Patterns of Cognitive Appraisal in Emotion

Craig A. Smith and Phoebe C. Ellsworth
Stanford University

There has long been interest in describing emotional experience in terms of underlying dimensions, but traditionally only two dimensions, *pleasantness* and *arousal*, have been reliably found. The reasons for these findings are reviewed, and integrating this review with two recent theories of emotions (Roseman, 1984; Scherer, 1982), we propose eight cognitive appraisal dimensions to differentiate emotional experience. In an investigation of this model, subjects recalled past experiences associated with each of 15 emotions, and rated them along the proposed dimensions. Six orthogonal dimensions, *pleasantness, anticipated effort, certainty, attentional activity, self-other responsibility/control,* and *situational control,* were recovered, and the emotions varied systematically along each of these dimensions, indicating a strong relation between the appraisal of one's circumstances and one's emotional state. The patterns of appraisal for the different emotions, and the role of each of the dimensions in differentiating emotional experience are discussed.

Most people think of emotions in categorical terms: "I was scared," or "I was sad," or "I was frustrated." In complicated situations they may say, "I felt sad *and* frustrated." The idea that there is a small set of fundamentally different emotions, has a long and illustrious history in science as well, dating back at least to Aristotle and reemerging in the theory of the four humors, in the works of eighteenth-century philosophers, and in Darwin (1872/1965). In recent years the categorical approach to the study of emotions has become prominent in psychology, stimulated by the monumental work of Sylvan Tomkins (1962, 1963, 1982; Ekman & Friesen, 1971; Izard, 1971, 1972, 1977; Izard & Buechler, 1980). This view of emotional experience admirably captures our intuition that happiness, anger, and fear are basic feeling-states, easily recognizable, and fundamentally different from each other.

However, most categorical theories present emotions as an unstructured collection of distinct entities and thus fail to capture our intuitions about the similarities and differences among emotions. Some emotions are commonly viewed as opposites, such as *joy* and *sorrow,* or *fear* and *anger.* Once we start considering the similarities and differences among emotions, more specific questions inevitably demand our attention. Are joy and sorrow opposite in the same way as fear and anger? Clearly not, because joy is pleasant, but fear and anger are both unpleasant. Then in what ways can emotions be "opposite?" The very idea of opposition implies a dimension or set of dimensions along which emotions can be arranged, so that we can begin to make more specific statements of *how* emotions are similar or dissimilar to each other.[1]

[1] A dimensional view of emotions is not incompatible with a categorical view. Even in a categorical system, dimensions may be useful for describing the similarities and differences among the categories. In a largely dimensional system, common emotion categories may represent regions of the dimensional space that are frequently experienced or subjectively salient. Also, it is possible for a categorical theory to include hypotheses about the relations among the discrete emotions (cf., Plutchik, 1980).

Search for Dimensions of Emotion

Questions about the interrelations among emotions are not new. In 1896 Wundt (1896/ 1897) proposed a three dimensional structure of emotional experience, and in 1941 Schlosberg began a series of investigations into the structural interrelations among emotions (Engen, Levy, & Schlosberg, 1958; Schlosberg, 1941, 1952, 1954) that marked the start of a research tradition that has continued up to the present (e.g., Berglund, Berglund, & Engen, 1982; Daly, Lancee, & Polivy, 1983; McHugo, Smith, & Lanzetta, 1982; Russell, 1983). However, this tradition has remained fairly isolated from other research on emotions. Progress has been slight and heuristic insights rather sparse.

One reason for this is that the empirical results have been disappointing. *Pleasantness* and *level of activation* (or *arousal*) are the only dimensions that have been found consistently across studies. For anyone interested in understanding the rich diversity and subtle nuance of emotional life, a simple characterization of emotions as pleasant or unpleasant, strong or weak, seems both theoretically sterile and experientially implausible. And in fact, most of the dimensional studies have found more than these two dimensions. The problem is that there is little consistency among these richer characterizations: Beyond pleasantness and level of activation, the dimensions that emerge are often difficult to interpret (e.g., Block, 1957; McHugo et al., 1982), and when they are interpretable, they vary from study to study. The failure to arrive at a solution that is both interesting and robust can be understood by examining both the methods and the theoretical underpinnings of the previous studies.

Methodological Problems With the Earlier Research

Twentieth-century research on the dimensions of emotion has evolved along two distinct lines. The original line, initiated by Schlosberg (1941), sought to discover the dimensional structure communicated through posed emotional *facial expressions* (Abelson & Sermat, 1962; Berglund et al., 1982; Engen et al., 1958; Frijda, 1969; Frijda & Philipszoon, 1963; Osgood, 1955, 1966; Schlosberg,

1952). The second, more recent line of research has examined the structure underlying the *subjective feeling states* associated with various emotions (e.g., Averill, 1975; Block, 1957; Bottenberg, 1975; Bush, 1973; Davitz, 1969; Izard, 1972; Russell, 1978, 1979, 1980; Russell & Mehrabian, 1977). There is no reason to expect that the same dimensions should be revealed by these two approaches. Some salient aspects of an emotional experience may not show on a person's face, and some salient aspects of facial movement may not correspond to changes in a person's feelings. Furthermore, in studies of facial expression, subjects are asked to interpret other people's emotions, whereas in many studies of subjective feelings subjects are asked to report on their own. What matters to us in understanding someone else's emotion may be quite different from what matters to us in understanding our own emotions.

Aside from possible problems created by the confounding of domains, there have been methodological weaknesses within each of the two lines of research. First, as Ekman, Friesen, and Ellsworth (1982) point out, the range of stimuli sampled will determine the dimensions that can be found. No possibility of discovering a valid dimension exists if the stimuli do not vary along that dimension. Several of the early studies were weak in this respect. For example, Abelson and Sermat (1962), who found only two dimensions, used a sample of faces that underrepresented angry and surprised expressions.

Second, the questions asked of the subject can restrict the dimensions it is possible to find. A common method for discovering the ways in which people differentiate among emotions is to have them rate the stimuli on a variety of scales. A major strength of this approach is that the recovered dimensions are usually interpretable. Both scale loadings and the arrangement of the stimuli along the dimensions can be used to guide interpretation. A further strength is that by having subjects rate each stimulus along a variety of scales, it is possible to uncover subtle, but psychologically important, dimensions. The major limitation of this method is that the selection of scales determines which dimensions can possibly be found. Although a meaningless scale will produce unsystematic

ratings, and thus can not "create" a nonexistent dimension, if a meaningful dimension is *not* represented in the scales it will not be found in the data. Therefore, studies using different sets of scales will often find different dimensions.

Critics of this technique have argued that the investigator's choice of scales constrains the subject to use those dimensions and makes it impossible to discover unexpected dimensions or to find out what dimensions are naturally salient. The usual alternative, designed to avoid these problems, has been to ask subjects to rate the similarity of all possible stimulus pairs (Abelson & Sermat, 1962; Berglund et al., 1982; Bush, 1973; Shepard, 1962; Russell, 1978, 1980). This allows the subjects to choose the dimensions they use in their judgments. A major limitation of this method is that investigators no longer have the scale loadings to help them decide what the dimensions mean, but must rely solely on the arrangement of the stimuli. Further, subjects may use inconsistent criteria to judge different pairs of stimuli, or may base their ratings on only the most salient dimensions. For both reasons, this method may often fail to reveal more than two or three dimensions.

Thus, both the direct rating and the similarity rating methods run the risk of missing distinctions that are meaningful in people's perceptions of emotion. One of our aims in the present research was to create a set of scales that would allow subjects to differentiate their emotional experiences meaningfully in ways that go beyond the usual two or three dimensions. Therefore, in reviewing the literature, we regarded a dimension as potentially valid if it was found in one study, and we were not particularly disturbed by other studies that did not find it.[2]

Dimensions of Facial Expression

Table 1 summarizes the results of both traditional lines of research on the dimensions of emotion. Looking first at the studies of facial expression, we see that there is consistent evidence for three dimensions: *pleasantness, level of activation,* and *attentional activity.* In 1955, Osgood found evidence that facial expressions also differ from each other

along a dimension of *control.* Although he and others (Frijda, 1969; Triandis & Lambert, 1958) felt that this dimension was somehow related to attentional activity, the two dimensions were clearly not identical (Frijda & Philipszoon, 1963). In a reanalysis of his data, Osgood (1966) found two dimensions in the place of the old control dimension: An Interest factor, corresponding more directly to attentional activity, and a new Control factor. Frijda and Philipszoon (1963) also found a fourth factor, defined by the semantic differential scales *mild-derisive, natural-artificial, submissive-authoritarian,* and *admiration-despise.* Frijda (1969) later interpreted this dimension as being closely related to Osgood's control dimension, with "natural," submissive expressions corresponding to "uncontrolled" expressions, and "artificial," authoritarian ones being "controlled."

Dimensions of Subjective Feeling States

Although attentional activity emerged as a consistent third dimension in the research on facial expression, none of the studies of subjective experience has found any evidence for it. Apparently people are likely to register the attentiveness of their companions' faces, but are unlikely to discriminate among their own feelings in terms of attention. On the other hand, several studies indicate control is important in interpreting subjective experience, just as it is in perceiving faces (see Russell, 1978, for a discussion of the convergent validity of this dimension within the domain of subjective feeling-states).

Finally, several studies of subjective feeling-states have found evidence that people differentiate among their own emotions in terms of *depth of experience.* Daly et al. (1983)

---

[2] In this review, the dimensions are grouped together on the basis of the original investigators' interpretations of them. Obviously, it is very difficult to formally compare dimensions found in different studies, particularly when the studies employ different methods and stimuli. Therefore, we do not intend our groupings to imply that all of the dimensions sharing a common label are necessarily identical. Instead we take the similarity of interpretations as an indication that the original investigators believed that they were examining conceptually related phenomena. We feel that these phenomena, and the concepts they are believed to represent, are worthy of further consideration.

describe this dimension as the intensity of the felt emotion, ranging from "no report of an emotion to an extremely emotional experience" (p. 445), and Russell (1978) describes it as contrasting "serious, profound emotions such as *spiritual* and *loving* with more shallow emotions such as *giddy, peevish,* or *coy*" (pp. 1152–1153). This dimension is not typically found in facial expression studies, although it bears some resemblance to an unnamed dimension found by Frijda (1969), defined by the scales *simple–complicated* and *shallow–deep.*

Theoretical Problems With the Earlier Research

The main theoretical problem with the earlier research is that there was very little theory. In general, the investigators did not choose their dimensions in order to explore their ideas about emotions. Some researchers were frankly atheoretical, waiting for ideas to emerge from the data. Others (e.g., Osgood, 1966) were trying to see whether dimensions discovered in other domains would extend to the experience or expression of emotion. Very few had a theory that included much more than the obvious considerations of arousal and valence. In part, this theoretical sterility was due to a failure to consider what it is about emotion that creates its variety. In this regard, the categorical theorists were more successful. Working from a list of different emotions, they could ask "what is unique about the feeling of anger" and "how is anger different from fear?" (cf. Izard, 1977). However, the categorical approach has not led to

Table 1
Empirically Derived Dimensions of Emotional Experience Found in Two or More Studies of Either Facial Expression or Subjective Feeling States

Studies	Dimensions				
	Pleasantness	Level of activation	Attentional activity	Control	Depth of experience
Facial expression					
Schlosberg (1952)	X		X		
Schlosberg (1954)	X	X	X		
Osgood (1955)	X	X		X	
Engen, Levy, & Schlosberg (1958)	X	X	X		
Triandis & Lambert (1958)	X	X	X		
Abelson & Sermat (1962)	X	X			
Shepard (1962)[a]	X	X			
Frijda & Philipszoon (1963)	X	X	X	(X)[b]	
Osgood (1966)[c]	X	X	X	X	
Frijda (1969)[d]	X	X	X	X	(X)[b]
Berglund, Berglund, & Engen (1982)	X	X	X		
Subjective feeling states					
Block (1957)	X	X			
Bush (1973)	X	X		X	
Averill (1975)	X	X		X	X
Bottenberg (1975)	X	X			X
Russell & Mehrabian (1977)	X	X		X	
Russell (1978)	X	X		X	X
Russell (1980)	X	X			
Daly, Lancee, & Polivy (1983)	X	X			X
Russell (1983)	X	X			

[a] Reanalysis of Abelson & Sermat (1962) data.
[b] Not interpreted as such by original authors; see text for explanation.
[c] Reanalysis of Osgood (1955) data.
[d] Reanalysis of Frijda & Philipszoon (1963) data.

Table 2
Proposed Cognitive Dimensions and Their Relations to Previously Found Dimensions[a]

Proposed cognitive dimensions	Previously found dimensions	Roseman (1979)	Scherer (1982)	Smith & Ellsworth (1985)
Pleasantness	X		X	X
Motivational state[b]		X		
Situational state[b]		X		
Anticipated effort/Activation[c]	X			X
Attentional activity/Novelty	X		X	X
Control Agency/Coping potential	X	X	X	X
Depth of experience	X			
Certainty		X		X
Goal-path obstacle/Goal relevance			X	X
Legitimacy		X		X
Norm/self-concept compatibility			X	
Responsibility				X

[a] Previously found dimensions are documented in Table 1.
[b] These two dimensions combine to form a Pleasantness dimension; see text for explanation.
[c] See text for explanation of the proposed relationship between Activation and Anticipated effort.

a general framework within which a wide range of emotions can be evaluated in the same terms.

Dimensions of Cognitive Appraisal

A third group of theorists, identified with neither the categorical nor the dimensional approach, have argued that emotional differences must inescapably involve differences in the way the organism appraises its environment (Arnold, 1960; James, 1890/1950; Lazarus, 1968; Lazarus, Kanner, & Folkman, 1980; Mandler, 1975; Plutchik, 1962, 1980; Roseman, 1984; Schachter & Singer, 1962; Scherer, 1982). In line with these theorists, we believe that the experience of emotion is closely associated with the organism's appraisal of its environment along several cognitive dimensions, and that a close study of these dimensions will help us to understand not only the nature of distinct emotional states, but also their interrelations. A few recent theorists, most notably Roseman (1984) and Scherer (1982) have independently proposed dimensional models. Their models, and ours, are shown in Table 2.[3]

Attention. Most of the research on dimensions of facial expression has found strong evidence that level of attention is an important aspect of emotion. It may even be that the first appraisal we make is whether to attend

to a stimulus, ignore it, or avoid it (Scherer, 1982). On a city sidewalk, a man with a gun in his hand is riveting, a sleeping verminous drunk is repellent, and the rest of the mass of humanity may not attract our attention at all. That this dimension is obvious in the facial expression studies but absent in the studies of subjective experience may be because attention is so preliminary, and subsequent appraisals seem much more salient in our descriptions. If we have barely noticed a stimulus, we are unlikely to mention it in an experiment.

Scherer's *novelty* dimension is related to the attentional activity dimension. Like an orienting response, it is an appraisal of the extent to which events violate or meet expectations and therefore demand attention or can be ignored. We have chosen to study this

[3] Several other recent investigators have also proposed an important role for cognitive appraisals in emotion, including DeRivera (1977), Weiner, Russel, and Lerman (1979), Clore and Ortony (1984), Abelson (1983), and Stein and Jewett (1984). For various reasons none of these are easily summarized in Table 2; however, we see all of them as compatible with our general point of view that emotional life is much more than movement back and forth along a continuum from *very positive* to *very negative* and that in order to understand the variety of emotions people experience we must consider their interpretations of their present environment and themselves within it.

dimension as a bipolar one, ranging from a powerful motivation to examine the stimulus more closely to an equally powerful motivation to turn away from the stimulus. Like most of our decisions, this one is tentative, and mainly based on the empirical evidence of bipolarity (e.g., Schlosberg, 1952, and follow-up research). A state of strong interest or fascination would represent one pole of this dimension, while disgust would usually fall at the opposite extreme.

Certainty. Roseman (1984) does not propose an attention dimension; in his scheme the most similar dimension is *certainty.* While it is likely that both attention and certainty are correlated in many situations, in that an unpredictable situation demands more of our attention than a predictable one, we feel that the cases in which the correlation fails are particularly interesting, and so we chose to include attention and certainty as separate dimensions. Hope and fear are the emotions for which uncertainty is paramount and attention is inescapably drawn to the source, but there are also situations in which we are uncertain about what is going on and do not particularly care to find out, and others, such as watching a lover or baby asleep, in which we feel no noticeable uncertainty, but our attention is devout.

Control. The control dimension has appeared with some consistency in the traditional literature, and it also appears in the cognitive models of both Roseman (1984) and Scherer. Scherer (1982) proposes that the organism must quickly evaluate its ability to cope with the situation and that this evaluation will contribute to its subjective feeling. We feel, as does Roseman, that this dimension is more complicated. We may be unable to control a situation because no one can control it, as in an earthquake, or we may be unable to control it because some other person controls it. Weiner, Russell, and Lerman (1979) have found support for a similar distinction in their research on emotional responses in achievement-related contexts. They found that different emotional responses were associated with both success and failure depending on whether the cause of the outcome was attributed to oneself, to others, or to "luck." Not wanting to obscure this potentially important distinction, we chose to retain the more

complex formulation, and in assessing perceptions of control we examined whether the events were controlled by the person, another person, or impersonal circumstances.

Pleasantness. Pleasantness has always emerged as an important dimension and has accounted for the lion's share of the variance. In some recent formulations (Zajonc, 1980), pleasantness is seen as such an immediate, automatic evaluation that it cannot be called a cognitive evaluation at all, but rather precedes cognition. Interestingly, none of the three new cognitive models is content with a simple pleasantness dimension. Roseman (1984) argues that pleasantness is a function of two appraisals—appraisals of what one wants in relation to what one has. That is, happiness can result from attaining a positive goal or from avoiding (not having) an evil, and the two states are different; likewise, the unpleasantness of a noxious event is different from the unhappiness of loss. The departure of a beloved friend is very different from the arrival of an enemy (cf. Abelson, 1983; Mowrer, 1960). Scherer (1982) proposes that stimuli are intrinsically pleasant or unpleasant, but that our evaluation of them will also depend on their relevance to our current purposes: "Even intrinsically pleasant stimuli can interrupt ongoing plans and thus be evaluated negatively by the organism in terms of goal attainment" (Scherer, 1982, p. 559). Because of sunny days and music, we kept a simple, intrinsic pleasantness dimension.

Perceived obstacle. However, like Scherer, we are well aware that even our favorite symphony or person can be annoying if we have to complete a job by an imminent deadline. We chose to call our additional complicating dimension *perceived obstacle,* a term both broader and less vague than goal relevance. It is broader in that it allows a feeling of pleasure on encountering an obstacle, as in sports, or poetry, or intellectual puzzles. It is less vague in that it avoids the vague term *relevance* in favor of a perception that is usually quite concrete: the perception of something standing in the way, even if the goal was previously unconscious.

Responsibility and legitimacy. A person may be responsible for initiating a situation, but then cease to control it. A thoughtless remark or a kind deed can set in motion

events that seem to go far beyond their causes. So control may be different from responsibility. When we think of emotions like *anger* and *guilt*, it seems that some dimension more human and "cognitive" than any we have yet considered must be involved. If a small child gets knocked down and hurt in a confrontation with a large dog, we are usually not angry, but if the confrontation is between a small child and an adult, we often are. Likewise, we feel greater guilt the more responsible we feel for the ill effects of our own actions.

The examples are familiar, but the conceptual issues are difficult. Roseman (1984) proposes a *legitimacy* dimension that represents an appraisal of whether the (good or bad) outcome is deserved or undeserved. Scherer (1982) approaches the same problem by proposing a *norm/self-concept compatibility* dimension by which people evaluate an action in terms of general social norms or personal standards. There is clearly a dimension here that is important in the adult human experience of anger and guilt, and that distinguishes these emotions from, for example, frustration and embarrassment. We chose to examine two related but potentially separable dimensions in the hope of further clarifying the conceptually elusive, but intuitively compelling set of distinctions: *responsibility*, the extent to which oneself, or someone or something else, is responsible for bringing about the event that arouses emotion, and the legitimacy or fairness of the outcome.

Anticipated effort. By now it should be obvious that we have failed to mention level of activation, one of the universally found dimensions. We do not question that emotional experiences vary in intensity; however, we do not feel that intensity is very important in discriminating among different emotional states. It is worth noting that neither Roseman nor Scherer include a separate intensity dimension either. Of course our machine, like a TV, has a volume control, but it does not affect the content of the channels. There is another dimension with a long and respectable history, that is very reminiscent of a global activation dimension, but potentially more useful in discriminating among emotions, and that is Cannon's (1929) concept of *fight or flight*. In fight or flight situations the

organism anticipates having to do something, to expend effort; in other situations it may relax, enjoy, or withdraw quietly. Because the anticipated effort is so important physiologically, we included it as a dimension in the place of level of activation.

A New Dimensional Approach

Obviously, we do not feel that the dimensional approach has yet been given a fair chance. Few investigators have asked questions explicitly designed to examine more than two or three dimensions. The studies employing global similarity ratings have been disappointing; apparently subjects do not take advantage of the theoretical openness of the technique. Rather than revealing dimensions undreamed of by the experimenter, they seem to sort the stimuli as crudely and easily as they can, and seldom reveal more than a *good–bad, strong–weak* categorization. Our aim was to discover whether people would consistently use a larger set (eight) of a priori dimensions if given the chance. The eight dimensions were, *pleasantness, attention, control, certainty, perceived obstacle, legitimacy, responsibility,* and *anticipated effort,* selected primarily because each of them has been suggested by at least one other researcher.

These are all dimensions of cognitive appraisal. We use the term *cognitive* broadly, as Lazarus (1984) does, rather than restrictively, as Zajonc (1984) does. We believe that people must answer certain fundamental questions about the changing sensations that impinge upon them not only so as to know what to do, but also so as to know what they feel. Their answers may be incorrect, in which case observers might say that their emotions are inappropriate. Their answers may be incomplete, in which case they might be uncertain of how they felt, or might vacillate between different emotions. The emotion, however, is in part the resultant of a series of estimates about the present environment. Finally, we are not proposing that emotion is merely the product of cognitions; instead, we are trying to explore the cognitive aspects of emotion.

Our approach was to ask people to remember past emotional experiences, one at a time, and to describe them to us in as much detail

as possible. We then asked them about their experiences, using questions that were systematically designed to tap the eight proposed dimensions. We predicted that we would find an interpretable multidimensional cognitive structure, representing appraisal dimensions along which people evaluate their relation with the environment during emotional experiences. And we predicted that basic categories of emotions, such as fear, sorrow, and anger, would be represented by different patterns of appraisal outcomes along the dimensions, and therefore, that examination of the appraisal patterns would provide considerable insight into the experience of the basic emotions.

Method

Experimental Overview and Design

In a fully within-subjects design, subjects were asked to recall past experiences associated with each of 15 different emotions. For each emotional experience subjects first responded out loud to a series of questions designed to encourage them to describe the experience in as much detail as possible, then posed the facial expression that would show someone else how they felt during the experience, and finally rated the experience along the hypothesized cognitive dimensions.[4] Because pretesting indicated that the procedure lasted approximately 10 min for each emotional experience, the experiment was run in two 1½ hr sessions held between one day and one week apart. Each subject described between six and nine emotional experiences during the first session and the remainder in the second session. The order in which the experiences were described was random across subjects.

Subjects

Subjects were 16 Stanford University undergraduates who participated in the study as part of an introductory psychology course requirement. Students who had indicated on a preselection questionnaire that they were both emotionally expressive and good at posing emotional facial expressions were selected to participate in the study. These criteria were used both to facilitate the posing phase of the experiment, and because pretesting suggested that people who say they are emotionally expressive give more complete descriptions of their emotional experiences than less expressive people.

Stimulus Emotions

The 15 emotions we asked subjects to describe were *happiness, sadness, fear, anger, boredom, challenge, interest, hope, frustration, contempt, disgust, surprise, pride, shame,* and *guilt.* We felt that 15 emotions was the maximum we could adequately observe using a within-subjects design. The selection of these particular emotions

was based on two considerations. First, we wanted to include the fundamental emotions (i.e., happiness, sadness, fear, anger, interest, contempt, disgust, surprise, shame, and guilt) proposed by discrete emotions theories (e.g., Ekman, Friesen, & Ellsworth, 1982; Izard, 1977; Tomkins, 1982). Second, we included emotions that we believed would represent the dimensional space as extensively as possible. This consideration led us to add frustration and boredom, as well as emotions that we expected to reveal differentiation among pleasant or positive emotional states (i.e., challenge, pride, and hope)—an area which has often been overlooked in previous studies (Lazarus et al., 1980).

Procedure

The subjects were solicited by telephone to participate in an individual 3-hr, 2-session experiment concerning "subjective emotional experience." At the first session, the subjects were told that unlike past studies, which "had shied away from asking people about their actual experiences of emotion," the purpose of "today's experiment is to find out what emotional experience is like *for you.*" They were told that they would be asked to answer a number of questions about their past emotional experiences out loud and that what they said would be tape-recorded. In order to encourage detailed descriptions we asked subjects to answer the questions as though "you are talking to a *Vulcan,* like Mr. Spock from *Star Trek.*" That is, they were told to describe their experiences as if they were talking to a brilliant being, very familiar with human culture, but unable to experience emotions first hand, and thus eager to learn as much about emotional behavior as possible. The subjects were also told they would be asked to pose the facial expression corresponding to the experience and that the poses would be videotaped. The final task for each experience would be to fill out a questionnaire that asked more specific questions about what it was like while they were "*actually experiencing* the emotion, not what it was like either just before or just after the emotional experience." (These instructions were reiterated when the subject was given the questionnaire.) The experimenter answered any questions about the procedure and then left the room, in order to minimize both the subjects' self-consciousness and any potential experimenter demands. Subjects were continuously observed from behind a one-way mirror, and communicated with the experimenter through a two-way intercom system.

The same procedure was followed for each emotional experience. First the subjects were asked to recall a past

---

[4] The instructions to show the emotion on the face were designed to study issues beyond the scope of the present discussion. Also, 17 additional subjects were not asked to recall a particular emotional experience, but instead to describe what each of the 15 emotions was usually or typically like. The results of this emotional concept study were generally similar to the results of the emotional experience study reported here, and will be fully described in another article specifically focussed on the comparison between general and specific representations.

experience or event in which they had felt a particular emotion. Then they were asked a number of general questions about that particular experience. For instance, when the subjects were to recall a past happy experience they were told:

> I want you to think of a past situation or event where you felt *happy*. Picture this situation in your mind. Try and remember as vividly as you can what this past *happy* situation was like: Think of what happened to make you feel *happy*, and what it felt like to be *happy* in this particular situation. Tell me when you are ready and have this *happy* situation in your mind, and I'll ask you questions about it. Remember you will be telling a Vulcan, who has never had a *happy* experience, what one was like.

When the subjects said they were ready they were asked the following series of questions about the experience.

1. Please describe this past *happy* situation to me. What was it like to be *happy* in this situation?
2. What happened in this situation to make you feel *happy?*
3. Why did these things make you feel *happy?*
4. How did you know that you were *happy* in this situation?
5. What did it feel like for you to be *happy* in this situation?
6. What did you do in this situation where you were *happy?*

In addition to providing a wealth of open-ended data for exploratory analysis, the main purpose of these questions was to encourage the subjects to recall their experiences as fully as possible before completing the ratings. We felt that this prior reminiscence would maximize the accuracy of the ratings. The instructions and questions seemed to be engaging, and to encourage the subjects to recollect their past experiences in detail. The answers to the questions tended to be long and involved, averaging approximately 350 words for each experience. Also, the experiences subjects chose to describe were usually important and emotionally involving. For example, for their sad experiences 9 subjects described their reactions to the death of someone very close to them. For their fearful experiences, subjects described compelling situations like being trailed by a car while walking alone after dark, seeing a prowler near an unlocked door while home alone at night, being chased by a guard dog, and almost being arrested for drug possession at a rock concert. Finally, during debriefing several subjects spontaneously commented that while making their descriptions they often felt themselves beginning to reexperience the feelings associated with the past event.

After the intervening posing task the subjects rated the experience on the dimensional ratings questionnaire.

Stimulus Ratings

The subjects rated each of their emotional experiences on the items presented in Table 3 (using happiness as a sample emotion). Each of the proposed dimensions was measured by two items, with two exceptions. In order to tap all three of the types of control we wanted to investigate (i.e., situational, self, other), three items were

constructed to measure the control dimension. In addition three items were constructed to measure the certainty dimension, because pretesting indicated that this might be a particularly difficult dimension to tap.

All items were rated on 11-point scales. Pleasantness and attention were rated on bipolar scales ranging from *unpleasant, divert attention* (-5) to *pleasant, devote attention* (5). The remaining dimensions were rated on monopolar scales ranging from *not at all* _____ (1) to *extremely* _____ (11). The items appeared on the questionnaire in the same order for all emotions across all subjects. The order was random with the constraint that no two items designed to measure the same dimension were adjacent to one another.

The three-part procedure was repeated for between six and nine emotions, until an hour and a half had elapsed, at which time the first session ended. On reporting for the second session the subject was briefly reminded of the procedure for each emotion. Then the experimenter left to observe the subject from behind the one-way mirror, and the procedure was completed for the emotions not covered during the first session. Following the last emotion, the subject was thoroughly debriefed and dismissed.

Results

Overview

The analyses were designed to address two major issues. First, we needed to identify the dimensions subjects used in rating their experiences. Then we sought to examine the hypothesis that the pattern of appraisals along the dimensions differed across emotions, and if they did, we wanted to describe the interrelations of the emotions within the dimensional framework.

The first task was to identify the dimensional structure of our subjects' ratings. Some previous researchers employing a priori rating scales have assumed that each scale represented a separate dimension (e.g., Engen et al., 1958; Russell & Mehrabian, 1977; Schlosberg, 1952, 1954; Triandis & Lambert, 1958), but this approach does not take into account the problem of intercorrelations among the scales, resulting in highly redundant dimensions. Other researchers have attempted to recover truly orthogonal dimensions in two different ways. Some have used a correlational approach, such as factor or principle components analysis (e.g., Block, 1957; Frijda, 1969; Frijda & Philipszoon, 1963; Osgood, 1966), while others have used multidimensional scaling techniques, a distance-fitting approach (e.g., Abelson & Sermat, 1962; Bush, 1973; Osgood, 1955; Shepard, 1962;

Russell, 1978, 1980, 1983). Neither approach provides strict guidelines for determining the dimensionality of the solution, and the researcher must subjectively decide how many of the dimensions are "real" by considering their stability and interpretability (Chatfield & Collins, 1980; Kruskal & Wish, 1978). Having designed the measures to tap eight independent dimensions, an unusually large number, we were concerned that we might be tempted to retain and interpret small, meaningless dimensions that reflected mainly error variance. To guard against this possibility we decided to analyze the data using both approaches; we used both principal components analysis (PCA) with varimax ro-

tation and Symmetric Individual Differences Multidimensional Scaling (SINDSCAL, Pruzansky, 1975). Because the two techniques examine the data in quite different ways, we felt we could be confident in the stability and validity of similar dimensions revealed by both.

The solutions produced by both techniques were examined in order to determine how and to what extent the emotions varied along the recovered dimensions. Then, in order to learn about the relative importance of the various dimensions in differentiating the emotions, we also performed discriminant analyses on the component scores produced by the PCA.

Table 3

Items on the Dimensional Ratings Questionnaire

Pleasantness
 (Pleasant) How pleasant or unpleasant was it to be in this situation?
 (Enjoy) How enjoyable or unenjoyable was it to be in this situation?
Attentional activity
 (Consider) Think about what was causing you to feel happy in this situation. While you were feeling happy, to what extent did you try to consider this thing further, or to what extent did you try to shut it out?
 (Attend) Think about what was causing you to feel happy in this situation. When you were feeling happy, to what extent did you try to devote your attention to this thing, or divert your attention from it.
Control
 (Situational-Control) When you were feeling happy, to what extent did you feel that circumstances beyond anyone's control were controlling what was happening in this situation?
 (Self-Control) When you were feeling happy, to what extent did you feel that you had the ability to influence what was happening in this situation?
 (Other-Control) When you were feeling happy, to what extent did you feel that someone other than yourself was controlling what was happening in this situation?
Certainty
 (Understand) When you were feeling happy, how well did you understand what was happening around you in this situation?
 (Uncertain) When you were feeling happy, how uncertain were you about what was happening in this situation?
 (Predict) When you were feeling happy, how well could you predict what was going to happen in this situation?
Goal-path obstacle
 (Problem) Think about what you wanted when you felt happy in this situation. While you were feeling happy, to what extent did you feel there were problems that had to be solved before you could get what you wanted?
 (Obstacle) Think about what you wanted when you felt happy in this situation. When you were feeling happy, to what extent did you feel there were obstacles standing in the path between you and getting what you wanted?
Legitimacy
 (Fair) Think about what was causing you to feel happy in this situation. When you were feeling happy, how fair did you think this thing was?
 (Cheated) When you were feeling happy in this situation, to what extent did you feel cheated or wronged?
Responsibility
 (Self-Responsibility) When you were feeling happy, how responsible did you feel for having brought about the events that were making you feel happy in this situation?
 (Other-Responsibility) When you were feeling happy, how responsible did you think someone or something other than yourself was for having brought about the events that were making you feel happy in this situation?
Anticipated effort
 (Exert) When you were feeling happy, to what extent did you feel that you needed to exert yourself to deal with this situation?
 (Effort) When you were feeling happy, how much effort (mental or physical) did you feel this situation required you to expend?

Data Estimation

Because both PCA and SINDSCAL require complete data sets, we estimated values for missing data points. Of the 4320 (18 items × 15 emotions × 16 subjects) possible data points 67, or 1.55% were coded as missing, 54 of them due to the failure of three subjects to recall past experiences associated with particular emotions. One subject claimed never to have experienced shame, and 2 subjects did not what the word *contempt* meant. An additional 9 data points were coded as missing because one subject indicated that she alternated between both poles of the two attentional activity dimension items during her recalled sad, contemptuous, shameful, and guilty experiences, and between both poles of just the *consider* item during the challenging experience. The remaining 4 missing points appear to be random failures to respond to particular items.

The missing data points were estimated using a two-step regression procedure (BMDPAM, Dixon, 1981). Each item for every emotion was entered into the analyses as a separate variable (e.g., subjects' ratings on the *enjoy* item for happiness and sadness were separate variables). In order to stay within analysis size limitations we ran 7 subanalyses, each of which included all of the variables designed to measure a single dimension (the variables for the anticipated effort and perceived obstacle dimensions were entered into a single analysis). The missing values were estimated by using regression on up to two predictor variables. An F-to-enter criterion of 4.00 was employed to ensure that only variables significantly correlated with the missing variable entered the regression. In 54 cases two variables met this criterion and entered the regression; in 9 cases a single variable met the criterion and was used; and in 4 cases no variables met the criterion so the variable mean was entered for the missing value. The entire data set, including the 67 estimated values, was employed in all subsequent analyses.

Dimensional Structure

As indicated above, both PCA with varimax rotation and SINDSCAL were employed to evaluate the dimensional structure of the emotional experiences. In the PCA each emotional experience was treated as a separate observation ($N = 240$).[5] In order to perform the SINDSCAL analysis, the raw ratings had to be transformed into distance estimates. For these estimates we employed profile distance measures instead of correlations, because profile distances preserve information about means and standard deviations, which is lost in correlational data (Kruskal & Wish, 1978). In particular, we employed scale profile distances; summing across subjects, a separate matrix containing distance estimates between all possible pairs of emotions was computed for each scale (Equation B, Kruskal & Wish, 1978, p. 72). Scale matrices were used instead of the more commonly employed subject matrices for two reasons: First, the scale matrices tend to produce clearer, more stable results (Kruskal & Wish, 1978); and second, with scale matrices, the dimension weights produced by SINDSCAL are similar to scale factor loadings, and are useful in interpreting the recovered dimensions.

The factor patterns and dimension weights found in the six-dimensional solutions of the PCA and the SINDSCAL analyses are presented in Tables 4 and 5, respectively.[6] The six-

[5] Due to the within-subjects design, individual differences in scale usage might inflate the intercorrelations among the variables, which in turn, could affect the solution. To check against this possibility, in addition to the raw-score analyses reported here, the PCA was also performed on deviation scores (computed by subtracting each subject's mean for a given variable from his or her scores for that variable). The results of the two analyses were virtually identical. Across the two solutions, both the rotated component loading of the original variables, and the mean location estimates of the 15 emotions, were correlated above .99 along all six of the recovered dimensions.

[6] For purposes of clarity the dimensions in Table 5 have been reordered to correspond to the analogous dimensions in Table 4. In both tables the order in which the dimensions emerged are indicated by the numbers at the top of the columns. The presence of negative loadings in the PCA solution and their general absence in the SINDSCAL solution reflect the very different algorithms the two techniques employ. PCA is a correlational approach, and the negative loadings reflect the fact that the ratings for different scales can covary in opposite directions. In contrast SINDSCAL is a Euclidean distance fitting algorithm, and the dimension weights reflect the relative contribution of each dimension in determining the observed distances in each of the scale or subject matrices. Because negative distance has no meaning in Euclidean space, dimensions can not make negative contributions

Table 4
Sorted Rotated Component Loadings (Pattern) of the Principal Components Analysis (6-d Solution)

Scale	Component						Com-munality
	1	2	3	4	5	6	
Pleasant	−0.91	—	—	—	—	—	0.90
Enjoy	−0.91	—	—	—	—	—	0.89
Obstacle	0.83	—	—	—	0.25	—	0.80
Problem	0.82	—	—	—	—	—	0.77
Cheated	0.75	−0.38	—	—	—	—	0.74
Fair	−0.74	0.47	—	—	—	—	0.81
Other-responsibility	—	−0.89	—	—	—	—	0.83
Self-responsibility	—	0.85	—	—	—	—	0.75
Other-control	—	−0.79	0.28	—	—	—	0.72
Self-control	—	0.60	—	—	0.32	−0.41	0.69
Uncertain	—	—	0.80	—	—	—	0.72
Understand	—	—	−0.78	—	—	—	0.66
Predict	—	—	−0.75	—	—	—	0.63
Consider	—	—	—	0.94	—	—	0.90
Attention	−0.27	—	—	0.88	—	—	0.88
Effort	—	—	—	—	0.90	—	0.89
Exert	0.39	—	—	—	0.83	—	0.86
Situational-control	—	—	—	—	—	0.89	0.88
Eigenvalue	4.52	2.96	2.07	1.84	1.81	1.11	
Variance[a]	25.1	16.5	11.5	10.2	10.0	6.2	

Note. For clarity of presentation the above component loading matrix has been rearranged so that the columns appear in decreasing order of variance explained by components. The rows have been rearranged so that for each successive component, loadings greater than 0.50 appear first. Loadings less than 0.25 have been omitted.
[a] Percentage of variance explained by the component.

dimensional solutions were chosen as optimal because the six dimensions emerging from both analyses were remarkably similar and highly interpretable. The sixth dimension was relatively small in both solutions, but because it clearly had the same interpretation across solutions it was judged to be stable and retained.

Examination of Tables 4 and 5 indicate that the recovered dimensions by and large correspond to the predicted dimensions. The first dimension in both analyses is easily interpretable as a pleasantness dimension. However, the high loadings of the *fair* and *cheated* items on this dimension suggest that,

to the distances. In theory, therefore, the minimum possible weight is zero. In practice, negative weights are sometimes observed. When small these negative weights merely reflect statistical fluctuation, or error variance. However, when these negative weights are large they reflect major discrepancies between the SINDSCAL model and the data, often because the dimensionality is too large for the data (Kruskal & Wish, 1978). In the present case (Table 5) there is only one negative weight larger than .25, and this weight (−0.28) is small.

contrary to predictions, judgments of pleasantness and legitimacy may not be distinct appraisals. Similarly, the second PCA dimension and the third SINDSCAL dimension are made up of items designed to assess both responsibility and control, suggesting people's appraisal of agency may be a combination of these two estimates. This responsibility/control dimension reflects attributions of one's own responsibility/control versus that of other people. The situational control item does not load significantly on this dimension in either analysis. The third PCA and fifth SINDSCAL dimensions represent the predicted certainty dimension; the fourth dimension in both analyses reflects attentional activity; and the fifth PCA and second SINDSCAL dimensions are interpretable as anticipated effort.

The sixth dimension in both analyses is interesting in that it was not predicted to be a separate dimension. This dimension, defined by the *situational control* item, reflects attributions about the extent to which the affective situation is controlled by circumstances (or fate) versus the extent to which it is controlled

by any human agent (self or other). This dimension, considered with the above responsibility/control dimension, supports Roseman's (1984) tripartite conception of agency. When evaluating agency in an emotional situation, people not only distinguish between self- versus other-responsibility/control, but they also evaluate the extent to which the situation is caused by circumstances beyond anyone's control (cf. also Weiner et al., 1979).

The last of our predicted dimensions was the perception of an obstacle. The loadings of the items intended to measure this dimension differ greatly in the two solutions. In the PCA solution they load highly on the pleasantness dimension, whereas in the SINDSCAL solution they load moderately on both the pleasantness and anticipated effort dimensions. This difference is the one major discrepancy between the two solutions. It reflects the fact that because PCA and SINDSCAL are different data reduction techniques, one method will often find regularities in the data that the other method treats as random vari-

ation. This discrepancy also demonstrates that the two analysis techniques will not necessarily lead to the same conclusions, and therefore increases our confidence in the conclusions suggested by both techniques. Taken together the two solutions suggest that the perception of an obstacle is related both to pleasantness and to anticipated effort.

How Do Appraisal Outcomes Differ Across Emotions?

The results presented thus far indicate that people can reliably evaluate emotional experiences along at least six cognitive dimensions. However, by themselves, these results do not show us how, or the extent to which, the emotions differ along these dimensions. The location estimates of the 15 emotions along each of the six dimensions in the SINDSCAL solution are presented in Figures 1, 2, and 3. In addition component scores were computed for the PCA solution. Table 6 lists the mean scores for each emotion along the six PCA dimensions. The correlations between the

Table 5
Sorted Dimension Weights (Pattern) of the SINDSCAL Analysis (6-d Solution)

Scale	Dimension						Goodness of fit[a]
	1	3	5	4	2	6	
Pleasant	0.88	—	—	—	—	—	0.96
Enjoy	0.88	—	—	—	—	—	0.96
Obstacle	0.42	—	—	—	0.62	—	0.93
Problem	0.37	—	—	—	0.66	—	0.95
Cheated	0.90	—	—	—	—	—	0.91
Fair	0.92	0.28	—	—	—	—	0.81
Other-responsibility	—	0.88	—	—	—	—	0.83
Self-responsibility	—	0.92	—	—	—	—	0.94
Other-control	—	0.70	—	—	—	—	0.72
Self-control	—	0.54	—	—	—	—	0.69
Uncertain	—	—	0.73	—	—	—	0.80
Understand	—	—	0.72	—	—	—	0.79
Predict	—	—	0.35	—	0.40	—	0.59
Consider	—	—	—	0.86	—	—	0.85
Attention	—	—	—	0.94	—	—	0.94
Effort	−0.28	—	—	—	1.04	—	0.92
Exert	—	—	—	—	0.92	—	0.93
Situational-control	—	—	—	—	—	0.75	0.89
Variance[b]	21.1	15.2	8.1	10.8	17.5	3.7	

Note. For clarity of presentation the above dimension loading matrix has been rearranged so that the columns and rows correspond to the analogous columns and rows in Table 4. Weights less than 0.25 have been omitted.
[a] Goodness of fit is the correlation between the predicted and observed distances between the objects for each scale.
[b] Percentage of variance explained by the dimension.

```
                        High Effort
                            |
                            |
                            |
                            |
                            |
                            |
         * Challenge        |              * Frustration
                            |    Shame
                            |    *       * Fear
                            |                    * Anger
                            |
                            |                * Sadness
                            |    * Guilt
                            |              * Contempt
                            |
                            |          * Disgust
Pleasant                    |                      Unpleasant
----------------------------|----------------------------------
                            |
             * Hope         |
                            |
       * Interest           |
                            |
                            |
                            |
                            |
                            |          * Boredom
                            |
                            |
      * Pride               |
          * Surprise        |
   * Happiness              |
                        Low Effort
```
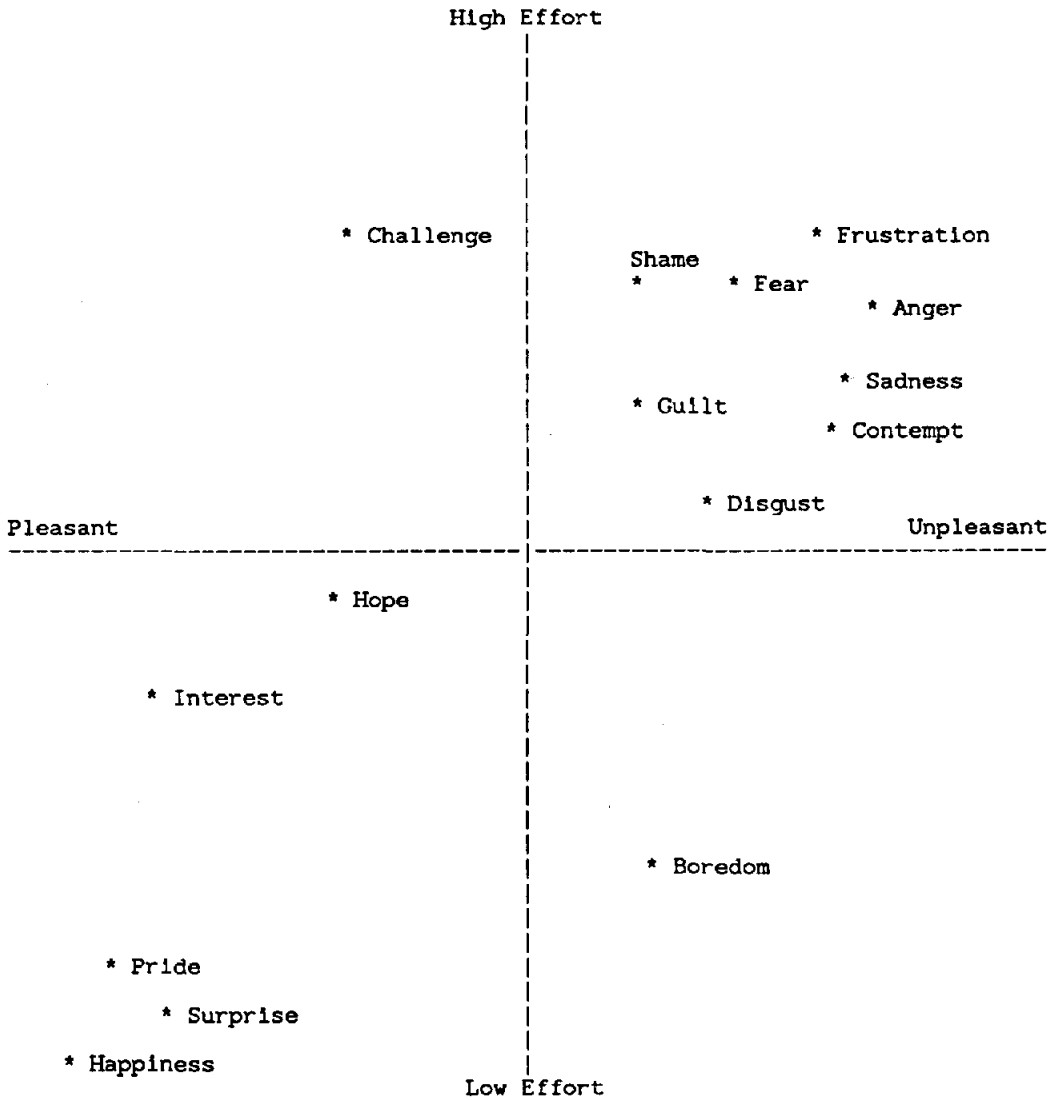
Figure 1. SINDSCAL location estimates for the 15 emotions plotted along the Pleasantness (X-axis) and Anticipated effort (Y-axis) dimensions.

SINDSCAL and PCA location estimates for all six dimensions are very high (pleasantness: $r = .98$; responsibility/control: $r = .98$; certainty: $r = .89$; attentional activity: $r = .89$; anticipated effort: $r = .76$; situational control: $r = .89$; all $ps < .001$) indicating that the relative locations of the emotions along each of the dimensions are highly similar across the two solutions. The lowest correlation, for the anticipated effort dimension, is easily attributable to the fact that the perceived obstacle items load moderately on the anticipated effort dimension in the SINDSCAL solution

but do not load on this dimension in the PCA solution. The reliable ordering of the emotions along the dimensions recovered by both techniques indicates that the dimensional appraisals are in some way related to the emotions, and do not reflect ratings of incidental properties of the situations unrelated to emotion.[7]

[7] Because SINDSCAL primarily fits the distances between mean objects (in this case the emotions), it will only reveal dimensions along which the objects systematically differ. However, because PCA derives factors from the
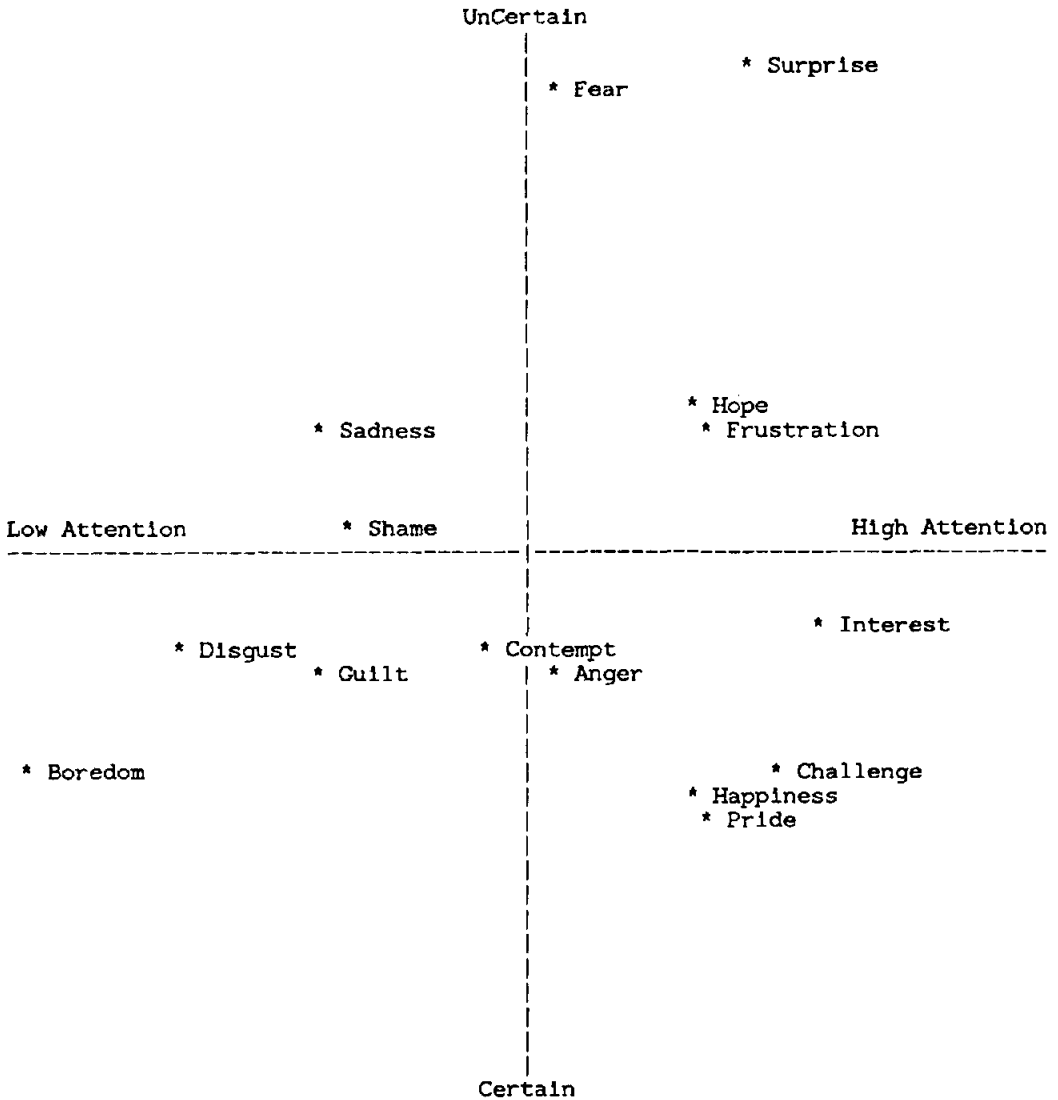
```
                                    UnCertain
                                        |
                                        |                   * Surprise
                                        | * Fear
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |                  * Hope
                          * Sadness     |                  * Frustration
                                        |
                                        |
Low Attention            * Shame        |                              High Attention
----------------------------------------|-------------------------------------------
                                        |
                                        |
                                        |                        * Interest
                                        |
           * Disgust          * Contempt|
                     * Guilt            | * Anger
                                        |
                                        |
   * Boredom                            |              * Challenge
                                        |          * Happiness
                                        |            * Pride
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |
                                        |
                                     Certain
```
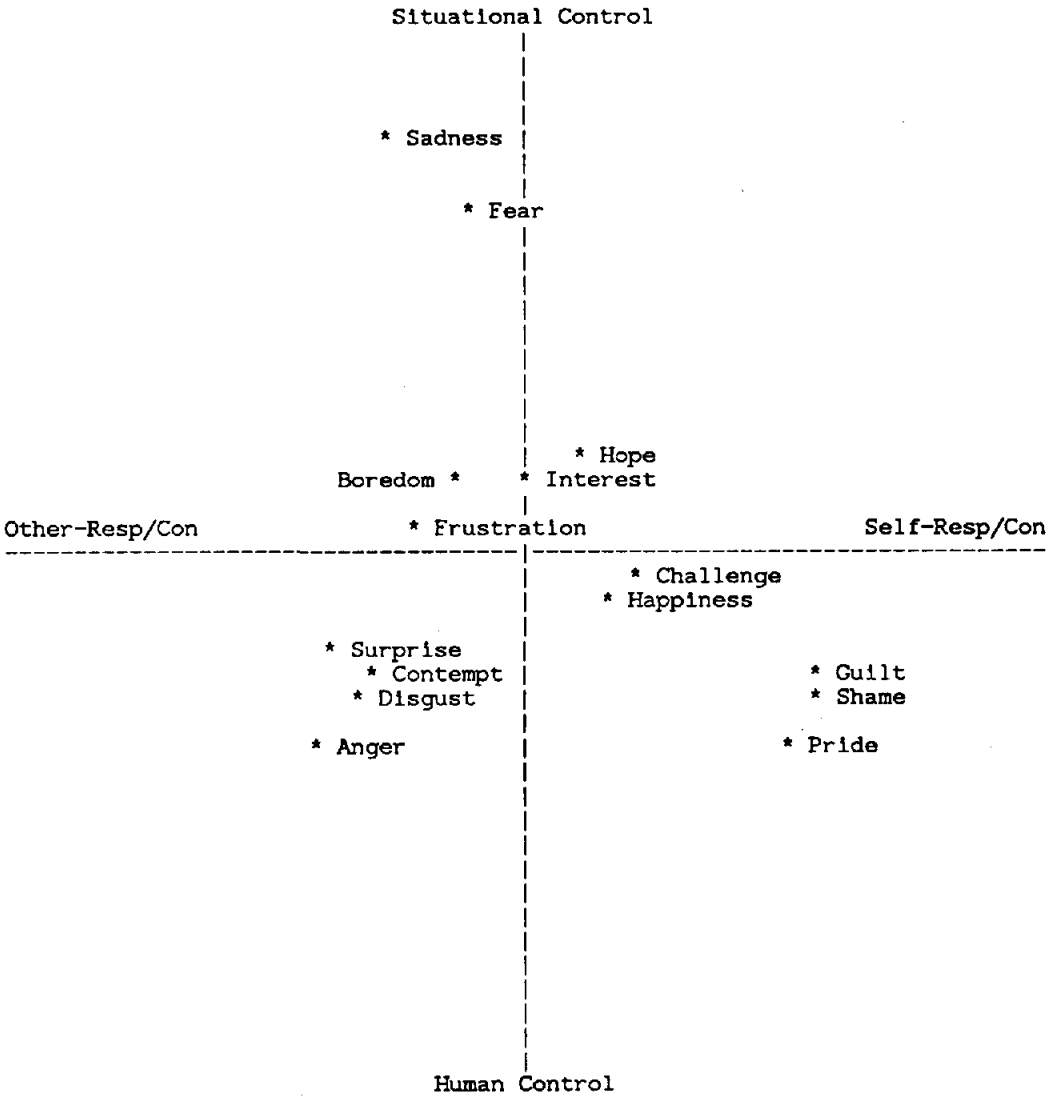
Figure 2. SINDSCAL location estimates for the 15 emotions plotted along the Certainty (X-axis) and Attentional activity (Y-axis) dimensions.

Table 6 and Figures 1, 2, and 3 demonstrate the ways in which the appraisals differ for the

correlational structure of the individual observations, it can reveal dimensions along which the individual observations vary, but the mean objects do not differ. That PCA revealed the same dimensions as SINDSCAL makes it is highly likely that the emotions vary systematically along these dimensions. Nevertheless, in order to confirm this fact, the PCA component scores were entered into separate within-subjects, one-way ANOVAs for each of the six dimensions. As expected, the main effect for emotions was highly significant for all six dimensions, all $Fs(14, 210) > 3.20$, all $ps < .001$.

various emotions.[8] Happiness, pride, surprise, interest, hope, and challenge are all pleasant emotions, while shame, guilt, disgust, fear, anger, contempt, frustration, boredom, and sadness are all unpleasant states. Challenge, fear, anger, and frustration are associated

[8] Although the PCA and SINDSCAL solutions are highly similar, the relative locations of some of the emotions along some of the dimensions vary slightly across the two solutions. Therefore, all statements in this article concerning the dimensional properties of the emotions are based on consideration of both solutions.

with particularly high levels of anticipated effort, whereas boredom and surprise are extremely low effort emotions. A strong sense of other-responsibility/control is associated with surprise and anger, whereas strong attributions of self-responsibility/control are associated with pride, shame, and guilt. Anger and pride are linked to strong attributions of human agency, but sadness and fear are distinctively high on situational control. The subjects wanted to pay particular attention when they were challenged, frustrated, or interested, but to shut out what was happening when they were disgusted or bored. Finally, the subjects felt least certain when they were surprised, afraid, or hopeful, but felt particularly certain about the situation when they were bored, happy, or proud. Interestingly, three unpleasant states (boredom, shame, and guilt) are highly differentiated from the other unpleasant emotions. Figure 1 shows that boredom is the only negative state that does not involve anticipated effort. Similarly, Figure 2 reveals that shame and

Figure 3. SINDSCAL location estimates for the 15 emotions plotted along the Self/Other-responsibility/control (X-axis) and Situational control (Y-axis) dimensions.

Table 6
Locations of Emotion Means Along the PCA Components

Emotion	Component					
	Pleasant[a]	Responsibility/ Control[b]	Certain[c]	Attention[d]	Effort[e]	Situational– Control[f]
Happiness	−1.46	0.09	−0.46	0.15	−0.33	−0.21
Sadness	0.87	−0.36	0.00	−0.21	−0.14	1.15
Anger	0.85	−0.94	−0.29	0.12	0.53	−0.96
Boredom	0.34	−0.19	−0.35	−1.27	−1.19	0.12
Challenge	−0.37	0.44	−0.01	0.52	1.19	−0.20
Hope	−0.50	0.15	0.46	0.31	−0.18	0.35
Fear	0.44	−0.17	0.73	0.03	0.63	0.59
Interest	−1.05	−0.13	−0.07	0.70	−0.07	0.41
Contempt	0.89	−0.50	−0.12	0.80	−0.07	−0.63
Disgust	0.38	−0.50	−0.39	−0.96	0.06	−0.19
Frustration	0.88	−0.37	−0.08	0.60	0.48	0.22
Surprise	−1.35	−0.94	0.73	0.40	−0.66	0.15
Pride	−1.25	0.81	−0.32	0.02	−0.31	−0.46
Shame	0.73	1.31	0.21	−0.11	0.07	−0.07
Guilt	0.60	1.31	−0.15	−0.36	0.00	−0.29

Note. Scores are standardized.
[a] Pleasantness: high scores indicate increased unpleasantness.
[b] Responsibility/Control: high scores indicate increased self-responsibility/control.
[c] Certainty: high scores indicate increased uncertainty.
[d] Attentional activity: high scores indicate increased attentional activity.
[e] Effort: high scores indicate increased anticipated effort.
[f] Situational control: high scores indicate increased situational control.

guilt differ from the other unpleasant states in attributions of responsibility/control. Both shame and guilt are associated with high *self-responsibility/control*, whereas the other unpleasant emotions are associated with *other-responsibility/control*.

In order to investigate the relative importance of the dimensions in differentiating among the emotions, a series of four stepwise discriminant analyses (BMDP7M, Dixon, 1981) were performed on the PCA component scores. (The results of these analyses should be viewed as exploratory rather than inferential, because they employ a between-subjects model unlike the within-subjects design employed in the study, and the practical consequences of violating the between-subjects assumption are not well understood.) The first analysis attempted to discriminate between all 15 emotional states. Follow-up analyses examined the pleasant and unpleasant emotions separately. Finally, because boredom, shame, and guilt are in some ways quite distinct from the other unpleasant states, a final analysis was run on the unpleasant states, excluding these three emotions. The

results of these analyses are presented in Table 7.[9] As can be seen from the table, in all four analyses the emotions were correctly classified at rates that were much better than could be expected by chance alone, once again illustrating the presence of systematic relations between cognitive appraisals and emotional experiences.

For each analysis Table 7 also presents the three dimensions that best discriminate among the emotions when each dimension is entered into the discriminant analysis by itself. The values in parentheses are the percentages of experiences correctly classified using each of the dimensions. This portion

---

[9] Although not depicted in Table 7, the discriminant analyses also produced F values corresponding to between-subject one-way ANOVAs along each of the dimensions. The F values produced in the analysis including all of the emotions are the between-subject analogs of the F values of within-subject one-way ANOVAs, which as mentioned above were also performed. Comparison of the two sets of F values revealed that they were highly similar for every dimension ($r = .999$), suggesting that the consequences of using an inappropriate model in the discriminant analyses are probably minimal in this instance.

Table 7
Discriminant Analyses Using PCA Component Scores

	Emotions analysed			
Percentage	All	Pleasant[a]	Unpleasant-1[b]	Unpleasant-2[c]
Percentage classified[d]	42.1	52.1	39.6	41.7
Percentage expected[e]	6.7	16.7	11.1	16.7
3 best discriminators				
1	Pleasant (16.7)[f]	Responsibility/ Control (36.5)	Situational- control (27.8)	Situational– control (40.6)
2	Effort (15.4)	Effort (32.3)	Effort (18.1)	Attention (25.0)
3	Situational- control (15.0)	Pleasant (29.2)	Attention (17.4)	Certain (24.0)

Note. Each experience was classified using a jackknifed classification function. That is, the classification function for any given experience was computed using all the data *except* that experience.
[a] Includes: Happiness, Challenge, Hope, Interest, Surprise, and Pride.
[b] Includes: Sadness, Anger, Boredom, Fear, Contempt, Disgust, Frustration, Shame, and Guilt.
[c] Includes: Sadness, Anger, Fear, Contempt, Disgust, and Frustration.
[d] Percentage of experiences classified correctly with all of the components entering the analysis.
[e] Percentage of experiences expected to be classified correctly by chance.
[f] The labels list the three dimensions for each analysis which correctly classify the most experiences when entered into the discriminant function by themselves. The values in parentheses represent the percentage of experiences correctly classified by using the single dimension.

of the table reveals that the importance of a dimension in discriminating between two or more emotional states depends heavily on the states considered. When all of the emotions are considered simultaneously, the pleasantness dimension is the single most important dimension for distinguishing between them. This finding is in line with the virtually universal finding of this dimension in previous studies. However, when the pleasant and unpleasant states are examined separately the importance of pleasantness diminishes greatly, and in its stead evaluations of agency predominate.

Given that the situation is basically pleasant, the consideration that best discriminates what we actually feel is our sense of how much control we ourselves (rather than someone else) had in initiating and maintaining the situation. Given a negative situation, our appraisal of the power of impersonal circumstances is most important in determining our emotion. By itself, the dimension of situational control can correctly classify over 40% of the experiences associated with the six emotions of sadness, anger, fear, disgust, contempt, and frustration, which is as well as they can be classified when all of the dimensions are considered. Clearly, considerations

of human versus circumstantial agency are important in discriminating among negative emotional states, much less so in differentiating positive emotions.

Does the Dimensional Structure Differ for Subsets of Emotions?

The finding that the discriminatory power of a dimension depends upon the set of emotions considered suggests that the local dimensional structure obtained by considering a set of similar (e.g., all pleasant or all unpleasant) emotions may differ from the global structure obtained by considering a broad range of emotional experience. Cognitive distinctions that are relatively uncommon or unimportant when considering a variety of emotions may be very important for distinguishing among a set of closely related states, whereas distinctions that are globally important may not discriminate well between similar emotions.

In order to explore possible differences between local and global dimensional structures we performed separate PCAs on the pleasant (happiness, challenge, hope, interest, surprise, and pride; $N = 96$) and unpleasant (sadness, anger, boredom, fear, contempt, dis-

gust, frustration, shame, and guilt; $N = 144$) experiences.[10] The analysis of the pleasant experiences yielded a six-dimensional solution that accounted for 78% of the variance. The loading patterns of the recovered dimensions were almost identical to those of the global solution, and the six dimensions in both solutions clearly had the same interpretations. The only notable difference between the two solutions was in the loadings of the perceived obstacle items. In the pleasant solution the *obstacle* and *problem* items loaded moderately on both the pleasantness dimension (-0.68 and -0.64, respectively) and the anticipated effort dimension (0.47 and 0.43, respectively), and therefore resembled the global SINDSCAL solution more closely than the global PCA solution. In general, however, the strong similarities between the two solutions provided little evidence of differences between the pleasant and global dimensional structures.

When we examined the dimensional structure of the unpleasant emotions a striking difference was found. The analysis of the unpleasant experiences revealed a six-dimensional structure that accounted for 75% of the variance, which was in most respects highly similar to both the global and pleasant solutions; however the loadings of the legitimacy items were very different. The fair and cheated items no longer loaded highly on the pleasantness dimension as they did in both the global and pleasant solutions (loadings < 0.25), instead they loaded highly on the responsibility/control dimension (0.83 and -0.70, respectively). This finding suggests that the appraisals of legitimacy and pleasantness may be distinct after all. Although in general, unpleasant experiences are viewed as being less fair than pleasant ones (as the global solution indicates), the present finding indicates that for unpleasant experiences the perceived fairness of the situation is not related to the degree of unpleasantness. Instead, for these experiences, fairness is important for appraisals of responsibility/control; if someone else is responsible for a bad situation, it is seen as less fair than if you yourself are responsible. This distinction does not seem to be made for pleasant experiences; the more pleasant the situation is, the fairer it is seen as being.

Discussion

Our results show that people's emotions are intimately related to their cognitive appraisals of their circumstances. The subjects rated past emotional experiences along six appraisal dimensions, and different patterns of appraisals were strongly associated with different emotions. The strength of this relation was demonstrated in the discriminant analyses, in which 15 different emotions were correctly predicted over 40% of the time on the basis of the corresponding patterns of cognitive appraisal. This rate is more than six times what would be expected by chance. If we know how a person sees his or her relation to the environment, we are better able to identify that person's emotional state; conversely, if we know what a person is feeling, we can deduce much about how that person is interpreting his or her circumstances.

What sets this study apart from its predecessors is not the discovery of new and heretofore unimagined dimensions of emotional experience, but the clear demonstration of the six dimensions simultaneously. Because dimensions beyond pleasantness and level of activation have seldom been found concurrently in the past, there has been much uncertainty about how any additional dimensions should be interpreted, and whether they were in fact distinct dimensions or merely different interpretations of a single third dimension. The simultaneous demonstration of six highly interpretable dimensions allows us to be confident that these dimensions are distinct entities. Further, we can use these dimensions to characterize the different emotions in much richer detail than was previously possible.

Properties of the Emotions

Happiness and pride. Subjects' experiences of happiness and pride were very similar

---

[10] SINDSCAL analyses were not performed because the distance fitting algorithm can always fit N objects arbitrarily into $N - 1$ dimensions. Therefore the small numbers of objects to be scaled in these analyses (pleasant, $N = 6$ emotions; unpleasant, $N = 9$ emotions) precludes the finding of a meaningful SINDSCAL solution with more than three or four dimensions.

along most of the dimensions. Both emotions were described as extremely pleasant states involving very little effort, a high level of certainty about the situation, and a strong desire to pay attention. Both were associated with attributions of human control and specifically with one's own sense of responsibility and control, but these attributions were considerably stronger for pride. These differences were readily apparent in the experiences subjects described. For pride, the subjects invariably recalled a personal achievement, such as receiving high school graduation awards, being admitted to Stanford University, receiving a part in a play, and winning an election. This sense of personal achievement was not emphasized in the happy experiences. Most subjects (11) remembered enjoyable times spent with other people—being reunited with close friends or relatives after a long absence, being at a party with friends, or going out on a pleasant date.

Interest and hope. Subjects' experiences of interest and hope were quite similar along all the dimensions except pleasantness and certainty. Subjects described interest as a highly pleasant state, whereas hope was considerably less so. Subjects remembered anticipating somewhat more effort when they felt interested or hopeful, and being less certain about their situation than they did for happiness or pride. However, for interest the subjects were still fairly certain, whereas for hope they were quite uncertain about what was happening. Both emotions were accompanied by a desire, particularly strong for interest, to attend to the situation. In both the hopeful and interesting experiences events were seen as largely controlled by the situation, and responsibility/control was not consistently attributed to either the self or to others.

Devout attention is a distinguishing feature of interest. Subjects consistently described novel experiences in which they wanted to learn something about the situation, such as visiting a foreign country, viewing surgery, and going to the opera for the first time. In contrast, moderate uncertainty about the occurrence of a desired outcome was salient in hope. Subjects described situations in which they felt that it was possible, but not certain, that they would get what they wanted. For instance, one subject was hopeful when he was called back for an audition for a part in a play, and another felt hopeful when she learned that a political candidate she was working for was leading in the polls. Further, a number of these situations were ones in which the subjects could do little to affect the outcome, such as waiting for college acceptances, and waiting to see if a friend or relative would recovery from surgery or cancer.

Challenge. Like hope, challenge was described as less pleasant than the other positive emotions, and it was further distinguished by an extremely high level of anticipated effort. However, challenge resembled interest in that subjects felt fairly certain about the situation and strongly desired to attend to it. It was similar to happiness in that it was associated with moderately strong attributions of human agency and self-responsibility/control. For their challenging experiences subjects described situations in which they felt fairly confident that they could achieve a desired goal but knew that it would require a great deal of effort. Six subjects described how they felt immediately prior to and during athletic events, such as when competing against an equally matched or slightly better opponent, or when skiing an advanced slope. Other subjects described more intellectual challenges such as taking an exam, and attempting to succeed at a difficult job.

Surprise. Surprise was described as being extremely pleasant, like happiness, pride, and interest. It was also similar to happiness and pride in that the subjects anticipated expending very little effort. However, subjects felt more uncertain in surprising situations than they did in any others. This uncertainty was accompanied by a strong desire to attend to the situation. Surprise was associated with attributions of human agency, and, unlike other pleasant emotions, it was seen as caused by other people. Subjects always described an unexpected event, such as receiving an *A* in a course for which a *C* was expected, getting a ticket to Hawaii as a birthday present, and getting unexpected flowers from a boyfriend.

Boredom. Subjects described boredom as an unpleasant state quite different from the other negative emotions. As with happiness and pride, subjects anticipated expending very

little effort and were very certain about their situations. Boredom was distinguished from every other emotion by an extremely strong desire to shut out or ignore what was happening. It was also seen as caused by the situation or by other people. Low effort and low attentional activity appear to be central to the experience of boredom. Subjects always described experiences in which they were compelled to remain in a situation where there was little or nothing to keep their minds occupied. Ten subjects described how they felt during classes in which the professor was dull or incomprehensible. Other subjects described how they felt while flying across the country, and being bed-ridden for three days after minor surgery.

Shame and guilt. The cognitive appraisals associated with shame and guilt were virtually indistinguishable from each other. Both emotions were described as unpleasant states requiring a relatively large amount of effort. Subjects remembered feeling moderately certain about the situation, although less so when ashamed than when guilty. They also remembered wanting to avoid thinking about the situation. In shame and guilt, unlike the other negative emotions, a sense of self-blame is central. For both emotions subjects always described situations in which they had done something that they regretted such as stealing something, lying, spreading gossip about a friend, or failing to meet an obligation.

Disgust. In many respects, the appraisal outcomes associated with disgust were similar to those for shame and guilt; it is an unpleasant state involving considerable effort, fairly high levels of certainty, and a strong unwillingness to attend to the situation (even stronger than for shame or guilt). Disgust was also associated with attributions of human control. However, whereas in shame and guilt the self was held responsible, in disgust someone else was seen as responsible. Many subjects described situations in which someone else did something physically repulsive that they wanted to shut out and get away from. For instance, six subjects described experiences in which someone was drunk and obnoxious and in four of the cases eventually got sick. Other subjects described situations in which they were exposed to something they found cognitively repulsive. Three subjects described

being disgusted by someone espousing what they felt were unacceptable, sexist, or racist attitudes.

Anger and contempt. Aside from a slight difference along the anticipated effort dimension, the appraisal outcomes associated with anger and contempt were much alike. Both were described as extremely unpleasant states, and both were associated with a considerable amount of anticipated effort, particularly anger. Like disgust, guilt, and interest, both emotions were associated with a fair degree of certainty about the situation, but neither was consistently associated with a strong desire to either attend to or ignore the situation. Both emotions were associated with strong attributions of human agency and other-responsibility/control. The experiences described for these two emotions were very similar. Typically they involved someone unfairly doing something that had negative consequences for the subject. Interestingly, the experiences associated with contempt tended to involve interpersonal relationships. Seven subjects described situations in which a person had backed out of a date with them, broken up a relationship with them, or had started dating someone with whom they had previously been involved. In contrast, anger was associated with a broader range of experiences, including receiving an unfair grade, having personal property destroyed, and having wine poured over one's head in a restaurant.

Frustration. Frustration was similar to anger in that it was described as a very unpleasant emotion in which the subjects anticipated expending extreme effort. It was accompanied by a fair degree of uncertainty about the situation and by a stronger desire to attend to the situation than for any other negative emotion. Frustration was associated with moderately strong appraisals of both situational control and other-responsibility/ control. An important characteristic of this emotion seems to be failure at something for which success is expected. The failure is often accompanied by uncertainty about its causes. Frustrating expeiences included doing poorly on an exam for which the subject felt she was well-prepared, being unable to get a computer program to run, and trying to write a paper in which the subject knew what she

wanted to say, but "couldn't write it down correctly."

Sadness. Subjects described sadness as being extremely unpleasant. Like contempt, it was associated with a high degree of anticipated effort, though less so than anger or frustration. As with frustration, subjects were somewhat uncertain about the situation, but, as with shame and guilt, subjects indicated a moderate desire to avoid thinking about it. Sadness was distinguished from all other emotions by extreme appraisals of situational control. These appraisals were accompanied by moderately strong appraisals of other-responsibility/control. Apparently, a belief that the unpleasant situation is controlled by impersonal circumstances and that nothing can be done to set it right is crucial to sadness. Several subjects described their sadness at the death of someone they loved. In other situations, in which perhaps the subject or someone else objectively had some control, subjects still reported that they felt that the situation was beyond anyone's control. For instance, one subject described being sad when she learned that her parents were getting a divorce "because I didn't want it, I knew it had to be, and yet I didn't want it." Another subject became sad when a number of problems—difficulties with school work and problems with her family and boyfriend—all converged on her at once. She described her sadness by saying, "I felt like the whole world was against me, and everything was wrong, and I—I had lost control."

Fear. Fear was described as an unpleasant state demanding extreme amounts of effort. Like surprise, fear was associated with maximal uncertainty about the situation. However, this uncertainty was not consistently accompanied by a strong desire to either attend to or shut out the situation. Fear was further associated with strong attributions of situational control, though not as strong as with sadness, and tended to be associated with appraisals of other-responsibility/control. Fear seems to be characterized by uncertainty about whether or not one will be able to escape or avoid an unpleasant outcome. In addition to the fearful experiences already described, subjects told of their feelings while being held up at knife-point, while being lost in the mountains, and after losing control

both while driving in a blizzard and while riding a bicycle down a very steep hill.

Properties of the Dimensions

The descriptions of the individual emotions demonstrate that each emotion (with the exceptions of shame and guilt, and anger and contempt) is characterized by a unique pattern of cognitive appraisals. It is important to consider the role that each of the cognitive appraisal dimensions plays in distinguishing among the emotions.

Pleasantness. As in every study examining the dimensions of emotional experience, we recovered a strong and clear pleasantness dimension. This dimension subsumed the proposed dimensions of legitimacy and perceived obstacle, and accounted for a large proportion of the variance (20–25%). Clearly, emotional experiences are readily classified as pleasant or unpleasant. Beyond this initial classification, however, pleasantness is of limited usefulness in differentiating among the emotions. In classifying the emotions, pleasantness is the single most important dimension when all 15 emotions are considered, but it does not help us much in making further differentiations when only the pleasant or only the unpleasant emotions are considered. Among the pleasant states, hope and challenge tend to be less pleasant than the others, but the unpleasant emotions all are about equally unpleasant. Thus, appraisal outcomes along the other dimensions need to be taken into account.

Anticipated effort. Amount of anticipated effort is particularly important in differentiating the pleasant emotions. Challenge is associated with very high anticipated effort, interest and hope with moderate effort, and happiness, pride, and surprise with very low effort. Among the unpleasant emotions, boredom is distinguished from the others by its extremely low levels of anticipated effort; all the rest tend to be associated with high levels of anticipated effort. When the situation is bad we try to ameliorate it, and that requires effort.

Certainty. Fear, hope and surprise are distinguished from the other emotions by uncertainty. It should be noted that of the six recovered dimensions, the solution for

certainty is the least satisfactory. Although this dimension is clearly defined by the scales designed to measure certainty, the communalities or goodness of fit of these items are only moderate, suggesting that the subjects found this dimension especially difficult to rate consistently. Examination of the experiences subjects described suggests that the recovered certainty dimension may be combining two distinct appraisals: the violation of one's past expectations and uncertainty about future developments. For surprise, subjects invariably described situations in which something unexpected had happened. In contrast, for hope and, to some extent, fear, subjects described situations in which they were unsure about what was going to happen—whether they would be hurt, arrested, or accepted by a good college.

Attentional activity. As the early studies of the dimensions of emotional facial expression suggest, the motive to keep seeking or to look away is important in differentiating emotional states, particularly for the unpleasant emotions. Frustration signifies a need to increase attention, whereas boredom and disgust are distinguished by rejection. All of the pleasant emotions are associated with a strong desire to pay attention, particularly interest and challenge. Although attention is distinct from certainty, the two dimensions are related. Certainty can be associated with a desire either to attend to the situation or to shut it out, but strong uncertainty is never associated with inattention.

Responsibility and control. Consistent with the ideas of Roseman (1984), we find that two dimensions are useful in understanding agency, and both of these dimensions provide substantial differentiation among the emotions. Surprise differs from all other pleasant emotions in its attributions of other-responsibility/control, whereas shame and guilt differ from all other unpleasant emotions in attributions of self-responsibility/control. Although the situational control dimension accounts for a small proportion of the overall variance (4–6%), it is essential for understanding the unpleasant emotions. Sadness and anger are poles apart—when we are angry we believe a person is responsible, but when we are sad we believe that we are victims of circumstance. In discriminating

among the fundamental unpleasant states of sadness, anger, fear, disgust, contempt, and frustration, the situational control dimension is almost as crucial as all of the dimensions combined (see Table 7).

Although the two dimensions involving responsibility and control are orthogonal, the appraisal outcomes along these dimensions are clearly related. When we attribute an outcome to ourself, we attribute it to ourself alone, but strong attributions of both situational control and other-responsibility/control can co-occur, as happens in sadness. It may be that people first appraise the extent to which they are in control of the situation and then, if they do not feel in control, seek other human agents or uncontrollable circumstances.

In sum, each of the cognitive dimensions is important in differentiating one or more of the emotions from the others. The pleasantness dimension chunks emotions into good ones and bad ones, but does not get us much further. Sorrow and anger are the two most unpleasant emotions, but they are very different on other dimensions. The relative importance of a dimension in differentiating among a set of emotions depends on the universe of emotions to be differentiated.

Future Directions

We have demonstrated a strong relation between the interpretation of an event and the emotional reaction to it. We have also identified several of the important dimensions of this interpretation and shown how these dimensions combine to make each of the emotions we have studied unique. We hope that we have helped to make the next questions a little clearer.

Are there further dimensions of emotional experience? Direct rating methods are unable to reveal properties of a phenomenon that are not specifically measured. Therefore, we cannot claim that our six dimensions capture all of emotional experience. Because we derived our dimensions from a comprehensive review of previous theory and empirical findings, we suspect that they are real. Nevertheless, there may be more. We have already suggested that our certainty dimension may confound two distinct appraisals. There is

also some reason to believe that the legitimacy and perceived obstacle dimensions, even though they appeared to be redundant with pleasantness in this study, should be further explored. When the unpleasant emotions are considered alone, what is seen as legitimate is related to who is in control, not to overall pleasantness. Thus appraisals of legitimacy may be distinct from appraisals of either pleasantness or responsibility/control. Similarly, the items intended to measure perceived obstacle sometimes load moderately on anticipated effort, suggesting that this appraisal may be distinct from the appraisals of either pleasantness or effort. Our results clearly indicate that typically, in college students, pleasantness is associated with fairness and few obstacles. However, by asking for one example of each basic emotion, we were probably encouraging reports of fairly prototypical emotional experiences. Thus, we cannot tell whether experiences that are unfair but pleasant, or free of obstacles but unpleasant, are impossible, or whether they are unusual but meaningful emotional experiences.

A further limitation of this study is that it employed expressive subjects in a within-subjects design. This design may have encouraged subjects to exaggerate relatively minor differences between the emotions, and expressive subjects may have reported on experiences that were biased in some manner. It is possible that had a between-subjects design been employed with randomly selected subjects, somewhat different relationships between the emotions might have been found.

We are currently conducting a series of studies that addresses these limitations. In a between-subjects design, we are asking subjects (not selected for expressivity) to describe past emotional situations in which particular appraisal outcomes or combinations of outcomes applied. By avoiding the use of common emotional labels to elicit the experiences, and by studying unusual combinations of appraisal outcomes, we can avoid studying only prototypical emotional experiences and can begin to determine which cognitive appraisal outcomes are central for particular emotions, and which are more optional. For instance, in the present study subjects consistently associated pleasantness with surprise, possibly because the first surprising experiences they thought of were pleasant. Life is full of unpleasant surprises, however, and we expect that we did not hear about them because the surprise was brief and the unpleasant emotion more lasting, and so more definitive. In further research we will ask about such plausible but (in the present study) unusual responses as unpleasant surprise.

How are cognitions and emotions related? The cognitive mapping of emotional experience revealed by our subjects suggests that cognitive appraisals have an important role in the experience of emotion. The nature of this role needs to be further examined. In this study, only dimensions originally thought, and later found, to be closely related to emotional experience were recovered and examined. However, we do not believe that *all* dimensions of cognitive appraisal are related to emotion, nor do we believe that the dimensions we examined are always related to emotion. We suspect, for example, that the appraisal of a person's eye color seldom systematically affects one's emotional state. Similarly, we suspect that it is possible to blame someone else for an unpleasant event that does not affect us personally without becoming angry.

Along with other contemporary emotions theorists (e.g., Arnold, 1960; Izard, 1977; Lazarus et al., 1980; Plutchik, 1980; Roseman, 1984; Scherer, 1982), we believe that emotions represent adaptive responses to the demands of the environment. Interpretation of the perceived situation in terms of prevailing goals creates an emotional experience that allows the organism to respond adaptively (Scherer, 1982). This view implies that cognitive appraisals will lead to an emotional response primarily when they are perceived as having adaptive significance for the organism's well-being. We believe that the dimensions revealed in the present study are an important step in helping us understand the kinds of perceptions that trigger emotions. However, it is still necessary to examine the conditions under which such perceptions will, and will not, result in emotional experience.

We also agree with Scherer (1982) that emotional behavior is an ongoing process—that the organism is constantly evaluating and responding to its environment, and therefore, that emotions are dynamic pro-

cesses rather than steady states. We have started with a method that elicits a fairly static view of the emotions, demonstrating how people saw the world at a particular time when they experienced a given emotion. This approach allowed us to identify relevant appraisal dimensions to be further explored in more dynamic contexts.

For instance, challenge and frustration were similar to each other in that both occurred when subjects wanted to achieve something and thought that they should be able to succeed. The major difference was that when challenged, subjects felt good and were fairly confident of success, but when frustrated, they felt bad and thought that they were failing for reasons they did not quite understand. Thinking dynamically, we would predict that when faced with a difficult goal, people often start out feeling challenged, but that the feeling of challenge will evolve into one of frustration if the goal eludes them. Further, we would predict that if the person perceived that someone else was preventing them from reaching the goal the frustration would turn to anger, but that if the impediment were due to uncontrollable circumstances the frustration would become sadness.

The appraisal process itself is unquestionably dynamic. Outcomes along one dimension influence outcomes along other dimensions. For instance, both pleasantness and uncertainty involve attention, unpleasantness involves anticipated effort. However, the self is only responsible when the situation is not. Why do these dependencies exist? Is it because we failed to consider large enough regions of emotional experience, or is the appraisal process structured so that some decisions preclude other decisions, and perhaps even rule out appraisals along whole dimensions? Having demonstrated that examination of cognitive appraisals can reveal much about the similarities and differences among emotional states, it becomes important to examine how these appraisals affect the ongoing experience of emotion.

References

Abelson, R. P. (1983). Whatever became of consistency theory? *Personality and Social Psychology Bulletin, 9,* 37–54.

Abelson, R. P., & Sermat, V. (1962). Multidimensional scaling of facial expressions. *Journal of Experimental Psychology, 63,* 546–554.

Arnold, M. B. (1960). *Emotion and personality* (2 Vols.). New York: Columbia University Press.

Averill, J. R. (1975). A semantic atlas of emotional concepts. *JSAS Catalogue of Selected Documents in Psychology, 5,* 330 (Ms. No. 421).

Berglund, B., Berglund, U., & Engen, T. (1982). *Multidimensional analysis of emotions expressed in photographs and words* (Report No. 583). Stockholm: Department of Psychology, University of Stockholm.

Block, J. (1957). Studies in the phenomenology of emotions. *Journal of Abnormal and Social Psychology, 54,* 358–363.

Bottenberg, E. H. (1975). Phenomenological and operational characterization of factor-analytically derived dimensions of emotion. *Psychological Reports, 37,* 1253–1254.

Bush, L. E. (1973). Individual differences multidimensional scaling of adjectives denoting feelings. *Journal of Personality and Social Psychology, 25,* 50–57.

Cannon, W. B. (1929). *Bodily changes in pain, hunger, fear, and rage* (2nd ed.). New York: Appleton-Century.

Chatfield, C., & Collins, A. J. (1980). *Introduction to multivariate analysis.* New York: Chapman & Hall.

Clore, G. L., & Ortony, A. (1984). Some issues for a cognitive theory of emotion. *Cahiers de Psychologie Cognitive, 4,* 53–57.

Daly, E. M., Lancee, J. W., & Polivy, J. (1983). A conical model for the taxonomy of emotional experience. *Journal of Personality and Social Psychology, 45,* 443–457.

Darwin, C. (1965). *The expression of the emotions in man and animals.* Chicago: University of Chicago Press. (Original work published 1872)

Davitz, J. R. (1969). *The language of emotions.* New York: McGraw-Hill.

DeRivera, J. (1977). A structural theory of the emotions. *Psychological Issues, 10* (4, Monograph No. 40).

Dixon, W. J. (Ed.). (1981). *BMDP statistical software.* Berkeley, CA: University of California Press.

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17,* 124–129.

Ekman, P., Friesen, 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.

Engen, T., Levy, N., & Schlosberg, H. (1958). The dimensional analysis of a new series of facial expressions. *Journal of Experimental Psychology, 55,* 454–458.

Frijda, N. H. (1969). Recognition of emotion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 4, pp. 167–223). New York: Academic Press.

Frijda, N. H., & Philipszoon, E. (1963). Dimensions of recognition of expression. *Journal of Abnormal and Social Psychology, 66,* 45–51.

Izard, C. E. (1971). *The face of emotion.* New York: Appleton-Century-Crofts.

Izard, C. E. (1972). *Patterns of emotions.* New York: Academic Press.

Izard, C. E. (1977). *Human emotions.* New York: Plenum.

Izard, C. E., & Buechler, S. (1980). Aspects of consciousness and personality in terms of differential emotions theory. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience: Vol. 1. Theories of emotion* (pp. 165–187). New York: Academic Press.

James, W. (1950). *The principles of psychology* (Vol. 2). New York: Dover Publications. (Original work published in 1890)

Kruskal, J. B., & Wish, M. (1978). *Multidimensional scaling.* Sage University paper series on quantitative applications in the social sciences. (Series No. 07–011). Beverly Hills: Sage.

Lazarus, R. S. (1968). Emotions and adaptation: Conceptual and empirical relations. In W. J. Arnold (Ed.), *Nebraska symposium on motivation, 1968* (pp. 175–266). Lincoln: University of Nebraska Press.

Lazarus, R. S. (1984). On the primacy of cognition. *American Psychologist, 39,* 124–129.

Lazarus, R. S., Kanner, A. D., & Folkman, S. (1980). Emotions: A cognitive-phenomenological analysis. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience: Vol. 1. Theories of emotion* (pp. 189–217). New York: Academic Press.

Mandler, G. (1975). *Mind and emotion.* New York: Wiley.

McHugo, G. J., Smith, C. A., & Lanzetta, J. T. (1982). The structure of self-reports of emotional responses to film segments. *Motivation and Emotion, 6,* 365–385.

Mowrer, O. H. (1960). *Learning theory and behavior.* New York: Wiley.

Osgood, C. E. (1955). Fidelity and reliability. In H. Quaslter (Ed.), *Information theory in psychology: Problems and methods.* (pp. 374–386). Glencoe, IL: Free Press.

Osgood, C. E. (1966). Dimensionality of the semantic space for communication via facial expressions. *Scandinavian Journal of Psychology, 7,* 1–30.

Plutchik, R. (1962). *The emotions: Facts, theories, and a new model.* New York: Random House.

Plutchik, R. (1980). *Emotion: A psychoevolutionary synthesis.* New York: Harper & Row.

Pruzansky, S. (1975). *SINDSCAL: A computer program for individual differences in multidimensional scaling.* Unpublished manuscript, Bell Laboratories, Murray Hill, NJ.

Roseman, I. (1984). Cognitive determinants of emotions: A structural theory. In P. Shaver (Ed.), *Review of personality and social psychology: Vol. 5. Emotions, relationships, and health* (pp. 11–36). Beverly Hills: Sage.

Russell, J. A. (1978). Evidence of convergent validity on the dimensions of affect. *Journal of Personality and Social Psychology, 36,* 1152–1168.

Russell, J. A. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology, 37,* 345–356.

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39,* 1161–1178.

Russell, J. A. (1983). Pancultural aspects of the human conceptual organization of emotions. *Journal of Personality and Social Psychology, 45,* 1281–1288.

Russell, J. A., & Mehrabian, A. (1977). Evidence for a three-factor theory of emotions. *Journal of Research in Personality, 11,* 273–294.

Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379–399.

Scherer, K. R. (1982). Emotion as process: Function, origin and regulation. *Social Science Information, 21,* 555–570.

Schlosberg, H. (1941). A scale of the judgment of facial expressions. *Journal of Experimental Psychology, 29,* 497–510.

Schlosberg, H. (1952). The description of facial expressions in terms of two dimensions. *Journal of Experimental Psychology, 44,* 229–337.

Schlosberg, H. (1954). Three dimensions of emotion. *Psychological Review, 61,* 81–88.

Shepard, R. N. (1962). The analysis of proximities: Multidimensional scaling with an unknown distance function. II. *Psychometrika, 27,* 219–246.

Stein, N. L., & Jewett, J. L. (1984). *A conceptual analysis of the meaning of negative emotions: Implications for a theory of development.* Unpublished manuscript, University of Chicago and Northwestern University, Chicago, IL.

Tomkins, S. S. (1962). *Affect, imagery, consciousness: Vol. 1. The positive affects.* New York: Springer.

Tomkins, S. S. (1963). *Affect, imagery, consciousness: Vol. 2. The negative affects.* New York: Springer.

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.

Triandis, H. C., & Lambert, W. W. (1958). A restatement and test of Schlosberg's theory of emotion with two kinds of subjects from Greece. *Journal of Abnormal and Social Psychology, 56,* 321–328.

Weiner, B., Russell, D., & Lerman, D. (1979). The cognition-emotion process in achievement-related contexts. *Journal of Personality and Social Psychology, 37,* 1211–1220.

Wundt, W. (1897). *Outlines of psychology* (C. H. Judd, Trans.). Leipzig: Wilhelm Englemann. (Original work published 1896)

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151–175.

Zajonc, R. B. (1984). On the primacy of affect. *American Psychologist, 39,* 117–123.