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Interest is an emotion associated with curiosity, exploration, and knowledge-seeking (Fredrickson, 1998; Izard, 1977; Silvia, 2005a, 2005b, 2006; Tomkins, 1962). The first researchers to propose an appraisal structure of interest were Smith and Ellsworth (1985). An alternative appraisal structure of interest was proposed by Silvia (2005a, 2005b). Experiment 1 tested these competing models. Participants viewed copies of calming and disturbing classical and contemporary paintings, rated each picture for appraisals, and reported their experienced interest, pleasantness/enjoyment, and disturbingness. Experiment 2 aimed to replicate the appraisal structures for the emotion of interest and measured viewing time. Results showed (1) interest and pleasantness were unrelated; (2) novelty–complexity positively predicted interest; (3) disturbing pictures were highly interesting; (4) and viewing time positively predicted interest.

COMPARING TWO APPRAISAL MODELS OF INTEREST

by

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Approved by

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To my loving wife, Traci, and my two sons, Josh and Alex.

APPROVAL PAGE

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CHAPTER I

INTRODUCTION

Interest is an emotion that is associated with curiosity and learning (Fredrickson, 1998; Izard, 1977; Silvia, 2005a, 2005b, 2006; Tomkins, 1962). The scant research conducted on the subject suggests conflicting ideas about what makes things interesting. There are competing models that describe the components of interest differently. Smith and Ellsworth (1985), the first emotion psychologists to propose an appraisal model of interest, suggest that interest primarily comes from an appraisal of pleasantness (Ellsworth & Smith, 1988). A competing model of interest from Silvia (2005a, 2005b) suggests that pleasantness is peripheral to interest. The present studies test these competing appraisal theories of interest.

Appraisal Theories of Emotion

An approach to emotion based on an appraisal theory perspective explains how emotions are elicited (Ellsworth & Scherer, 2003; Roseman & Smith, 2001). Researchers pursuing the topic of emotions from a cognitive perspective came, in part, from the influential work of Arnold (1960). She coined the term *appraisal* to describe a direct and intuitive evaluation of events that cause emotions. She proposed that we evaluate the environment from a perspective of our own well-being and check to see if the stimuli are beneficial or harmful, which then determines how we feel. Lazarus (1966), who was the

first appraisal theorist, suggested a further differentiation between a primary appraisal where we determine the implications for our well-being and a secondary appraisal where we appraise our ability to cope with a situation.

During the 1980s a number of researchers worked separately at building different models of appraisal theories. Although subtle differences between the models are apparent, the result was the first proposal for the elements that differentiate distinct emotional experience. Appraisal theories were different from other contemporary theories of emotion because they attempted to offer a comprehensive view of the generation of emotions. Emotional reactions were differentiated from each other because of a distinctive appraisal structure, distinctive subjective feeling state, a defined physiological pattern in the body, and an urge to respond in a certain manner known as an action tendency (Ekman, 1984; Frijda, 1986; Izard, 1977; Plutchik, 1980; Scherer, 1984; Smith & Lazarus, 1990; Tomkins, 1980).

How Appraisals Work

Appraisal theories of emotion explain two central problems of emotion psychology. First, what makes people emotional? Appraisal theories contend that emotions are elicited by evaluations of events. An appraisal is an evaluation that prompts an emotion. Appraisals precede emotions; thus, emotions are not generated until after a particular appraisal is made. The elicitation of each distinctive emotion occurs from a distinctive pattern of appraisals. The different combinations of the same appraisals is

involved in producing all emotions. According to appraisal theory, all situations that evoke the same appraisal pattern will evoke the same emotion.

Second, what makes emotions different? Appraisal theories maintain that a common pattern of appraisal is found in all situations that evoke the same emotion. Sadness, for example, arises when an event has been interpreted as motive-inconsistent (Roseman, 1984) or motive-incongruent (Smith & Lazarus, 1990). It is further differentiated from other negative emotions by high certainty that the event will occur, and low power and control over the situation (Ellsworth & Scherer, 2003). When situations are perceived differently by different individuals, it follows that different emotions will be experienced. It is also given that the same individual who appraises the same situation in a different way at different times may feel different emotions (Roseman & Smith, 2001). Appraisals can be controlled or automatic processes—sometimes occurring without our awareness.

Current appraisal theorists converge on the notion that emotions serve a functional purpose (Ellsworth & Smith, 1988; Roseman, 1984; Smith & Ellsworth, 1985). They help mediate between the environment and behavior; emotions prepare and motivate people to cope with circumstances and environmental demands adaptively. Appraisals are accompanied by tendencies to respond in a certain way. In fact, Roseman and Smith (2001) maintain that emotions are more likely to have adaptive value in coping with situations more often than not.

How can emotions be summed up by asking a few questions related to appraisals?

In keeping with the principle of parsimony, it is better to predict emotional experience using a limited amount of appraisal dimensions. Although proposing a larger set of appraisal dimensions explains a larger proportion of variance, a desired classification of emotions should remain simple (Scherer, 1997). This will become more apparent in presenting the two competing models of appraisals that predict the emotion of interest.

Appraisal Models of Interest

Smith and Ellsworth (1985) proposed the first appraisal model of interest. They suggested that six cognitive appraisal dimensions (*pleasantness, anticipated effort, certainty, attentional activity, responsibility, and control*) differentiated emotional experience. They asked people to remember past emotional experiences, one at a time, and then they asked them to rate the experience on scales designed to tap their proposed dimensions. The 15 emotions that were measured included the basic emotions (e.g., happiness, interest, sadness, fear, anger, contempt, disgust, surprise, shame, and guilt) previously proposed by Ekman, Friesen, and Ellsworth (1982), Izard (1977), and Tomkins (1982). They also included emotions that would differentiate pleasant states such as challenge, pride, and hope. Each emotion was composed of different patterns of appraisals. Their results suggested that interest involved four appraisal components: high pleasantness, high effort, moderate certainty, and high attentional activity. Since interest

was grouped among the pleasant emotions, a core feature was the overlap with the emotion of enjoyment.

In a later study, Ellsworth and Smith (1988) found that pleasant emotions were less differentiated than unpleasant emotions. Participants were asked to recall pleasant experiences associated with particular situational appraisals. Evidence was found for a distinct pattern of appraisals between interest, hope/confidence, challenge, tranquility, playfulness, and love. Interest, for example, was suggested to be initiated as a response to situations perceived to be important and to require high levels of attention, as was found in the first study (Smith & Ellsworth, 1985). Although it was suggested that people could possibly experience interest in unpleasant circumstances, Ellsworth and Smith maintained that “pure interest is a pleasant emotion” (p. 328).

Ellsworth and Smith (1988) concluded that the reason why pleasant emotional experiences are less differentiated than unpleasant experiences is because of high levels of intercorrelation between the pleasant emotions. In addition, when participants are asked about pleasant emotions in general, happiness is reported by almost all participants. This suggests that there might be a generic lack of differentiation to pleasant emotions. They proposed that the term “happy” becomes redundant and is used to characterize all pleasant experiences.

This line of research helped to establish the appraisals associated with emotions such as interest. The research designs, however, relied on retrospective self-reports of

emotions. Participants were required to remember and provide responses to up to 15 different emotions. Instead of tapping emotional experience, this methodology appears to target beliefs about emotions or people's memories for emotions. Because interest is often confused in everyday speech with liking to do something, recalling interest retrospectively might easily be confounded with enjoyment. A clearer picture of emotions and specifically interest, thus, would come from in vivo measurement.

An alternative appraisal structure of interest was proposed by Silvia (2005a, 2005b). In that model, the appraisal structure of interest has two appraisals: an appraisal of novelty-complexity (something new and complex), and an appraisal of coping potential (the ability to understand the new and complex thing). A series of four experiments tested this model of interest. The first study used randomly-generated polygons ranging from 4 to 160 sides (Silvia, 2005b). People were asked to pick the most interesting polygon. The appraisal of coping potential—the ability to understand—significantly predicted the choice of the complex polygon. As expected, people who rated themselves with the ability to understand complex art chose the more complex polygons as interesting. For people who were asked to pick the most enjoyable polygon, complexity did not predict what was most enjoyable.

The second study used postmodern poetry. People read a poem, “The Whitest Parts of the Body” by Scott Macleod (Silvia, 2005b), that was complex and obscure. In the high ability condition, participants received information about the meaning of the

poem. In the control condition, participants were left to evaluate the contents of the poem without any help. As expected, those who understood the meaning of the poem found the poem more interesting. A causal effect of appraised coping-potential was supported for interest. The third experiment used experimental visual art (Silvia, 2005b). Half the pictures were simple and half were complex. People provided ratings of interest and understanding for each of the pictures. For the simple pictures, the ability to understand was unrelated to interest. For the complex pictures, coping potential strongly predicted interest. A fourth experiment measured viewing time of random polygons as a behavioral expression of interest (Silvia, 2005b). Participants were instructed to view each polygon for as long as was desired based on how interesting it was. When people felt able to understand complex art, viewing time was the longest for complex images.

A follow up experiment was conducted using a within-person design (Silvia, 2005a). People viewed over 30 pictures of abstract visual art. Each image was rated for appraisals of novelty-complexity and coping potential. Although the within-person relationships differed between people, each person's appraisals strongly predicted interest. Once again, interest was a result of appraising something high in novelty-complexity and coping potential.

There are many benefits to studying interest in the five studies conducted by Silvia (2005a, 2005b). The emotion of interest was measured in vivo, a methodology largely ignored in appraisal research. Participants were not required to think of a time

when they felt a great deal of interest and then rate what they were thinking at the time. Only one emotion was measured, allowing for better control of the stimulus materials and allowing the participants to respond directly to the central construct of interest. Each study was conducted in a laboratory setting and used convergent methods to support the proposed appraisal structure of interest.

The Present Research

The two appraisal models make different predictions. Smith and Ellsworth (1985) posited that interest involved four appraisal components: high pleasantness, high effort, moderate certainty, and high attentional activity. Silvia (2005a, 2005b) suggested that interest is composed of appraisals of something as new and complex and also as understandable. The principal difference between the two models is the assertion that pleasantness is central to the appraisal of interest.

Two experiments were designed to test these competing models. Can people find things that are aversive interesting? Smith and Ellsworth's (1985) model would say no, whereas Silvia's (2005) model would say yes. The visual arts are an ideal platform to test these models. Visual art can be viewed as a system of symbols that convey meaning from the artist to the appreciator (Berlyne, 1971). Berlyne, the father of experimental aesthetics, suggests that art's primary function is to express and induce emotions. Classical and contemporary paintings were chosen to reflect both soothing as well as disturbing subject matter. The soothing paintings were chosen to convey a pleasant

stimulus, whereas the disturbing paintings were chosen to convey an unpleasant stimulus. Participants were asked to view copies of paintings and answer questions designed to measure interest, enjoyment, disturbingness, and their appraisals.

Both experiments test several predictions. First, they aim to replicate past research on the components that comprise the emotion of interest (Silvia, 2005a, 2005b). Second, they will demonstrate that the relationship of interest and enjoyment will be differentiated by complexity. Interest will have a positive relationship to complexity, whereas enjoyment will have a negative relationship to complexity (see Berlyne 1971, 1974; Evans & Day, 1971). Third, things that are disturbing will be interesting but not enjoyable. Fourth, I predict that viewing time will be positively related to interest, and viewing time will be negatively related to enjoyment. Finally, I predict that interest and enjoyment will only be modestly related. If the emotions of interest and enjoyment are differentiated, and things that are disturbing are found to be interesting, the model proposed by Smith and Ellsworth (1985) will not be appropriate for describing the emotion of interest.

CHAPTER II

EXPERIMENT 1: METHOD

Participants. A total of 83 students—68 women, 14 men, and 1 unspecified—enrolled in General Psychology at the University of North Carolina at Greensboro participated and received credit toward a research option. Six participants were excluded from analysis for not following directions, leaving a sample of 77 students.

Materials. Color copies of 13 classic and contemporary works of art were provided followed by measures of interest. Six of the pictures were calming (*Departure of Ulysses from the Land of Feaci* by Claude Lorraine, *Dance Foyer at the Opera* by Edgar Degas, *The Water Lily Pond* by Claude Monet, *Poppies, near Argenteuil* by Claude Monet, *Boats at Low Tide* by Georges Seurat, and *Avenue de l'Opéra: Morning Sunshine* by Camille Pissaro). Seven were disturbing (*Head Surrounded by Sides of Beef* by Francis Bacon, *The Fighter* by Egon Schiele, *Muerte y funerales de Caín (Death and Funeral of Cain)* by David Alfaro Siqueiros, *Judith and Holofernes* by Artemisia Genileschi, *The Carrying of the Cross* by Hieronymus Bosch, *Saturn Devouring His Children* by Francisco Goya y Lucientes, and *Echo of a Scream* by David Alfaro Siqueiros).

Design and Procedure. Participants were run in groups of up to 8 at a time in a laboratory at individual desks approximately 5 feet apart that faced toward the front of

the classroom. Instructions were given by the experimenter to first answer a questionnaire related to personality. Following the questionnaire, participants were then asked to view pieces of art for as long as needed and then to answer questions for each corresponding painting. Color reproductions were provided of the classical and contemporary pieces of art, which were inserted into vellum sheets and attached in a booklet. The questionnaire that was designed to measure emotions and appraisals was 13 pages with each page numbered. Each page of the questionnaire then corresponded to a numbered painting.

Measures of Appraisals and of Interest. Emotional responses and appraisals were measured following each of the paintings, using 7-point Likert scales. Some items measured interest (*interesting-uninteresting* and *boring-engaging*) and enjoyment (*enjoyable-unenjoyable*, *cheerful-sad*, and *pleasing-displeasing*). Other items measured appraisals of novelty-complexity (*familiar-unfamiliar*, *simple-complex*, and *common-unusual*) and ability to understand (*easy to understand-hard to understand*, *comprehensible-incomprehensible*, and *coherent-incoherent*). I also measured ratings of the paintings' disturbingness (*calming-disturbing*).

Analysis Strategy. Appraisals of interest were analyzed using within person measurement. A conventional between-person analysis would provide an average of the interest ratings, complexity ratings, ability to understand ratings, and disturbingness ratings. The averages would be used with least squares regressions to identify which

ratings predicted interest. The within-person analysis strategy does not use ratings averaged. Instead, an analysis is conducted using regressions within each person. So, in lieu of 13 appraisal scores averaged to predict interest, appraisals will be tested 77 times, one for each subject. There will be 13 ratings of interest, enjoyment, novelty-complexity, ability to understand, and disturbingness. The result is 77 regression analyses and the average outcome will then provide the appraisals that comprise the components of interest.

Multilevel analysis is appropriate for hierarchically structured data in which dependency occurs among observations (Nezlek, 2001). In general, an ordinary least square's repeated analysis of variance can not be used without the same number of observations for all participants and can produce inaccurate estimates of error. This occurs because coefficients are treated as fixed and not random—producing misleading parameter estimates and tests of significance. The first level model, or random coefficients model, treats the first level regression coefficients as random variables at the second level. This means that the variables are treated as originating from a probability distribution (Kreft & de Leeuw, 1998).

There is consensus among many researchers that multilevel random coefficient modeling provides many advantages over ordinary least squares measures because of its ability to model random error at levels of analysis simultaneously due to its reliance on

maximum likelihood procedures to estimate coefficients. This ultimately provides better statistical information (Bryk & Raudenbush, 2002; Kreft & de Leeuw, 1998).

Predictions. I aim to replicate past research on the components that comprise the emotion of interest. Second, I will demonstrate that the relationship of interest and enjoyment will be differentiated by complexity. Interest will have a positive relationship to complexity, whereas enjoyment will have a negative relationship to complexity. Third, things that are disturbing will be interesting but not enjoyable. Finally, I predict that interest and enjoyment will be modestly correlated. If the emotions of interest and enjoyment are differentiated, and things that are disturbing are found to be interesting, the model proposed by Smith and Ellsworth (1985) will not be appropriate for describing the emotion of interest.

CHAPTER III

EXPERIMENT 1: RESULTS

For each picture, the 2 items measuring interest, the 3 items measuring enjoyment, the 2 items measuring novelty-complexity, and the 3 items measuring coping potential, were averaged to form respective scores. Because there are 13 pieces of art that are nested within people, and there are 77 people in the sample, the data have a multilevel structure. I chose to analyze the nested data using multilevel random coefficient modeling, or MRCM, which permits for simultaneous estimation of within and between person effects at multiple levels as well as within-person analysis using one level (Luke, 2004; Nezlek, 2001).

The multilevel analyses were conducted using the software HLM 6. HLM uses maximum likelihood estimation as opposed to ordinary least squares. The reported effects were estimated using robust standard errors. The within person variables (e.g., ratings of interest and enjoyment as well as appraisals of novelty, understanding and disturbingness) were all group level centered. Group centering helps prevent problems with high correlations between slopes and intercepts and is standard in this type of procedure. In addition, since analysis was conducted with the use of a Likert scale where 0 is not a possible response, the variable would, therefore, need to be centered (Nezlek, 2001).

The following four within-person regression equations were estimated:

- Interest = $B_0 + B_1$ (Appraised ability to understand) + B_2 (Appraised novelty-complexity) + R;
- Enjoyment = $B_0 + B_1$ (Appraised ability to understand) + B_2 (Appraised novelty-complexity) + R;
- Disturbingness = $B_0 + B_1$ (Interest) + B_2 (Enjoyment) + R;
- Interest = $B_0 + B_1$ (Enjoyment) + R.

The regression equations are similar to those using ordinary least squares with the exception that they refer to effects within a single case. Interest, for example in the first regression equation, was modeled as the individual's average interest across 13 paintings (B_0), slopes for the appraised ability to understand (B_1), complexity (B_2), and residual error (R). The multilevel modeling, thus, gives the impression of computing an individual regression equation for each of the 77 people in the sample (see Silvia, 2005a, 2005b).

In the first equation, the analyses revealed statistically significant associations for both appraisal components. As was predicted, and further supporting prior research, increased appraised ability to understand was associated with increased interest ($B = .205$ (from .089 and .321 with 95% confidence), $t(76) = 3.5$, $p = .001$). Increased appraised novelty-complexity, furthermore, was associated with increased interest in the paintings, $B = .398$ (from .29 to .506 with 95% confidence), $t(76) = 7.32$, $p < .001$). This can be interpreted at the within-person level that paintings were rated more interesting when

they were appraised as easy to understand and as new and complex. These coefficients support our appraisal predictions.

In the second equation, the analyses showed that enjoyment was clearly differentiated from interest. The appraisal of novelty-complexity had a statistically significant negative association with enjoyment ($B = -.563$ (from $-.645$ to $-.481$ with 95% confidence), $t(76) = -13.621$, $p < .001$). The appraisal of coping potential had a statistically significant positive association with enjoyment ($B = .17$ (from $.082$ to $.258$ with 95% confidence), $t(76) = 3.874$, $p < .001$). Whereas the novelty-complexity slope was positive for interest, the novelty-complexity slope was negative for enjoyment. Since complexity's effect is negative for enjoyment, this supports the assertion that interest does not share the same appraisals as enjoyment.

In the third equation, interest had a statistically significant association with disturbingness ($B = .395$ (from $.327$ to $.463$ with 95% confidence), $t(76) = 11.485$, $p < .001$). This means that as things became more disturbing, they became more interesting. Enjoyment, however, had a statistically significant negative association with disturbingness ($B = -1.042$ (from -1.08 to -1 with 95% confidence), $t(76) = -51.571$, $p < .001$). Hence, the more disturbing something is, the less enjoyable it is. Finally, it is worth noting that in the final equation that enjoyment had a non-significant association with interest ($B = .034$ (from $-.048$ to $.116$ with 95% confidence), $t(76) = .824$, $p = .412$).

CHAPTER IV

EXPERIMENT 1: DISCUSSION

Experiment 1 directly tested two competing appraisal models for the emotion of interest. Smith and Ellsworth (1985) suggest that the experience of interest requires pleasantness and attentional activity. The appraisal model proposed by Silvia (2005a, 2005b, 2006) suggests that interest requires appraising something as new and complex (an appraisal of novelty-complexity) and appraising something as understandable (an appraisal of coping potential). The purpose of this experiment was to test whether pleasantness is required for interest. The results of Experiment 1 suggest that the experience of interest and pleasantness contain dissimilar appraisals. Appraisals of novelty-complexity, for example, had opposite effects for interest and pleasantness. Ratings of disturbingness, in a parallel fashion, had opposite effects for pleasantness and interest. Most importantly, because ratings of disturbingness strongly predicted interest, this provides a strong contradiction to the notion that pleasantness is consistent with or required for interest. This effect would neither be suggested nor explained by Smith and Ellsworth's model.

Previous studies in experimental aesthetics have used viewing time as a convergent measure of interest (Berlyne, 1963; Bechtel, 1967). Bechtel developed a

device to measure museum visitors' footsteps without their knowledge. There was a significant positive correlation between the time a subject spent in front of a piece of art and his or her rank order of preference. Berlyne (1971) suggested that looking time was largely a measure of exploration and found a significant relationship of scores of mean looking time and mean interestingness. Since interest is the emotion most commonly associated with curiosity and exploration, I expect that things that are interesting will also attract the longest attention. The purpose of Experiment 2 was to test this notion—more specifically, that things that are rated with the highest ratings of interest will be looked at the longest.

CHAPTER V

EXPERIMENT 2: METHOD

Experiment 2 was conducted to extend the findings of the first experiment. Many of the same paintings were selected along with some new pieces to allow for better control in the quality of the presentation. Digital copies of the paintings were presented electronically on a computer monitor. Once again, emotions and appraisals were measured following the presentation of each painting. In addition, viewing time was measured as a way of adding a behavioral component to complement the measurement of the emotion of interest. Participants were unaware that viewing time was being measured. Following the presentation of each picture, participants were instructed to move to a series of questions when ready that were aimed at measuring interest, enjoyment, understanding, complexity, and disturbingness.

Participants. A total of 83 students—63 women, 20 men—enrolled in General Psychology at the University of North Carolina at Greensboro participated and received credit toward a research option.

Materials. Graphical presentation of 20 classical and contemporary works of art was provided electronically on a computer using SuperLab Pro software. Ten of the paintings were calming (*Adonis led by Cupids to Venus* by Francesco Albani, *Zwinger Waterway* by Bernardo Bellotto, *Capriccio: The Horses of San Marco in the Piazzetta* by

Canaletto, *A Seaport at Sunrise* by Claude Lorrain, *Emarkation of St.Paula Romana at Ostia* by Claude Lorrain, *View of a Harbour* by Caspar David Friedrich, *The Giudecca Canal with the Zattere* by Francesco Guardi, *Landscape with Aeneas at Delos* by Claude Lorrain, *Seaport with the Embarkation of the Queen of Sheba* by Claude Lorrain, and *Dido building Carthage; or the Rise of the Carthaginian Empire* by John Mallord William Turner). Ten were disturbing (*Head VI* by Francis Bacon, *The Fighter* by Egon Schiele, *Echo of a Scream* by David Alfaro Siqueiros, *Saturn Devouring His Children* by Francisco de Goya y Lucientes, *Two Women Eating* by Francisco de Goya y Lucientes, *Self Portrait* by Francis Bacon, *Muerte y funerales de Caín (Death and Funeral of Cain)* by David Alfaro Siqueiros, *The Dead Mother* by Edvard Munch, *The Vision of the Prophet Ezekiel* by Mikhail Vrubel, and *Australian Scapegoat* by Arthur Boyd).

Design and Procedure. Participants took part individually in an empty laboratory with just a desk and a computer. Instructions were given that participants would view a series of paintings and answer questions giving their impressions. The 20 paintings were presented in a different random order for each person. Participants were allowed to view the paintings for as long as desired; unbeknownst to the participants, viewing time was measured. Following instructions, the experimenter prompted the first painting to appear on the screen. The participants were guided to press the space bar to initiate the questions after viewing the painting. Following the presentation of the painting, the following questions were asked on a 9-point Likert scale: *How interesting is this picture?*, *How*

enjoyable is this picture?, How easy to understand is this picture?, How complex is this picture?, and How disturbing is this picture?. Participants responded by pressing a numerical response on the keyboard. A 9-point scale was used because of its intuitive appeal with nine keys displayed on the top of the keyboard. At the conclusion of the presentation of paintings and questions, a message prompted the participants to contact the experimenter. Following a questionnaire, participants were thanked, debriefed, and excused.

Analysis Strategy. As with Experiment 1, appraisals of emotion were analyzed using within person measurement. 20 ratings of interest, enjoyment, novelty-complexity, ability to understand, and disturbingness were used across all participants. The results allowed me to then examine the appraisals that comprise the components of interest.

Predictions. I expect that findings will replicate those expected in Experiment 1. Interest and enjoyment should be demonstrated as distinct emotions. Whereas complexity will be positively related to interest, complexity will have a negative relationship to enjoyment. Finally, I expect to demonstrate that paintings that are disturbing will be rated as interesting. In addition to the predictions made in Experiment 1, I predict that the higher the ratings of interest, the longer the viewing time. Additionally, I believe that enjoyment will have no discernable relationship to viewing time.

CHAPTER VI

EXPERIMENT 2: RESULTS AND DISCUSSION

The following five within-person regression equations were estimated:

- Interest = $B_0 + B_1$ (Appraised ability to understand) + B_2 (Appraised novelty-complexity) + R;
- Enjoyment = $B_0 + B_1$ (Appraised ability to understand) + B_2 (Appraised novelty-complexity) + R;
- Interest = $B_0 + B_1$ (Enjoyment) + R;
- Disturbingness = $B_0 + B_1$ (Interest) + B_2 (Enjoyment) + R;
- Viewing time = $B_0 + B_1$ (Interest) + B_2 (Enjoyment) + R.

The regression equations are similar to those using ordinary least squares with the exception that they refer to effects within a single case. Interest, for example in the first regression equation, was modeled as the individual's average interest across 20 paintings (B_0), slopes for the appraised ability to understand (B_1), complexity (B_2), and residual error (R). The multilevel modeling, thus, computes an equation for each of the 83 people in the sample (see Silvia, 2005a, 2005b).

In the first equation, the analyses found significant effects for both appraisal components. As was predicted, and further supporting Silvia's prior research, increased

appraised ability to understand had a statistically significant positive association with interest ($B = .096$ (from .01 to .182 with 95% confidence), $t(82) = 2.235$, $p = .028$). Increased appraised novelty-complexity, furthermore, had a statistically significant positive association with interest in the paintings ($B = .313$ (from .2398 to .3862 with 95% confidence), $t(82) = 8.54$, $p < .001$). This can be interpreted at the within-person level that paintings were rated more interesting when they were appraised as easy to understand and as new and complex. These coefficients support our appraisal predictions.

In the second equation, the analyses showed that enjoyment was related to interest. Increased appraisals of novelty-complexity had a statistically significant positive association with enjoyment ($B = .171$ (from .097 to .245 with 95% confidence), $t(82) = 4.565$, $p < .001$). Likewise, an increased appraisal of coping potential had a statistically significant positive association with enjoyment ($B = .444$ (from .356 to .532 with 95% confidence), $t(82) = 10.05$, $p < .001$).

While these experiments are attempting to show the discriminative properties of interest and pleasingness or enjoyment, it is not uncommon for the two to be related. Berlyne (1971) suggested that, “some of the studies that have been reviewed suggest that pleasingness and interestingness vary inversely with each other, and some suggest that they vary directly with each other. But those that have investigated the relation between the two most thoroughly make it clear that pleasingness and interestingness are not the same thing and that the relations between the two are complicated” (pp. 213-214). The

results of the third equation, indeed, reflect this positive relationship between interest and enjoyment ($B = .49$ (from $.404$ to $.576$ with 95% confidence), $t(82) = 11.423$, $p < .001$).

In the fourth equation, disturbingness had a statistically significant positive relationship with interest ($B = .575$ (from $.455$ to $.695$ with 95% confidence), $t(82) = 9.5$, $p < .001$). This means that as things became more disturbing, they became more interesting. Enjoyment, however, had a statistically significant negative relationship with disturbingness ($B = -.963$ (from -1.033 to $-.893$ with 95% confidence), $t(82) = -27.445$, $p < .001$). Hence, the more disturbing something is, the less enjoyable it is. While in this circumstance interest and enjoyment shared a positive relationship with each other, analyzing disturbingness once again demonstrates the discriminant nature of things that are pleasant from those that are interesting.

Finally, in the fifth equation, viewing time had a statistically significant association with interest ($B = 791$ (from 437 to 1145 with 95% confidence), $t(82) = 4.481$, $p < .001$). Although nonsignificant, enjoyment had a negative relationship with viewing time ($B = -58.650$ (from -363.91 to 246.61 with 95% confidence), $t(82) = -.384$, $p = .701$). Pursuant to the idea that interest is associated with curiosity and exploration, when interest was at its highest, viewing time was at its longest. Viewing time then becomes the ideal behavioral measure of the exploratory behaviors associated with interest.

CHAPTER VII

GENERAL DISCUSSION

Interest helps motivate us to learn and to explore, thus guaranteeing our engagement with the environment (Izard & Ackerman, 2000). Interest discriminates itself as an emotion because of a distinct pattern of appraisals that allow us to conceptualize, understand, and predict the emotional experience. Do things need to be pleasant to be engaging or interesting? The present research aims to address the discrepancies between two models of the emotion of interest from an appraisal theory perspective. Smith and Ellsworth (1985, 1988) proposed that interest is a combination of pleasantness, attentional activity, effort, and certainty. Silvia (2005a, 2005b, 2006) proposed an alternative explanation for interest—more specifically, interest occurs when things are novel and complex, yet understandable. Silvia’s model ignores the appraisal of pleasantness, suggesting that things found to be unpleasant can be interesting. These two experiments measured emotions and appraisals using contemporary and classical pieces of art.

Two experiments provided evidence for the role of appraisals in the elicitation of interest. In Experiment 1, participants viewed color digital copies of contemporary and classical pieces of art. After viewing each piece of art, the participants provided ratings of interest, enjoyment, understanding, complexity, and disturbingness. Results showed that

appraised complexity and understanding strongly predicted interest in the paintings. Appraised complexity as expected, however, negatively predicted enjoyment. Finally, further differentiating subjective feelings of interest and enjoyment, ratings of disturbingness positively predicted interest, but negatively enjoyment. This supports the notion that aversive things can be interesting, but not necessarily enjoyable. In Experiment 2, we extended these findings showing that the behavioral expression of interest—time spent viewing an image—was highest when both appraisals were at their highest. When people appraised a painting as novel and complex, yet understandable—the two appraisals central to the emotion of interest—the results clearly predicted interest in visual art. The behavioral measure of viewing time also supported a positive relationship with interest. Consistent with the view of interest as an emotion associated with curiosity and exploration, people who rated paintings as interesting spent significantly more time viewing paintings.

Smith and Ellsworth (1985, 1988) did not conduct research on interest per se; instead their goal was to measure many emotions. They suggested that interest is characterized by appraisals of pleasantness, high attentional activity, and high effort. There are some similarities in the two models compared in these studies. Smith and Ellsworth's attentional activity, defined as whether something deserves or demands attention, could arguably overlap with Silvia's variable of novelty-complexity. Assessing something as complex, in addition, would require effort. The key difference between the

two models therefore would be pleasantness. If interest is truly an expression of curiosity and exploration, it would be inappropriate to suggest that interest would be uniquely based on pleasant things. Indeed, these two studies show that art pieces that are unpleasant—particularly pieces such as Francisco Goya’s painting of the shadowy Saturn devouring his children—are grotesque and macabre, yet interesting. This evidence strongly suggests that pleasantness is not necessarily central to interest.

The methodological differences between the two camps of research compared here are significant. Smith and Ellsworth relied on retrospective reporting of past emotional experience. Instead of tapping emotional experience, this methodology appears to target beliefs about emotions or people’s memories for emotions. This can be problematic for an emotional experience which can be low in intensity and duration such as interest. In fact, LeDoux (1996) criticizes appraisal research as basing understanding of appraisal processes largely on self-reports. Ellsworth and Scherer (2003) conclude that “it is obvious that exclusive reliance on self-report measures leaves many questions unanswered, including the fundamental question of whether the reports reflect the actual experience or a later construction” (p. 587).

Given the disparity in the appraisals, the methodologies, and the findings, a revision of the appraisal research is in order. The method used here and Silvia’s methods (2005a, 2005b) measured appraisals and emotions as the participants experienced the feelings associated with the art. This allows for the optimal manipulation and

measurement of emotion. Because interest is confounded by multiple meanings (see Silvia, 2006) and specifically can be interchangeable with something found as pleasant in everyday spoken language, asking open-ended questions about interest retrospectively might lead to results that suggest other experiences than interest. This method might also fail to capture the subtlety of an emotion such as interest, and relies heavily on people's memory for prior emotional experience. Additionally, asking questions about so many emotions in one sitting can be at the very least a mentally taxing exercise to the participants.

One current limitation of emotion research is that reliance on self-reports implies that we are consciously aware of our appraisals. While in some circumstances this might be true, there are many circumstances where we are unaware of our thoughts that lead to experiencing an emotion. Future research should attempt to address this shortcoming by developing ways of manipulating appraisals and emotions without our awareness.

In these two experiments, the focus was on differentiating pleasantness from interest. A study with both methods might have provided strong convergent evidence for the appraisals associated with interest—demonstrating that regardless of an experimental or self-report approach, pleasantness is peripheral to interest. The results from the series of studies conducted by Smith and Ellsworth (1985, 1988), however, suggest conflicting reports of the appraisals associated with interest. They found consistent evidence for pleasantness and attentional activity. The other variables included certainty and effort,

but failed to systematically replicate across their studies, thus providing no evidence for inclusion in a model of interest. In light of the potential confound with self-reports of emotion and multiple uses of the word interest, in vivo measurement provides an unambiguous and preferable explanation for the intended emotional experience.

In Experiment 2, a behavioral measure of viewing time was used. This allows for the optimal measurement of the exploratory behaviors associated with interest.

Participants unknowingly chose to view paintings for as long as they wanted before answering questions based on each piece. As expected, those paintings that were ranked as the most interesting also had the longest viewing time. This provides further evidence for the differentiation of interest and pleasantness. Our results showed that interest was positively related to viewing time, but enjoyment was negatively related to viewing time. Although the latter relationship was not significant, it was in the intended direction. The appraisal components suggested in the model by Smith and Ellsworth—specifically that pleasantness is the primary appraisal in interest—would be unable to explain this discrepancy.

Finally, appraisal dimensions are the cognitive components of an emotion. In keeping with the principle of parsimony and Scherer's (1997) suggestion of a simple classification of emotion, interest, therefore, can be distinguished from other emotions by asking if the situation is novel and complex and if there is the necessary coping potential (the ability to understand the situation) (Silvia 2005a, 2005b, 2006).

REFERENCES

- Arnold, M. B. (1960). *Emotion and personality: Vol. 1 Psychological aspects*. New York: Columbia University Press.
- Bechtel, R. B. (1967). *Footsteps as a measure of human preference*. Topeka: Environmental Research Foundation.
- Berlyne, D. E. (1963). Complexity and incongruity variables as determinants of exploratory choice and evaluative ratings. *Canadian Journal of Psychology*, 17, 274 – 290.
- Berylne, D. E. (1971). *Aesthetics and psychobiology*. New York: Appleton-Century-Crofts.
- Ekman, P. (1984). Expression and the nature of emotion. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 319–344). Hillsdale, NJ: Erlbaum.
- Ekman, P., Freisen, W. V., & Ellsworth, P. (1982). Research foundations. In P. Ekman (Ed.), *Emotion in the human face* (2nd ed., pp. 1 – 143). New York: Cambridge University Press.
- Ellsworth, P. C., & Scherer, K. R. (2003). Appraisal processes in emotion. In R. J. Davidson, K. R. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 572 – 595). New York: Oxford University Press.

- Ellsworth, P. C., Smith, C. A. (1988). Shades of joy: Patterns of appraisal differentiating pleasant emotions. *Cognition and Emotion*, 2, 301 – 331.
- Evans, D. R., & Day, H. I. (1971). The factorial structure of responses to perceptual complexity. *Psychonomic Science*, 27, 357 – 359.
- Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, 2, 300–319.
- Frijda, N. H. (1986). *The emotions*. Cambridge, UK: Cambridge University Press.
- Izard, C. E. (1977). *Human emotions*. New York: Plenum.
- Izard, C. E., & Ackerman, B. P. (2000). Motivational, Organizational, and regulatory functions of discrete emotions. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 253 – 264). New York: Guilford.
- Lazarus, R. S. (1966). *Psychological stress and the coping process*. New York: McGraw Hill.
- LeDoux, J. E. (1996). *The emotional brain*. New York; Simon & Schuster.
- Luke, D. A. (2004). *Multilevel modeling*. (Sage University Paper Series on Quantitative Applications in the Social Sciences, series no. 07–143). Newbury Park, CA: Sage.
- Nezlek, J. B. (2001). Multilevel random coefficient analyses of event- and interval-contingent data in social and personality psychology research. *Personality and Social Psychology Bulletin*, 7, 771–785.

- Kreft, I. G., & de Leeuw, J. (1998). *Introducing multilevel modeling*. Thousand Oaks: CA: Sage.
- Plutchik, R. (1980). *Emotion: A psychobioevolutionary synthesis*. New York: Harper & Row.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks: CA: Sage.
- Roseman, I. J. (1984). Cognitive determinants of emotion: A structural theory. In P. Shaver (Ed.), *Review of personality and social psychology: Vol. 5. Emotions, relationships, and health* (pp. 11–36). Beverly Hills, CA: Sage.
- Roseman, I. J., & Smith, C. A. (2001). Appraisal theory: Overview, assumptions, varieties, controversies. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, method, research* (pp. 3 – 19). New York: Oxford University Press.
- Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 293–318). Hillsdale, NJ: Erlbaum.
- Scherer, K. R. (1997). Profiles of emotion-antecedent appraisal: Testing theoretical predictions across cultures. *Cognition and Emotion*, *11*, 113 – 150.

- Silvia, P. J. (2005a). Cognitive appraisals and interest in visual art: Exploring an appraisal theory of aesthetic emotions. *Empirical Studies of the Arts*, 23, 119 – 133.
- Silvia, P. J. (2005b). What is interesting? Exploring the appraisal structure of interest. *Emotion*, 5, 89 – 102.
- Silvia, P. J. (2006). *Exploring the psychology of interest*. New York: Oxford University Press.
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48, 813 – 838.
- Smith, C. A., & Lazarus, R. S. (1990). Emotions and adaptation. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 609 – 637). New York: Guilford.
- Tomkins, S. S. (1962). *Affect, imagery, consciousness*. New York: Springer Publishing Company, Inc.
- Tomkins, S. S. (1980). Affect as amplification: Some modifications in theory. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience: Vol. 1. Theories of emotion* (pp. 141–164). New York: Academic Press.
- Tomkins, S. S. (1982). Affect theory. In P. Ekman (Ed.), *Emotion in the human face* (2nd ed., pp 353 – 395). New York: Cambridge University Press.