). However, there are many caveats. Western males have been found to prefer colors with higher saturation than females do (Schloss & Palmer, 2011). The difference starts developing around adolescence (12-13 years old) with no significant difference at younger ages (Child, Hansen, & Hornbeck, 1968).Differences in hue preference start developing earlier, at around the age of three (Chiu et al., 2006).

Color preference has also been found to be a highly culture-dependent variable (Palmer & Schloss, 2010). For example, though blue is preferred in over a dozen countries (Adams & Osgood, 1973; Hurlbert & Ling, 2007), it was found to be disliked in the small country of Kuwait (Choungourian, 1968).

Based on the aforementioned evidence, (Palmer & Schloss) (2010) developed the ecological valence theory of color preference, which suggests preference arise from association with objects. Preliminary evidence supported the idea though future investigation is needed (Schloss, 2015).

Artists as Neuroscientists

Psycho-aesthetics scholars have long suggested that artists are de facto visual neuroscientists who use different techniques to explore the abnormality in our visual sense (Carbon, 2014). Artistic training and perceptual learning have made artists more

sensitive to visual attributes[4] (Ostrofsky et al., 2012) and enabled them to use these stimuli in the creative process.

The colorimetric barycenter is commonly referred to the “center of gravity” for compositional color and is traditionally taught by art schools as the balancing point in a painting (Locher, 2010, page 131). Art theorists have also considered the balance of an image around the center to be the most important principle in visual arts (Arnheim, 1988). The effect has been found in both experts and non-experts, suggesting a perceptual constancy (Arnheim, 1988). An examination of 1332 paintings across culture and time revealed a similar colorimetric barycenter among all 1332 paintings (Valeriy Firstov, Firstov, Firstov, Voloshinov, & Locher, 2007). The effect was further supported in an empirical study of the creative process, using students with an average of three years of study at the Academy of Fine Arts (Locher, Cornelis, Wagemans, & Stappers, 2001). The experimenters invited the participants to create an “interesting” design with planar black triangular and quadrilateral shapes cut from sheets of high-luster black polystyrene 2.0 mm in thickness. Shapes were selected as the tools for creation because they have been shown to be distinctive in terms of figurative characteristics. A qualitative balance index of the recording of the entire creative process shows that despite the stages of construction, format, or types of shapes, the designs had been following the principle of balance.

[4] Ostrofsky, Kozbelt, & Seidel’s (2012) study shows that experts and artists, compared to non-experts, are faster at reacting to properties of visual stimuli.

Similar examination has also found that artworks and natural scenes have a similar Fourier power spectrum, which suggests these images all have the same fractal-like, scale-invariant property (see figure 5 for an example of such image) (Redies, Hasenstein, & Denzler, 2007).[5] Such an effect was found across cultures, styles (in both abstract and traditional artworks), and in both artworks and natural scenes (Graham & Field, 2007; Graham, Stockinger, & Leder, 2013; Redies et al., 2007).

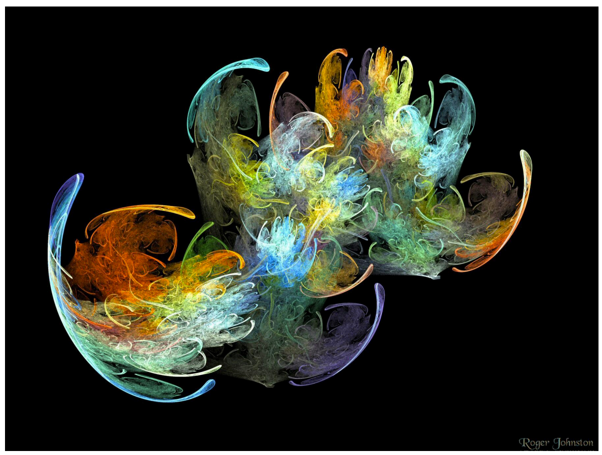

Figure 5: Fractal Art (Johnson, 2016)

Mere Exposure & Active Elaboration

Mere exposure of a given stimulus has been known to increase the liking of the stimulus if the exposed is not aware of the deliberate procedure (Carbon, 2011). Throughout the process, the effect of perceptual qualities is significantly influenced by familiarity (Leder & Nadal, 2014). However, there are caveats. The relationship between mere exposure and aesthetic preference is essentially a U-shaped function (Zajonc, Shaver, Tavris, & Van Kreveld, 1972). The mere exposure was found to lower liking

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[5] These type of images tend to exhibit a self-repeating pattern at every scale.

after twenty or more exposures (Zajonc et al., 1972). Other studies also show us that the effect is null once the subject is made aware of the phenomena (Moreland & Topolinski, 2010). However, in everyday life, people often actively seek out to be exposed to stimuli. Active elaboration, the process in which participants were led to actively think about the stimuli, was found to increase liking even further (Carbon, 2011).

Together with the prototypicality mechanism, they form the basis of the adaptation mechanism, the process in which people adapt to the ongoing changes in their perceptual environment (Schmid et al., 2013). By either actively or passively adapting to novel stimuli, we grew to like the works more and more. To test the effect, (Carbon & Leder) (2005) developed the Repeated Evaluation Technique (RET) to simulate real world experience of repeated exposure. Experimenters asked participants to rate/evaluate car designs in different ages in 25 rating blocks. Controlling for previous knowledge and previous interests in aesthetics, the experiment found that RET significantly increased participants' liking for car designs than their original rating.

In a domain in which continuous stream of innovation and possibility of media exposure exists, the adaptation mechanism can then help produce a recursive loop of dynamic change of aesthetic tastes (Carbon, 2011). The recursive loop of exposure not only increases our collective aesthetic pleasure but also our social interaction, which in turn feeds back into our interest (Reber & Norenzayan, 2010).

However, this is not to say that mere exposure on a societal scale would certainly lead to increased liking among all attributes. Instead, study has demonstrated that mere exposure effect and the overall adaptation mechanism are subjected to the influence of other variables, such as context (Gillebaart, Förster, & Rotteveel, 2012). According to the

Gillebaart et al. ’s (2012) experiments, when subjects are primed with security-related cues or context, the mere exposure effect is more influential than when subjects are primed with growth-related cues.

Visual Perceptual Learning

In fact, the effect of mere exposure can be categorized under the bigger umbrella of visual perceptual learning (VPL), which describes the phenomenon of increased performance of perceiving perceptual qualities as a result of extended visual perceptual experience (Watanabe & Sasaki, 2015). There are two types of VPL: task-relevant VPL, i.e. performance increase due to intentional training, and task-irrelevant VPL, performance increase due to unintentional exposure (Watanabe & Sasaki, 2015). The mere exposure effect can put under the umbrella of task-irrelevant perceptual learning (Watanabe & Sasaki, 2015). Study also suggests that people could implicitly learn the structure of a stimulus without ever actively learning the structure (Reber et al., 2004). For example, participants were found to prefer grammatical tonal music sequences created out of a finite state grammar than ungrammatical music sequences (Bruce, Harman, & Turner, 2007). Taking advantage of the mere exposure effect and the implicit learning of structure effect, domain experts used visual perceptual learning techniques to more efficiently differentiate perceptual qualities. As the following section will demonstrate, the perceptual learning effect drives experts to agree on similar aesthetic judgments, while alienating them from non-experts.

Cognition

Attention-Driven Cognitive Mastering

Attention can be directed toward aesthetic appraisal, and can thus introduce cognitive and affective forces in the appraisal process. Art is only art when we think of it as art. An individual may feel aesthetic pleasure; however, without intentional attention direction, a person may never think of it as aesthetically worthy. Attention is important for our discussion of shared preference because the point of attention differentiates experts and non-experts, among other things. Experts' aesthetic judgment has been found to differ from non-experts' in many different dimensions (Leder, Gerger, Brieber, & Schwarz, 2013). Other than the amount of exposure, experts' art education influences them to consider qualities that non-experts may not consider, such as creative techniques, authors' style, authors' artistic education etc. (Leder et al., 2004; Scherer, 2005). A facial electromyography study on experts' and non-experts' responses toward aesthetic objects supported the idea of differentiated focus on visual qualities (Leder et al., 2013). The discipline of art education and art history is an ever-evolving field. Nevertheless, the field has come to agree on many principles, which in turn contribute to the formation of experts' shared aesthetic preference.

However, many principles of art appreciation are also being challenged. For example, several computer science and neuroaesthetics scholars have devised an algorithm to automatically generate artistic images of high perceptual qualities based on different artistic styles (see figure 6) (Gatys, Ecker, & Bethge, 2015). It calls in question of how much art appreciation dogmas about styles matter.

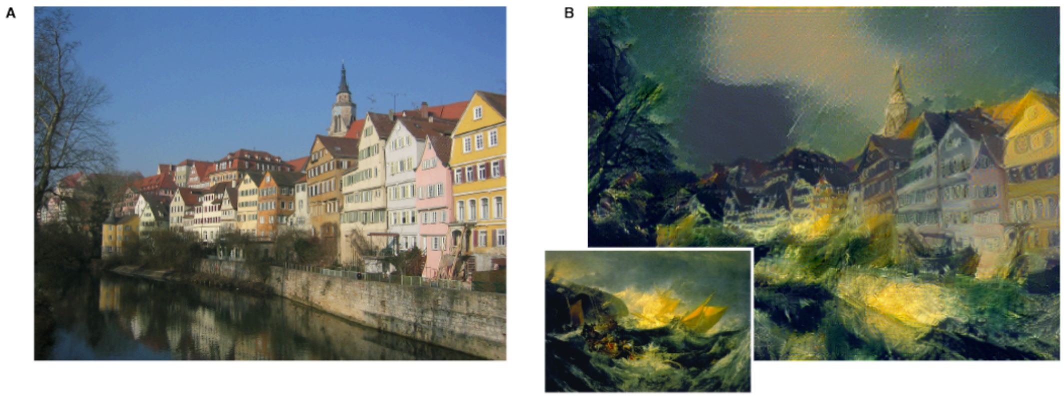

Figure 6: A photograph depicting the Neckarfront in Tübingen, Germany (A) is transformed with the style provided in the image in the bottom left corner (Gatys et al., 2015). Here the bottom left image is *The Shipwreck of the Minotaur* by J.M.W. Turner, 1805 (Gatys et al., 2015).

As mentioned above, active elaboration and intentional perceptual learning further diversify experts and non-experts; in the meantime they do drive experts to agree on more aesthetic judgments. Compared with non-experts, experts are likely to agree on a result of aesthetic evaluation (Pang, Nadal, Müller-Paul, Rosenberg, & Klein, 2013).

Furthermore, experts appear to have a different emotional response pattern different from that of laypeople (Leder et al., 2013). The result was posited to be the influence of cognitive mastering of affect (Leder et al., 2013). Experts were less responsive to direct affective valence and more mediated by attention in terms of their emotional response (Leder et al., 2013). The pattern is suggested to be a unique distanced mode of emotion coping, driving the domain experts' aesthetic preference to converge (Pang et al., 2013).

Shared Fluency

Besides exposure predominately influenced by society, we also self-select the degree to which we want to be exposed to stimuli (Reber & Norenzayan, 2010). On one

hand, class difference leads to a need for differentiation and gives people of different upbringing exposure to different aesthetic products (Reber & Norenzayan, 2010). The additional exposure leads to increased liking toward specific aesthetic products (Reber & Norenzayan, 2010). On the other hand, it is likely that individual personality can also lead to different social grouping (Brewer, 1991) which leads to different amount of aesthetic exposure (as described in the mere exposure section above) and eventually leads to different aesthetic preference (Rawlings, Barrantes i Vidal, & Furnham, 2000). There has been ample evidence for both the correlation between personality and social grouping (see Mikulincer, Shaver, Dovidio, & Simpson, 2015 for review) and the correlation between personality and aesthetic preference (see Rawlings et al., 2000 for review). However, there has been limited experimental evidence examining this specific relationship in the realm of aesthetics. Future research can be enlisted in this effort.

Affect

Aesthetic Emotion vs. Utilitarian Emotion

Before the discussion of the emotional response to content, a question needs to be answered first: is the feeling evoked by aesthetic objects *emotion*? If so, do general findings from the psychology of emotion apply to this type of emotion? The question had been heavily debated in the field in the early days (Tan, 2000). The central question is concerned with the utility of emotion. Traditional evolutionary theory of emotion considers emotion as an intense affective mechanism of coping with the outside environment with an *adaptive* function (Frijda, 1986). For example, if a person suddenly sees a danger snake during a peaceful walk, s/he would feel fear as well as the associated physiological systems for the fight-flight response (Ortony & Turner, 1990). However, aesthetic emotion usually does not relate to specific biological needs or plans for behavioral change as coping mechanism (Scherer, 2004). However, as Scherer (2004) pointed out, aesthetic emotion in fact do lead to weaker change of behavioral readiness, as observed by physiological change, and sometimes lead to behavioral change. Recent experimental evidence, for instance, shows that beholders actually subconsciously imagine the artists' brushstroke actions in their mind[6] (Moreland & Topolinski, 2010; Shusterman, 2010). Thus, regardless of whether there is a so-called biological goals assigned to aesthetic emotion, the similarity between aesthetic emotion and utilitarian

[6] This phenomenon is typically referred to as embodiment.

emotion in terms of physiological and behavioral change can only lead to the conclusion that aesthetic emotion can considered as emotion (Scherer, 2004; 2005).

Prototypical Emotional Response

Researchers have found that artists, through depiction, can reliably convey specific emotions such as anger (Gabrielson & Juslin, 2001). How do artists convey emotion? A satisfying interpretation can come from the prototype approach to emotion (Phillip Shaver, Schwartz, Kirson, & O'Connor, 1987). Accordingly, emotion arise from repeated experiences and is organized around prototypical instances of different categories of emotions (Phillip Shaver et al., 1987). Prototypical instances of emotions have "certain specifiable components, themes, or features" with variants of the emotion having different features added or removed (Keltner & Haidt, 2010). If an image does depict central features of the prototypical instances of emotions, it is expected that the perceivers would likely experience the same emotion. The phenomenon can be observed in basic aesthetic emotion as well as more complex ones (Joshi et al., 2011). More complex emotions have also been found to be reliably evoked by aesthetic depiction (Joshi et al., 2011). One prominent example is the complex emotion of awe. For example, vastness was considered a central feature of the prototypical case of awe. Vast scenes of grand nature was capably of reliably evoking the emotion of awe in viewers (Keltner & Haidt, 2010).

The prototypicality of emotion also helps forming shared aesthetic preferences. In fact, building upon principles of aesthetics, computer scientists have been able to develop a program capable of automatically extracting perceptual and affective features of images and predicting the general aesthetic scores and emotional categories of images (Joshi et

al., 2011). The researchers obtain image data from large online photo-sharing sites with different tagging and emoticons. The system can then predict emotions expressed by the images to a certain degree (Joshi et al., 2011). The system does suffer from the *aesthetic gap* of lack of past experience and lack of understanding of appropriate context of viewing. However, future development of machine learning technology can possibly build a more self-conscious machine.

Social Factors

Expectation & Context

As Leder et al. (2004) points out, strictly speaking, the aesthetic evaluation process may not necessarily start with perception, but rather with social expectation. This expectation can be created out of many social factors. For example, advertising and branding effect prepares the viewer to have expectations of designed artifacts (Hoch & Ha, 1986). Furthermore, the context of the viewing, such as the museum setting, can drive viewers to place themselves as the viewer of “art” rather than mere drawings (Tschacher et al., 2012). One study showed that participants found artworks in a museum context more enjoyable and more interesting (Brieber, Nadal, Leder, & Rosenberg, 2014). The effect of expectation is even more prominent in (Wagner, Menninghaus, Hanich, & Jacobsen)’s (2014) study over disgusting images. Experimenters show pictures depicting disgusting elicitors, such as mold, rotten food, to 24 non-experts in the art field. One group was told the image was an artistic depiction while the other group was told the image was an documentary photograph. Disgusting images were even found to be enjoyable if they were expected to be art (Wagner et al., 2014).

Authenticity is another often-considered factor in the formation of expectation. However, study shows that the labeling of authenticity can lead the viewers to give significantly different ratings of aesthetic quality, even when the painting is exactly the same (Wolz & Carbon, 2014). Further neurological examination revealed that the assignment of inauthenticity could lead the participants’ attention to focus on guessing

the details of inauthenticity (Huang, Bridge, Kemp, & Parker, 2011). The assignment of authenticity activates the orbitofrontal cortex, an area traditionally associated with reward and monetary gain (Huang et al., 2011). The result indicates that participants may be evaluating aesthetic quality in relation to monetary gains (Huang et al., 2011).

So far, neurological evidence has largely pointed to the activation of cognitive brain areas in testing formation expectation, though laboratory research has suggested expectation leads to change in both cognitive and emotional responses.

Shared Fluency

As mentioned above, there exists a self-recursive shared fluency loop continuously adapting aesthetic preference. The theory has been described well in the sections above. However, it is worth noting that since the theory implicates the formation of social groups, many findings regarding social groups may be applicable here. Future research is needed in linking these two realms of research.

Discussion

Aesthetic appreciation and creation has become an integral aspect of human culture. Every year, almost trillions of dollars are spent on industries related to aesthetics (World Trade Organization, 2014). The present paper offers a framework of shared aesthetic preference to guide future research in the creative industry.

The current framework also helps inform future research within the larger realm of general psychology. Psychology of aesthetics, as the second oldest branch in modern day psychology (Tinio, 2013), has been an essential part of the study of human psychology. Because aesthetics is effectively the result of many different cognitive mechanisms, certain experimental findings can also be generalized to all cognitive effects. For example, psycho-aesthetics found that emotion could be reliably evoked by certain visual stimuli, relieving psychologists of emotions to create emotional scenarios for every experiment.

Beyond the study of psychology, the study of aesthetics has other implications. Computer scientists have recently gain attempts to an intelligent system capable of aesthetic evaluation (Galanter, 2012). Aesthetic creation and evaluation are also considered an integral aspect of creativity (Kaufman & Sternberg, 2010). Therefore the ability for aesthetic appraisal and creation has been considered an integral aspect of the *creative* machines (Galanter, 2012). As recent studies show, the future direction of the field has also moved toward a numerical model of aesthetics with the help of computer scientists (Schmid et al., 2013).

After all, the ability of generating and sharing art is a central part of our humanity. No other species are known to be capable of creating and appreciating art. Artistic creation is the climax of our creativity and deserves the scholars of all realms as an important subject of study. As Henry David Thoreau (1894, p. 385) once said, “the world is but a canvas to our imagination.”

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