

Must Interesting Things be Pleasant? A Test of Competing Appraisal Structures

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What makes something interesting? Appraisal research has proposed two appraisal structures for the emotion of interest. One model (Smith & Ellsworth, 1985) contends that appraised pleasantness is central to interest, whereas an alternative model (Silvia, 2005b) contends that pleasantness is unnecessary for interest. An experiment tested these competing predictions. Participants viewed calming and disturbing paintings, rated each picture for appraisals, and reported their experienced interest and pleasantness/enjoyment. Within-person analyses found that (a) interest and pleasantness were essentially unrelated; (b) appraised novelty–complexity positively predicted interest, but negatively predicted pleasantness; and (c) disturbing pictures were highly interesting but unpleasant, whereas calming pictures were highly pleasant but uninteresting. The results thus strongly suggest that interesting things needn't be pleasant. Implications for in vivo (versus retrospective) tests of competing appraisal predictions are considered.

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Appraisal theories have emerged as a powerful perspective on the elicitation and differentiation of emotional experience (Ellsworth & Scherer, 2003). Given the general acceptance of the appraisal approach, a central task for modern appraisal research is to refine and reconcile the predictions made by appraisal models. The agreement among different appraisal theories is substantial, yet there are cases in which different theories make inconsistent predictions. To date, few studies have directly compared the competing predictions made by different appraisal theories (see Roseman, Spindel, & Jose, 1990). The present research examines two competing appraisal models of the emotion of *interest*, an emotion associated with curiosity, exploration, and knowledge-seeking (Izard, 1977; Silvia, 2005c, 2006; Tomkins, 1962). Smith and Ellsworth (1985) suggest that interest requires an appraisal of high pleasantness (Ellsworth & Smith, 1988a, 1988b). A recent appraisal model of interest (Silvia, 2005a, 2005c), however, suggests that pleasantness is peripheral to interest—people can be interested in disturbing, unpleasant events. The present research uses in vivo methods (rather than scenario or retrospective methods) to test these competing appraisal structures.

The Emotion of Interest

Interest has been a controversial emotion. Some emotion theories view interest as an important emotion that is central to curi-

osity, learning, and human development (e.g., Izard, 1977; Tomkins, 1962). Other theories, in contrast, do not view interest as an emotion (e.g., Lazarus, 1991; Ortony, Clore, & Collins, 1988). If emotions are viewed as organized syndromes of components, such as experiential, expressive, cognitive, physiological, and motivational components (Scherer, 2001), then interest appears to qualify as an emotion (see Silvia, 2006, chap. 1, for a review). Interest has a reliable expressive component in both infants (Langsdorf, Izard, Rayias, & Hembree, 1983) and adults (Reeve, 1993). Physiological markers of heightened engagement predict self-reported interest and behavioral measures of interest (Evans & Day, 1971; Langsdorf et al., 1983; Libby, Lacey, & Lacey, 1973). Interest's motivational components have been widely studied. Research in text processing, for example, shows that interest affects what people choose to read, promotes the use of deep-level processing strategies, and enhances comprehension of the text (see Silvia, 2006, chap. 3). Finally, self-reported interest, physiological engagement, expressive markers of interest, and behavioral measures of exploration converge (e.g., Langsdorf et al., 1983; Reeve, 1993; see Silvia, 2006, chap. 1). Thus, it seems reasonable to view interest as an emotion, perhaps as part of a family of “epistemology-based emotions” (Keltner & Shiota, 2003).

Appraisal Models of Interest

Smith and Ellsworth's Model

Smith and Ellsworth (1985) were the first researchers to propose an appraisal structure for interest. They asked people to remember past emotions, one at a time, and then to rate the experience on scales designed to tap appraisal components. Interest involved three components: high pleasantness, high attentional activity, and moderate certainty. In a subsequent retrospective study of positive emotions, Ellsworth and Smith (1988b) again found that high pleasantness and high attentional activity differentiated interest from other positive emotions. Unlike the prior study, however,

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high effort predicted interest and the effect of certainty didn't replicate. In their retrospective study devoted to negative emotions (Ellsworth & Smith, 1988a), a similar appraisal structure emerged. High pleasantness and high attentional activity again predicted interest. Unlike the past two studies, this study found that appraisals of uncertainty and importance predicted interest.

Viewed collectively, these three studies suggest that interest's core appraisal structure consists of high pleasantness and high attentional activity. Unambiguous support for these two components appeared in all three studies. Appraised importance (Ellsworth & Smith, 1988a) and appraised effort (Ellsworth & Smith, 1988b) each appeared in one of the three studies, and high certainty had a positive effect in one study (Smith & Ellsworth, 1985), a negative effect in another (Ellsworth & Smith, 1988a), and no effect in a third (Ellsworth & Smith, 1988b). It thus seems reasonable, based on the entire program of research, to view pleasantness and attentional activity as interest's appraisal components in the Ellsworth and Smith model.

Silvia's Model

An alternative appraisal structure of interest was proposed by Silvia (2005b). Rooted in the multilevel sequential-check theory of appraisal (Scherer, 2001), this model proposes that interest involves an appraisal of *novelty-complexity* (whether an event is new, uncertain, complex, or contradictory) followed by an appraisal of *coping potential* (the ability to understand the new, complex thing). Thus far, seven direct tests have strongly supported this appraisal structure (Silvia, 2006a, 2005a, 2005c; for reviews, see Silvia, 2005b, 2006b). Appraisals of novelty-complexity and coping potential strongly predict interest. These effects appear for manipulated and measured appraisals, for self-report and behavioral measures of interest, for several kinds of interesting stimuli (random polygons, poetry, experimental visual art), and for between-person and within-person levels of analysis (Silvia, 2005a). It is worth noting that all of these experiments involved in vivo manipulation and assessment of interest. People were exposed to potentially interesting events; their appraisals were measured or manipulated; and their momentary experience of interest was measured. In no instance were people asked to retrospectively recall a past episode of intense interest or an intense positive emotion and then rate that experience on an extensive set of emotion and appraisal scales.

By omitting pleasantness, Silvia's appraisal model assumes that events needn't be appraised as pleasant to be interesting. This reasoning is based on past theories of interest and past experimental research. Tomkins (1962) contended that interest and enjoyment had different adaptive functions. Interest motivates novelty-seeking and exploration, whereas enjoyment motivates attachments to familiar events that caused enjoyment in the past. Tomkins noted that these functions could conflict, such as when one has to choose between a new restaurant and a favorite restaurant. The purpose of novelty-seeking is to build knowledge and skills (White, 1959) and trying new things often leads to negative emotions due to uncertainty, threat, or disappointment. If interest required pleasantness, interest's novelty-seeking function would be undermined. Tomkins's functional distinction between interest and enjoyment is supported by people's fascination with disgusting, morbid, and macabre events (e.g., Rawlings, 2003). Although

distressing and violent events are unpleasant, interest enables people to gain information about such events and thus to possibly forestall them.

Furthermore, a large literature shows that interest and enjoyment have different causes (for a review, see Silvia, 2006, chap. 1). Dozens of experiments in the Berlyne (1971, 1974) tradition of experimental aesthetics explored relations between interest and enjoyment. This research, which used diverse stimulus materials, dependent measures, and samples, commonly found dissociations between interest and enjoyment. In particular, the class of novelty-complexity variables (labeled *collative variables* by Berlyne) increases interest but decreases enjoyment (for an early review, see Berlyne, 1971, pp. 213-220). Moreover, ratings of interest and enjoyment differentially predict behavioral measures of exploration and physiological markers of task engagement (e.g., Evans & Day, 1971; Libby et al., 1973). Nearly all of this research preceded the development of appraisal models of interest, so it didn't use appraisal concepts to explain the relationships (see Silvia, 2005b). Nevertheless, the replicated dissociations between interest and pleasantness deserve attention from modern appraisal researchers, particularly because (a) most of the experiments manipulated appraisal components and (b) none of the experiments involved retrospective reports of past emotional states.

The Present Research

In the present research, we tested the competing appraisal predictions. Participants viewed a series of classical paintings; some of the paintings were disturbing and others were calming. For each picture, participants provided reports of emotions and appraisals (interest, pleasantness, novelty-complexity, coping potential, and disturbingness). This design enables a series of analyses that triangulate on whether or not pleasantness is central to interest. First, we tested whether interest and pleasantness were highly correlated. Smith and Ellsworth would predict a strong correlation, whereas we would not. Second, we explored whether interest and pleasantness had similar antecedent appraisals (e.g., whether novelty-complexity has similar effects on interest and pleasantness). Smith and Ellsworth would predict similar antecedents given the presumed high correlation between interest and pleasantness, whereas we would predict dissociations (i.e., novelty-complexity should have opposite effects on interest and pleasantness, as in past research). Finally, we examined how interest and pleasantness relate to the paintings' level of disturbingness. Smith and Ellsworth would predict that disturbing paintings would be less interesting given the necessity of pleasantness for interest, whereas we would expect disturbing paintings to be more interesting.

Method

Participants and Design

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 people were excluded because they were not native English speakers or because of substantial missing data, leaving a final sample of 77 (64 women, 13 men).

Procedure

Participants were run in groups of up to eight at a time in a laboratory with individual desks. Everyone faced the same direction, and the participants couldn't see each other's faces. The experimenter explained that the study was about people's emotions, thoughts, and impressions in response to different kinds of visual art. People received a booklet of color copies of 13 classical paintings along with a questionnaire for recording their impressions of each painting. 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; *Death and Funeral of Cain* by David Alfaro Siqueiros; *Judith and Holofernes* by Artemisia Gentileschi; *The Carrying of the Cross* by Hieronymus Bosch; *Saturn Devouring His Children* by Francisco Goya; and *Echo of a Scream* by David Alfaro Siqueiros).

People were instructed to view each painting for as long as they wished, to consider their feelings and impressions of the painting, and then to complete the rating scales. Emotional reactions and appraisals were measured using 1–7 bipolar Likert scales. The instructions thus attuned people to their emotional and cognitive responses, although the ratings scales referred to qualities of the pictures. Two items measured interest (*interesting-uninteresting* and *boring-engaging*), three items measured pleasantness (*enjoyable-unenjoyable*, *cheerful-sad*, and *pleasing-displeasing*), three items measured appraisals of novelty–complexity (*familiar-unfamiliar*, *simple-complex*, and *common-unusual*), three items measured appraisals of coping potential (*easy to understand-hard to understand*, *comprehensible-incomprehensible*, and *coherent-incoherent*), and one item measured judgments of the paintings' disturbingness (*calming-disturbing*). These items have been widely used in past experimental research on interest (e.g., Berlyne & Peckham, 1966; Silvia, in press, 2005a, 2005c), and multivariate studies show that the items form the appropriate factors (e.g., Evans & Day, 1971).

Results

Analysis Strategy and Data Reduction

The data have a multilevel structure, in which responses to the 13 paintings are nested within each of 77 people (Hox, 2002). Appraisal theories make predictions at the intraindividual level—a person's appraisals cause that person's emotions—but appraisal predictions are usually tested at the between-person level (i.e., relations between variables at the level of the sample). Instead of collapsing across the within-person information and computing conventional multiple regression analyses, we estimated the within-person relationships between appraisals and emotions using multilevel random-coefficient modeling. One can view these analyses as computing a regression equation 77 times, once for each participant, and then averaging the intercepts and slopes to arrive at the average within-person relations between appraisals and emotions (although this is only a metaphor for the nature of multilevel estimation; see Hox, 2002; Luke, 2004). The multilevel analyses were conducted with HLM 6 using restricted maximum likelihood estimation. Due to likely non-normality in the outcome variables, the effects were estimated using standard robust errors (Hox, 2002, p. 200). All within-person variables were group-mean centered (i.e., at each participant's own mean), and the coefficients were modeled as random effects.

As a check on the disturbingness manipulation, we tested whether people rated the six calming pictures as less disturbing

than the seven disturbing pictures. As expected, the disturbing pictures ($M = 5.87$, $SD = .55$) were rated as much more disturbing than the calming pictures ($M = 2.09$, $SD = .70$), paired-samples $t(75) = 35.8$, $p < .001$. The two items measuring interest, the three items measuring pleasantness, the three items measuring novelty–complexity, and the three items measuring coping potential were averaged to form composite scores.¹ Table 1 displays descriptive statistics.

Replicating Past Research

To see if the appraisal structure identified in past research (Silvia, 2005b) was replicated, we first assessed whether interest was predicted by appraised coping potential and by novelty–complexity. The analyses found significant effects for both appraisal components. As expected, both appraised coping potential, $B = .205$, $SE = .058$, $t(76) = 3.54$, $p < .001$, and appraised novelty–complexity predicted interest in the paintings, $B = .398$, $SE = .054$, $t(76) = 7.32$, $p < .001$. These effects nicely replicate past research.

Relating Interest and Pleasantness

If pleasantness is central to interest, then one would predict that interest and pleasantness would strongly correlate. In a second analysis, we assessed whether ratings of pleasantness predicted interest. The two ratings were essentially independent, $B = .033$, $SE = .04$, $t(76) = .83$, $p < .41$. Thus, at the within-person level, a person's ratings of pleasantness carried little information about his or her ratings of interest. This suggests that pleasantness isn't central to interest.

Are interest and pleasantness predicted by the same appraisals? Given that interest and pleasantness were unrelated, it seems unlikely that they have the same appraisal basis. In a third analysis, we assessed whether pleasantness was predicted by appraisals of coping potential and novelty–complexity. Coping potential significantly predicted pleasantness ($B = .17$, $SE = .042$, $t(76) = 3.9$, $p < .001$); novelty–complexity had a significant *negative* relationship with pleasantness, $B = -.563$, $SE = .039$, $t(76) = 14.1$, $p < .001$. This effect indicates a dissociation of interest and pleasantness: paintings appraised as high in novelty–complexity were more interesting but less pleasant.

Are Disturbing Things Interesting?

In a final analysis, we examined how ratings of the paintings' disturbingness related to the experience of interest and pleasantness. If pleasantness is central to interest, then disturbing paintings should be less interesting. No support for this prediction was found. When we assessed whether disturbingness ratings were predicted by interest and pleasantness, a strong *positive* effect for interest ($B = .395$, $SE = .034$, $t(76) = 11.57$, $p < .001$) and a

¹ Factor analyses showed that the items formed the expected factors. The first factor explained substantial variance and the items were appropriately correlated: interest (85% of the variance, $r = .70$), pleasantness (75% of the variance, average $r = .62$), novelty–complexity (58% of the variance, average $r = .36$), and coping potential (83% of the variance, average $r = .76$).

Table 1
Descriptive Statistics for Within-Person Variables

	<i>M</i>	<i>SE</i>	Level 1 variance	Level 2 variance	ICC
Interest	5.01	.068	2.385	.177	.069
Pleasantness	3.92	.051	3.293	.00094	.0003
Disturbingness	4.13	.047	4.856	.00052	.0001
Appraised complexity	4.32	.048	3.593	.00059	.0002
Appraised coping potential	4.61	.075	3.552	.165	.044

Note. The within-person statistics are estimated via unconditional models. The variables were rated on 1–7 scales. $n = 77$. ICC = intraclass correlation coefficient.

strong *negative* effect for pleasantness ($B = -1.042$, $SE = .02$, $t(76) = 51.95$, $p < .001$) appeared. As the paintings were appraised as being more disturbing, they were experienced as more interesting but less enjoyable.²

Discussion

Now that the appraisal approach to emotion is well established (Ellsworth & Scherer, 2003), a central task for appraisal research is to reconcile differences between appraisal theories. The present research directly tested two competing predictions about appraisals and interest: an appraisal structure involving *pleasantness* and *attentional activity* (Smith & Ellsworth, 1985), and an appraisal structure involving *novelty–complexity* and *coping potential* (Silvia, 2005c, 2006). The central difference—whether high pleasantness is necessary for interest—was examined in an experiment. The pattern of results clearly shows that pleasantness is not necessary for interest. First, pleasantness wasn't significantly related to interest. Second, appraisals of novelty–complexity had opposite effects on pleasantness and interest. Third, pleasantness and interest had opposite relationships with perceptions of disturbingness. Ratings of a painting's disturbingness strongly predicted interest but negatively predicted pleasantness—this effect is hard to reconcile with the view that pleasantness is central to interest.

In this experiment, we focused solely on the differing predictions made regarding pleasantness. Smith and Ellsworth's cumulative body of research on interest found two reliable components: pleasantness and attentional activity. Pleasantness is the most salient difference between the models, and the two models of interest agree about the role of attentional activity. If attentional activity is construed as akin to novelty (e.g., its labeling as *attentional activity/novelty* in Smith & Ellsworth, 1985), then it can be seen as a part of the family of novelty–complexity variables. We did not test peripheral components of interest's appraisal structure (e.g., certainty, effort). These components didn't systematically replicate across Smith and Ellsworth's three studies, and it seemed unnecessary to examine the peripheral appraisal components if little support is found for a central component like pleasantness.

The empirical disparities between Smith and Ellsworth's series of experiments and Silvia's series of experiments probably stem from methodological differences. All three of Smith and Ellsworth's studies asked participants to recall an instance in which they experienced interest or to recall emotions associated with certain appraisals. People then rated how they felt at the time and what their appraisals were. The issue of how accurately people

can remember past emotions and past appraisals is not straightforward, but it is clear that retrospective reports of emotions and appraisals may be distorted or reconstructed (Levine, Prohaska, Burgess, Rice, & Laulhere, 2001; Parkinson, 1995). An emotion like interest, which is relatively transient and low in intensity, may not be encoded as deeply as emotions that are more intense. Furthermore, interest doesn't seem to involve appraisals of goal congruence or compatibility with standards and social norms (Scherer, 2001), so it may be less memorable than emotions that implicate important personal goals. Regardless of the exact nature of the retrospective bias, it seems clear that an *in vivo* test of interest's appraisal structure circumvents many of these problems.

Experimental *in vivo* methods and retrospective self-report methods represent different points on a breadth–fidelity dimension (see Silvia, 2005c). Retrospective methods enable researchers to gain a lot of data regarding a lot of emotions, but they are less suited for examining the inner workings of a single emotion. These methods are thus useful when broad information is desired, such as when researchers test entire appraisal models (Smith & Ellsworth, 1985). Experimental methods, in contrast, are poorly suited for exploring a wide range of emotions, but they are ideal for examining the dynamics of one or two emotions (e.g., surprise; Scherer, Zentner, & Stern, 2004). Replicating an appraisal structure with both methods provides powerful convergent evidence. But when the two methods provide different results—as is the case with the two appraisal models of interest—it seems reasonable to view the experimental data as more definitive.

Finally, we would like to emphasize the value of directly testing competing appraisal structures. As a class of theories, appraisal theories have emerged as a leading explanation for the elicitation and differentiation of emotions (Ellsworth & Scherer, 2003). Now that there is little debate over the value of appraisal theories, it is time to examine the differences between specific appraisal theories (e.g., Roseman et al., 1990). Evaluating competing predictions will accelerate the growth of knowledge about appraisal–emotion relationships.

² One might suggest that participants were using the term *interesting* casually due to uncertainty over their emotional reactions or due to a reluctance to report their true feelings. This possibility seems unlikely. First, the measure of interest was a composite of two items (*interesting-uninteresting* and *boring-engaging*), one of which was reverse-scored. The measure was not merely an endorsement of the adjective *interesting*, so one would need to presume that people also used a low-frequency word like *engaging* out of uncertainty. Second, these items have been extensively used in past research. Past studies (e.g., Evans & Day, 1971) show that self-report ratings on these bipolar scales load on the same factor as physiological measures of engagement and behavioral measures of interest. Because emotion theories predict that an emotion's experiential component will converge with physiological and behavioral components, the pattern strongly suggests that the self-report measures capture emotional experience. Finally, the results show that self-reported interest was coherently predicted by appraisals at the within-person level. Thus, one would have to assume that variance in an individual person's uncertain or evasive use of *interest* was strongly predicted by rating the picture as disturbing, complex, and understandable.

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