

## Emotional Responses to Art: From Collation and Arousal to Cognition and Emotion

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### **Article:**

Emotions and art are intimately related (Tan, 2000). From ancient to modern times, theories of aesthetics have emphasized the role of art in evoking, shaping, and modifying human feelings. The experimental study of preferences, evaluations, and feelings related to art has a long history in psychology. Aesthetics is one of the oldest areas of psychological research, dating to Fechner's (1876) landmark work. Psychology has had a steady interest in aesthetic problems since then, but art has never received as much attention as one would expect (see Berlyne, 1971a; Tan, 2000; Valentine, 1962). The study of art and the study of emotions, as areas of scientific inquiry, both languished during much of the last century. It is not surprising that the behavioral emphasis on observable action over inner experience would lead to a neglect of research on aesthetics. In an interesting coincidence, both art and emotion resurfaced in psychology at about the same time. As emotion psychologists began developing theories of basic emotions (Ekman & Friesen, 1971; Izard, 1971; Tomkins, 1962), experimental psychologists began tackling hedonic qualities of art (Berlyne, 1971a, 1972, 1974). Since then, the psychology of emotion and the psychology of art have had little contact (see Silvia, in press-b; Tan, 2000).

A landmark in the modern study of emotional responses to art is Daniel Berlyne's (1971a, 1974) development of the "new experimental aesthetics." This tradition, which still pervades contemporary research on art, emphasized controlled laboratory research involving advanced behavioral-science methods. I begin with a historical overview of Berlyne and the new experimental aesthetics, with an emphasis on how his theory explained emotional responses to art. This review discusses the innovative features of Berlyne's work, examines the theoretical assumptions that motivated the behavior-theory approach to aesthetics, and considers the limitations of this research for explaining emotions and art.

I then turn to modern theories of emotions, particularly appraisal theories of emotion (Lazarus, 1991; Roseman & Smith, 2001; Scherer, 2001a). To modern researchers, it is clear that the psychology of emotions is a good starting point for exploring emotional responses to art. After seeing what appraisal theories can say about emotional responses to art, I review recent experiments that tested appraisal predictions about interest in poetry and visual art (Silvia, 2005a, 2005b). I cannot hope to address or resolve all of the rich issues that follow from intersecting appraisal theories with the study of art. Instead, my goal is to demonstrate the fruitfulness of modern emotion theories for classic aesthetic problems, thus, perhaps, stimulating a "new" new experimental aesthetics.

### *Daniel Berlyne and the New Experimental Aesthetics*

Berlyne's approach to the psychology of art, labeled "the new experimental aesthetics" (Berlyne, 1974), was an extension of his earlier theories of curiosity and exploration (Berlyne, 1960, 1967). Berlyne's theory of curiosity is better thought of as a series of theories, for Berlyne modified his theory's presumed mechanisms as psychobiological research clarified the neurological systems involved in perception, arousal, and reward (see Silvia, 2006, chap. 2). Some features, however, remained constant in his work, particularly (a) an emphasis on a

class of stimulus features known as “collative variables” (Berlyne, 1960, chap. 2) and (b) an emphasis on arousal as a mechanism of reward and preference.

The class of collative variables consisted of stimulus factors such as complexity, novelty, uncertainty, and conflict. In an innovative analysis, Berlyne (1960) proposed that these seemingly different features had two core similarities. First, each involved comparing pieces of information, such as incoming information with expected information (e.g., novelty or uncertainty) or different informational elements within a stimulus field (e.g., conflict or complexity). As Berlyne (1971a, p. 69) described it, “the word ‘collative’ ... adverts to the fact that, in order to decide how novel, surprising, complex, and so on, a pattern is, one must compare or collate information from two or more sources.” Second, each collative variable has the quality of arousal potential, the ability to affect the intensity of arousal. Thus, stimuli high in complexity, novelty, uncertainty, and conflict can increase arousal, although they will not necessarily do so.

The hedonic qualities of stimuli, artistic or otherwise, were traced to changes in arousal. Berlyne's (1960) theorizing is clearly rooted in the post-Hullian developments in motivation psychology that surrounded his work (see Bolles, 1967). Berlyne did not commit to a strong Hullian model of drive, in which drive reduction is the sole source of reward (e.g., Hull, 1952). He did, however, embrace the conceptual lexicon of the Hullian tradition, especially the assumption that reward involves the reduction of activated states (be they “arousal” or “drive”) toward a preferred state (Cupchik, 1988). In his early model, Berlyne (1960) assumed that people preferred states of low arousal, but—in an intriguing twist—he asserted that low arousal came from moderate levels of arousal potential. Thus, stimuli with low and high levels of complexity, novelty, uncertainty, and conflict caused high levels of arousal (see Silvia, 2006, chap. 2). As clever as this model was, it fared poorly as research cast doubt on the existence of a single system of arousal and reward (see Berlyne, 1967).

By the time of his psychobiological model of aesthetics, Berlyne (1967, 1971a) assumed that the hedonic qualities of art came from separate biological systems of reward. The first system—the primary reward system—generated positive affect whenever arousal potential increased. This system's activation increased as arousal potential increased, eventually leveling off at a high level. As a result, things became more appealing as complexity, novelty, and so forth increased. The second system—the primary aversion system—generated negative affect whenever arousal potential increased. This system's activation also increased as arousal potential increased, but it had a higher absolute activation threshold than the primary reward system. Thus, the primary reward system “kicked in” before the primary aversion system. The joint operation of these two systems created an inverted-U curve. Stimuli move from neutral to positive as arousal potential goes up, but they shift from positive to negative after arousal potential passes an optimal tipping point. 1

Lest these psychobiological ideas seem detached from the study of emotions and art, it is worth noting that a strength of Berlyne's theorizing was his emphasis on continuities between the experience of art and the experience of artlessness. The psychological dynamics of reward were presumed to be the same for both. This assumption mainstreamed the psychology of art and enabled the tools of hard-nosed behavioral inquiry to be applied to aesthetic problems. Nevertheless, the new experimental aesthetics was an unlikely revolution. Even in hindsight, it is surprising that art resurfaced in mainstream research through a behaviorist tradition that eschewed cognitive and emotional constructs (Berlyne, 1975; Konečni, 1996).

### **The New Experimental Aesthetics**

Berlyne used these two classes of concepts—the collative variables and the arousal model of reward—to make predictions about emotional responses to art. He assumed that the collative variables were embodied in structural features of art. Paintings, music, literature, and films could be described as varying in complexity, novelty, uncertainty, and conflict, particularly when these variables are viewed as representing abstract qualities of information (Berlyne, 1957). A tradition of information-theory models of aesthetics (e.g., Moles, 1966) lent weight to this supposition. If art can be understood in terms of objective stimulus features such as complexity and novelty, then emotional responses to art can be explained with reference to the broader hedonic effects of complexity and novelty. Berlyne (1971a, p. 176) asserted that “the stimulus properties that apparently govern

aesthetic appreciation consist essentially of those that constitute what we have called ‘arousal potential.’” As a result, preferences for art can be framed in terms of how collative properties of art affect the arousal systems of reward.

As an example of Berlyne's specific predictions, preferences for art should follow an inverted-U pattern. Manipulating many levels of complexity—such as by creating random polygons with different numbers of sides—should yield a quadratic effect on preference. The highly simple and highly complex polygons should be the least appealing, whereas the moderately complex polygons should be the most appealing. Furthermore, this relationship should be general across kinds of art. If complexity is an abstract, structural feature of art, then the quadratic effect of complexity on preference should be evident for visual art, music, film, poetry, literature, and any other aesthetic context that can be characterized on a simple-complex dimension.

The new experimental aesthetics was clearly fertile. The two primary books (Berlyne, 1971a, 1974) are rich with experimental research that catalyzed a new interest in psychology and art. Within a few years, the effects of the collative variables on the hedonic qualities of art had been tested with randomly generated polygons, patterns, musical melodies, and film clips (Evans & Day, 1971; Hare, 1974; Normore, 1974); with authentic visual art (Berlyne & Ogilvie, 1974; Cupchik, 1974); with samples of adults and children (Bragg & Crozier, 1974); with cross-cultural designs comparing Canadian, Indian, and Ugandan participants (Berlyne, 1976; Berlyne, Robbins, & Thompson, 1974); and with comparisons of untrained participants and experts trained in visual and musical arts (Crozier, 1974; Hare, 1974). These studies measured a broad range of variables, including semantic differential ratings, time spent viewing or listening to something, choices between two art objects, physiological measures of “arousal” (typically skin conductance; Evans & Day, 1971), and factor scores formed from condensing large sets of subjective responses.

An unexpected finding that emerged in early research was the difference between ratings of interest and ratings of preference (also referred to as pleasingness). Preference judgments often followed a nonlinear function, whereas interest was typically a linear function of the collative variables. Interest was thus anomalous for the model, because the interaction of the three reward systems was expected to create inverted-U functions. This was an early clue that emotional responses to art were more differentiated than simply “positive” or “rewarding.” Many researchers up to the present day have found this effect (e.g., Ellsworth & Smith, 1988; Silvia, 2005b), about which I have more to say later.

### **The New Experimental Aesthetics in Hindsight**

Berlyne's (1971a) approach to experimental aesthetics left an enormous mark on later research. As time has past, it has been easier to gain perspective on Berlyne and his work (see Cupchik, 1988; Konečni, 1996). Applying the tough-minded methods of behavioral research to aesthetic problems accelerated the growth of knowledge about psychological aspects of art and brought aesthetic problems into the mainstream of psychology. At the same time, certain elements of Berlyne's thinking inhibited research directions that would have proven fruitful. Cupchik (1988) pointed out that Berlyne's antipathy toward the emergence of cognitive psychology (see especially Berlyne, 1975) closed the door to studying how thoughts and emotions interact in aesthetic contexts. Elsewhere (Silvia, 2006, chap. 2) I have reviewed the growth of Berlyne's (1960, 1978) thinking about arousal and reward, particularly his reluctance to abandon a model of reward founded on shifts in arousal despite the changing tides of motivational psychology.

Were Berlyne alive today, he probably would not be an arousal theorist. The concept of “general arousal” has faded into history. It is now widely known that markers of “arousal” are essentially decoupled (see Neiss, 1988). For example, it is common to find decoupling within different “arousal” measures (such as electrodermal and cardiovascular responses) and even within the same system (such as low correlations among heart rate, systolic blood pressure, and diastolic blood pressure; e.g., Gendolla & Krüsken, 2001). For these and other reasons, many researchers have closed the books on arousal as a legitimate, explanatory construct (Neiss, 1988). This is one reason why some theoretical debates—such as conflicts between Berlyne's arousal model and a

prototype model (e.g., Boselie, 1991; Martindale, Moore, & Borkum, 1990; North & Hargreaves, 2000)—are unproductive; the psychobiological assumptions of Berlyne's arousal model are known to be wrong. Berlyne's arousal explanations have faded, but the fact remains that many experiments have revealed effects of novelty, complexity, and uncertainty on feelings of interest and enjoyment. If the collative variables do not affect preference by virtue of their effects on arousal, how do they affect aesthetic preferences? This leaves the psychology of art with orphaned data in need of a new theory. In the following sections, I propose some new ways of thinking about past research that also open doors for future research. Emotion psychology has developed into a powerful and integrative approach to many psychological topics; below I explore its fruitfulness for understanding emotional responses to art.

### *Cognitive Appraisals and Emotional Experience*

Modern emotion psychology can offer much to the study of aesthetics. Emotion psychology emerged, in part, from the recognition that emotions are not merely states of high arousal (e.g., Duffy, 1934). Instead, emotions are evolved, pancultural psychological mechanisms for dealing with “fundamental life tasks” (Ekman, 1992). Modern theories offer sophisticated models of the nature, functions, and processes of emotion. There are many theories of what emotions are and where they come from (see Silvia & Warburton, 2006). In recent years, appraisal theories of emotion have emerged as a leading perspective on emotions (Ellsworth & Scherer, 2003; Lazarus, 1991; Roseman, 2001; Scherer, 2001a). Appraisal theories have a long history, dating to early research on stress and coping (Schorr, 2001), and, at least according to appraisal theorists, “there is, at present, no viable alternative to an appraisal (in the broad sense of the word) explanation for the general prediction of the elicitation and differentiation of emotions” (Scherer, 2001b, pp. 389–390).

### **Appraisals of Events**

The central assumption of all appraisal theories is that evaluations of events, not events themselves, are the local cause of emotional experience (Roseman & Smith, 2001). This assumption firmly establishes appraisal theories within a subjective, contextual approach to understanding emotions. It may seem needlessly extreme to assume that events do not cause emotions, but it is easy to demonstrate that emotions arise from subjective appraisals of events (Roseman & Evdokas, 2004). In fact, it is hard to explain interperson and intraperson variability in emotional experience by referring to objective features of events. In any situation, different people will respond with different emotions. And, in similar situations, the same person will have different emotions at different times. This situation is familiar to researchers in experimental aesthetics, given the wide variability in emotional responses to art. Thus, it soon seems self-evident that objective events are poor explanations of emotions.

A subtler reason why events do not cause emotions concerns the diversity of events that cause the same emotion (Roseman & Smith, 2001). For any given person, a vast set of events can lead to the same emotion. For example, someone might be happy on (a) hearing that a friend just had a baby, (b) listening to a new song by a favorite composer, (c) having a good dinner with old friends, (d) finding a new shortcut for the morning commute, (e) having a paper accepted for publication, and (f) imagining hypothetical triumphs over his or her nefarious foes. What objective, surface features do these events have in common? (Indeed, what are the “objective features” of fictional, fantastical events?) Appraisal theories, in contrast, easily handle these problems because the underlying subjective judgments—in this case, appraising an event as congruent with a goal and as likely to continue (Lazarus, 2001)—are the same in each situation. Different events will create the same emotions if the person appraises each event similarly. As before, the subjective psychological structure of an event is what is critical to emotions.

### **Differentiation of Emotions**

A second assumption of appraisal theories is that emotions can be differentiated according to the evaluations that cause them (Roseman & Smith, 2001). This simply means that different emotions are brought about by different groups of evaluations, known as appraisal structures. Each emotion has a distinct appraisal structure composed of a set of appraisal components. Common appraisal components include appraising something as being unexpected, relevant to a goal, controllable or uncontrollable, inconsistent with personal standards, and one's own or another person's fault (see Roseman, 2001; Scherer, 2001a; Smith & Ellsworth, 1985; Weiner,

1986). The appraisal structure of anger, for example, consists of (a) appraising an event as incongruent with a goal or motive, (b) appraising an agent (typically another person) as blameworthy for the event, and (c) appraising one's potential to cope with the event as high, such as through self-assertion or aggression (see Kuppens, Van Mechelen, Smits, & De Boeck, 2003).

Some emotions have small, simple appraisal structures. The emotion of interest, for example, has two appraisals: an appraisal of something as new, unexpected, or complex and an appraisal of one's ability to comprehend the new, complex thing (Silvia, 2005a, 2005b, 2006). Other emotions have complex appraisal structures. The appraisal structure of shame, for instance, involves appraising an event as (a) relevant, (b) caused by the self, (c) urgent, (d) involving bad outcomes, (e) committed through negligence, and (f) inconsistent with one's personal standards (see Scherer, 2001a). Similar emotions can be grouped into families according to their similar appraisal structures (Ellsworth & Scherer, 2003). For example, the emotions in the “hostility triad”—anger, disgust, and contempt (Izard, 1977)—have several appraisal components in common.

### **Some Quick Contrasts**

This brief overview of appraisal theories has already highlighted some unique ideas relative to the new experimental aesthetics. First, we see contrasts with Berlyne's emphasis on objective stimulus features, such as objective complexity and novelty, as causes of aesthetic responses. Appraisal theories would recast this by contending that an “objectively complex” object will affect aesthetic responses only inasmuch as a person subjectively appraises the object as “complex.” The person's subjective appraisals mediate between emotions and the outer world. Second, emotional responses to art are traced to the unfolding of a set of cognitive appraisals, not to the operation of psychobiological reward and punishment systems (Berlyne, 1971a). A variable's “collative properties” are not enough, according to appraisal theories, to create an emotion. A series of subjective evaluations is required.

Finally, many emotions are of interest in the appraisal approach. The Berlyne tradition restricted itself to enjoyment, interest, and aversion. This small class of affective responses follows from the model of motivation underlying the research. In arousal and drive models, motivational outcomes were “rewarding” or “aversive” (Berlyne, 1967). This leaves only simple positive and negative states as possible subjective reactions. In contrast, appraisal theories focus on a wide range of emotions such as happiness, interest, surprise, awe, anger, fear, sadness, shame, guilt, disgust, contempt, and embarrassment (Ellsworth & Scherer, 2003). The psychology of art has had little to say about most of these emotions, despite their apparent relevance to the experience of art, largely because of the assumptions of the collation-and-arousal model.

### ***Evidence for Appraisals and Interest in Art***

It is one thing to show that appraisal theories of emotions can say much about aesthetic problems; it is quite another to develop testable hypotheses that demonstrate the fruitfulness of an appraisal approach. This section reviews new research rooted in appraisal theories on emotional responses to art. This research examined appraisals of interest (Silvia, 2006), the emotion associated with exploration, intrinsic motivation, curiosity, and learning (Fredrickson, 1998; Hidi, 1990, 2001; Krapp, 1999; Sansone & Smith, 2000; Silvia, 2001, 2005b; Tomkins, 1962). It is the prototypical emotion in a class of “epistemology-related” emotions (Ellsworth, 2003; Keltner & Haidt, 2003; Keltner & Shiota, 2003). Interest is an important emotion in the psychology of art. The Berlyne (1971a, 1974) tradition has extensively researched interest in response to art, and Tan (2000) proposed that interest is the emotion most central to aesthetic experience. Of all of the emotions, then, interest seems like a good one with which to explore the usefulness of an appraisal approach to emotional aspects of aesthetics.

The central assumption of an appraisal approach, as noted earlier, is that emotions arise from subjective appraisals of events. In the case of interest resulting from art, appraisal theories predict that people will experience interest when they make the appraisals that generate interest. This naturally raises the question of interest's appraisal structure. Past theories and recent research (Ellsworth & Smith, 1988; Silvia, 2005) have shown that interest's appraisal structure consists of two primary components. The first is a novelty check (Scherer, 2001a), which refers to a class of disruptive variables that cause a sense of dysfluent processing

(Silvia, 2005b). Appraising something as new, unfamiliar, uncertain, complex, inconsistent, inchoate, and mysterious typifies this first appraisal. The similarity to Berlyne's (1960) class of "collative variables" is apparent (see Silvia, 2006, chap. 2). The second appraisal is a coping-potential check (Scherer, 2001a), which refers to an appraised ability to understand the new, unfamiliar, complex thing identified by the first appraisal. A coping-potential check, unlike the novelty check, has no equivalent in the Berlyne tradition. This appraisal is explicitly subjective and metacognitive, because it refers to judgments regarding comprehension, understanding, and meaningfulness (cf. Leder, Belke, Oeberst, & Augustin, 2004; Russell, 2003). Thus, the contrasts between an appraisal approach and a collation-arousal approach should be more obvious.

### **Basic Tests of the Appraisal Model of Interest in Art**

Four experiments have tested how these two appraisals jointly affect interest in art (Silvia, 2005b). The first study assessed interest in randomly generated polygons, a venerable staple of experimental aesthetics research. Coping potential was operationalized with individual differences. People completed a brief scale that assessed their ability to understand complex art, and then they viewed random polygons that ranged from simple (4 sides) to complex (160 sides). People were asked to select the "most interesting" polygon. Appraisals of ability to understand significantly predicted the complexity of the most interesting polygon. As people felt more able to understand complex art, they selected highly complex polygons as being the most interesting. A second group of participants was asked to select the "most enjoyable" polygon. Appraisals of ability to understand predicted the level of complexity that people found interesting but not the level that people found enjoyable. This is consistent with past research on differences between interest and enjoyment (cf. Ellsworth & Smith, 1988; Russell, 1994; Russell & George, 1990; Russell & Gray, 1991; Silvia, 2006, chap. 1), and it supports the appraisal model's assumption that each emotion has a distinct appraisal structure.

A second study examined interest in postmodern poetry. People were asked to read a poem by Scott MacLeod, a modern writer of experimental language art. The poem, titled "The Whitest Parts of the Body" (MacLeod, 1999), is abstract, complex, and obscure. For example, the poem's first stanza reads "such daring against men / with a throat so big / separated by a hundred years / full of misfortune: the bloody / flux. taken by a fit of madness / prone to eating human flesh / and measured, in due course, / by naturalists." The final stanza reads "it carries out terrible ravages / lost, and usually permanently / lost, among whom, wringing her hands / and crying out / to heaven, / was the girl's mother." In a control condition, people read the poem, appraised their ability to understand it, and reported their feelings of interest. In a high-ability condition, people received information that unlocked the poem's meaning. They were told that the poem comes from a book of poems about killer sharks. As expected, people in the high-ability group found the poem more interesting than did people in the control group. Mediation analyses showed that appraisals of ability to understand fully mediated the effects of the manipulation on interest. The extra information about the poem's meaning increased perceived ability to understand the poem; understanding, in turn, increased interest. This experiment thus shows a causal effect of appraised coping potential on interest in poetry.

A third experiment extended the appraisal model to visual art. Participants viewed pictures taken from books and journals of modern "visual poetry"; the styles included concrete poetry, asemic writing, automatic art, and typographic art (e.g., Harris, 2001; Huth, 1990; Morin, 2003; Selby, 2003; Topel, 2002). Half of the pictures were fairly simple, and half were fairly complex (based on pretesting). For each picture, people gave ratings of interest and ability to understand the picture. As expected, interest depended on both complexity and coping potential. For simple pictures, ratings of ability to understand were unrelated to interest. For complex pictures, however, ability strongly predicted interest: Interest increased as appraised ability increased. The relationships between appraisals and interest were unaffected when possible "third-variable" confounds (trait curiosity and positive affectivity) were controlled statistically.

A fourth experiment showed that appraisals predicted behavioral expressions of interest. In this experiment viewing time, a measure popularized by Berlyne (1971a, 1974), was used to measure interest. People viewed random polygons, ranging from simple to complex, on a computer screen. Their appraised ability to understand complex art had been measured earlier in the semester. People could view each polygon for as long as they

wished; when the image became boring, they could press a key to move to the next image. Appraisals of ability interacted with the polygons' complexity to predict viewing times. People spent the most time viewing an image when the image was highly complex and they felt able to understand complex art; the pattern is displayed in Figure 1. This supports the appraisal model's predictions with behavioral data, thus extending the past studies beyond self-reports of interest.

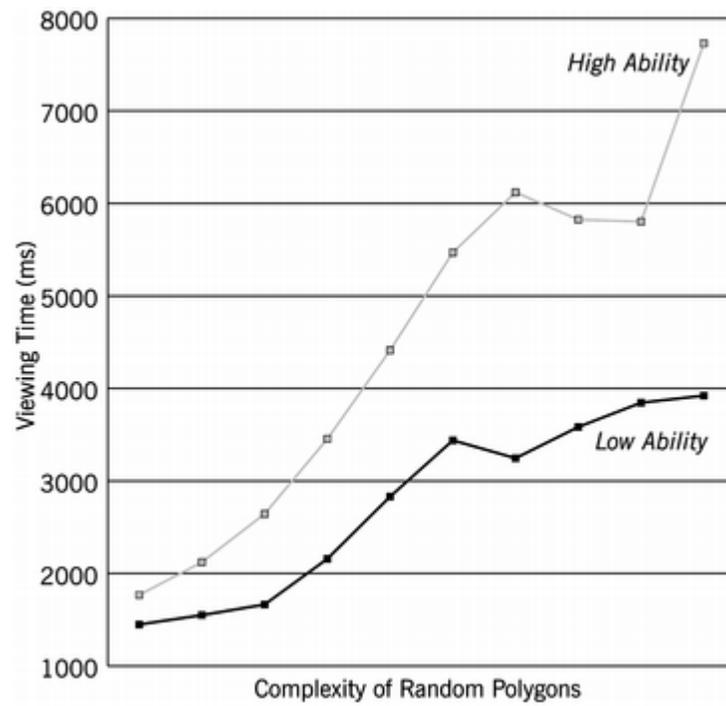


Figure 1. Effects of appraised ability to understand on time spent viewing random polygons (in milliseconds) that varied in complexity (Silvia, 2005b , Experiment 4). People spent the most time viewing a polygon when (a) the polygon was highly complex and (b) they felt able to understand complex art

### **Within-Person Relationships of Appraisals and Interest in Art**

Another experiment extended this research by examining within-person relationships between appraisals and interest (Silvia, 2005a). Between-person effects show relationships between appraisals and interest within the sample as whole. Strictly speaking, though, appraisals should predict interest at the within-person level (Scherer, 2001a). Between-person and within-person effects are mathematically distinct, and conventional between-person analyses need not replicate at the within-person level (see Nezlek, 2001). In this study, people viewed more than 30 pictures of abstract visual poetry. They rated each image for interest and for appraisals of complexity and of ability to understand the image. The large numbers of responses for each participant enabled an analysis of within-person correlations.

Using multilevel random-coefficient modeling (Hox, 2002; Luke, 2004), I estimated the within-person covariance of appraisals and interest. Both appraisals strongly and significantly predicted interest, thus providing a within-person confirmation of the appraisal predictions. Figure 2 shows how the two appraisals predicted interest. This histogram depicts the distributions of unstandardized regression coefficients for complexity and ability to understand. It shows that, for each person in the sample, these appraisals positively predicted interest. It also shows that these within-person relationships differed between people. Although complexity and coping potential positively predicted interest for everyone, they did so more strongly for some people than for others. Exploring why appraisal-emotion relationships differ between people is an intriguing, cutting-edge area of appraisal research (see Kuppens et al., 2003).

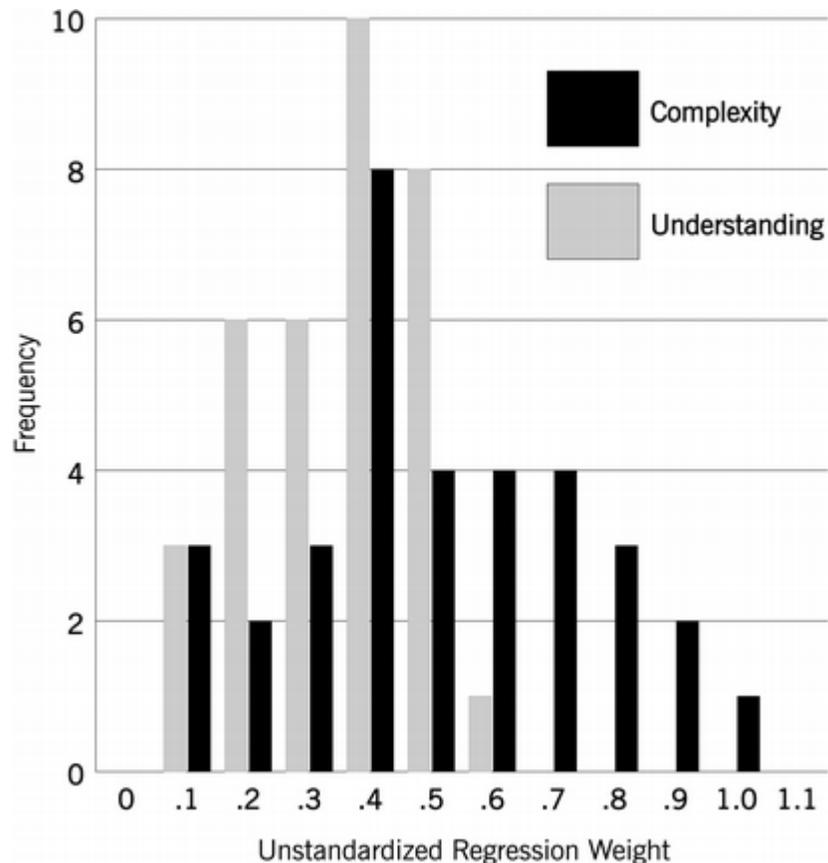


Figure 2. Histograms of within-person relationships between appraisals and interest. The x-axis displays the size of within-person unstandardized regression coefficients that estimate the effects of appraisals on interest. Thus, for the entire sample, appraisals of complexity and appraisals of ability to understand had uniformly positive relationships with interest. Moreover, the range of effects was greater for appraisals of ability to understand

### The Appraisal Basis of Expertise

A final experiment (Silvia, in press) applied the appraisal model to the study of artistic expertise. Many studies have revealed expert-novice differences in emotional responses to art (e.g., Hekkert & van Wieringen, 1996a, 1996b; Millis, 2001). A typical finding in this area is that people with experience in art prefer works higher in complexity than do people without expertise in art (Hare, 1974; Walker, 1980). This finding challenges arousal models. One needs to assume that the thresholds relating arousal and reward differ between experts and novices or that complex stimuli are more or less arousing to experts. An appraisal position, in contrast, easily explains this effect. Appraisal theories, not surprisingly, trace group differences in emotional responses to differences in appraisals (Roseman & Smith, 2001; van Reekum & Scherer, 1997). If people with training in art find some kinds of art more interesting, then it must be because they are more likely to appraise the art in ways that generate interest. Knowledge about art will affect the emotional experience of art.

An experiment (Silvia, in press) tested the appraisal explanation for why artistic training affects interest. It seems straightforward that training increases appraisals of coping potential, the evaluation of one's resources and abilities for understanding what is presented. This is, after all, the purpose of learning about the history and theory of art. Given their higher appraised ability to understand, experts should find the art more interesting. Students with extensive art training or with no training viewed simple and complex paintings. For each painting, they gave ratings of interest and of appraisals. Figure 3 (top panel) shows the effects of expertise on interest. As expected, art experts and novices differed in how interesting they found the complex visual art but not in how interesting they found the simple visual art. Additional analyses examined whether these group differences were due to appraisals. The two groups did not differ in how complex they found the art. As in past research (see

Crozier, 1974), there was high agreement on appraised complexity. However, the groups differed in their appraised ability to understand the visual art. Figure 3 (bottom panel) shows how expertise affected appraisals of ability to understand. As expected, people with artistic training felt more able to understand the visual art, and this difference in understanding corresponded with differences in interest. This is an example of how the appraisal perspective can make new predictions.

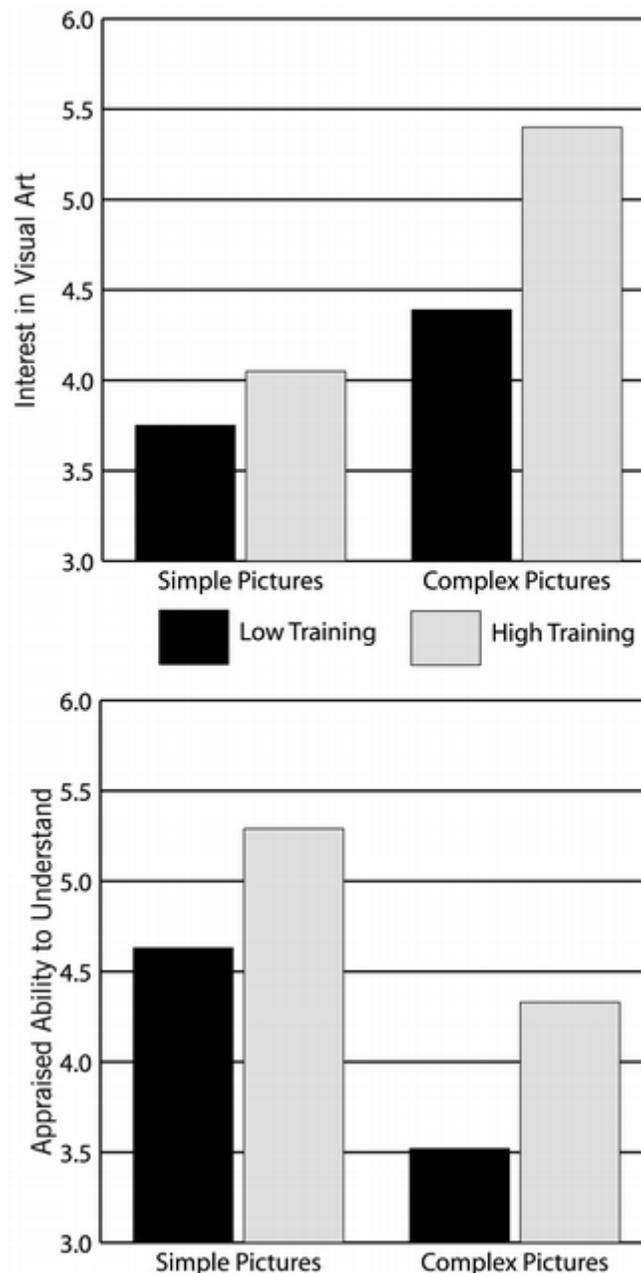


Figure 3. Effects of artistic expertise on interest in simple and complex visual art (top) and on appraised ability to understand the images (bottom)

### Revisioning Past Research on Experimental Aesthetics

Thinking about emotional responses to art in terms of appraisals recasts some past research in experimental aesthetics. Though not explicitly motivated by appraisal theories, many past experiments demonstrate the value of an appraisal approach. One example is the small body of work on how titles influence the experience of art. Russell and Milne (1997) reasoned that people enjoy art more when they grasp its meaning. In one experiment, they presented reproductions of paintings accompanied by their real titles, accompanied by fake titles, or without titles. People judged the paintings as more meaningful when they read the real titles relative to fake

titles and no titles. Furthermore, the real titles marginally increased enjoyment and interest in the paintings. In later experiments, Russell (2003) compared the effects of titles and detailed descriptions of paintings. People who read a paragraph describing the artist's work and its relevance for the painting found the painting more meaningful and enjoyable than did people who received no information. Millis (2001) found that titles had the largest effect on enjoyment when they fostered an elaborated, coherent representation of the painting; titles that simply described the painting's central objects and activities had no effect.

These experiments offer converging support for an appraisal model. People judged paintings as easier to understand when they could read the paintings' titles and descriptions. As a result, people found the paintings more enjoyable and interesting. These studies clearly parallel the experiments described earlier, in which appraisals of one's ability to understand art made art more interesting (Silvia, 2005a, 2005b). Moreover, their manipulations provide additional experimental support for a largely correlational literature. At the same time, the appraisal model connects this seemingly isolated body of work to broader theoretical problems in the study of aesthetics. These studies, which examined a specific, isolated problem (how titles affect responses to art), can be brought under a broader theoretical umbrella. This foreshadows the potential for an appraisal approach to integrate disparate pockets of research in experimental aesthetics.

### *Some Implications of Appraisal Theories for Emotional Responses to Art*

So far, I have reviewed the basic assumptions of appraisal theories and considered how they can make new predictions about interest in art. This section explores some of the more salient implications of an appraisal model for understanding emotional responses to art.

#### **Rethinking “Aesthetic Response”: Interest, Enjoyment, and Distinct Emotions**

A central claim of appraisal theories is that there are many distinct emotions (Lazarus, 1991; Roseman, 2001; Scherer, 2001a). These emotions have different appraisal structures, different functions, and usually different expressive and biological signatures. It is impractical, from an appraisal perspective, to speak of global, undifferentiated emotional concepts. Emotional concepts within the Berlyne tradition, however, have emphasized generic affective terms, such as preference, reward value, aesthetic response, hedonic response, and affective response. These terms are too ambiguous given the different causes and effects of distinct emotions. Does a painting that has “negative hedonic value” make someone sad? Anxious? Disgusted or angry? Finding art disgusting is clearly different from finding art saddening. It is unproductive to lump different emotions, each with distinct causes and consequences, under an umbrella emotional term.

The study of interest and enjoyment shows the perils of ignoring differences between discrete emotional states. Research conducted by Russell (1994; Russell & George, 1990; Russell & Gray, 1991) shows that ratings of interest diverge from ratings of enjoyment and that generic measures of preference mask these differences. Many other studies have shown that the collative variables have different effects on interest and enjoyment (e.g., Berlyne & Crozier, 1971; Crozier, 1974; Cupchik & Gebotys, 1990) and that interest and enjoyment factors are composed of different markers (Evans & Day, 1971). The large literature documenting differences between interest and enjoyment (see Silvia, 2006, chap. 1) cautions against a simple view of positive affective responses to art. Interest and enjoyment have different appraisal structures (Ellsworth & Smith, 1988), different effects on viewing time and exploratory choice (Crozier, 1974; Evans & Day, 1971), and different functions as emotions (Izard, 1977; Tomkins, 1962). General concepts of preference and reward are too vague to account for the discrete effects of discrete emotions; appraisal theories can predict and explain these differences between similar emotions.

#### **Prototypicality as a Theory of Aesthetic Preference**

Although dominant, Berlyne's collative model is not the only prominent theory of emotional responses to art. A prototypicality model of aesthetic preference (Martindale et al., 1990) is currently the major alternative to Berlyne's collative theory. This model proposes that preference for a work of art is determined by the perceived typicality of the work, not by the work's collative features. This seems to be part of a broader “prototype preference” effect; people also prefer typical faces, animals, and objects (Halberstadt & Rhodes, 2000; Rhodes

& Halberstadt, 2003). Several controversial experiments have compared typicality against complexity and novelty (e.g., Martindale et al., 1990; Martindale, Moore, & West, 1988; Whitfield, 1983) with the goal of determining which variables better explain aesthetic preference (see discussions by Boselie, 1991; Hekkert, Snelders, & van Wieringen, 2003; Konečni, 1996; North & Hargreaves, 2000).

The conflict between a prototypicality model and Berlyne's arousal model seems unproductive. First, the arousal model is no longer viable, so it is unnecessary to pit other theories against it. Second, the prototype model shares many of the arousal model's limitations. Like arousal, typicality is said to affect diffuse affective responses such as preference, not specific emotions. It is hard for this theory to make predictions about specific positive emotions (enjoyment or interest) and even harder for it to make predictions about specific negative emotions. One might agree that high typicality creates a positive emotional response yet still wonder what negative emotional response is caused by low typicality. As discussed earlier, a theory of emotional responses to art should have something to say about when people become angry, sad, disgusted, and anxious in response to art. The prototypicality model, by focusing solely on a single factor that modifies general preferences, seems unable to account for differentiated emotional responses. 3

An appraisal approach can inform and reinterpret the prototype model. The prototype model resembles an appraisal model in one fundamental respect: Both explain emotional responses in terms of cognitive evaluations of objects. Appraisal theories, however, would contend that more appraisals than one (i.e., typicality) are involved, and they would recast typicality in terms of other appraisals. For instance, in Scherer's (2001a) appraisal model, a novelty check is one of the first appraisals. This appraisal involves evaluating an event's novelty, familiarity, and expectedness. Typical objects are low in novelty and high in familiarity, in that they represent the central tendency of a category (see Hekkert et al., 2003). In Lazarus's (2001) model, happiness results from evaluating an event as consistent with a goal and likely to persist; familiar objects and events tend to create happiness because they are judged as safe and benign. Moreover, appraising an object as comprehensible affects positive emotions (Russell, 2003; Silvia, 2005b). In light of this finding, it is noteworthy that prototypicality research often assesses typicality with measures of "meaningfulness" that map onto comprehensibility (see Martindale et al., 1990).

An appraisal model would thus agree that perceptions of typicality influence emotional responses to art. At the same time, an appraisal model would view this as a special case of appraisal processes, specifically appraisals related to familiarity and ability to understand. Recasting typicality effects in terms of appraisals connects typicality research to a broader literature on how cognitive processes affect emotions, circumscribes the effects that could be expected from variations in typicality, and, potentially, makes new predictions about when typicality will affect different kinds of emotions.

### **Reconsidering the Inverted U**

A theme throughout research in experimental aesthetics is the venerable inverted-U curve relating stimulus intensity to hedonic response (Berlyne, 1960, 1971a; Walker, 1980, 1981). An appraisal approach implies that the inverted-U function should be laid to rest, for several reasons. First, the effects of events on emotions do not stem from objective qualities of the events but from subjective interpretations of the events. As a result, it is misleading to assert a general law of stimulus intensity and emotional response that is independent of the subjective meaning of the stimulus. Second, the inverted-U pattern refers to a relation between global stimulus intensity and global affect. From an appraisal position, neither variable should be viewed globally. Stimuli are relevant only inasmuch as people make specific interpretations of their significance. Conflating separate appraisals (such as novelty and coping potential) is counterproductive. Likewise, affect is rarely global but is instead differentiated into specific emotions (Ellsworth & Scherer, 2003). There is little reason to think that all emotional responses to art—disgust, anger, sadness, awe, interest, and enjoyment—follow an inverted-U curve. Indeed, research routinely shows that interest and enjoyment follow different curves (see Silvia, 2006, chap. 1).

Finally, the inverted-U curve was never more than a description of an empirical relationship, and it has been an elusive description at that (Walker, 1981). Regardless of how well an inverted-U curve describes relations

between events and emotions, appraisal theories explain these relationships. Clearly, it is more productive to study a theory that makes new predictions than to persevere on a descriptive model that often fails to fit the data. Appraisal theories thus suggest that the inverted-U framework deserves an honorable discharge. Is “Arousal” Irrelevant?

Although Berlyne (1960, 1967, 1978) changed his ideas on the psychobiology of curiosity, he retained arousal as a mediator between the collative variables and the ensuing response (see Silvia, 2006, chap. 2). The role of arousal, however, became less certain as time passed, and modern research on interest assigns no role to arousal (Silvia, 2006). Berlyne himself considered the possibility that the collative variables could directly affect responses. In response to controversy over “whether there is sufficient evidence for the claim that the collative stimulus properties produce their motivational effects through changes in arousal,” Berlyne (1971b, p. 192) noted:

I have used the term “arousal potential” to refer conveniently to a sizable collection of stimulus properties that seem to have a number of effects in common. But the term is defined strictly in terms of these stimulus properties, which means that statements about effects of the variables that make up arousal potential can stand or fall independently of any hypothesis about the role of arousal.

After reviewing research that suggested a role for arousal, Berlyne conceded that “one must certainly admit that the question is still open and that arousal is not by any means implicated by a watertight chain of argument” (p. 193).

Arguments over arousal persist in modern experimental-aesthetics research. Research rooted in the Berlyne tradition continues to make predictions based on the psychobiological model, and this has resulted in conflicts with models that eschew arousal (e.g., Boselie, 1991; Martindale et al., 1990; North & Hargreaves, 2000). It seems time to close the question about arousal that was open in Berlyne's time. Arousal is no longer a fruitful, explanatory concept in psychology (Neiss, 1988). As a result, positing arousal as a mediating mechanism is unlikely to enhance modern theories of motivation and emotion. Furthermore, viewing “arousal potential” as an objective stimulus feature (Berlyne, 1960) conflicts with the subjectivity presumed by appraisal theories. Asserting that objective events cause emotions creates difficult problems, such as why people respond differently to the same event (Lazarus, 2001; Roseman & Smith, 2001). These problems arose in the new experimental aesthetics: If complexity is an objective feature of a painting, why do experts and novices assign different ratings of subjective complexity and have different emotional responses? In short, the psychology of art needs to update its mechanisms. The processes proposed by appraisal theories can account for the predictions made by arousal models and generate new ideas for future research.

### *Conclusion*

This article has provided a mix of history, summary, and advocacy. Its goal was to introduce the assumptions and predictions of appraisal theories to researchers interested in emotional responses to art. Berlyne's new experimental aesthetics, as fertile as it has been, has probably gone as far as it can go in explaining the central problems of emotion and art. Its assumptions about motivation (i.e., arousal and reward), emotion (i.e., emotions are high arousal states), and cognition (i.e., it is not important) are clearly anachronistic. Persevering on these ideas will make the psychology of art drift from the mainstream of psychological thought. The modern science of emotion has much to offer the study of aesthetics; it provides an expansive set of new ideas, hypotheses, and research directions. If pursued, appraisal theories could form the basis of a “new” new experimental aesthetics.

### *Footnotes*

1 As in his earlier theory, Berlyne (1971a) assumed that decreases in arousal were rewarding. This was enabled through the operation of a third system—the secondary reward system—that inhibited the primary aversion system. When arousal potential declines, this system inhibits the primary aversion system. This is experienced as pleasure, because the primary reward system is no longer antagonized by a coinciding aversion system.

2 A sequential model of appraisal, in which early appraisals provide inputs to others, is presumed in this model of interest and appraisal. Controversies over the sequential nature of appraisals have not yet been settled (see Roseman & Smith, 2001; Scherer, 2001a), but early research (Scherer, 1999) suggests it is reasonable to assume that some appraisals inform others.

3 The criticisms of the prototype model generally apply to a new theory of aesthetic response based on processing fluency (Reber, Schwartz, & Winkielman, 2004). This theory asserts that people find art beautiful when they find it easy to process. Prototypicality effects are seen as a special case of processing fluency, because typical objects are easier to process. Processing fluency does affect judgments of liking and beauty (e.g., Winkielman & Cacioppo, 2001), but it is hard to explain differentiated emotional responses (e.g., enjoyment, interest, anger, and sadness) with a single cognitive cause (variations in ease of processing). This model is thus restricted to diffuse positive judgments. Like the prototype model, the processing fluency model can be understood in terms of appraisals. Appraisals of familiarity and of coping potential (here referring to perceived ability to understand) are known to influence positive emotional reactions (Scherer, 2001a; Silvia, 2005b).

### *References*

- Berlyne, D. E. (1957). Uncertainty and conflict: A point of contact between information-theory and behavior-theory concepts. *Psychological Review*, 64, 329–339.
- Berlyne, D. E. (1960). *Conflict, arousal, and curiosity*. New York: McGraw-Hill.
- Berlyne, D. E. (1967). Arousal and reinforcement. In D. Levine (Ed.), *Nebraska symposium on motivation* (Vol. 15, (pp. 1–110)). Lincoln: University of Nebraska Press.
- Berlyne, D. E. (1971a). *Aesthetics and psychobiology*. New York: Appleton-Century-Crofts.
- Berlyne, D. E. (1971b). What next? Concluding summary. In H. I. Day, D. E. Berlyne, & D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education* (pp. 186–196). Toronto: Holt, Rinehart & Winston.
- Berlyne, D. E. (1972). Ends and means of experimental aesthetics. *Canadian Journal of Psychology*, 26, 303–325.
- Berlyne, D. E. (Ed.). (1974). *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation*. Washington, DC: Hemisphere.
- Berlyne, D. E. (1975). Behaviorism? Cognitive theory? Humanistic psychology? To Hull with them all. *Canadian Psychological Review*, 16, 69–80.
- Berlyne, D. E. (1976). Similarity and preference judgments of Indian and Canadian subjects exposed to Western paintings. *International Journal of Psychology*, 11, 43–55.
- Berlyne, D. E. (1978). Curiosity and learning. *Motivation and Emotion*, 2, 97–175.
- Berlyne, D. E., & Crozier, J. B. (1971). Effects of complexity and prechoice stimulation on exploratory choice. *Perception and Psychophysics*, 10, 242–246.
- Berlyne, D. E., & Ogilvie, J. C. (1974). Dimensions of perception of paintings. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 181–226). Washington, DC: Hemisphere.
- Berlyne, D. E., Robbins, M. C., & Thompson, R. (1974). A cross-cultural study of exploratory and verbal responses to visual patterns varying in complexity. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 259–278). Washington, DC: Hemisphere.
- Bolles, R. C. (1967). *Theory of motivation*. New York: Harper & Row.
- Boselie, F. (1991). Against prototypicality as a central concept in aesthetics. *Empirical Studies of the Arts*, 9, 65–73.
- Bragg, B. W. E., & Crozier, J. B. (1974). The development with age of verbal and exploratory responses to sound sequences varying in uncertainty level. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 91–108). Washington, DC: Hemisphere.
- Crozier, J. B. (1974). Verbal and exploratory responses to sound sequences varying in uncertainty level. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 27–90). Washington, DC: Hemisphere.

- Cupchik, G. C. (1974). An experimental investigation of perceptual and stylistic dimensions of paintings suggested by art history. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 235–257). Washington, DC: Hemisphere.
- Cupchik, G. C. (1988). The legacy of Daniel E. Berlyne. *Empirical Studies of the Arts*, 6, 171–186.
- Cupchik, G. C., & Gebotys, R. J. (1990). Interest and pleasure as dimensions of aesthetic experience. *Empirical Studies of the Arts*, 8, 1–14.
- Duffy, E. (1934). Emotion: An example of the need for reorientation in psychology. *Psychological Review*, 44, 184–198.
- Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, 6, 169–200.
- Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 17, 124–129.
- Ellsworth, P. C. (2003). Confusion, concentration, and other emotions of interest: Commentary on Rozin and Cohen (2003). *Emotion*, 3, 81–85.
- 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 positive 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.
- Fechner, G. T. (1876). *Vorschule der Ästhetik*. [Elementary aesthetics]. Leipzig, Germany: Breitkopf & Härtel.
- Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, 2, 300–319.
- Gendolla, G. H. E., & Krusken, J. (2001). The joint impact of mood and task difficulty on cardiovascular and electrodermal reactivity in active coping. *Psychophysiology*, 38, 548–556.
- Halberstadt, J., & Rhodes, G. (2000). The attractiveness of nonface averages: Implications for an evolutionary explanation of the attractiveness of average faces. *Psychological Science*, 11, 285–289.
- Hare, F. G. (1974). Artistic training and responses to visual and auditory patterns varying in uncertainty. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 159–168). Washington, DC: Hemisphere.
- Harris, K. (2001). *Elémentations*. Charlottesville, VA: Xtant Books.
- Hekkert, P., Snelders, D., & van Wieringen, P. C. W. (2003). “Most advanced, yet acceptable”: Typicality and novelty as joint predictors of aesthetic preference in industrial design. *British Journal of Psychology*, 94, 111–124.
- Hekkert, P., & van Wieringen, P. C. W. (1996a). Beauty in the eye of expert and nonexpert beholders: A study in the appraisal of art. *American Journal of Psychology*, 109, 389–407.
- Hekkert, P., & van Wieringen, P. C. W. (1996b). The impact of level of expertise on the evaluation of original and altered versions of post-impressionistic paintings. *Acta Psychologica*, 94, 117–131.
- Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research*, 60, 549–571.
- Hidi, S. (2001). Interest, reading, and learning: Theoretical and practical considerations. *Educational Psychology Review*, 13, 191–209.
- Hox, J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Erlbaum.
- Hull, C. L. (1952). *A behavior system*. New Haven, CT: Yale University Press.
- Huth, G. (1990). *Ghostlight*. Port Charlotte, FL: Runaway Spoon Press.
- Izard, C. E. (1971). *The face of emotion*. New York: Appleton-Century-Crofts.
- Izard, C. E. (1977). *Human emotions*. New York: Plenum.
- Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition and Emotion*, 17, 297–314.
- Keltner, D., & Shiota, M. N. (2003). New displays and new emotions: A commentary on Rozin and Cohen (2003). *Emotion*, 3, 86–91.
- Konečni, V. J. (1996). Daniel E. Berlyne (1924–1976): Two decades later. *Empirical Studies of the Arts*, 14, 129–142.

- Krapp, A. (1999). Interest, motivation and learning: An educational-psychological perspective. *European Journal of Psychology of Education*, 14, 23–40.
- Kuppens, P., Van Mechelen, I., Smits, D. J. M., & De Boeck, P. (2003). The appraisal basis of anger: Specificity, necessity, and sufficiency of components. *Emotion*, 3, 254–269.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lazarus, R. S. (2001). Relational meaning and discrete emotions. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 37–67). New York: Oxford University Press.
- Leder, H., Belke, B., Oeberst, A., & Augustin, A. (2004). A model of aesthetic appreciation and aesthetic judgments. *British Journal of Psychology*, 95, 489–508.
- 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.
- MacLeod, S. (1999). *The life of Haifisch*. Lawrence, KS: Broken Boulder Press.
- Martindale, C., Moore, K., & Borkum, J. (1990). Aesthetic preference: Anomalous findings for Berlyne's psychobiological model. *American Journal of Psychology*, 103, 53–80.
- Martindale, C., Moore, K., & West, A. (1988). Relationship of preference judgments to typicality, novelty, and mere exposure. *Empirical Studies of the Arts*, 6, 79–96.
- Millis, K. (2001). Making meaning brings pleasure: The influence of titles on aesthetic experience. *Emotion*, 1, 320–329.
- Moles, A. (1966). *Information theory and esthetic perception*. (J. E. Cohen, Trans.). Urbana: University of Illinois Press.
- Morin, G. (2003). *A penny dreadful*. Toronto: Insomniac Press.
- Neiss, R. (1988). Reconceptualizing arousal: Psychobiological states in motor performance. *Psychological Bulletin*, 103, 345–366.
- 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*, 27, 771–785.
- Normore, L. F. (1974). Verbal responses to visual sequences varying in uncertainty level. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation* (pp. 109–119). Washington, DC: Hemisphere.
- North, A. C., & Hargreaves, D. J. (2000). Collative variables versus prototypicality. *Empirical Studies of the Arts*, 18, 13–17.
- Reber, R., Schwartz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review*, 8, 364–382.
- Rhodes, G., & Halberstadt, J. (2003). It's not just average faces that are attractive: Computer-manipulated averageness makes birds, fish, and automobiles attractive. *Psychonomic Bulletin and Review*, 10, 149–156.
- Roseman, I. J. (2001). A model of appraisal in the emotion system: Integrating theory, research, and applications. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 68–91). New York: Oxford University Press.
- Roseman, I. J., & Evdokas, A. (2004). Appraisals cause experienced emotions: Experimental evidence. *Cognition and Emotion*, 18, 1–28.
- 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, methods, research* (pp. 3–19). New York: Oxford University Press.
- Russell, P. A. (1994). Preferability, pleasingness, and interestingness: Relationships between evaluative judgments in empirical aesthetics. *Empirical Studies of the Arts*, 12, 141–157.
- Russell, P. A. (2003). Effort after meaning and the hedonic value of paintings. *British Journal of Psychology*, 94, 99–110.
- Russell, P. A., & George, D. A. (1990). Relationships between aesthetic response scales applied to paintings. *Empirical Studies of the Arts*, 8, 15–30.
- Russell, P. A., & Gray, C. D. (1991). The heterogeneity of the preferability scale in aesthetic judgments of paintings. *Visual Arts Research*, 17, 76–84.

- Russell, P. A., & Milne, S. (1997). Meaningfulness and the hedonic value of paintings: Effects of titles. *Empirical Studies of the Arts*, 15, 61–73.
- Sansone, C., & Smith, J. L. (2000). Interest and self-regulation: The relation between having to and wanting to. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation* (pp. 341–372). San Diego, CA: Academic Press.
- Scherer, K. R. (1999). On the sequential nature of appraisal processes: Indirect evidence from a recognition task. *Cognition and Emotion*, 13, 763–793.
- Scherer, K. R. (2001a). Appraisal considered as a process of multilevel sequential checking. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 92–120). New York: Oxford University Press.
- Scherer, K. R. (2001b). The nature and study of appraisal: A review of the issues. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 369–391). New York: Oxford University Press.
- Schorr, A. (2001). Appraisal: The evolution of an idea. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research* (pp. 20–34). New York: Oxford University Press.
- Selby, S. (2003). *Problem pictures*. San Francisco: SINK Press.
- Silvia, P. J. (2001). Interest and interests: The psychology of constructive capriciousness. *Review of General Psychology*, 5, 270–290.
- 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.
- Silvia, P. J. (in press). Artistic training and interest in visual art: Applying the appraisal model of aesthetic emotions. *Empirical Studies of the Arts*.
- Silvia, P. J., & Warburton, J. B. (2006). Positive and negative affect: Bridging states and traits. In D. L. Segal & J. C. Thomas (Eds.), *Comprehensive handbook of personality and psychopathology: Vol. 1. Personality and everyday functioning* (pp. 268–284). New York: Wiley.
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48, 813–838.
- Tan, E. S. (2000). Emotion, art, and the humanities. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 116–134). New York: Guilford Press.
- Tomkins, S. S. (1962). *Affect, imagery, consciousness. Vol. 1: The positive affects*. New York: Springer.
- Topel, A. (2002). *Unwritten*. Charlottesville, VA: Xtant Books.
- Valentine, C. W. (1962). *The experimental psychology of beauty*. London: Methuen.
- van Reekum, C. M., & Scherer, K. R. (1997). Levels of processing in emotion-antecedent appraisal. In G. Matthews (Ed.), *Cognitive science perspectives on personality and emotion* (pp. 259–330). Amsterdam: Elsevier.
- Walker, E. L. (1980). *Psychological complexity and preference: A hedgehog theory of behavior*. New York: Brooks/Cole.
- Walker, E. L. (1981). The quest for the inverted U. In H. I. Day (Ed.), *Advances in intrinsic motivation and aesthetics* (pp. 39–70). New York: Plenum.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer.
- Whitfield, T. W. A. (1983). Predicting preference for familiar, everyday objects: An experimental confrontation between two theories of aesthetic behavior. *Journal of Environmental Psychology*, 3, 221–237.
- Winkielman, P., & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology*, 81, 989–1000.