EMPIRICAL STUDIES OF THE ARTS, Vol. 26(2) 197-218, 2008

THE PERCEPTION AND EVALUATION OF VISUAL ART

HENRIK HAGTVEDT
University of Georgia, Athens

REIDAR HAGTVEDT
Georgia Institute of Technology, Atlanta

VANESSA M. PATRICK
University of Georgia, Athens

ABSTRACT

Visual art is a complex stimulus. Drawing on extant theory that the interplay of affect and cognition evoked by a stimulus drives evaluations, we develop a generalizable model for the perception and evaluation of visual art. In three stages, we develop scaled measurements for the affective and cognitive components involved in the perception of visual art and present a structural equation model that integrates these components in art evaluation.

The nature of art has been a topic of philosophical interest since the days of the ancient Greeks. Yet the experience of art, and consequently the perception and evaluation of art, seems particularly challenging to comprehend within a scientific framework. Previous research has nonetheless made much progress toward a psychological understanding of art perception and aesthetic appreciation (Funch, 1997). The current research builds on this work to develop a structural model for the perception and evaluation of visual art. Since the visual experience of art arguably includes both cognitive and emotional components (Baltissen & Ostermann, 1998; Silvia 2005a), the proposed model incorporates both these elements.

doi: 10.2190/EM.26.2.d
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This research relies on visual art, specifically paintings, as stimuli. Further, it is restricted to participants without formal art training, because it seems reasonable that different types of training may affect cognitive judgments enough to unduly complicate a general model. Indeed, Bezruczko and Schroeder (1994) noted that professional artists and non-artists differ on various dimensions of visual preferences. Silvia (2006) similarly noted that although people high and low in training make the same emotional appraisals of art, they differ in their appraisals of what makes art interesting. Thus, it seems reasonable to concentrate on the untrained category of viewers first, while the effects of training may be added at a later stage. After all, some form of art appreciation appears to be a general human phenomenon (Dutton, 2002; Tansey & Kleiner, 1996), while different schools of art may have more specific influences on how artworks are perceived and judged.

Perception is generally referred to as the process of making sense of the world around us. It involves the acquisition, interpretation, selection, and organization of sensory information. Since Plato's allegory of the cave, explained in the *Republic*, the importance of perception in understanding a human being's interaction with the world has been well established. Although perception is dependent on a host of physiological (e.g., age, health, hunger) and social (e.g., cultural differences, social roles, self-concept) factors, the perception of "art itself is a cultural universal" (Dutton, 2002).

Given the complexity and variety of art, it may seem naïve to attempt to capture the perception of visual art in a single model. However, the present research represents an initial attempt at this endeavor. For the purposes of this research, we characterize art perception as the acquisition, interpretation, and organization of the affective and cognitive elements stimulated by an artwork and the interplay of these elements in forming the evaluation of art. After a brief discussion about what constitutes art in the context of this research, as well as a theoretical discussion of the interplay between affect and cognition, scales are developed for both emotions and perceived attributes involved in the perception of visual art, and a structural equation model is presented that integrates these components in the evaluation process.

IDENTIFYING ART

An antecedent to the notion of art as a distinct category was merely the perceived difference between nature and human activity, and throughout much of history the modern distinction between "art" and "craft" was virtually nonexistent (Hauser, 1999). During medieval times, painting and sculpture were taught in artisans' guilds, music was often placed in the same category as math, and poetry was grouped with rhetoric and grammar. It was not until the mid-eighteenth century that Abbé Batteux presented a separate classification of fine arts consisting of music, poetry, painting, sculpture, and dance (Shrum, 1996). One of the

distinguishing marks of these disciplines was that they had pleasure rather than utility as the main goal, and their classification as the fine arts came to be disseminated throughout Europe.

Today the notion of art as a special category of human activity, with a unique influence on viewers, still remains. However, it seems doubtful whether scholars will ever agree on a definition for this category. For instance, Wartenberg (2006) discusses 29 different perspectives on what does or does not constitute art. He draws on philosophical viewpoints describing art as "imitation" (Plato), "redemption" (Nietzsche), or "the communication of feeling" (Tolstoy), to more recent views of art as "fetish" (Adrian Piper) or "virtual" (Douglas Davis). However, in the current context it seems appropriate to define art from the viewers' perspective: that art is that which is categorized by the viewers as such (Bourdieu & Darbel, 1997; Dewey, 1989).

In a descriptive survey conducted by Hagtvedt and Patrick (2008), 77 participants representative of our sample population were given a sorting task and asked to distinguish art images from non-art images and to describe why they considered certain images to be art and others to be non-art. A variety of artworks, ranging from Renaissance to modern works, were used as stimuli. Respondents consistently asserted that art images are expressive ("emotion," "expression"), that the manner of creation is a central feature of an artwork ("talent," "creativity and skill," "I couldn't do it"), while making a statement without this manner ("symbol . . . not creativity and skill") is not enough to constitute art. Based on these self-reports, on a review of art history (e.g., Tansey & Kleiner, 1996), and on our own experience and research, we suggest that artworks may be identified as works perceived as embodying human expression, where a perceived main feature of the work is the manner of its creation and/or execution rather than just a concept, idea, or message underlying it or conveyed by it, and where this manner is not primarily driven by any other contrived function or utility. Other works may depend on a context, such as being placed in a gallery, for their impact, but in the current research it seems more useful to focus on works considered to be art by the viewer whether they are hanging in a museum or anywhere else.

THEORETICAL BACKGROUND

In this section, we discuss the conceptual background for the main components of the art perception and evaluation process: cognition and affect.

Cognition: Perceived Attributes

A great deal of previous research has focused on art perception and visual aesthetics (Pickford, 1972), often dealing with specific aspects of aesthetic judgments such as the appeal of certain constellations of facial lineaments depicted in

portraiture, or the appeal of certain colors in connection with certain shapes. Funch (1997) asserts that Fechner, Lipps, Arnheim, and Berlyne deserve special mention for their contributions toward the development of art appreciation as a field of study.

Fechner's (1871) proposal to supplement philosophical speculations with empirical observation paved the way for psychological aesthetics as an independent discipline. Thus, formal judgments of beauty and harmony should be measured rather than only postulated or deduced from philosophical concepts. Lipps (1906) contributed to this trend with his empathy theory, suggesting that aesthetic appreciation is experienced as belonging to the work of art rather than to the observer. This idea would also suggest that emotions, which per force belong to the individual experiencing them, should influence the cognition of attributes belonging to an artwork. Indeed, some researchers have argued that observers must be emotionally primed to look for categories before they are even able to perceive them (Damasio, 1994). Thus, the attributes of an artwork that underlie its aesthetic or intellectual appeal may be perceived as belonging to the artwork itself, although the experience of these attributes is partially shaped by the emotions elicited in the viewer. These components thus represent distinct yet interlinked aspects of the experience of an art object. Therefore, it seems reasonable to include both emotions and judgments of aesthetic and intellectual appeal in measurements of art perception.

Arnheim (1974) also emphasizes cognition in perception and creativity. As a representative of Gestalt theory concentrating on visual art, he develops an understanding of the mind as primarily visual in regards to art. Arnheim defines perception as the experiencing of "visual forces." He places dynamic perception, as opposed to mere mechanical recording of visual elements, at the very root of aesthetic experience. Berlyne (1971) expands on such notions with novel interpretations of measurable responses to art objects. He gives rise to a kind of experimental aesthetics that in many ways supplants Fechner's approach to art appreciation. In Berlyne's psychobiological framework, aesthetic pleasure is tied to changes in level of arousal, and motivational factors such as novelty, surprise and complexity replace formal beauty or harmony as the fundamental basis of psychophysical aesthetics.

Affect

Oatley and Duncan (1992) estimate that 7% of emotion experienced in daily life stems from dealing with cultural artifacts. It is well established that visual art is an aesthetic stimulus that evokes an emotional response (Tan, 2000). What remains a question unanswered, and forms a focus of the current research, is the role that an individual's emotional response to an artwork has in its evaluation.

Affective states differ not only in how and when they arise but are differentiated from each other in valence and arousal. The valence of an emotion refers to

how positive or negative it is. The influence of affect is typically congruent with its valence, such that a positive feeling leads to a positive evaluation while a negative feeling gives rise to a negative evaluation. The arousal potential of an emotion is defined as a feeling state of activation that varies from drowsiness to frantic excitement (Mehrabian & Russell, 1974), and LeDoux (1996) discusses the existence of at least five arousal systems in the brain contributing to emotional experience. Previous research has established that arousal, in addition to the valence of emotion, may influence information processing and evaluation (Sonbonmatsu & Kardes, 1988). Pham, Cohen, Pracejus, and Hughes (2001) argue that while many studies show that the direction of preferences may be tied to the valence of feelings toward a given target, the strength of these preferences may be tied to the level of arousal elicited by that target. Indeed, a substantial amount of research suggests that the arousal experienced at a given point in time accentuates or polarizes subsequent affective and evaluative responses (Reisenzein, 1983).

The Interplay of Cognition and Emotions

Several affective-cognitive models proposed by Cohen and Areni (1991), Berkowitz (1993), Forgas (1995), LeDoux (1995, 1996) and Wyer, Clore, and Isbell (1999) suggest that an interplay between the affect elicited by the stimulus and the cognitive responses to the stimulus give rise to the overall evaluation of the stimulus. However, these models differ in how this interplay occurs.

For instance, Berkowitz (1993) proposes a three-stage reaction to a stimulus: first, basic and automatic associative processes; second, more deliberative, higher-order cognitive processing; and third, higher-order affective reactions. Built on neuropsychological evidence, LeDoux's (1995) model supports Berkowitz to propose that "low-road affective processes," "high-road cognitive processes" and "high-road affective responses" may arise in response to a stimulus. In contrast, Zajonc (1980) supports the idea of relatively automatic affective reactions but does not support the notion of post-cognitive affective reactions resulting from higher-order processing.

Irrespective of this debate, it is generally agreed that on exposure to a stimulus, two processes may occur (Shiv & Fedorikhin, 1999). First, when an individual is exposed to a stimulus, he often appraises it globally as a whole without doing a detailed assessment of its individual features (Lazarus, 1991). This spontaneous appraisal may include cognitive and affective responses that can provide the basis for an initial impression of the stimulus (often referred to as a lower-order route: Berkowitz, 1993; Wyer et al., 1999). This initial impression is accounted for in forming a detailed evaluation when additional information, specific and relevant to the judgment, becomes available (often referred to as a higher-order route: Berkowitz; Wyer et al.). Notably, the first process occurs relatively automatically while the second process is more deliberate and controlled. The current research

does not focus on lower-order cognitions, but it investigates how emotions inform the more detailed cognitive assessment of perceived attributes. We would expect that while the cognitive assessment of an artwork's perceived attributes does not depend entirely on the emotions evoked from viewing it, the evoked emotions are likely to influence the cognitive judgment to some degree.

The current research thus continues an investigation of arts and aesthetics with roots in Berlyne's (1971, 1974) tradition of experimental aesthetics; a tradition that has sparked a variety of debates about alternative theories of aesthetic experience (e.g., Boselie, 1991; Martindale, Moore, & Borkum, 1990; North & Hargreaves, 2000; Silvia, 2005b). Indeed, as Cupchik (1988) noted, Berlyne's suspicion of cognitive psychology may have hindered the study of how cognitions and emotions interact in aesthetic contexts. Later work, although indebted to Berlyne's pioneering efforts, has reopened this rich and promising area of research.

An alternative to Berlyne's psychobiological framework is the prototypicality model of aesthetic experience (Martindale et al., 1990). According to this model, preference for an artwork is determined by the work's perceived typicality rather than by its collative features. However, as Silvia (2005a) argues, this model shares many of the arousal model's limitations, and it does not seem nuanced enough to capture the complexity of aesthetic experience. For instance, even if high typicality leads to positive emotions, it seems difficult to predict what kinds of negative emotions will arise as a result of low typicality, as well as what this may entail for the overall perception and evaluation of the artwork. This is arguably also true of a model of aesthetic emotions according to which viewers deem an artwork beautiful when they find it easy to process (Reber, Schwartz, & Winkielman, 2004). It seems difficult to explain the diverse emotional reactions to an artwork with a single cause, that is, ease of processing. A more nuanced approach to experimental aesthetics is that of appraisal theory (Silvia, 2005a, 2005b), which assumes that evaluations of events, rather than the events themselves, cause the emotional experience. In this view, artworks may be said to affect emotions via their influence on appraisals. This diverges from the Berlyne tradition, in which aesthetic response is tied to objective features of the art object (Cupchik, 1988).

The interplay of affect and cognition is complex, and neither past research nor the current research can be said to have captured this interplay fully. While it seems reasonable that cognitive evaluations may give rise to emotional responses, as suggested by, for instance, the prototypicality model and appraisal theory, the current research emphasizes how emotions inform cognitive evaluations. For instance, a viewer might deem an object fascinating in part because of the excitement or thrill he feels upon viewing it, whether or not this thrill has yet been explained by a conscious appraisal. This view is in line with neuropsychological evidence suggesting that preliminary affective responses precede cognition (Damasio, 1994; LeDoux, 1996).

OVERVIEW OF THE EMPIRICAL INVESTIGATION

The objective of the empirical investigation was to develop an understanding and scaled measurements of the various components that we theorize influence art evaluation, how these components relate to one another, and how they inform art evaluation as a summary judgment. The empirical investigation was conducted in three stages. Our approach may be considered to conform to what Tan (2000) refers to as the "reverse-design approach" consistent with other work in psychological aesthetics and psychology of the arts. Specifically, we reconstruct the emotional and cognitive processes underlying the experience of visual art from characteristics of the stimuli and then extend this understanding to develop a confirmatory model that more robustly tests these relationships using a single stimulus. Stage 1 involved preliminary item generation in which lists of emotions and attributes involved in the perception and evaluation of art were elicited using a variety of artworks. Stage 2 was designed to refine and further develop the scales for the emotional and cognitive components involved in consumers' perception of visual art, as well as to develop a structural equation model that combines these components in the evaluation process. Finally, Stage 3 involved conducting a confirmatory factor analysis (CFA) and a test of the structural model using a single stimulus. These three stages of the empirical investigation are described next.

STAGE 1: PRELIMINARY ITEM GENERATION

Based on the above perspectives, the first step in the empirical investigation was to generate a list of emotions and perceived attributes involved in the perception and evaluation of artworks to use in the main studies. The initial stage of item generation was entirely exploratory, relying on informal interviews with a convenience sample of five art experts (artists and curators) and ten non-experts to supply a list of items. Two separate pilot studies were conducted using these emotions and attributes, with respondents viewing works of art and indicating on 8-point Likert scales (0 = do not agree at all, 7 = agree strongly) the degree to which they agreed that the artwork evoked the various emotions in them and the degree to which they agreed that the various attributes were descriptive of the artwork. The artworks used were chosen to represent a large range of differences in style, medium and emotional content. The first pilot study was conducted with a convenience sample of 11 respondents, aged 22 to 67, each filling out three separate questionnaires based on three different artworks, resulting in 33 completed questionnaires. The second pilot study was conducted with a convenience sample of 16 respondents, aged 20 to 68, each filling out four separate questionnaires based on four different artworks, resulting in 64 completed questionnaires. This preliminary research was not intended to draw any conclusions, but it supplied enough data to conduct exploratory factor

analyses and get rough indications of which emotions and attributes to include for further evaluation.

The next step was to draw on extant literature to refine the list of emotions (Ekman, 1999) and attributes (Funch, 1997; Tansey & Kleiner, 1996). This refined list was additionally evaluated by a panel of ten experts: 6 artists, curators, and/or art professors with higher education in fine arts and/or art theory, and four PhDs with an interest in art. The resulting list of emotions and attributes was used as the basis of a larger study in Stage 2.

STAGE 2: SCALE AND MODEL DEVELOPMENT

The objective of this study was to further develop scales for the emotional and cognitive components involved in the perception of visual art, as well as to develop a structural equation model that combines these components in the evaluation process.

Method

Stimuli. Five figurative paintings were chosen as the stimuli, pre-tested to maximize the variability in emotional valence and arousal. The pretests were conducted with a convenience sample of ten undergraduate students, four PhD students, and two professors. Respondents reported on 9-point semantic differential scales their perception of the artworks as eliciting negative or positive emotion, and as eliciting low or high arousal. *Saturn Devouring his Son* by Francisco Goya was pre-tested as eliciting negative emotion (M = 2.6) and high arousal (M = 7.0). *Mourning Man* by Käthe Kollwitz elicited negative emotion (M = 3.3), low arousal (M = 4.0). *Moscow* by Wassily Kandinsky elicited positive emotion (M = 6.7), high arousal (M = 6.3). *Madame Monet and Her Son* by Pierre-Auguste Renoir elicited positive emotion (M = 7.2), low arousal (M = 3.9). *Self-portrait* by Käthe Kollwitz elicited neutral emotion (M = 4.8), low arousal (M = 3.6).

Participants and Procedure. One hundred and fifty undergraduates participated, each randomly assigned to one of the five paintings. They were each given a high resolution color print of this painting, and the questionnaires to be completed were otherwise identical. Participants reported on 9-point Likert scales (1 = not at all, 9 = a great deal) the extent to which the artwork awoke the various emotions in them, and on 9-point Likert scales (1 = not at all, 9 = extremely) how well the various attributes described the artwork. Additionally, they reported on 9-point semantic differential scales [unfavorable – favorable, negative – positive, bad – good, unpleasant – pleasant, dislike very much – like very much (α = .94)] their overall evaluation of the painting.

Results

Factor Analysis. Exploratory factor analysis with Promax rotation, Kaiser normalization, and the suppression of loadings lower than .40 resulted in 17 emotions, splitting into four factors, with 78% of cumulative variance explained (see Table 1), and 19 perceived attributes, also splitting into four factors, with 71% of cumulative variance explained (see Table 2).

Structural Model. Based on the above theoretical perspectives, the emotions are likely to inform the first impressions of the artwork's aesthetic appeal and interestingness (Cupchik & Gebotys, 1990). For instance, pleasurable emotions elicited when viewing an object may influence the judgment that this object is aesthetically pleasing. Next, it seems reasonable that these appeals would influence critical judgments of the artwork. For instance, the impression of an artwork as thought provoking and interesting may cause this artwork to be viewed

Table 1. Emotions Factor Loadings (Stage 2)

Emotion	Negative – High arousal	Positive – Low arousal	Positive – High arousal	Negative – Low arousal
Agitation	.87			
Stress	.86			
Anxiety	.85			
Tension	.82			
Uncertainty	.56			
Serenity		.90		
Contentment		.89		
Happiness		.80		
Joy		.76		
Stimulation			.84	
Eagerness			.83	
Enthusiasm			.79	
Excitement			.75	
Loneliness				.87
Melancholy				.77
Sadness				.75
Despair				.70
Cronbach α	.89	.81	.87	.87

Table 2. Perceived Attributes Factor Loadings (Stage 2)

Attribute	Creativity	Aesthetic appeal	Formal execution	Curiosity appeal
Imaginative	.86			
Creative	.87			
Inventive	.80			
Innovative	.80			
Original	.75			
Novel	.66			
Distinct	.65			
Beautiful		.95		
Aesthetically pleasing		.95		
Attractive		.91		
Elegant		.62		
Symmetrical			.88	
Rhythmic			.79	
Patterned			.68	
Unified			.65	
Balanced			.60	
Thought provoking				.80
Intellectually stimulating				.63
Interesting				.53
Cronbach α	.92	.90	.81	.84

as creative and original. Similarly, the impression of an artwork as aesthetically pleasing may influence the evaluation of the artwork's formal execution (e.g., balance, unity), or the technical skill with which the artwork has been executed. These two variables, creativity and skill/formal execution, are viewed as fundamental building blocks of the overall evaluation of artworks. Indeed, "Artistic quality is often thought of in terms of two components: originality and technical skill" (Kozbelt, 2004, p. 1). See Figure 1 for the intermediate structural model.

Fit Indices. Fit judgments are per force subjective measures involving a number of different indicators (Marsh, Balla, & McDonald, 1988). Four indicators were

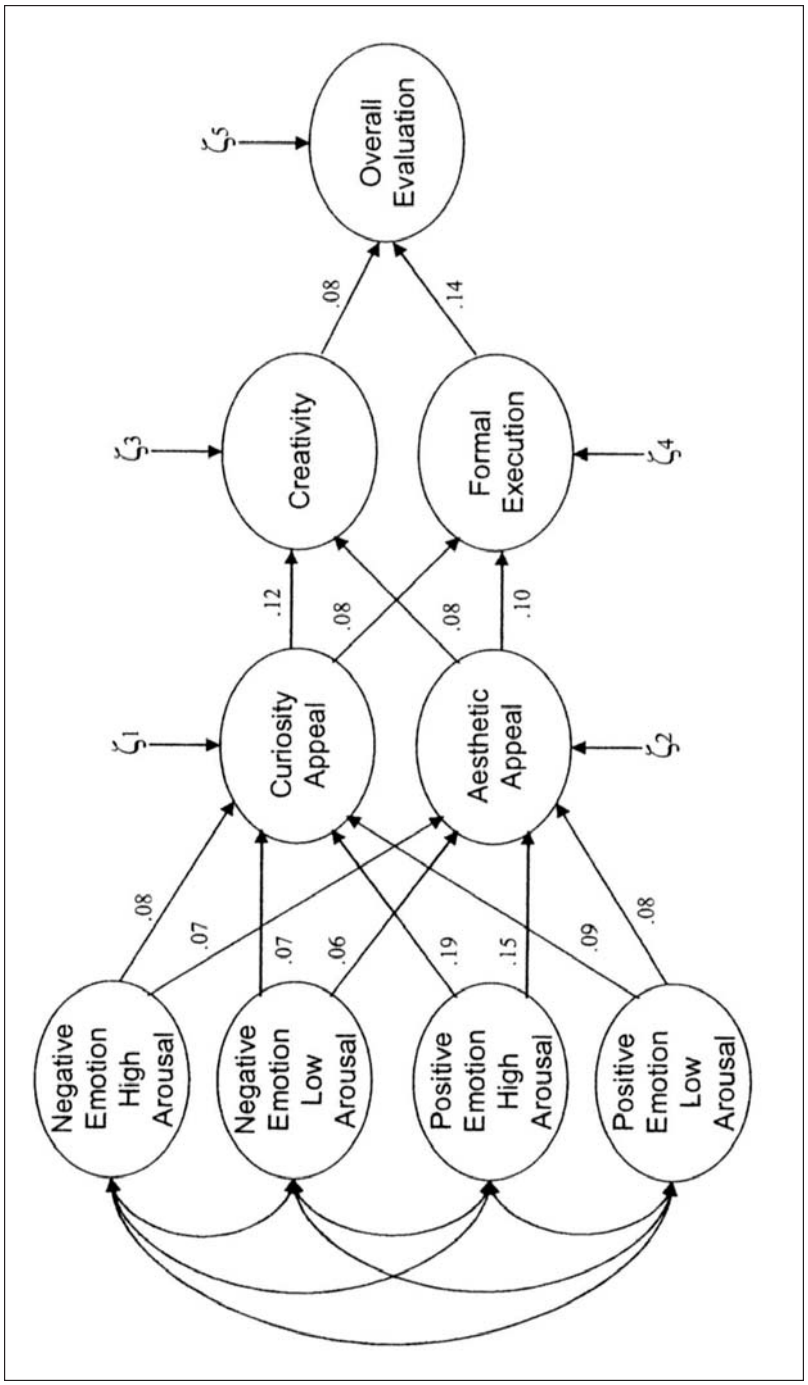

Figure 1. Intermediate structural model (Stage 2). Please see Tables 1 and 2 for items.

used for this research: χ^2/df ratio, the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). For the chi-square test it is difficult to obtain non-significant values in complex problems (Marsh et al.). However, dividing the chi-square by the degrees of freedom provides a measure of model fit, sometimes called the normed chi-square, which is less sensitive to sample size (Kline, 2005). Values of 2.0, 3.0, or even as high as 5.0 have been recommended as indicating reasonable fit (Bollen, 1989). The TLI was chosen based on Vandenberg and Scarpello (1990) and on Marsh et al.'s evaluation of commonly used fit indices against the criteria that ideal indices are ones that (a) are relatively independent of sample size, (b) correctly mirror differences in fit, and (c) require an appropriate penalty function for the inclusion of additional parameters. Popular indices such as the goodness-of-fit index (GFI), the adjusted GFI (AGFI) and the root-mean-square residual (RMSR) performed poorly in light of these criteria, while the TLI closely meets the ideal criteria. Generally speaking, TLI values of .90 or higher indicate adequate fit (Vandenberg & Scarpello). The CFI, one of the most widely used fit statistics in structural equation modeling (SEM), assesses the relative improvement in fit of the model in question compared with a baseline model. Values greater than approximately .90 indicate reasonably good fit (Kline). The RMSEA is a parsimony-adjusted index, with a noncentrality parameter that reflects the degree of misspecification of the model in question. Values between .05 and .08 suggest reasonable fit, while RMSEA $\leq$ .05 indicates close approximate fit (Kline). The intermediate structural model resulted in a promising but inadequate fit (χ^2/df = 1699.24/759 = 2.24, TLI = .81, CFI = .82, RMSEA = .09).

Discussion

The fit indices revealed an inadequate model fit. Although the χ^2/df ratio was convincing, the other statistics were slightly outside of the acceptable range. However, the model clearly showed promise, especially given that it was based on five different stimuli. Recall that this was done to maximize variability, to help ensure that the model would be generalizable rather than specific to a particular stimulus. Although this was a reasonable intermediate step, a fair test of the model must still be conducted with a single stimulus.

Before conducting the final data collection, the factors were scrutinized, and final minor adjustments were made in the items. The largest changes concerned the Creativity factor, where three of the seven items were deemed as redundant, and the Formal Execution factor, where it was deemed that this factor only partially reflected a more general aspect of evaluation, namely the perception of the technical skill with which the artwork was executed.

STAGE 3: CFA AND TEST OF THE MODEL

The objective of the final stage was to conduct a confirmatory factor analysis and a test of the structural model using a single stimulus.

Method

Stimulus and Procedure. A figurative painting, *Bal du Moulin de la Galette* by Pierre-Auguste Renoir, identified as art in a pre-test with 12 undergraduates ($M = 7.6$; 1 = no, 9 = yes), was chosen as the stimulus. Two hundred and eighty-seven undergraduates participated in the survey. One participant answered with a single score throughout the survey and was therefore removed. Thus, 286 surveys were included in the analysis. The procedure was the same as in the previous study, except that this time the survey was completed online.

Results

Confirmatory factor analysis was conducted on each individual construct before combining them in the structural model. See Table 3 for fit indices and factor loadings.

The structural model was set up following the same pattern as that of the intermediate model (see Figure 2). As noted above, the only visible difference between the two models is that the Formal Execution variable from the intermediate model has been replaced with a general Skill variable in the final model. Further, the same fit indices were used as those chosen for the intermediate model ($\chi^2/df = 1093.82/540 = 2.03$, TLI = .93, CFI = .94, RMSEA = .06). See Appendix 1 for the covariance matrix.

Discussion

All fit indices confirmed adequate fit for the final structural model. It should be noted that any structural equation model is one of several possible solutions, and that there may be alternative models which could conceivably explain the same data. For instance, one might argue that there may be more direct effects on overall evaluation, or that certain variables may correlate. However, the current results represent strong support for the underlying theory and the proposed model.

GENERAL DISCUSSION

This research develops scales for the emotional and cognitive components involved in the perception of visual art and presents a structural equation model that integrates these components in the evaluation process. Drawing on extant theory regarding the interplay of affect and cognition, we develop a theoretical

Table 3. Results of the Confirmatory Factor Analysis (Stage 3)

Construct	χ^2/df	TLI	CFI	RMSEA	Items	Loading
N-H	.82/2 = .41	1.00	1.00	0	Unease	.92
					Anxiety	.80
					Uncertainty	.78
					Disquiet	.77
N-L	.89/2 = .45	1.00	1.00	0	Sadness	.95
					Despair	.86
					Gloom	.85
					Loneliness	.73
P-H	0	1.00	1.00	NA	Excitement	.96
					Enthusiasm	.82
					Thrill	.70
P-L	5.00/2 = 2.50	.99	1.00	.07	Happiness	.94
					Joy	.91
					Gladness	.77
					Serenity	.43
Curiosity	.93/2 = .47	1.00	1.00	0	Interesting	.89
					Arou. Curiosity	.84
					Fascinating	.74
					Int. Stim.	.74
Aesthetic	2.95/2 = 1.48	1.00	1.00	.04	Aesthetically	.95
					Attractive	.94
					Beautiful	.86
					Appealing	.77
Creativity	6.36/2 = 3.18	.98	.99	.09	Original	.86
					Distinct	.82
					Creative	.74
					Inventive	.71
Skill	0	1.00	1.00	NA	Workmanship	.97
					Well Crafted	.91
					Skillfully Made	.81
Evaluation	9.04/2 = 1.81	1.00	1.00	.05	Good	.92
					Positive	.92
					Favorable	.91
					Pleasing	.89
					Like	.87

Notes: TLI = Tucker-Lewis index, CFI = comparative fit index, RMSEA = root mean square error of approximation, N-H = Negative Emotion High Arousal, N-L = Negative Emotion Low Arousal, P-H = Positive Emotion High Arousal, P-L = Positive Emotion Low Arousal, Arou. Curiosity = Arousing Curiosity, Int. Stim. = Intellectually Stimulating, Aesthetically = Aesthetically Pleasing, Appealing = Appealing to the Senses, Workmanship = Of Excellent Workmanship.

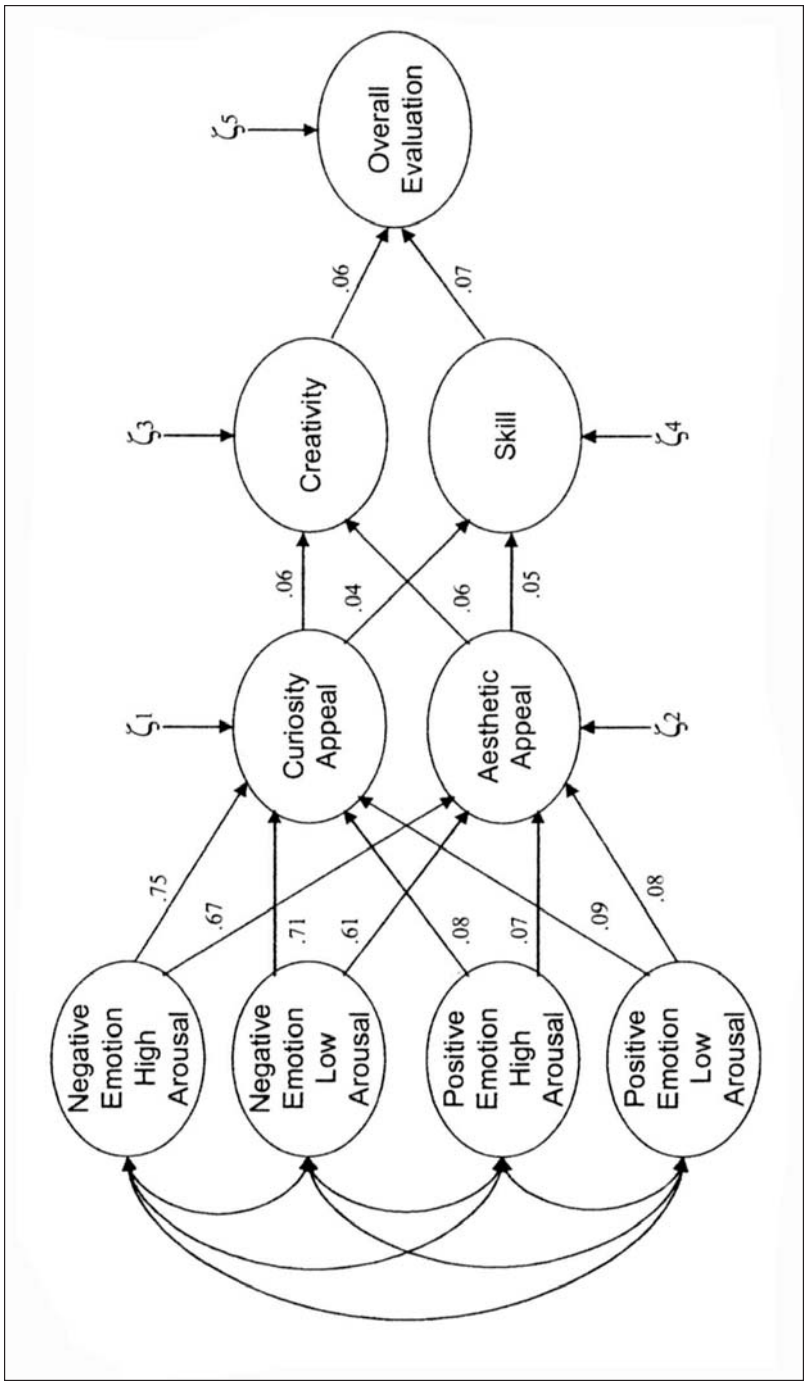

Figure 2. Final structural model (Stage 3). Please see Table 3 for items.

framework to help guide the empirical investigation. Following the preliminary item development and exploratory factor analysis, a structural model is developed based on five artworks which maximize variability in terms of arousal and valence of emotion. Finally, confirmatory factor analysis is conducted, and the structural model is tested using a single artwork as the visual stimulus. Four emotion factors (positive or negative with high or low arousal) and four cognitive factors (curiosity appeal, aesthetic appeal, creativity, and skill), together with an evaluation index, represent the latent variables of the model.

The cognitive factors found here have strong parallels in past research. The curiosity appeal and aesthetic appeal appear similar to previous interesting and pleasing factors (Cupchik & Gebotys, 1990), and the creativity and skill factors are similar to originality and technical skill components discussed in the extant literature (Kozbelt, 2004). Other attributes from previous research, such as complexity, typicality, or familiarity, did not take part in the final factors, although they were included in the initial item generation. This may be understood as resulting from the current focus on basic and universal aspects of visual art. For instance, the impact of complexity on the experience or appreciation of an artwork may depend on the interaction of this attribute with other attributes of the artwork. Sometimes the artwork will benefit from increased complexity, other times it will not. It seems reasonable, however, that for instance interestingness will enhance a viewer's experience with an artwork as a general rule. As for the emotion factors, researchers disagree on whether the experience of art and aesthetics should be viewed in terms of global affect or discrete emotional states. The current model finds support for the former view, but a great deal more research is necessary to shed light on this issue and on the area of emotions in general. For instance, in his research on core affect, Russell (2003, p. 1) discusses "a broad framework that includes perception of the core-affect-altering properties of stimuli, motives, empathy, emotional meta-experience, and affect versus emotion regulation." As research on emotions progresses, it will contribute to the evolving understanding of art and aesthetics.

The generalizability of this model needs verification through further research. Indeed, considering the complexity and variety of visual art, it may not even be feasible to capture the perception of visual art in its entirety with a single model. At the very least, such a model will always entail a tradeoff between comprehensiveness and parsimony, and various approaches should be attempted in the future. For instance, it may be that non-linear relationships play an important role, such that non-linear statistical tools should be employed to measure them. In other research, the various aspects of art perception may be given a more in-depth treatment, for instance through qualitative analysis. However, the current research represents a step toward a more thorough understanding of how visual art is perceived and evaluated. Only untrained viewers participated in the research, because while some form of art appreciation is a general human phenomenon, different schools of art may have more specific influences on how artworks are

perceived and judged. Future research may also expand on the current findings by investigating how the perception and evaluation of visual art differs from that of other arts. Further, within the category of visual art there are many subcategories, in terms of for instance styles and time periods. Future research may focus on differences in perception for the various categories. Finally, while the current research focuses on untrained viewers, future research may investigate more closely how training and expertise affect the perception and evaluation of visual art.

ACKNOWLEDGMENTS

The authors would like to thank the editor and the reviewers for their helpful insights on improving the manuscript and Robert J. Vandenberg and George M. Zinkhan for their valuable comments.

APPENDIX 1: Covariance Matrix (Stage 3)

	Ser	Hap	Joy	Glad	Lone	Desp	Sad	Gloo	Enth	Exci	Thri	Anx	Unce	Unea	Disq
Ser	3.51														
Hap	1.32	2.72													
Joy	1.12	2.34	2.77												
Glad	1.00	2.03	2.04	2.94											
Lone	0.32	–0.61	–0.42	–0.50	3.23										
Desp	0.21	–0.67	–0.50	–0.57	1.60	2.16									
Sad	0.12	–0.65	–0.45	–0.55	1.64	1.68	1.88								
Gloo	–0.05	–0.77	–0.58	–0.64	1.55	1.55	1.68	2.05							
Enth	0.28	1.54	1.66	1.50	–0.35	–0.20	–0.33	–0.38	3.50						
Exci	0.32	1.67	1.74	1.62	–0.62	–0.27	–0.45	–0.54	2.78	3.59					
Thri	0.23	1.33	1.54	1.48	–0.43	–0.01	–0.07	–0.20	2.21	2.62	4.21				
Anx	–0.39	–0.63	–0.50	–0.51	1.45	1.41	1.41	1.61	0.06	–0.12	0.29	3.00			
Unce	–0.03	–0.81	–0.71	–0.56	1.74	1.58	1.56	1.64	–0.48	–0.48	–0.17	2.23	4.09		
Unea	–0.55	–1.03	–0.82	–0.84	1.53	1.55	1.51	1.62	–0.44	–0.44	–0.11	2.38	2.62	3.19	
Disq	0.05	–0.51	–0.42	–0.45	1.43	1.40	1.42	1.56	–0.21	–0.29	–0.08	1.77	2.02	1.96	3.02
Inve	0.82	1.05	1.07	1.20	–0.01	1.18	0.10	–0.06	0.94	1.24	1.28	–0.09	0.05	–0.18	–0.30
Orig	0.55	0.87	0.82	0.81	–0.19	0.06	–0.06	–0.24	0.65	0.82	0.68	–0.36	–0.22	–0.29	–0.48
Dist	0.69	0.84	0.92	0.83	–0.13	0.04	–0.01	–0.18	0.68	0.92	0.77	–0.26	–0.13	–0.14	–0.54
Crea	0.64	1.10	1.14	0.99	–0.42	–0.38	–0.29	–0.41	0.73	0.99	0.74	–0.63	–0.42	–0.59	–0.71
Beau	1.15	1.53	1.43	1.36	–0.63	–0.64	–0.59	–0.72	0.88	1.15	0.73	–1.25	–0.91	–1.41	–0.97
Aest	1.18	1.52	1.39	1.41	–0.47	–0.68	–0.64	–0.80	1.07	1.13	0.82	–1.23	–0.84	–1.40	–1.00
Attr	1.07	1.45	1.35	1.28	–0.55	–0.72	–0.62	–0.78	0.95	1.10	0.82	–1.20	–0.92	–1.36	–0.93
Appe	1.19	1.30	1.20	1.28	–0.39	–0.59	–0.50	–0.66	1.18	1.25	0.91	–0.90	–0.82	–1.14	–0.80
Intl	0.97	0.72	0.62	0.56	–0.10	–0.09	0.01	–0.19	0.67	0.73	0.78	–0.41	–0.42	–0.55	–0.43
Intr	0.61	1.11	1.06	1.03	–0.50	–0.58	–0.41	–0.50	0.85	0.96	1.01	–0.63	–0.59	–0.74	–0.66
Cur	0.53	0.96	0.96	0.94	–0.40	–0.36	–0.16	–0.25	0.85	1.10	1.18	–0.42	–0.19	–0.45	–0.49
Fasc	0.98	1.17	1.31	1.15	–0.20	–0.08	–0.06	–0.19	1.01	1.33	1.70	–0.33	–0.35	–0.46	–0.45
Skil	0.58	0.99	0.87	0.87	–0.37	–0.51	–0.37	–0.46	0.82	0.89	0.63	–0.51	–0.58	–0.61	–0.64
Work	0.74	1.18	1.12	1.10	–0.39	–0.51	–0.47	–0.53	0.82	0.91	0.59	–0.60	–0.72	–0.71	–0.61
craf	0.72	1.21	1.16	1.14	–0.39	–0.57	–0.49	–0.60	0.87	0.92	0.65	–0.73	–0.78	–0.82	–0.68
Fav	1.12	1.63	1.49	1.46	–0.57	–0.66	–0.48	–0.64	0.93	1.10	0.77	–0.89	–0.76	–1.01	–0.74
Pos	0.99	1.64	1.53	1.43	–0.71	–0.69	–0.66	–0.81	1.07	1.33	1.00	–1.00	–0.93	–1.18	–0.81
Good	0.98	1.44	1.28	1.32	–0.49	–0.51	–0.47	–0.62	0.87	1.08	0.84	–0.71	–0.63	–0.86	–0.54
Plea	1.13	1.53	1.41	1.44	–0.51	–0.65	–0.58	–0.71	0.87	1.03	0.75	–1.03	–0.77	–1.18	–0.68
Like	1.11	1.61	1.46	1.46	–0.53	–0.58	–0.51	–0.66	0.99	1.21	0.90	–1.09	–0.92	–1.25	–0.83

APPENDIX 1: (Cont'd.)

	Inve	Orig	Dist	Crea	Beau	Aest	Attr	Appe	Intl	Intr	Cur	Fasc	Skil	work	craf	Fav	Pos	Good	Plea	Like
Inve	3.46																			
Orig	2.10	3.50																		
Dist	1.87	2.46	3.39																	
Crea	1.83	1.98	1.93	2.98																
Beau	1.26	1.16	1.24	1.76	3.39															
Aest	1.15	1.11	1.18	1.50	2.81	3.45														
Attr	1.26	1.06	1.16	1.48	2.63	2.93	3.14													
Appe	1.21	1.14	1.17	1.41	2.25	2.41	2.36	3.30												
Intl	1.05	0.82	0.84	1.11	1.07	1.07	1.02	1.33	3.17											
Intr	1.13	1.16	1.11	1.49	1.63	1.55	1.49	1.51	1.86	2.63										
Cur	1.19	1.20	1.12	1.52	1.43	1.43	1.42	1.41	1.92	2.14	3.13									
Fasc	1.66	1.28	1.21	1.69	1.73	1.56	1.54	1.62	1.89	1.99	2.04	3.54								
Skil	0.80	1.05	1.04	1.30	1.49	1.61	1.63	1.51	0.87	1.34	1.21	1.23	2.39							
work	0.94	1.02	1.00	1.29	1.72	1.73	1.73	1.54	0.88	1.32	1.21	1.30	1.87	2.40						
craf	1.06	1.15	1.13	1.32	1.82	1.80	1.78	1.66	0.81	1.36	1.27	1.26	1.81	2.17	2.54					
Fav	1.27	1.11	1.05	1.48	2.17	2.06	2.07	1.91	1.15	1.58	1.37	1.58	1.44	1.60	1.60	2.65				
Pos	1.15	0.98	0.97	1.45	1.88	1.82	1.83	1.69	1.02	1.42	1.20	1.50	1.28	1.43	1.39	2.13	2.42			
Good	1.08	0.99	0.96	1.33	1.77	1.75	1.78	1.49	0.92	1.35	1.11	1.35	1.29	1.39	1.36	2.03	1.96	2.23		
Plea	1.06	0.93	0.85	1.25	1.90	1.93	1.89	1.73	1.07	1.33	1.18	1.37	1.27	1.38	1.37	1.96	1.95	1.88	2.31	
Like	1.41	1.24	1.12	1.67	2.40	2.32	2.29	2.00	1.19	1.68	1.49	1.75	1.48	1.69	1.65	2.39	2.22	2.16	2.11	3.25

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Direct reprint requests to:

Henrik Hagtvedt
132 Brooks Hall
Terry College of Business
University of Georgia
Athens, GA 30602
e-mail: hhagtvedt@yahoo.com