

Fuzzy Concepts in a Fuzzy Hierarchy: Varieties of Anger

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This article argues that the concept of anger is not well characterized from the classical perspective. Instead, its membership is graded, its borders are fuzzy, and its subcategories fail to form a true class-inclusion hierarchy. Ss rated potential anger subcategories (fury, jealousy, annoyance, etc.) and remembered instances of their own anger as varying in degree of membership in anger. Degree of membership (prototypicality) predicted each subcategory's availability from memory given the category name, reaction time to verify its status as a subcategory, and its substitutability within naturally generated sentences about anger. Two predictions of a true class-inclusion hierarchy failed: that Ss would agree in adjudicating the membership of potential subcategories of anger and that all instances of a subcategory of anger would also be instances of anger. As an alternative to the classical view, emotion concepts are hypothesized to vary in their degree of breadth and overlap and to be mentally represented as scripts that allow different instantiations in different contexts.

Berkowitz (1993) recently described his research program and theory on anger. Clore, Ortony, Dienes, and Fujita (1993) replied that Berkowitz's work was not really about anger. They argued that, by definition, anger must include a prior perception of blameworthiness, and Berkowitz had left this component out of his theory. Clore et al. (1993) remarked, "Many seemingly empirical issues turn out to be nonempirical matters of definition" (p. 57). But is the perception of blameworthiness a part of the definition of anger? What is the definition of anger? Is it a nonempirical matter?

In this article, we take up the question of how anger is defined. We question the classical approach to matters of definition often implicitly assumed by writers on the topic, including both Berkowitz and Clore et al. (1993). According to the classical approach each concept is defined by a set of common features, each necessary and together sufficient to determine membership. We argue instead that membership in the category of anger is a matter of degree and that borders separating anger from "not-anger" are fuzzy. We argue that the varieties of anger fail to form a true class-inclusion hierarchy as envisioned in both classical and prototype accounts previously proposed (including our own). Our purpose here is not to discover facts about anger per se but to explore the concept of anger.¹ Our focus is on

the prior issue of what events count as anger, on what is and what is not included in the category of anger.

A better understanding of the concept of anger is important for more than just the evaluation of Berkowitz's (1993) theory. Used in everyday life, the concept of anger is part of the implicit folk taxonomy by means of which people categorize the passions they experience, witness, or hear about. In this role, anger is a concept involved every day in people's interpretation of their social world and, according to some writers, to the experience of human emotions (Harré, 1986; Mandler, 1984; Schachter & Singer, 1962). Used in self-report questionnaires or in rating scales, the word *anger* is often essential to the communication between researcher and subject and between therapist and client. Used as a theoretical construct, the concept of anger has been said by certain theorists to denote a "basic" emotion (e.g., Ekman, 1984; Izard, 1977; Johnson-Laird & Oatley, 1989; Tomkins, 1962–1963). And, of course, the everyday conception of anger can be a source of hypotheses for scientific analyses of the events so conceptualized. Traditionally, a definition of anger is required before empirical work on anger per se can begin. Some definition is presupposed in any research program designed to test any hypothesis regarding the events called anger—for the scientist must know which events they are. And yet a definition of anger remains elusive.

Portions of this research were presented at the Canadian Psychological Association Convention in Montreal, June 1988.

This research was supported by University of Winnipeg Group II Grant 4100 awarded to Beverley Fehr and by a grant from the Social Sciences and Humanities Research Council of Canada to James A. Russell.

We thank Dee-Ann Matsugu, Lara Weick, Lisa Wong, and Janet Wu for their help in gathering and analyzing the data.

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The Study of Emotion Concepts

"Emotion concepts have been studied for a long time in a variety of disciplines," Kovecses (1990) noted, and "a common thread that runs through most of the research . . . [is the] classical view" (pp. 1–2). In the classical view, the domain of emotion concepts forms a class-inclusion hierarchy: Emotion includes anger, which includes rage, annoyance, and all other subcategories of anger. Features defining the superordinate concept

¹ Indeed, there is sometimes a confusion in writings on emotion between concepts and the events they are concepts of. A concept of an object or event must be distinguished from the object or event itself.

of emotion are a proper subset of the features defining basic emotions; features defining each basic emotion are a proper subset of the features defining any subordinate category. These criterial features exist in the events conceptualized (in the extension of each concept) and are what is known by anyone who understands the concept (their representation forms its intension). The classical approach to emotion concepts has recently been vigorously renewed and explicitly defended (Clore & Ortony, 1991; Johnson-Laird & Oatley, 1989; Oatley & Johnson-Laird, 1992; Parrott, 1992). Lazarus (1991) recently wrote of the essence of anger and other basic emotions and sought to state their defining features. Even more important, the classical assumptions are often held implicitly.

Rosch (1977) inspired an alternative perspective. Drawing on philosophical analyses (Wittgenstein, 1953), Rosch argued that many (but not all) natural language concepts lack criterial features and instead are understood by means of clearest cases or best examples (prototypes). Other instances can be ordered in terms of their similarity to these prototypical cases; thus, categories possess an "internal structure." Boundaries between categories are fuzzy, with members of one category blending into members of neighboring categories. Subsequently, a family of nonclassical accounts has been proposed (Barsalou, 1987; Kahneman & Miller, 1986; Komatsu, 1992; Lakoff, 1987; Medin, 1989; Neisser, 1987). Recent debate among nonclassical theorists focused on the role of single exemplars as opposed to more abstract representations (Brooks, 1990; Nosofsky, 1988; Reber, 1989). In this article, we do not seek to differentiate within the family of nonclassical accounts but to explore some important attributes that distinguish classically from nonclassically defined concepts.

The present study is part of a larger project analyzing emotion concepts along nonclassical lines (Fehr, 1982, 1988; Fehr & Russell, 1984, 1991; Fehr, Russell, & Ward, 1982; Russell, 1989, 1991, 1992; Russell & Bullock, 1986). Other writers as well have found a nonclassical approach useful in their analyses of emotion concepts (Averill, 1980; Burch & Pishkin, 1984; Conway & Bekerian, 1987; Fitness & Fletcher, 1993; Gurtman, 1987; Horowitz, Wright, Lowenstein, & Parad, 1981; Iaccino, 1989; Lakoff, 1987; Mascolo & Mancuso, 1990; Shaver, Schwartz, Kirson, & O'Connor, 1987; Shields, 1984; Tiller & Harris, 1984). The evidence gathered so far has focused on the superordinate concept of emotion, with little work on less abstract concepts, such as envy, anger, jealousy, and so forth. (One exception is a recent analysis we carried out on the concept of love; Fehr, 1988; Fehr & Russell, 1991.) Informally, we have been told by emotion researchers that the concept of emotion might well be fuzzy, but that anger, like concepts for other "basic" emotions, is surely properly defined. And, indeed, fuzziness in the concept of emotion does not necessarily imply fuzziness in anger or other such concepts of specific emotions.

Investigators coming from both a classical (Clore & Ortony, 1991; Johnson-Laird & Oatley, 1989) and a nonclassical perspective (Fehr & Russell, 1984) have assumed a class-inclusion hierarchy, and therefore the assumption has gone unchallenged. Ironically, Rosch's (1977) nonclassical theory of concepts retained a classical class-inclusion hierarchy for each domain of concepts. Theoretical treatments of emotion often assume that

emotion concepts are organized in a true hierarchy. For example, the category of emotion is often divided into seven (plus or minus two) "basic" emotions² (Ekman, 1984; Izard, 1971; Johnson-Laird & Oatley, 1989; Tomkins, 1962-1963). The number of emotion-related terms in the English language has been estimated between 500 and 2,000 (Averill, 1975; Wallace & Carson, 1973). The assumption is that all such terms have their place as subcategories of the basic emotions. Specific hierarchical structures of emotion concepts have also been derived empirically from hierarchical cluster analysis (Boucher, 1979; Dietze, 1963; Fillenbaum & Rapoport, 1971; Shaver et al., 1987; Storm & Storm, 1987; Stringer, 1967), which assumes rather than tests the hypothesis that emotion categories form an inclusion hierarchy.

The Concept of Anger as Seen by the Experts

All speakers of English know what the word *anger* means. Perfunctory or no effort is therefore typically given to the issue of definition. We assume that what we know is a classical definition, although implicit. The first hint of problem comes when writers attempt to make this assumed knowledge explicit.

Although most writers agree that criterial features for anger exist, they disagree on just what those features are. Sharkey (1988) defined anger as "an internal state involving varying degrees and interactions between physiological, affective, cognitive, motoric, and verbal components" (p. 361). This definition fails to distinguish anger from other emotions or, indeed, from other general psychological states. Other writers differ in which of these features are included and how each feature is specified more precisely.

Some writers have emphasized that anger contains a physiological component (Ausberger, 1986; Ekman, 1992; Izard, 1977; Kliwer, 1986; Likierman, 1987; Mandler, 1984; Novaco, 1975; Spielberg, Jacobs, Russell, & Crane, 1983). Unless the physiological component can be specified to at least some degree, this claim amounts to little more than saying that anger can occur only in biological organisms. Writers are not always clear whether the physiological component is a necessary (defining) feature of anger or merely associated with anger in fact. That physiology is a defining feature can be doubted: Some writers have denied the existence of any physiological component (Averill, 1982; Solomon, 1976); gods, ghosts, and other disembod-

² According to Rosch, Mervis, Gray, Johnson, & Boyes-Braem (1976), once a hierarchy is laid out, one of the levels in that hierarchy will be basic, as determined by a set of converging criteria. Basic-level categories are first learned by children and first enter the lexicon of a natural language. Basic-level categories are labeled by the shortest words and possess more features than superordinate-level categories. The basic level is the most general level at which people use similar motor movements for interacting with category members; category members have similar overall shapes, a mental image can reflect the entire category, and so on. The notion of a basic level of categorization must not be confused with the altogether different notion of a "basic" emotion (Ortony & Turner, 1990). Nevertheless, Shaver et al. (1987) argued that basic-level categories in the emotion domain correspond to basic emotions.

ied creatures are sometimes said to be angry (if meant literally rather than metaphorically, as in an "angry storm"); and computers are claimed capable of literal anger (N. H. Frijda, personal communication; Sloman & Croucher, 1981)—none of these propositions would be meaningful if anger necessarily included a physiological component.

Another possible feature describes the cause of anger. That is, to count as anger, a state must be caused in a certain way. For Clore and Ortony (1991), a certain type of cause—perception of blameworthiness—is a necessary feature of anger. For some writers, the cause is to be described objectively: injury (Alschuler & Alschuler, 1984) or stress or danger (Gaylin, 1984). For other writers, the cause is to be described subjectively: a cognitive appraisal of a situation as immoral (de Rivera, 1977), interference (Kliewer, 1986), a thwarted goal (Mandler, 1984), harm or injury (various classical authors, see Schimmel, 1979), serious or personal threat (Averill, 1982), frustration (Heinrichs, 1986; Hunt, Cole, & Reis, 1958), a threat to self-esteem (Feshbach, 1986; Izard, 1977; Kemper, 1987) or threat more generally (Likierman, 1987; Rubin, 1986), or one of several appraisals such as interference, insult, or frustration (Kliewer, 1986). On the other hand, Johnson-Laird and Oatley (1989) argued that anger can occur for no known reason; it is possible to feel anger and not know why. Their claim entails that a particular type of cause is not a necessary feature of anger.

A third possible component to anger is aggressive behavior (Watson, 1918/1929), a desire or motive to behave aggressively, or a plan to behave aggressively (Frijda, 1986; Mandler, 1984; Rubin, 1986). Other writers have distinguished anger from aggression. Retrospective accounts of anger reveal many cases that subjects categorize as anger but that lack aggressive behavior, desires, or plans (Averill, 1982; McKellar, 1949).

A fourth possible component concerns other feelings or emotions. For example, Stearns (1972) stated, "anger may be best defined as a combination of uneasiness, discomfort, tenseness, resentment (which is a response to selective stimuli), and frustration" (p. 6). Spielberg et al. (1983) defined the subjective component of anger as feelings of tension, annoyance, irritation, fury, and rage. Tyrrell, McCarty, and Johns (1977) said that anger is a secondary emotion that results when primary feelings of fright and frustration are aroused. Danesh (1977) argued that fear is always present when anger is present. Izard (1977) argued that fear and anger are qualitatively distinct basic emotions with separate subjective feelings. Theorists also disagree on whether anger includes only negative (unpleasant) feelings (e.g., Biaggio, 1987; Hunt et al., 1958; Kliewer, 1986), both positive and negative feelings (Schimmel, 1979), or neither (Alschuler & Alschuler, 1984).

There is also no agreement on what are and what are not subcategories of anger. If so, there is, again, no agreement on what is and what is not to be included in the category of anger. Table 1 lists some representative formulations. Allport (1924/1952) simply stated without justification or explanation that *resentment*, *remorse*, *jealousy*, *envy*, *reproach*, *scorn*, and *hatred* are subcategories of *anger*. Tomkins and McCarter's (1964) list was presupposed in the instructions they gave to subjects who were asked to assign emotion labels to facial expressions of so-called basic emotions. Dietze (1963) and Fillenbaum and Rapoport (1971)

carried out hierarchical cluster analyses, but too small a sample of concepts was included to be of much help for present purposes. Shaver et al. (1987) also carried out a hierarchical cluster analysis. In their version, anger is divided into six clusters. Storm and Storm (1987) provided the most comprehensive hierarchical cluster analysis to date, and through a rational and empirical process arrived at a complex structure. *Anger*, *hostility*, and *disgust* are joined together into an unnamed cluster more general than *anger*, but less general than *emotion*. Anger, in turn, is subdivided into the four subcategories shown in Table 1. Johnson-Laird and Oatley (1989) offered a semantic analysis of all English words for emotions. The various subcategories of anger they listed all contain *anger* as a necessary feature.

There is also no agreement on the nature of the universally assumed hierarchy of emotions. Consider the different locations of the concept of hostility, especially as it relates to anger: Hostility is a discrete basic emotion, qualitatively different from anger (Storm & Storm, 1987); anger is a subcategory of hostility (Izard, 1977); hostility is a subcategory of anger (Shaver et al., 1987); *anger* and *hostility* are synonyms, perhaps differing in intensity (Plutchik, 1980; Tomkins & McCarter, 1964); hostility is a subcategory of disgust, which is qualitatively different from anger (Johnson-Laird & Oatley, 1989). For others, hostility is not a category of emotion at all, but a behavior or desire or plan to behave.

Or, consider the different locations of *envy* in relation to anger: Envy is a subcategory of anger (Allport, 1924/1952; Fillenbaum & Rapoport, 1971; Shaver et al., 1987). Envy is a subcategory of disgust, which is qualitatively different from anger (Johnson-Laird & Oatley, 1989). Envy is a subcategory of hostility, which is distinct from both anger and disgust (Storm & Storm, 1987).

In short, the common approach to the concept of anger and the various types of anger remains the classical one: a search for necessary and sufficient (criterial) features to define concepts, all placed within a class-inclusion hierarchy. Still, even if we rely on the definitions and inclusion hierarchies articulated by the experts, we cannot find agreement. Here we attempt to show that the classical assumptions that have guided these attempts probably do not hold for anger. Later, we discuss an alternative approach. We begin with three properties that should help distinguish classically defined concepts from those that are not: internal structure, clarity of boundaries, and class-inclusion hierarchy. The classical account predicts clear boundaries and a true class-inclusion hierarchy; it does not predict (but is not contradicted by) internal structure. Our predictions were the reverse: internal structure but lack of clear boundaries and class-inclusion hierarchy.

Overview

The research reported here was thus aimed at three specific questions: Does anger show evidence of internal structure, as predicted by the various nonclassical accounts? (That is, do members of the category vary in a reliable and meaningful fashion in the degree to which they are members?) Does anger have precise boundaries, or fuzzy ones? And does the family of anger-related concepts fit within a true class-inclusion hierarchy? To

Table 1
Proposed Subcategories of Anger

Source	Subcategories of anger	Comment
Allport (1924/1952)	Resentment, remorse, jealousy, envy, reproach, scorn, hatred	No justification or explanation offered
Dietze (1963)	Ireful	Results of a cluster analysis
Tomkins & McCarter (1964)	Rage, mad, furious, aggressive, hostile	Presupposed as synonyms or subtypes by the judgment scale given subjects. Anger and rage are said to differ in intensity
Izard (1971)	Aggressive, bitterness, enmity, ferocity, furious, fury, mad, rage, revenge, spite, vengeful, vexation	Considered correct labels for a facial expression of anger
Fillenbaum & Rapoport (1971)	Envy	Results of a cluster analysis
Plutchik (1980)	Fury, rage, exasperation, hostility, annoyance	Degrees of intensity along a single continuum
Shaver, Schwartz, Kirson, & O'Connor (1987)	<i>Irritation</i> , aggravation, agitation, annoyance, grouchiness, grumpiness <i>Exasperation</i> , frustration <i>Rage</i> , outrage, fury, wrath, hostility, ferocity, bitterness, hate, loathing, scorn, spite, vengefulness, dislike, resentment <i>Disgust</i> , revulsion, contempt <i>Envy</i> , jealousy <i>Torment</i>	Hierarchical cluster analysis. The six italic terms are subtypes of anger; the remaining terms are subtypes of these
Storm & Storm (1987)	Mad, cholera, fury, rage, wrath Annoyed, aggravated, displeasure, fed up, frustrated, impatient, irritated, not pleased, pissed off, put out, sore, teed off, ticked off, frown, stern, unamused Indignant, insulted, irate, offended, outrage Cross, cranky, discontent, dissatisfied, grouchy	Rational and empirical (cluster analysis) means
Johnson-Laird & Oatley (1989)	Bad blood, bitter, cross, dander, dudgeon, huff, irate, rage, scorn, seethe, splenetic, sulk, tantrum, temper, umbrage, wild, wrath To be aggravated, aggrieved, annoyed, bugged, chafed, disgruntled, displeased, enraged, frustrated, furious, galled, heated, incensed, indignant, infuriated, irked, irritated, livid, mad, maddened, miffed, narked, needled, nettled, peeved, pestered, piqued, pissed, rankled, roiled, sore, teased, vexed Irritable, bad-tempered, choleric, crabby, cranky, crotchety, fractious, grouchy, huffy, ill-humored, ill-tempered, irascible, irritable, petulant, sullen, testy, tetchy, touchy, upright Frustration, discontent Nuisance	Rational analysis

begin to answer these three questions, subjects were given the concept of anger and asked to list its subcategories, that is, the next lower level in the presumed hierarchy of emotion (Study 1). The next two studies concerned the hypothesis of internal structure: that both the subcategories of anger (Study 2) and actual experiences of anger (Study 3) would vary in their degree of membership in the category of anger. Two further studies assessed predicted cognitive consequences of graded membership—that the time to verify membership is proportional to degree of membership (Study 4) and that the perceived naturalness of spontaneously generated sentences about anger declines when less prototypical subcategories of anger are substituted for the word *anger* (Study 5). The final two studies examined the hypothesis that the borders of the concept of anger are fuzzy rather than precise and examined several tests of the notion that anger is embedded in a true class-inclusion hierarchy. Study 6

obtained semantic judgments; Study 7 obtained judgments about actual experiences of emotion.

Together, the results formed a pattern that, we argue, supports our preference for a nonclassical approach: Anger possesses a reliable and meaningful internal structure. Its boundaries are fuzzy. Its subcategories fail to form a true class-inclusion hierarchy. We generally postpone discussion of how the results support this argument until after all seven studies are described. For example, internal structure, which is central to our argument, is best established by a convergence of operations, and these seven studies thus provided seven indexes of graded membership within anger. Rather than compare the indexes as they arise, we postpone comparison until the end. In turn, the existence and meaningfulness of internal structure make the evidence on fuzzy borders predictable and understandable rather than simply random error or confusion.

In the seven studies conducted, subjects were undergraduate students at the University of British Columbia, Vancouver, British Columbia, Canada.

Study 1: Free Listing of Subcategories

In this study, subjects were given the category of anger and asked to list its subcategories. The frequency with which a subcategory was listed was one index of its degree of membership.

Method

Subjects ($N = 317$) were given written instructions that told them we would name a general category and that their task would then be to give us the items that belong to that category. *Seafood, emotion, fear, and love* were given as examples of general categories. Various items that might belong to each were also listed. Each subject was then told that this study concerned the general category of anger. Each was asked to list as many items of the anger category as came to mind. Most subjects quit within a few minutes, and answer sheets were collected after 5 min.

Results and Discussion

In tallying responses, we ignored syntactic form (e.g., *fury* and *furious* were treated as the same response). Subjects listed a total of 635 items, 450 of which were mentioned by only 1 or 2 subjects. Table 2 lists the 185 items mentioned by 3 or more subjects (1% or more of the sample). Of these, few were mentioned by more than a handful, and none by a majority of the subjects. The frequency-of-listing scores changed gradually from the most available (*frustration, hate, and mad*), mentioned by a third of the sample, to the mass of relatively unavailable terms, mentioned by 1% or less. No clear boundary separated available from unavailable items.

To begin to make sense of subjects' responses, we sorted them into five rough groups:

1. Monolexemic general terms. Most were nouns (*hate, rage, and fury*), although a few were adjectives (*mad*). These items appeared to constitute simple subcategories of anger or perhaps synonyms.

2. Adjectives that required the word *anger*. Some responses, all adjectives, were best interpreted as implying the word *anger*. *Violent, explosive, and uncontrolled* (in this context) make better sense if we assume that the subject meant violent anger, explosive anger, and so forth. Many of the subordinate categories seen by Rosch were of this sort (living-room chair and dining-room chair).

3. Causes or objects of anger. Examples are *failure, doing poorly on exam, betrayal, lies, self, and argument*. Subjects who listed these terms apparently meant to say that one type of anger is anger caused by failure, another is anger at doing poorly on an exam, and so on.

4. Behavioral aspects or accompaniments of anger. Examples are *yelling, fighting, hitting, swearing, and screaming*. Subjects who listed these terms apparently meant to say that one type of anger is anger that includes yelling, another is anger that includes fighting, and so forth.

5. Accompanying feelings or states. Examples are *confusion and arousal*. Subjects who listed these terms apparently meant

to say that one type of anger is anger accompanied by confusion, another is anger accompanied by arousal.

These five groups were made up after the fact to fit the data. Not every item was possible to classify in one and only one of the five groups. (Is jealousy a cause, a subcategory, or an accompanying feeling of anger?) Nevertheless, even this preliminary grouping suggests that subjects had a difficult time with the task. They apparently had no common pool of knowledge from which identical responses could be drawn, and each subject resorted to his or her own strategy. Not all of what subjects listed were therefore clear subcategories of anger. Many were not even clear types of emotion. Some subjects seemed to have created their own subcategories, others simply to have free associated, and still others to have resorted to unknown strategies.

A complementary interpretation of these results is that our subjects, faced with a difficult task, altered the instructions. Perhaps they relied on an anger script, complete with antecedents (frustration, doing poorly on exam), behavioral components (screaming, fighting), concomitant feelings (arousal), and consequences (war, killing). Perhaps, alternatively, they may have first generated different exemplars of anger. Rather than intending to say that anger caused by frustration is a subcategory of anger, the subject who responded with *frustration* might have remembered a specific case of anger, which happened to have begun with frustration. On these interpretations, subjects had difficulty producing subcategories of anger, and therefore some resorted to producing parts or instances.

We then selected 32 items from Table 2 for analysis in the next study. We selected items from the full range of frequency-of-listing scores but oversampled items that were more frequently listed, that had been listed in previous studies as subcategories of anger, and that could reasonably stand without addition of the word *anger* (e.g., *hot* was omitted). The 32 selected are presented in Table 3. It might be argued that dictionaries and thesauruses and experts might be consulted for a proper list of anger's subcategories. The approach we took was aimed at the concepts available to everyday thought. Subjects here were adult, college-educated speakers of English, and idiosyncratic terms were omitted. Nineteen of the 32 selected items had been listed in Table 1 as a subordinate category of anger by at least one theorist. Our selection of an item did not assume it to be a genuine subcategory of anger. As we later show, the exact composition of the list of 32 was not a deciding issue in the conclusions we draw.

Study 2: Prototypicality—Semantic Ratings

Even though people believe that category membership is an either-or matter (Medin, 1989), they acknowledge that some members seem to be better examples of the category than others (Rosch, 1977); apples better exemplify the concept of fruit than do figs or pickles.

Method

Subjects ($N = 40$) were presented with the 32 items selected in Study 1. They were asked to rate each on degree of membership (how good it is as an example) in the category of anger. Subjects rated each item on a scale ranging from 1 (*extremely poor example*) to 6 (*extremely good*)

Table 2
Free Listing of Subcategories of Anger

Item	No. of times listed	Item	No. of times listed	Item	No. of times listed	Item	No. of times listed	Item	No. of times listed
Frustration	144	Physical	14	Heat	6	Inconsideration	4	Exasperation	3
Hate	129	Emotional	13	Murder	6	Injustice	4	Eating	3
Mad	104	Envy	13	Prejudice	6	Lover	4	Expression	3
Violence	70	Swearing	13	Punching	6	Misunderstanding	4	Failure	3
Annoyance	65	Destructive	12	Rebelliousness	6	Mild	4	Fire	3
Upset	59	Disgust	12	Silence	6	Miss	4	Humiliation	3
Rage	57	Resentment	12	Stupidity	6	Moody	4	Homework	3
Fury/infuriated	50	Shouting	12	Uptight	6	Obsession	4	Inward	3
Jealousy	42	Sadness	12	Bored	5	Performance	4	Injury	3
Aggression	36	Vengeful	12	Bothered	5	Perturbed	4	Impulsive	3
Hurt	33	Hostile	11	Beat	5	Rejected	4	Losing control	3
Temper (temper tantrum)	33	Impatience	11	Crazed	5	Rude	4	Lineups	3
Fighting	30	People/person	11	Disagreement	5	Rivalry	4	Lost	3
Revenge	30	Crying	10	Destroy	5	Suicidal	4	Maim	3
Pain	24	Disturbed	10	Frenzy	5	Stress	4	Mistrust	3
Yelling	24	Explosive	10	Indignant	5	Sadism	4	Nervousness	3
Confusion	23	Helpless	10	Ignorance	5	Tears	4	Offensive	3
Disappointment	23	Abusive	9	Kicking	5	Tests	4	Political	3
Failure	22	Agitation	9	Losing	5	Ticked	4	Punishment	3
Unhappiness	20	Arousal	9	Lack	5	Uncooperative	4	Pouting	3
Dislike	19	Displeasure	9	Peevishness	5	Verbal	4	Pressure	3
Fear	19	Lies	9	Suppressed	5	Annihilation	3	Power	3
Irritation	19	Spite	9	Sorrow(ful)	5	Avoid	3	Pity	3
Depression	18	Excitement	8	Throwing things	5	Bad drivers	3	Righteous	3
Hitting	18	Irrational	8	Unjustified	5	Blame	3	Repressed	3
Red	18	Doing poorly on exams	8	Unfairness	5	Being late	3	Red face	3
Self	18	Steam	8	Uneasy	5	Boiling	3	Slam doors	3
Killing	17	Wrong	8	Actions	4	Breaking	3	Seething	3
Anxiety	16	Betrayal	7	Blind	4	Clenched	3	Smoking	3
Hot	16	Bitterness	7	Bitching	4	Cheated	3	Sorrow	3
Screaming	16	Aggravation	7	Competitive	4	Contempt	3	Sullen	3
Tension	16	Despise	7	Controlled	4	Cranky	3	Strength	3
Meanness	15	War	7	Enemy	4	Cruel	3	Stimulation	3
Pissed off	15	Anger	6	Friends	4	Despair	3	Seared	3
Uncontrolled	15	Discontent	6	Hyper	4	Desperate	3	Turmoil	3
Argument	14	Fuming	6	Intense	4	Danger	3	Worry	3
Dissatisfied	14								

Note. N = 317.

example). They were allowed as much time as they needed to complete the task. The terms were given in the same random order to each subject.

The 32 words were presented to half the subjects as single terms. A second form was made by converting the single terms to phrases. Usually the word *feeling* was added to the adjectival form; the exceptions were “having a temper tantrum” and “having failed.”

Results and Discussion

The mean prototypicality rating for each of the 32 potential subcategories is reported in Table 3. Although somewhat different results came from the two forms, the correlation between ratings of the terms in the two forms was high ($r = .90$). This index of convergent validity indicates high reliability of the average prototypicality ratings.

Subjects did not produce a bimodal distribution of prototypicality ratings. Rather, prototypicality ratings arranged the 32 candidates from the obvious types of anger to the very question-

able cases, with no clear border between them. Still, it might be argued that whereas some items included in the set of 32 are genuine subcategories of anger, other items are not. If so, the high correlation between forms might be due simply to including both members and nonmembers in the calculation. To examine this possibility, we recalculated the correlation between the two forms for just those items with a pooled rating greater than or equal to 3.50 (i.e., those that fell within the top range of the scale). For these 18 items, the correlation between forms was lower but still statistically significant ($r = .61, p < .05$). Further evidence on this question comes from the next study, which bypasses any choice of subcategories by examining actual cases of anger.

Study 3: Prototypicality—Actual Experiences of Anger

Subjects find it meaningful to rate the degree to which a physical object is an example of a category: A fig is a poorer example

Table 3
Prototypicality Ratings for 32 Candidate Subcategories of Anger

Subcategory	Form 1		Form 2		Combined	
	Rank	<i>M</i>	Rank	<i>M</i>	Rank	<i>M</i>
Fury ^a	4	4.80	1	5.35	1	5.08
Rage ^a	3	4.80	2	5.10	2	4.95
Mad ^a	2	4.89	4	4.70	3	4.80
Anger at self	1	4.95	7	4.40	4	4.68
Violent	7	4.30	3	5.05	5	4.68
Aggravation ^a	5	4.45	10	4.15	6	4.30
Temper tantrum ^a	8	4.30	8	4.25	7	4.28
Hate ^a	10	4.00	6	4.45	8	4.23
Hostility ^a	9	4.25	9	4.20	9	4.23
Fighting	17	3.75	5	4.60	10	4.18
Frustration ^a	6	4.45	15	3.75	11	4.10
Annoyance ^a	12	3.95	11	4.05	12	4.00
Yelling	13	3.95	13	4.00	13	3.98
Spite ^a	18	3.75	12	4.05	14	3.90
Bitterness ^a	11	4.00	14	3.80	15	3.90
Jealousy ^a	14	3.95	17	3.45	16	3.70
Impatience ^a	15	3.85	19	3.20	17	3.53
Upset	16	3.85	22	3.15	18	3.50
Irritation ^a	19	3.75	20	3.20	19	3.48
Resentment ^a	23	3.20	16	3.50	20	3.35
Failure	20	3.65	23	3.00	21	3.33
Humiliation	21	3.25	21	3.20	22	3.23
Disturbed	26	3.10	18	3.25	23	3.18
Indignant ^a	25	3.12	25	2.78	24	2.95
Disappointed	22	3.25	29	2.60	25	2.93
Tension	24	3.15	27	2.65	26	2.90
Discontent ^a	27	3.10	28	2.65	27	2.88
Envy ^a	28	2.80	24	2.90	28	2.85
Disgust ^a	29	2.80	26	2.75	29	2.78
Depression	30	2.50	30	2.00	30	2.25
Sorrow	31	2.40	31	2.00	31	2.20
Fear	32	1.45	32	1.50	32	1.48

Note. Ratings were made on a scale ranging from 1 (*extremely poor example*) to 6 (*extremely good example*). Form 2 was made by changing the word in Form 1 to an adjective (or past participle) and adding the word *feeling*, for most terms—with several exceptions: *feel like fighting*, *feel like yelling*, *feeling of spite*, *having a temper tantrum*, and *having failed*. The correlation between scores obtained from the two forms was .90.

^a These words were listed in Table 1 as a subordinate category of *anger* by at least one theorist.

of a fruit than is an apple (Rosch, 1977). On this subjects agreed. We have just seen that our subjects even agreed that *jealousy* is a poorer example of anger than is *fury*. But if a person were asked to rate his or her own emotional state according to its degree of membership in the category of anger, that might be a different matter. Oatley and Johnson-Laird (1992) argued that one simply knows whether one is angry—there exists privileged access to one's own mental state. If so, the answer would be either yes or no rather than a matter of degree. In this case, asked to rate degree of membership, subjects might refuse or simply avoid the middle of the response scale. The question addressed in the present study was therefore whether subjects find that their own actual experiences of anger vary in the degree to which they involve anger.

Assuming that subjects would be willing to rate the prototypicality of their own anger, we also wondered whether that judgment would amount to a rating of intensity. In the domain of emotion concepts, some researchers have raised the possibility

that differences in prototypicality can be accounted for by intensity alone (e.g., Mascolo & Mancuso, 1989; Tiller & Harris, 1984). We believe that prototypicality must be distinguished from intensity. For some domains, intensity plays no role in prototypicality: In the category of fruit, the apple's greater prototypicality than a fig's is unlikely to be accounted for by the apple being more intense than the fig. In other domains, intensity may be one of the determinants of prototypicality: The more intense red is the more prototypical. Emotion appears to be a domain of this second type.

In this study, we asked subjects to rate prototypicality of their own remembered anger experiences. According to our hypothesis, subjects should find such ratings a meaningful task and use the full scale. We also asked subjects to rate the intensity of the same experience. The two ratings should be positively correlated, but our expectation was that the correlation would not be so large that prototypicality and intensity would be indistinguishable. Subjects were asked to recall an actual instance of

anger. There were five sets of instructions, four of which were designed to request different degrees of prototypicality. The fifth simply asked for the last case of anger.

Method

Subjects ($N = 165$) each received a questionnaire that described the study as one of actual instances of anger. They were asked to recall several of their own anger experiences. Subjects then were randomly assigned to one of five conditions and received one of the following sets of instructions:

Clearst case: We'd first like you to remember several occasions on which you were really angry. Forget about the annoyances and petty irritations and try to recall a few cases of genuine anger. Take a minute to think about each one. Now, please select the one occasion that was the clearest case of anger.

Best example in last week: We'd first like you to remember any occasions in the last week on which you were angry. If possible, think of cases of genuine anger rather than minor annoyances and petty irritations. Take a minute or so to think about one. Now, please select the one occasion that was the best example of anger in the last week.

Poor case: In this study, we're not interested in the melodramatic, textbook cases of anger. Rather, we're interested in the more ordinary, everyday cases where it is sometimes even difficult to decide if you're really angry. If you search your memory for times when you were angry, you'll probably discover several occasions that were only "sort of" anger. Please try to recall several such occasions. Take a minute or so to recall each one. Now please select the one occasion that was anger but that was, nonetheless, a difficult-to-decide case.

Borderline case: In this study, we're not interested in the melodramatic, textbook cases of anger. Rather, we're interested in what we call "borderline" cases, when you're not sure whether what you're experiencing is really anger or not. Most people have occasionally wondered "Is what I'm feeling anger—or something else?" Please search your memory and try to recall just such an occasion. Discard the times when you were definitely not angry. If you can recall more than one "borderline" case, take a minute to think about each one. Now, please select the one occasion where you were really unsure. It might have been anger, it might not have been anger.

Last time: In order that we select an unbiased sample of everyday angry experiences, we'd like you to remember the very last time you were angry. These angry episodes are easily forgotten; so we'd like you to follow this procedure. Try searching your memory by going backward one step at a time. Are you angry now? Were you angry earlier this hour? The hour before? If not today, were you angry last night? And so on. Obviously we're not looking for only the melodramatic, textbook cases of anger. Rather, we want to find the everyday occurrences of anger. So, having searched your memory, please select the very last time you were angry.

The remainder of the questionnaire was identical for all subjects and concerned the episode recalled. The first item asked for a rating of intensity of the recalled experience on a scale from 0 (*not intense at all*) to 8 (*maximum intensity*). The second asked for a rating of how good it was as an example of anger prototypicality. The instructions used were those from Study 2; the rating scale ranged from 0 (*not an example at all*) to 6 (*extremely good example*). The final item asked for a written description of the episode.

Results and Discussion

Table 4 shows the prototypicality ratings for the 165 instances of anger recalled. Across the 165 instances, subjects did not

avoid the middle of the response scale. The conditions are rank ordered in Table 4 according to mean prototypicality, and the rank ordering was as expected. Mean prototypicality of the instances recalled under the various instructions differed reliably, $F(4, 160) = 2.96, p < .05$.

In the best-case condition, most subjects could think of good examples of anger (65% rated moderately good or excellent), although some could think of only a poor example (14% rated moderately or slightly poor). When selection was limited to 1 week or the very last time, fewer cases recalled were good examples. Everyone knows what the word *anger* means, what the prototypical cases are like, even though not everyone may be able to recall experiencing the prototype. These results might be taken to argue for the existence of a mental representation of anger consisting of an abstract schema (prototype, script) in addition to specific exemplars.

These results overall speak against a "demand characteristic" as an explanation. In the first two conditions, the demand was for subjects to recall prototypical cases, and yet some subjects still confessed that they were unable to fulfill that demand and had to report a less good instance. When subjects attempted to find a poor or borderline case, they often could (38% rated poor example or not an example). Still, most of the cases recalled under these instructions were nevertheless rated as good, and some (5%) as excellent, examples (availability from memory may work against an attempt to find poor examples). Perhaps most informative in this regard was the "last time" condition, because there was no attempt to pull either especially prototypical or especially atypical examples of anger. Indeed, this condition may provide an approximate estimate of the distribution of recalled instances of actual anger along the typicality continuum. Prototypical instances of anger were not rare (26% rated moderately good or excellent), but less prototypical examples were common.

Across the 165 cases of anger, rated prototypicality correlated .61 with rated intensity. This intermediate value is consistent with our expectation that although intensity is one of the features that determines prototypicality, it is not the only one. (Our instructions may have worked against our hypothesis by inad-

Table 4
Frequency Distribution of Prototypicality Ratings of Recalled Instances of Anger

Condition	Mean rating	Response category ^a						
		0	1	2	3	4	5	6
Best case	4.73	0	0	2	3	10	14	9
Best case in last week	4.00	0	5	2	5	7	12	6
Last time	3.97	0	4	5	3	7	14	5
Poor case	3.74	1	1	4	6	14	6	3
Borderline case	3.56	0	3	4	9	11	8	1
Total		1	13	16	26	49	54	24

Note. $N = 37$ per condition.

^a Prototypicality ratings were made on a scale where 0 = *not an example at all*, 1 = *extremely poor example*, 2 = *moderately poor example*, 3 = *slightly poor example*, 4 = *slightly good example*, 5 = *moderately good example*, and 6 = *excellent example of anger*.

vertently calling for a positive correlation between intensity and prototypicality. When describing prototypical cases, we asked subjects to forget the “annoyances and petty irritations”—the less intense cases.) That prototypicality is not identical with intensity was reinforced by the subjects’ descriptions of their experiences. The following case was rated as only moderately intense but an extremely good example of anger:

I was seeing someone who had just moved to the area. We’d been dating 2–3 months. He went back to his old city for a visit one weekend. When he got back he told me he had stayed with his old girlfriend.

In contrast, the following was rated as very intense but only a slightly good example of anger:

I went swimming at a pool. I was swinging on a rope, then my arm slipped, and I bashed my knee-cap on the edge.

Similarly, the following was rated as very intense but as an extremely poor example of anger:

At my summer job, I had to work with Cheryl quite closely. The problem was that she didn’t think very highly of me and would do all she could to humiliate me. My particular angry episode was the day she harshly insulted me and then commanded me to sweep the floor. I was torn between feeling crushed, depressed and angry, not to mention worried about what would happen next.

Rosch and Mervis (1975) suggested that prototypicality is mediated by family resemblance—prototypical cases share more features with one another than do nonprototypical cases and have fewer features in common with members of neighboring categories. Earlier research (Fehr & Russell, 1984) failed to find strong evidence for family resemblance effects in the emotion domain: Family resemblance scores were least correlated among eight indices of internal structure. Partly on the basis of this finding, Tiller and Harris (1984) suggested that researchers should look elsewhere for the determinants of typicality effects. One of the alternatives they suggested was intensity. The results of the present study suggest that intensity may indeed be one, but not the sole, determinant of typicality. In complementary research on subcategories of *love*, we found support for the notion that family resemblance may mediate typicality: Family resemblance was the measure that correlated most highly with typicality ratings, $r = .86$ (Fehr & Russell, 1991). Altogether, these results imply that family resemblance among a pattern of features—rather than any single feature—determines prototypicality.

Study 4: Reaction Time to Verify Category Membership

The first three studies gathered evidence that alleged that subcategories of anger or actual experiences of anger can be reliably ordered according to their degree of membership in the category of anger—anger is internally structured. We now turn to one of the hypothesized cognitive consequences of internal structure: Category membership of prototypical cases is verified more quickly than the membership of peripheral cases (Rosch, 1973). For example, the sentence “A robin is a bird” is affirmed more quickly than is the sentence “A penguin is a bird.” “Anger is an emotion” is affirmed more quickly than is

“Pride is an emotion” (Fehr et al., 1982). “Maternal love is a type of love” is affirmed more quickly than is “Puppy love is a type of love” (Fehr & Russell, 1991). The present study sought to test this relationship in the domain of anger.

We selected 20 candidates from the list of 32 used in Study 2; we selected only nouns (thus eliminating *mad*, *violent*, etc.) and eliminated three candidates that might not be considered emotions (*frustration*, *temper tantrum*, and *failure*).

Method

Subjects ($N = 38$) were presented with 60 statements of the form “X is a type of Y” and were asked to respond “true” or “false” to each of the statements. The statements consisted of (a) 10 true prototypical anger statements (e.g., “Fury is a type of anger”), (b) 10 true nonprototypical anger statements (e.g., “Irritation is a type of anger”), (c) 10 false prototypical anger statements (e.g., “Aggravation is a type of building”), (d) 10 false nonprototypical anger statements (e.g., “Depression is a type of fruit”), (e) 5 true prototypical vehicle statements (e.g., “Car is a type of vehicle”), (f) 5 true nonprototypical vehicle statements (e.g., “Carriage is a type of vehicle”), (g) 5 false prototypical vehicle statements (e.g., “Truck is a type of flower”), and (h) 5 false nonprototypical vehicle statements (e.g., “Subway is a type of weapon”).

Subjects first received general instructions and five practice sentences (e.g., “Apple is a type of fruit”) to familiarize them with the task. Responses to the practice items were not recorded. The 60 statements were presented in a separate random order for each subject.

Results and Discussion

Reaction times were analyzed only for “correct” responses. A response was considered correct if the subject responded “true” to a true prototypical or nonprototypical statement and “false” to a false statement. Mean reaction times and percentage of correct responses for each of the anger statements appear in Table 5. Subcategories are ordered by prototypicality ratings from Study 2 to facilitate a comparison between the two measures of internal structure. Dependent sample t tests revealed that, as predicted, reaction times to verify the membership of prototypical instances of anger were faster than to verify nonprototypical instances, $t(37) = 3.49$, $p < .001$ ($M = 1,494$ vs. $1,651$ ms).³ The difference between reaction times for false prototypical and nontypical anger statements was not significant, $t(37) = 1.77$, $p = .09$.

As Fehr et al. (1982) found for the general case of emotion, subjects responded *true* more often to prototypical anger cases than they did to nonprototypical cases, $t(37) = 5.38$, $p < .001$. The mean number of *true* responses was 8.39 for prototypical statements and 6.63 for nonprototypical statements. The difference in number correct between false prototypical (8.95)

³ In another study ($N = 25$) the present result was partially replicated. Subjects responded true or false to a large set of sentences, including 10 of the form “X is a type of anger.” For 5 sentences X was more prototypical (hostility, fury, spite, jealousy, and aggravation); for 5 sentences X was less prototypical (irritation, humiliation, disgust, discontent, and sorrow). Reaction time (for “true” responses only) was 1,768.3 ms for prototypical subcategories and 2,105.7 ms for less prototypical subcategories, $t(24) = 3.78$, $p < .01$.

Table 5
Indices of Degree of Membership

Subcategory	Reaction time ^a	% verifying membership			Substitutability ^d
		Semantic judgment ^a	Semantic judgment ^b	Actual cases ^c	
Fury	1400.97	86.8	100.0	93.3	4.30
Rage	1244.94	86.8	90.6	100.0	4.31
Aggravation	1470.68	89.5	90.3	100.0	4.30
Hate	1422.68	89.5	90.6	93.3	3.39
Hostility	1397.76	86.8	96.9	93.3	3.99
Annoyance	1539.61	86.8	81.3	86.7	3.83
Spite	1581.79	73.7	83.9	86.7	3.34
Bitterness	1413.37	79.0	87.5	80.0	3.68
Jealousy	1527.13	79.0	90.3	73.3	2.94
Impatience	1603.56	84.2	77.4	73.3	3.30
Irritation	1618.87	81.6	90.6	80.0	3.65
Resentment	1612.88	84.2	90.3	80.0	3.47
Humiliation	1657.38	57.9	41.9	80.0	3.07
Tension	1572.39	73.9	48.4	53.3	3.67
Discontent	1656.31	84.2	45.2	53.3	3.94
Envy	1481.69	68.4	71.9	26.7	2.73
Disgust	1644.91	84.2	68.8	66.7	3.68
Depression	1237.73	39.5	35.5	60.0	3.31
Sorrow	1727.14	36.8	21.9	93.3	3.28
Fear	1334.41	57.9	31.3	60.0	2.91

^a Study 4, reaction time in milliseconds. ^b Study 6, *N* varied from 30 to 32. ^c Study 7, *N* = 15. ^d Study 5 substitutability scores derive from ratings made on a scale where 1 = *very peculiar* and 6 = *very natural sounding*. *Anger* received a mean naturalness score (substitutability) of 4.82 when it was left unsubstituted in the sentence.

and nonprototypical (9.10) cases was not significant, $t(37) = -.92, p > .10$.

As expected, true prototypical vehicle statements were verified more quickly than were true nonprototypical vehicle statements, $t(37) = 3.18, p < .01$ (1,213 vs. 1,330 ms). However, unlike the anger statements and unlike Fehr et al.'s (1982) findings with vehicle statements, false prototypical instances were verified more quickly than were false nonprototypical instances, $t(37) = 3.21, p < .01$ (1,310 vs. 1,408 ms). The mean number correct did not differ for true prototypical and nonprototypical vehicle statements, $t(37) = -.15, p > .10$ (4.53 vs. 4.55 out of 5, respectively), nor did it differ for false prototypical and nonprototypical ones, $t(37) = -1.15, p > .10$ (4.63 vs. 4.76, respectively). It may be that a ceiling effect occurred with the vehicle statements. It should also be kept in mind that only half as many vehicle statements as anger statements were used in this study.

Study 5: Substitutability

Another hypothesized cognitive consequence of internal structure is that prototypical cases are closer to what is meant in using the concept. To illustrate, Rosch (1977) showed that a spontaneously generated sentence about fruit, such as "A bowl of fruit makes a nice centerpiece for the table," continues to sound quite natural when *apples* or words for other prototypical fruit are substituted for *fruit*. On the other hand, the sentence sounds peculiar when a nonprototypical fruit, such as *watermelons*, is substituted for *fruit*. This finding suggests that prototypical exemplars are closer to the meaning of *fruit* than the orig-

inator of the sentence had in mind when generating the sentence. Similar effects were found when types of emotion, such as love, hate, and awe, were substituted in sentences about emotion (Fehr & Russell, 1984) and when subtypes of love were substituted in sentences about love (Fehr & Russell, 1991). In this study, anger was the category of interest.

Method

Twenty-one frame sentences containing the word *anger* were first generated by students in an introductory psychology class (the sentences appear in Table 6). Next, a pool of 420 experimental sentences was formed by substituting each of the 20 candidate subcategories given in Table 5 for the word *anger*. A new sample of subjects (*N* = 105) then responded to the experimental and original sentences. Sentences were drawn such that each subcategory and each sentence frame appeared only once for each subject (thereby yielding 21 versions of the questionnaire). Subjects rated each sentence on a scale where 1 = *very peculiar* and 6 = *extremely natural sounding*. Five subjects received each version of the questionnaire.

Results and Discussion

For each frame sentence, a naturalness score for anger and for each candidate subcategory was calculated as the mean of the 5 subjects' ratings. Naturalness scores were then correlated with the prototypicality ratings obtained in Study 2; the results are shown in Table 6. The correlations were generally in the expected positive direction, although with an extensive range (-.23 to .76). About half were reliably positive; none were reliably negative. This range might reflect sampling error. Alterna-

Table 6
Correlations Between Naturalness and Prototypicality for 21 Sentences

Sentence	<i>r</i>
He was very temperamental and could not control his anger.	.76*
The little boy felt anger when he wanted to stay up late and his mother would not let him.	.73*
Anger is often accompanied by violence.	.69*
He showed his anger by breaking the door.	.63*
When people lie, it makes me feel angry.	.61*
In a fit of anger, I threw a tennis racquet at my brother.	.56*
Because he experiences anger easily, Jerry has high blood pressure.	.54*
Many people use the emotion anger to release all their anxieties and problems.	.53*
That insult started to raise my anger at that person.	.49*
I feel anger when I am taken for granted by others.	.46*
The father showed anger toward his son for breaking the window.	.45*
Anger occurs when you extremely disapprove of something.	.38
Many people who experience anger yell at someone to let off some steam.	.34
Anger is something that everyone must release once in awhile.	.22
Anger is like a tornado of the mind that sweeps up and destroys all in its path.	.22
Most of my anger is brought on by myself because I have not worked hard enough to achieve a certain goal.	.13
Injustices of any kind make me feel anger.	.13
A person might feel anger if something wrong is being done and he or she cannot do anything about it.	.08
Anger often results when things turn out differently than expected.	-.06
Failing at a task causes great anger.	-.14
Anger can be a positive emotion when controlled and directed.	-.23

Note. The sentences were all written by university undergraduates.

* $p < .05$.

tively, the range might reflect something about the frame sentences. The sentences that did not yield positive correlations tended to apply to many emotions. For example, fill in the blank in this sentence: “_____ often results when things turn out differently than expected.” One could reasonably have filled in *surprise*, *anxiety*, *disappointment*, *excitement* as well as *anger* or almost any emotion. Now, fill in the blank in the next sentence: “The little boy felt _____ when he wanted to stay up but his mother wouldn’t let him.” *Anger* seems the most likely candidate, although *disappointment* and *sadness* also come to mind.

Finally, as another index of internal structure, a substitutability score was computed for each target subcategory by averaging naturalness scores across the 21 sentences. These scores are reported in Table 5.

Study 6: Subordinate Status and Fuzzy Borders— Semantic Judgments

If something is a cocker spaniel, then it is a dog. If someone is a mother, then she is a female. If something is an X, then it is a Y whenever X is a subordinate category of Y. In a classically defined hierarchy, each subcategory is an unequivocal member of the category directly above it in the hierarchy and a nonmember of all categories not in that pathway. This principle is a necessary feature of a true hierarchical relationship and therefore provides a basis for a test of the existence of such a relationship. One question addressed in the next two studies is whether subcategories of anger share these properties.

A second, related question addressed in these two studies was

raised by Armstrong, Gleitman, and Gleitman (1983). They demonstrated that a concept’s possession of an internal structure does not prove that it has fuzzy boundaries or lacks defining features. They showed that classically defined concepts, such as *even number*, possess an internal structure—subjects reliably rated 4 better than 106 as an example of an even number. The studies reported so far in this article concerned internal structure, and the possibility therefore remains that anger is as classically defined as *even number*.

Armstrong et al.’s (1983) result challenged prototype researchers to state a clear difference between classically defined and prototypically defined concepts. One difference should concern the existence of unclear cases (Fehr & Russell, 1984). If category membership is determined by possession of a set of defining features, then membership is either-or; the boundaries of the category are clearcut. Suppose that Category Y is defined by Features a and b. If Category X is defined by Features a, b, and c, then X is a subcategory of Y. Thus, in the classical view, people should agree on which events and which subcategories are and are not members of classically defined concepts. On the other hand, membership in prototypically defined concepts is graded, and boundaries between concepts are fuzzy. Because membership is determined by resemblance, an inherently graded attribute, people can disagree on the membership of borderline cases.

Fehr and Russell (1984) found that for classically defined concepts such as *female*, *odd number*, and *even number*, subjects showed high agreement in deciding whether subcategories belonged to the more superordinate category, regardless of the

prototypicality of those subcategories. In contrast, for *fruit, vegetable, vehicle, and emotion*, subjects agreed on the category membership of prototypical subcategories but disagreed on the membership of nonprototypical instances. Subjects did not appear to know, even implicitly, any means of achieving a consensual decision. Of course, this evidence pertains to superordinate categories. What remains unknown, and hence examined here, is whether subjects show the same kind of disagreement when adjudicating membership in a less abstract category such as anger.

Method

Subjects (*N* = 123) were asked directly about target subcategories of anger. There were four versions of a 25-item questionnaire. Items were of the form "Is X a Y?" drawn from a pool of 100 questions. Thirty-five items in the pool were the questions of interest, in which X was replaced by a candidate subcategory of anger and Y was replaced by the word *anger*. The remaining 65 were filler items, for 50 of which the expected answer was no and the higher level category name (Y) was *fear, joy, agitation, or sadness*. Each version of the questionnaire was completed by between 30 and 32 subjects.

Results and Discussion

From our point of view, agreement among subjects on membership is inherently a matter of degree. According to the classical view, in contrast, the answer to the question of whether a genuine subcategory of X is a member of X should be an unequivocal yes. A subcategory of any other emotion should produce an unequivocal no. Thus, both ours and the classical account expect the answer in some cases to be clearly yes or no. What differentiates the two accounts is that the classical one requires all cases to be clear. Our account predicts some unclear cases and predicts that the unclear cases will be the peripheral ones. In other words, we expect amount of agreement to vary gradually from the clear yeses through the unclear cases to the clear nos. This gradual shift should correspond to internal structure, the continuum of the degree of membership. Three features of the present results are therefore important: (a) that the shift from subcategories to nonsubcategories is gradual and reliable, (b) that the shift is correlated with other indices of internal structure, and (c) that at least some cases lack consensus.

The percentages of subjects answering yes for the 20 candidate subcategories of anger are shown in Table 5. Results for all subcategories proposed by Shaver et al. (1987) are shown in Table 7. The results show a gradual shift from 100% down to 22% affirming membership. At one extreme were fury and outrage, which everyone agreed were subcategories of anger. At the other extreme were depression, sorrow, and fear, which fewer than a third of the sample agreed were subcategories of anger. The ranking of candidates was a reliable phenomenon: The proportion affirming membership found in this study correlated .82 with the proportion affirming membership in Study 4. Later, we show that the proportion of agreement was also related to other indices of internal structure.

It is more difficult to pinpoint the unclear cases. The classical view demands a consensus on every case, but what result constitutes consensus? Obviously, 100% agreement is consensus on

yes, 0% is consensus on no, and a 50–50 split is an unclear case, but what of cases in between? Put another way, how much deviation from 100% or 0% should be allowed as due to random error? The results with fury, rage, aggravation, hate, and hostility suggest that 90%–100% consensus is possible. If so, percentages below 90% but above 10% would indicate unclear cases, and a majority (12) of the 20 target candidates would be unclear.

Even some lists of subcategories prepared by experts (Table 1) included items that fell below the 90% criterion: Allport (1924/1952) and Fillenbaum and Rapoport (1971) listed envy (72%). Izard (1971) listed bitterness (88%), spite (84%), and ferocity (80%). Shaver et al.'s (1987) 28 subcategories of anger (shown in Table 7) ranged from fury (100%) to exasperation (57%). Plutchik (1980) too listed exasperation (57%). Storm and Storm's (1987) list ranged from fury (100%) to discontent (55%). Johnson-Laird and Oatley's (1989) list is especially important because they were explicit in their definitions and in contrasting theirs with a prototype account. They argued that bitterness (88%), spite (84%), annoyance (81%), impatience (77%), and discontent (45%) are all subcategories of anger and, in fact, include anger as a defining feature; for such candidates, subjects should have reached consensus on yes. In contrast, hate (91%), hostility (97%), jealousy (90%), humiliation (42%), and envy (72%) are subcategories of disgust and include disgust as a defining feature; for these seven candidates, subjects should have

Table 7
Percentage of Subjects Affirming Membership in the Category Anger for Shaver et al.'s Subcategories

Subcategory	%
Fury	100
Outrage	100
Hostility	97
Vengefulness	97
Rage	91
Hate	91
Irritation	91
Aggravation	90
Jealousy	90
Resentment	90
Bitterness	88
Wrath	87
Spite	84
Scorn	83
Annoyance	81
Ferocity	80
Grouchiness	80
Contempt	80
Frustration	73
Grumpiness	73
Dislike	73
Loathing	73
Envy	72
Agitation	70
Disgust	69
Revulsion	67
Torment	60
Exasperation	57

Note. Data for 15 of these items are repeated from Table 5.

reached consensus on no. The results are clearly at odds with these predictions.

Some of these unclear cases might be attributed to error and could arouse debate over the definition of consensus. It might be argued that 90% is therefore too high for consensus. Suppose that consensus is set at 75%, halfway between 100% and 50%. Then, 7 of the 20 target subcategories remain unclear; 10 of the 28 candidates proposed by Shaver et al. (1987) remain unclear. Moreover, lowering the criterion for consensus comes at a cost. For example, contempt (80%) now achieves consensus as a subcategory of anger (Table 7). In unpublished data, we asked subjects whether contempt was a type of disgust; 82.1% of one sample and 78.0% of another sample said yes. Thus, contempt would achieve consensus both as a subtype of anger and as a subtype of disgust. Moreover, some experts believe that contempt is a discrete basic emotion distinct from both anger and disgust (Ekman & Friesen, 1986; Izard, 1971).

Suppose that an even more liberal definition of consensus is taken. For all candidates on Shaver et al.'s (1987) list to be clear cases, consensus would have to be defined as 57% or greater. Even with consensus set at 57%, tension (48%) and discontent (45%) remain unclear cases. Moreover, the closer the level is to 50%, the more the notion of consensus loses any meaning, and the hypothesis of clear boundaries becomes untestable. In addition, the lower the criterion for consensus, the more likely a given candidate achieves consensus as a member of more than one basic emotion, and the less likely would the entire set be to achieve mutual exclusivity, a topic taken up in the next study.

Among the filler items, we included several that turned out to be revealing. The results of Table 7 show that 70% agreed that agitation is a subcategory of anger; one of the filler items revealed that 53% of the same sample also agreed that agitation is a subcategory of fear. Moreover, 67% agreed that fear is a subcategory of agitation, and 77% agreed that anger is a subcategory of agitation. Table 7 shows that 60% agreed that torment is a subcategory of anger; a filler item revealed that 67% agreed that torment is a subcategory of fear, and 83% agreed that torment is a subcategory of sadness. Subjects in this study therefore violated two further properties of a class-inclusion hierarchy. They endorsed the same item as a member of different, higher level categories (i.e., they agreed that A is a subcategory of both B and C). They also agreed both that A is a subcategory of B and that B is a subcategory of A.

Study 7: Subordinate Status and Fuzzy Borders—Actual Experiences

The previous study asked subjects to make judgments about the meaning of words. The next study asked subjects to make analogous judgments about actual instances of emotion.

Each subject was asked to recall vividly a specific clear instance of a candidate subordinate category of anger (e.g., recall a time when you were annoyed). The subject then judged whether the emotion recalled was also anger (as well as other emotions). If annoyance is a genuine subcategory of anger, then the subject should always reply yes. (This procedure is equivalent to asking a subject to think of an actual cocker spaniel they

had encountered and then to state whether that particular creature was a dog.)

This study was also designed with another purpose in mind. Subjects were asked whether various emotions in addition to anger were also present in the instance recalled. Some of their responses provided data relevant to another presupposition of a class-inclusion hierarchy, namely, mutual exclusivity.

Method

Each subject was asked to remember the last clear case of one specific emotion. The emotions were the 20 candidate subordinates of anger. Each emotion was responded to by a separate sample of 15 subjects (thus, $N = 300$). Subjects were asked which of 14 other feelings were present during the emotion remembered. The questionnaire then listed 14 feeling terms: *anger* plus seven candidate subcategories of anger (listed in Table 8). The remaining 6 were filler items intended to disguise the purpose of the study. The response scale called for a yes or no on each of the 14 terms.

Results and Discussion

The number of subjects affirming membership in the category of anger for cases of the 20 target subordinates is shown in Table 5. Once again, the candidates did not divide cleanly into those that were subcategories of anger and those that were not. As in Study 6, one can debate how to define consensus, but however it is done, some candidates were unclear. In addition, at a given cut-off for consensus, some targets defined as clear cases in Study 6 became unclear cases in Study 7.

In formal class-inclusion hierarchies, categories at the same level are mutually exclusive: Nothing is a member of more than one category. Suppose that anger formed a strict hierarchy with seven subcategories: rage, hate, envy, frustration, hostility, jealousy, and disgust. By the principle of mutual exclusivity, any emotional state that counts as one of these would not be any of the others. Table 8 presents results from the present study in a way that allows a test of such a hypothesis. By mutual exclusivity, all entries would be zeros, signifying that a clear instance of one was thereby a nonmember of all others. The results clearly violated this principle.

The taxonomies given in Table 1 suggest other hypotheses that can be explored with these data. For example, Izard (1971) considered hostility as a general category, with anger, disgust, and contempt as its subordinates. This hypothesis was not well supported in that 7% of those who recalled a case of anger, 33% who recalled disgust, and 20% who recalled contempt were not in a state of hostility. According to Storm and Storm (1987), Johnson-Laird and Oatley (1989), and Shaver et al. (1987), contempt is a subcategory of disgust. On the other hand, Izard's (1971) hierarchy has contempt and disgust as mutually exclusive. Neither hypothesis was well supported in that 27% of subjects who recalled an occasion of contempt denied that they were in a state of disgust, and 73% affirmed that they were.

It might be argued that perhaps up to 33% of our subjects were simply ignorant of the meaning of the words involved. The difficulty is finding an allowance for error and ignorance that still preserves the empirical quality of the hypothesis tested. Moreover, recall that the experts have not agreed on such

Table 8
Number of Violations of Mutual Exclusivity

Stimulus emotion	Rated emotion						
	Rage	Hate	Envy	Frustration	Hostility	Jealousy	Disgust
Rage	—	10	1	14	12	3	10
Hate	12	—	1	10	14	2	12
Envy	2	4	—	11	5	14	3
Frustration	6	3	0	—	8	0	5
Hostility	5	6	1	14	—	1	7
Jealousy	6	2	8	14	10	—	6
Disgust	7	8	0	7	10	1	—

Note. Maximum possible in each cell is 15.

matters either. On the other hand, although Storm and Storm (1987) and Johnson-Laird and Oatley (1989) were explicit, Izard (1971) and Shaver et al. (1987) might not have meant to claim that their hierarchies had all the properties of a true class-inclusion hierarchy. But then arises the question of just what properties are their proposed hierarchies supposed to have.

It has been argued that prototype researchers have confused meaning with an identification function. Fuzziness arises, according to this argument, when identifying cases of anger (or of dog or of grandmother), not in the meaning of anger (or dog or grandmother). The results of the present study might seem subject to this criticism because, unlike Study 6, it concerned actual cases. However, notice that identification had already taken place (the subject recalled an instance already identified as, say, annoyance). The question posed here concerned a semantic relation: Was that previously identified case of annoyance also a case of anger? If annoyance were defined as a subcategory of anger, or included anger as a defining feature, then the answer follows by simple logical deduction.

General Discussion

Internal Structure

The internal structure of a concept—variation of members in the degree to which they are members—is best demonstrated through a convergence of measures. The studies reported here provided seven separate measures of the degree to which 20 potential subcategories of anger vary in membership. The measures were (a) frequency of free listing (Study 1), (b) direct prototypicality rating (Study 2), (c) reaction time to verify membership (Study 4; inversely related to internal structure), (d) percentage verifying membership (Study 4), (e) substitutability into sentences about anger (Study 5), (f) percentage of agreement on membership of subcategories (Study 6), and (g) percentage of agreement on membership of instances (Study 7).

Correlations between these measures (calculated across the 20 candidates) are shown above the diagonal in Table 9. All of the correlations were in the expected direction, although nonsignificant in 7 of the 21 cases (principally those involving reaction time). Reaction time had been expected to correlate negatively with the other measures, but the correlations found were uniformly low and, with one exception, nonsignificant.

A possible criticism of the results just described is that the least prototypical of the 20 candidates were really nonmembers and that the correlations obtained reflected nothing but this fact. To address this criticism, correlations were recalculated across the 15 most prototypical candidates (on the basis of the direct ratings of Study 2, we omitted *envy*, *disgust*, *depression*, *sorrow*, and *fear*). The resulting correlations are shown below the diagonal in Table 9. Again, all of the correlations were in the expected direction, although nonsignificant in 6 of the 21 cases (principally those involving the free-listing measure). (The magnitudes of the correlations involving free-listing were not altered much, but the drop from 20 to 15 cases meant that higher magnitudes would be required to reach the conventional level of significance.) In this recalculation, the reaction time measure now yielded significant results. (Thus, the five omitted candidates may have represented less reliable reaction time data because they were based on fewer cases, as shown in Table 5.) Overall, the general convergence shown in Table 9 suggests that gradedness of internal structure is a reliable property of the concept of anger rather than the result of precisely which candidates are sampled or of mere confusion by the subjects over a particular measure of prototypicality.

The results just mentioned pertain to gradedness of the subcategories within anger. Gradedness was also found with actual emotional experiences. In Study 3, subjects reported that their own experiences of anger were graded. In Study 7, subjects reported that their actual experiences of fury, rage, and so on varied in degree of membership in the category of anger.

Anger's internal structure is a key property in understanding cognitive processes involving the concept of anger, for internal structure has been related to major indices of cognitive processing: what people have in mind when they use the concept in a sentence, availability from memory, speed of processing, and inductive inference. Internal structure also helps undermine the classical view. The classical view did not predict internal structure and cannot, without ad hoc assumptions, account for internal structure. Internal structure was predicted by Rosch's (1977) notion of resemblance to prototypical cases and is integral to all nonclassical accounts. Therefore, evidence of internal structure supports an alternative account that helps explain how people could understand and use a concept like anger without knowing, even implicitly, a list of necessary and sufficient

Table 9
Correlations Among Measures of Internal Structure

Measure	1	2	3	4	5	6	7
1. Frequency of free listing ^a	—	.44*	-.36*	.35*	.15	.37*	.33*
2. Prototypicality ratings ^b	.48*	—	-.24	.72**	.64**	.85**	.65**
3. Reaction time ^c	-.46*	-.88*	—	-.01	-.20	-.20	-.09
4. % affirmative responses ^d	.43	.48*	-.50**	—	.56*	.82**	.29
5. Substitutability ^e	.07	.62**	-.57**	.65**	—	.44*	.56**
6. % agreement on subcategories ^f	.34	.68**	-.61**	.65**	.44	—	.44*
7. % agreement on instances ^g	.37	.79**	-.67**	.38	.57*	.73**	—

Note. Correlations above the diagonal were calculated across the 20 subcategories of anger listed in Table 5, those below the diagonal across the top 15 subcategories; *t* tests were one-tailed.

^a Study 1. ^b Study 2, combined results from two forms. ^c Study 4. ^d Study 4. ^e Study 5. ^f Study 6. ^g Study 7.

* $p < .05$. ** $p < .01$.

features. Nevertheless, internal structure alone does not directly contradict the classical view. For that, we must turn to a demonstration of fuzzy borders.

Fuzzy Borders

Several writers (Clore & Ortony, 1991; Oatley & Johnson-Laird, 1992; Parrott & Smith, 1991) argued that the mental representation of specific emotion concepts includes both a prototype (thus, accounting for internal structure) and a classical definition. Clore and Ortony (1991) pointed out that people have a "representation of the essence of great-grandmotherhood" (p. 49) and so people might also have a representation of the essence of anger. Specifically, they suggested that the "perception of some kind of injustice or blameworthy act is not only a typical feature of anger, it is a necessary feature of anger" (p. 50).

We know of no empirical evidence on the question of whether perception of blameworthiness is a necessary or merely typical feature of anger, but consider the question in light of the evidence we do have. Suppose that perception of blameworthiness were a necessary feature of anger and that our representation of the essence of anger included this information. Now, ask yourself whether irritation, annoyance, grouchiness, contempt, frustration, and grumpiness are subcategories of anger. The answer would be an unequivocal no for any item on the list that lacked perception of blameworthiness as a necessary feature. We suggest that perception of blameworthiness is not a necessary feature in any of these concepts, and yet we know that some subjects and some experts do believe that some of them are subcategories of anger. Or consider the emotion of jealousy. According to most analyses here, and according to some experts (Allport, 1924/1952; Shaver et al., 1987), jealousy is a prototypical subcategory of anger. Yet, according to recent findings, "having one's partner merely pay attention to a member of the opposite sex is a potent elicitor of jealousy, no matter how blameless his or her intentions" (Fitness & Fletcher, 1993, p. 949). If so, jealousy would not be a subcategory of any concept that includes perception of blameworthiness as a necessary feature.

The possibility of necessary and sufficient features seems unlikely in light of other evidence gathered here. Three studies

found that subjects did not agree with one another on whether, for example, disgust is a subcategory of anger. In Studies 4 and 6, although subjects agreed with one another concerning membership of the most prototypical subcategories, they did not do so for the less prototypical ones. In Study 7, subjects recalled actual cases of disgust and other alleged subcategories of anger and then, in some instances, indicated that these emotions were not anger. Experts too have not agreed among themselves. For Shaver et al. (1987), disgust is a subcategory of anger; for Ekman and Friesen (1986), Izard (1971) and Johnson-Laird and Oatley (1989), disgust and anger denote separate basic emotions. Moreover, the unclear cases could be predicted independently on the basis of internal structure: Unclear cases were the less prototypical cases. Thus, contrary to Clore and Ortony (1991), anger's prototypes and internal structure are not separate from its definition but involved in the only definition of anger we have.

Such results as we obtained would be surprising—indeed, inexplicable—if people shared a specific test for deciding questions of category membership. That is, if disgust and anger, like triangle and pentagon, were classically defined categories, then that definition would specify the criterial features that would determine membership of any specific subcategory in an unequivocal manner. The criterial features need not be explicit (people need not be able to articulate what the features are), but the features must be at least implicit in the sense of determining semantic judgments. The existence of unclear cases indicates that no defining features are known. It appears that people estimate category membership on the fly (Kahneman & Miller, 1986) and do not do so in a way that achieves consensus. Instead, they may rely on similarity or resemblance and then make an arbitrary cutoff.

Hierarchical Structure

The central question raised here concerned hierarchical structure. Study 1 demonstrated the difficulty subjects had in producing the next lower level of the anger hierarchy. Subjects did list subcategories, but the large number of idiosyncratic terms and the variety of strategies used to generate subcategories suggested, not surprisingly, that people do not share an ex-

PLICIT, ready-made, well-elaborated taxonomy for types of anger. Instead, they compose one on request. Of course, it remains possible that subjects did possess such a taxonomy, but implicitly, and could not make it explicit under the conditions of this study.

Further results argued against an implicit class-inclusion hierarchy. In Studies 6 and 7, clear violations of the rules of such a hierarchy were found. Subjects regarded A as a member of Category B and then turned around and regarded B as a member of Category A. For example, the majority agreed both that agitation is a subcategory of anger and that anger is a subcategory of agitation. In addition, subjects also violated mutual exclusivity when they treated A as a member of both Categories B and C; agitation was rated as a type of anger as well as a type of fear. In adjudicating particular candidates, subjects did not agree with one another. They did not possess a preformed list of anger's subcategories, nor did they appear to possess the means of deciding particular cases in a consensual manner.

It might be argued that we have not examined all possible lists of subcategories and that some other list will form a true hierarchy. The combined results of Studies 6 and 7 make this possibility appear very unlikely. Those candidates most likely to achieve consensus on being subcategories of anger are those least likely to be mutually exclusive. Consider the candidate subcategories that achieved the most consensus: *fury*, *rage*, *hostility*, and *mad*. We might suppose that at least these four candidates are true subcategories of anger. But clearly *fury*, *rage*, *hostility*, and *mad* are far from mutually exclusive. A further problem with this solution is what to do with the remaining concepts: *hate*, *spite*, *resentment*, and the other items listed in Tables 1 and 2. If these are not subcategories of anger, they are less likely subcategories of fear, surprise, happiness, disgust, and sadness, the other usual candidates for basic-level concepts (Johnson-Laird & Oatley, 1989; Shaver et al., 1987). If *hate*, *spite*, *resentment*, and the like are themselves basic level, then the number of basic-level categories is going to be huge, and the set of basic-level concepts is unlikely to be mutually exclusive. The challenge to proponents of the classical view is to agree on how to arrange the full set of emotion concepts into a class-inclusion hierarchy.

Once we question the assumption of a strict hierarchy, the anomalies generated in earlier attempts to delineate that hierarchy become more apparent. For instance, in Shaver et al.'s (1987) study, the emotions *love*, *joy*, *anger*, *sadness*, *fear*, and perhaps *surprise* were taken to be basic-level concepts. *Longing* appeared as a subcategory of *love*, which in turn was a subcategory of positive emotion. If this were correct, *longing* would be a positive emotion. In fact, the authors noted that many subjects classified *longing* as a form of *sadness*, which fell among the negative emotions. A hierarchical structure can be imposed (through statistical or other means) on concepts, like those related to emotion or to anger, but we must not assume that the resulting hierarchy necessarily represents something psychologically real or that the relationships among the concepts conform to the assumptions of that hierarchy. Some small subsets may even form a strict hierarchy (e.g., *rage* may be a proper subset of *anger*), but it appears that most emotion concepts do not.

Where Does the Classical Approach Stand?

Do people act as if they possess a classical definition for the concept of anger? Do the concepts surrounding anger form a class-inclusion hierarchy? Our case against the classical account is empirical rather than logical. In seven studies, college educated speakers of English were given opportunities to use anger and related concepts in a way predicted by the classical account. They did not. Experts so far have been unable to agree on the required necessary and sufficient features or on the nature of the class-inclusion hierarchy surrounding anger. Of course someone may yet propose a set of criterial features and a class-inclusion hierarchy and show that these features and that hierarchy are what mediate the use of anger and related concepts. Such a demonstration has not yet occurred.

It might be argued that the list of candidate subcategories studied here was in some way flawed, that the subjects were confused or ignorant or, more generally, that the research reported here was inadequate. Empirical conclusions always remain vulnerable to further evidence. Nevertheless, in light of the success of nonclassical accounts of many everyday concepts (Medin, 1989), the classical view is no longer the only possibility. It is no longer reasonable to assume the classical view until proven otherwise. Although it is always possible that an empirical case for a classical approach to anger will be made, that case has not yet been made. No evidence favors that hypothesis, and available evidence speaks against it.

One classical alternative remains. Perhaps each individual possesses a classical definition, but different individuals possess different definitions. The evidence gathered here is consistent with this possibility, and so it cannot be ruled out. Nevertheless, this possibility is not what any of the proponents of the classical view had in mind (Clare & Ortony, 1991; Johnson-Laird & Oatley, 1989; Parrott & Smith, 1991). Communication between individuals would be miscommunication in a way never envisioned by proponents of the classical view. On this alternative, anger has no one definition, and so those theorists who attempt to state its definition are mistaken. To our knowledge, the possibility of idiosyncratic classical definitions has not been seriously proposed by any writer on this topic and thus remains merely a theoretical possibility.

An Alternative

It may be time to focus on what people actually do rather than on what they do not do. The results reported here speak against one account—the classical account—of these facts. We have also departed significantly from Rosch's (1977) theory of concepts by challenging Rosch's assumption of a hierarchy of discrete levels and consequently the possibility that one level in that hierarchy is basic. But we have yet to specify an alternative. Some writers have suggested alternatives. Averill (1982) argued that the concept of anger is a syndrome, no one feature of which is defining. Conway (1990) argued that emotion concepts include memories for salient individual episodes. de Sousa (1987), Lakoff (1987), and Kovecses (1990) argued that the concept of anger is a prototypical scenario. Kahneman and Tversky (1982) argued that scenarios can be mentally simulated rather than re-

trieved from memory. Our hypothesis is consistent with these ideas: To know the concept of anger is to know a script (to be able to simulate a scenario) in which prototypical antecedents, feelings, expressions, behaviors, physiological changes, and consequences are laid out in a causal and temporal sequence (Fehr & Russell, 1984). Actual experiences resemble the prototypical script in various ways and to various degrees.

The anger script is more complex than this simple description above implies, because the script specifies different episodes for different contexts.⁴ The anger script is not isolated from general knowledge but is embedded in it. The anger script generates families of episodes that vary with context. The word *family* is a metaphor for the way in which the meaning of the script varies with the context of its use. Langer (1942) illustrated this point with the verb *to run*:

If we say: The brook runs swiftly, the word runs does not connote any leg-action, but a shallow rippling flow. If we say that a rumor runs through the town, we think neither of leg-action nor of ripples; or if a fence is said to run around the barnyard there is not even a connotation of changing place. Originally these were probably all metaphors but one (though it is hard to say which was the primitive literal sense). (p. 140)

Scholars examining the varied uses of the verb *to run* might hypothesize a common feature, such as describing a course, but this feature is an abstraction created by the scholars after the fact. "Describing a course" is not contained in the word *run*; it is not represented in the minds of English speakers, and it played no role in the history of the word. Presumably, the abstraction "describing a course" would not be true of earlier meanings of *run*, nor possibly of later meanings. In a similar fashion, anger and related concepts capture a family of scenarios connected in diverse ways. *Anger* has changed its meaning over the course of history, and words translated as *anger* in other languages do not capture exactly the same set of events.

When no context is specified, the word *anger* recalls its own prototypical context: One person offends another. The offended person is overwhelmed with feelings, impulses, and sensations. He (and we think the prototypical angry person is a man) glares, clenches, struggles to control his anger, and then lashes out in violence. But the script is such that somewhat different sequences are recalled when more context is specified. A young man "angry at the world" recalls a more brooding, irritable person, subject perhaps to bouts of self-destructive behavior. An angry infant may respond simply to frustration with loud crying. An angry politician may give impassioned speeches.

What counts as anger in one context might not in another. Consider an angry mob and an angry judge. An angry mob might inflict wanton violence on innocent bystanders and property. An angry judge might with a stern demeanor advocate a stiff punishment and ask the police to take the prisoner away. But a judge who inflicted wanton violence on innocent bystanders and property would be considered insane rather than angry. And a mob that advocated a stiff punishment in a stern demeanor would be considered a sober, judicious mob, not an angry one.

Alleged subcategories of anger such as annoyance or jealousy are similarly understood in terms of scripts and are similarly context dependent. Scripts for the candidate subcategories over-

lap with and resemble the anger script in various ways and to various degrees. Yet, few if any features are shared by all the subcategories; they bear a family resemblance to one another. Subcategories thus vary in their degree of membership in anger, and no sharp boundary separates subcategories from non-subcategories. The features of scripts are not each necessary and together sufficient to define membership in any script, and therefore one script cannot easily be said to be a subcategory of another or mutually exclusive with a third. (The script notion per se is not incompatible with a classical view. On the classical view, the script for each subcategory of anger would have to include all the features of anger plus more differentiating features. Our account predicts that, in fact, few emotion scripts are so organized.)

According to our alternative account, the set of emotion concepts do not form a class-inclusion hierarchy. Instead, emotion concepts form a fuzzy hierarchy, which means that the concepts vary (a) in breadth, that is, in the range of events they denote and (b) in the degree to which they overlap. The concept of emotion is very broad, and it overlaps many other concepts. Overlap is not class inclusion because the overlap is not complete, as when some cases of pride are emotional but others are not. Upset is less broad than emotion but broader than anger. Anger, in turn, is broader than and overlaps with rage. Contempt, disgust, frustration, jealousy, envy, and so on overlap anger, but not completely. If the emotion domain is structured in the way just described, it would be understandable that our subjects, and psychological theorists before them, would have difficulty producing one consensual hierarchy. When categories overlap and boundaries between them are fuzzy, different (and logically incompatible) hierarchies are possible, with each capturing some features and some cases.

Breadth is a continuum: Some concepts are more abstract, some less so. In a fuzzy hierarchy, it is therefore impossible to delineate distinct levels, such as superordinate, basic, and subordinate or even high, middle, and low. Thus, it is not surprising that even researchers working within the nonclassical prototype perspective have been unable to agree on just which categories form the "basic level" of categorization. Nevertheless, Rosch, Mervis, Gray, Johnson, and Boyes-Braem's (1976) notion of basic can be salvaged by applying the notion to individual categories rather than to one level of categorization. A category is basic when it more nearly maximizes the combination of breadth and distinctiveness. More abstract categories are too broad, and more specific categories are too distinct. In this modified version, basicness is a matter of degree: Some categories are more basic than others. Hypotheses regarding basicness would be similarly graded. For example, the more basic the category, the earlier it is learned.

P. Shaver (personal communication, June 23, 1993) suggested the possibility that the anger script forms a core on which other (subordinate) scripts are built. Fury, indignation, exasper-

⁴ The anger script must be combined with general knowledge to yield specific expectations in specific circumstances. One three-and-a-half-year-old was asked, what would an angry tiger do? He replied, "eat you." Asked what an angry butterfly would do, the child replied, "fly very fast."

ation, and so on are alterations of and therefore subcategories of anger. His analogy was to football where there is one standard, official game on which variants are built (touch football, flag football, and other unnamed informal games created on the spot). Our guess is that Shaver's proposal might hold for small clusters of emotion categories (e.g., rage and irritation might be built on anger), but we doubt that most categories are defined in this manner. Our alternative view is that no one script holds a privileged central status. Those scripts defined by fewer features are simply broader in scope (have greater extension). A language can add a new script to articulate an important emotional situation. In our view, jealousy is defined not so much as a variant of anger as it is built on a love triangle. Frustration is built on a different situation, the blocking of a desire. In contrast, fury is built on the intensity and extremity of the response, whatever the eliciting situation. Annoyance is built on the moderateness of the response and the pettiness of the eliciting situation. Shaver's proposal predicts clear clusters centered on a core script, whereas we predict that a given "subordinate" category might resemble several different "core" scripts and thus might straddle the borders. An actual case of jealousy, for example, might more resemble fear than anger, another might resemble sorrow, and a third might resemble disgust, although the prototypical case most resembles anger.

The notion of context-sensitive scripts within a fuzzy hierarchy suggests a rather different analysis of the domain of emotion concepts than commonly presupposed. Some scripts are broad, abstract notions with few features; other scripts specify a highly detailed story. Each script can stand alone in the sense of needing no other emotion scripts, although no emotion script can stand without general background knowledge. The emotion domain seen from this perspective is markedly less rigid than the classical hierarchy, because no one feature, concept, or rule is necessary for the functioning of this knowledge structure. Thus, new scripts can be added without altering the original structure. Old concepts can fall out of use or change their meaning. Children can acquire the concepts in partial form and in various orders. Natural languages can evolve along different courses. There is no necessary one-to-one translation of emotion words between languages (Russell, 1991).

Finally, let us consider what this analysis implies for the emotion psychologist. Psychologists must study the everyday concept of anger, for it is a psychological phenomenon as worthy of study as any. But psychologists need not use the everyday concept of anger in their theories of the events referred to as anger, for science must be ever open to new conceptualizations. When they theorize about anger as an event, psychologists can modify or even abandon any conceptualization. Thus, many of the implications of a prototype analysis of emotion apply to the use and study of anger and need not be repeated here (Bullock & Russell, 1986; Fehr & Russell, 1984; Russell, 1989, 1991). Perhaps one example would be allowed.

What does our analysis of anger say to theorists such as Berkowitz (1993) and Clore et al. (1993)? According to our proposed alternative, the word *anger* takes on a specific meaning in a specific context. Within limits, any user can create a meaning by specifying how he or she is using the word. Psychologists too can create more delineated concepts by specifying how they are

using the word *anger* in a specific article. Thus, the context of his article made it clear that Berkowitz (1993) used the word *anger* to refer roughly to any impulse to aggression triggered by an unpleasant event. Clore et al. (1993) used the word *anger* to refer to cases that begin with a perception of blameworthiness. Although the sets of cases selected by these two definitions may overlap somewhat, they are largely distinct. By specifying their meaning, each writer is prescribing rather than describing the meaning of anger. Each writer is therefore better translated as saying, "let me specify a particular class of events." Contrary to their own claims, the writer is not usefully translated as saying, "let me describe what the word *anger* really means." From our (descriptive) point of view, both Berkowitz (1993) and Clore et al. (1993) were using *anger* in a legitimate (but atypical) way, for the nature of our everyday concepts is that they can take on specific meanings in specific contexts. Their ideas are only incompatible if we assume that they are using *anger* in the same way. Their hypotheses are compatible when translated as suggesting testable accounts of different classes of events.

References

- Allport, F. H. (1952). *Social psychology*. New York: Johnson. (Original work published 1924)
- Alschuler, C. F., & Alschuler, A. S. (1984). Developing healthy responses to anger: The counselor's role. *Journal of Counseling and Development*, 63, 26-29.
- Armstrong, S. L., Gleitman, H., & Gleitman, L. R. (1983). What some concepts might not be. *Cognition*, 13, 263-308.
- Ausberger, D. (1986). An existential approach to anger management training. *Journal of Psychology and Christianity*, 5, 25-29.
- Averill, J. R. (1975). A semantic atlas of emotional concepts. *JSAS Catalog of Selected Documents in Psychology*, 5, 330. (Ms. No. 421)
- Averill, J. R. (1980). A constructivist view of emotion. In R. Plutchik & H. Kellerman (Eds.), *Theories of emotion* (Vol. 1, pp. 305-340). San Diego, CA: Academic Press.
- Averill, J. R. (1982). *Anger and aggression: An essay on emotion*. New York: Springer-Verlag.
- Barsalou, L. W. (1987). The instability of graded structure: Implications for the nature of concepts. In U. Neisser (Ed.), *Concepts and conceptual development: Ecological and intellectual factors in categorization* (pp. 101-140). Cambridge, England: Cambridge University Press.
- Berkowitz, L. (1993). Towards a general theory of anger and emotional aggression: Implications of the cognitive-neoassociationistic perspective for the analysis of anger and other emotions. In R. W. Wyer & T. K. Srull (Eds.), *Perspectives on anger and emotion* (Vol. 5, pp. 1-46). Hillsdale, NJ: Erlbaum.
- Biaggio, M. K. (1987). Clinical dimensions of anger management. *American Journal of Psychotherapy*, 41, 417-427.
- Boucher, J. D. (1979). Culture and emotion. In A. J. Marsella, R. G. Tharp, & T. J. Ciborowski (Eds.), *Perspectives on cross-cultural psychology* (pp. 159-178). San Diego, CA: Academic Press.
- Brooks, L. (1990). Concept formation and particularizing learning. In P. P. Hanson (Ed.), *Information, language and cognition: Vancouver studies in cognitive science* (Vol. 1, pp. 141-167). Vancouver, Canada: University of British Columbia Press.
- Bullock, M., & Russell, J. A. (1986). Concepts of emotion in developmental psychology. In C. E. Izard & P. B. Read (Eds.), *Measuring emotions in infants and children* (Vol. 2, pp. 203-237). Cambridge, England: Cambridge University Press.
- Burch, J. W., & Pishkin, V. (1984). Family resemblance—Category

- structure of joy and shame. *Journal of Clinical Psychology*, 40, 1136–1143.
- Clore, G. L., & Ortony, A. (1991). What more is there to emotion concepts than prototypes? *Journal of Personality and Social Psychology*, 60, 48–50.
- Clore, G. L., Ortony, A., Dienes, B., & Fujita, F. (1993). Where does anger dwell? In R. W. Wyer & T. K. Srull (Eds.), *Perspectives on anger and emotion* (Vol. 6, pp. 57–88). Hillsdale, NJ: Erlbaum.
- Conway, M. A. (1990). Conceptual representation of emotions: The role of autobiographical memories. In K. J. Gilhooly, M. T. G. Keane, R. H. Logie, & G. Erbos (Eds.), *Lines of thinking: Reflections on the psychology of thought* (pp. 133–143). New York: Wiley.
- Conway, M. A., & Bekerian, D. A. (1987). Situational knowledge and emotions. *Cognition and Emotion*, 1, 145–191.
- Danesh, H. B. (1977). Anger and fear. *American Journal of Psychiatry*, 134, 1109–1112.
- de Rivera, J. (1977). *A structural theory of the emotions*. New York: International Universities Press.
- de Sousa, R. (1987). *The rationality of emotion*. Cambridge, MA: MIT Press.
- Dietze, A. G. (1963). Types of emotions or dimensions of emotion? A comparison of typal analysis with factor analysis. *Journal of Psychology*, 56, 143–159.
- Ekman, P. (1984). Expression and the nature of emotion. In K. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 319–344). Hillsdale, NJ: Erlbaum.
- Ekman, P. (1992). Are there basic emotions? *Psychological Review*, 99, 550–553.
- Ekman, P., & Friesen, W. V. (1986). A new pan-cultural facial expression of emotion. *Motivation and Emotion*, 10, 159–168.
- Fehr, B. (1982). *Prototype organization of emotion*. Unpublished master's thesis, University of British Columbia, Vancouver, British Columbia, Canada.
- Fehr, B. (1988). Prototype analysis of the concepts of love and commitment. *Journal of Personality and Social Psychology*, 55, 557–579.
- Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of Experimental Psychology: General*, 113, 464–486.
- Fehr, B., & Russell, J. A. (1991). The concept of love viewed from a prototype perspective. *Journal of Personality and Social Psychology*, 60, 425–438.
- Fehr, B., Russell, J. A., & Ward, L. M. (1982). Prototypicality of emotions: A reaction time study. *Bulletin of the Psychonomic Society*, 20, 253–254.
- Feshbach, S. (1986). Reconceptualization of anger: Some research perspectives. *Journal of Social and Clinical Psychology*, 4, 123–132.
- Fillenbaum, S., & Rapoport, A. (1971). *Structures in the subjective lexicon*. San Diego, CA: Academic Press.
- Fitness, J., & Fletcher, G. J. O. (1993). Love, hate, anger, and jealousy in close relationships: A prototype and cognitive appraisal analysis. *Journal of Personality and Social Psychology*, 65, 942–958.
- Frijda, N. H. (1986). *The emotions*. Cambridge, England: Cambridge University Press.
- Gaylin, W. (1984). *The rage within*. New York: Simon & Schuster.
- Gurtman, M. B. (1987, August–September). *What is an affective prototype?* Paper presented at the 95th Annual Convention of the American Psychological Association, New York.
- Harré, R. (1986). An outline of the social constructionist viewpoint. In R. Harré (Ed.), *The social construction of emotions* (pp. 2–14). Oxford, England: Basil Blackwell.
- Heinrichs, D. J. (1986). A psychoanalytic approach to anger management training. *Journal of Psychology and Christianity*, 5, 12–24.
- Horowitz, L. M., Wright, J. C., Lowenstein, E., & Parad, H. W. (1981). The prototype as a construct in abnormal psychology: I. A method for deriving prototypes. *Journal of Abnormal Psychology*, 90, 568–574.
- Hunt, J. McV., Cole, M. W., & Reis, E. E. S. (1958). Situational cues distinguishing anger, fear, and sorrow. *American Journal of Psychology*, 71, 136–151.
- Iaccino, J. (1989). *Understanding the concept emotion: Support for a prototype perspective*. ERIC-CAPS: Office of Educational Research and Improvement, Communication and Reading Skills Database.
- Lisle: Illinois Benedictine College, Department of Sociology-Psychology. (ERIC Document Reproduction Service No. ED 299637)
- Izard, C. E. (1971). *The face of emotion*. New York: Appleton-Century-Crofts.
- Izard, C. E. (1977). *Human emotions*. New York: Plenum Press.
- Johnson-Laird, P. N., & Oatley, K. (1989). The language of emotions: An analysis of a semantic field. *Cognition and Emotion*, 3, 81–123.
- Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, 93, 136–153.
- Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases*. Cambridge, England: Cambridge University Press.
- Kemper, T. D. (1987). How many emotions are there? Wedding the social and the autonomic components. *American Journal of Sociology*, 93, 263–289.
- Kliwer, D. (1986). A life-cycle approach to anger management training. *Journal of Psychology and Christianity*, 5, 30–39.
- Komatsu, L. K. (1992). Recent views of conceptual structure. *Psychological Bulletin*, 112, 500–526.
- Kovecses, Z. (1990). *Emotion concepts*. New York: Springer-Verlag.
- Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago: University of Chicago Press.
- Langer, S. K. (1942). *Philosophy in a new key*. Cambridge, MA: Harvard University Press.
- Lazarus, R. S. (1991). Progress on a cognitive-motivational-relational theory of emotion. *American Psychologist*, 46, 819–834.
- Likierman, M. (1987). The function of anger in human conflict. *International Review of Psycho-Analysis*, 14, 143–161.
- Mandler, G. (1984). *Mind and body: Psychology of emotion and stress*. New York: Norton.
- Mascolo, M. F., & Mancuso, J. C. (1989). *Prototype representations of individual emotion categories*. Unpublished manuscript.
- Mascolo, M. F., & Mancuso, J. C. (1990). *The structure and content of emotion knowledge: A prototype approach*. Unpublished manuscript.
- McKellar, P. (1949). The emotion of anger in the expression of human aggressiveness. *British Journal of Psychology*, 39, 148–155.
- Medin, D. L. (1989). Concepts and conceptual structure. *American Psychologist*, 44, 1469–1481.
- Neisser, U. (1987). *Concepts and conceptual development*. Ecological and intellectual factors in categorization. Cambridge, England: Cambridge University Press.
- Nosofsky, R. M. (1988). Exemplar-based accounts of relations between classification, recognition, and typicality. *Journal of Experimental Psychology: Learning Memory and Cognition*, 14, 700–708.
- Novaco, R. W. (1975). *Anger control: The development and evaluation of an experimental treatment*. Lexington, MA: Lexington Books.
- Oatley, K., & Johnson-Laird, P. N. (1992). Terms of emotion: The inferences that can be drawn. *Revista de Psicologia Social*, 7, 97–104.
- Ortony, A., & Turner, T. J. (1990). What's basic about emotions? *Psychological Review*, 97, 315–331.
- Parrott, W. G. (1992). Emotion concepts in theory and in everyday life. *Revista de Psicologia Social*, 7, 115–123.
- Parrott, W. G., & Smith, S. F. (1991). Embarrassment: Actual vs. typical

- cases, classical vs. prototypical representations. *Cognition and Emotion*, 5, 467-488.
- Plutchik, R. (1980). *Emotion: A psychoevolutionary synthesis*. New York: Harper & Row.
- Reber, A. S. (1989). Implicit learning and tacit knowledge. *Journal of Experimental Psychology: General*, 118, 219-235.
- Rosch, E. H. (1973). On the internal structure of perceptual and semantic categories. In T. E. Moore (Ed.), *Cognitive development and the acquisition of language* (pp. 111-144). San Diego, CA: Academic Press.
- Rosch, E. (1977). Human categorization. In N. Warren (Ed.), *Studies in cross-cultural psychology* (Vol. 1, pp. 1-49). San Diego, CA: Academic Press.
- Rosch, E., & Mervis, C. B. (1975). Family resemblances in the internal structure of categories. *Cognitive Psychology*, 7, 573-605.
- Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology*, 8, 382-439.
- Rubin, J. (1986). The emotion of anger: Some conceptual and theoretical issues. *Professional Psychology: Research and Practice*, 17, 115-124.
- Russell, J. A. (1989). Measures of emotion. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience* (Vol. 4, pp. 83-111). San Diego, CA: Academic Press.
- Russell, J. A. (1991). In defense of a prototype approach to emotion concepts. *Journal of Personality and Social Psychology*, 60, 37-47.
- Russell, J. A. (1992). Brief comments on the study of emotion concepts. *Revista de Psicologia Social*, 7, 259-263.
- Russell, J. A., & Bullock, M. (1986). Fuzzy concepts and the perception of emotion in facial expressions. *Social Cognition*, 4, 309-341.
- Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review*, 69, 379-399.
- Schimmel, S. (1979). Anger and its control in Graeco-Roman and modern psychology. *Psychiatry*, 42, 320-337.
- Sharkin, B. S. (1988). The measurement and treatment of client anger in counseling. *Journal of Counseling and Development*, 66, 361-365.
- Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion and emotion knowledge: Further explorations of a prototype approach. *Journal of Personality and Social Psychology*, 52, 1061-1086.
- Shields, S. A. (1984). Distinguishing between emotion and nonemotion: Judgments about experience. *Motivation and Emotion*, 8, 335-369.
- Sloman, A., & Croucher, M. (1981). *Why robots will have emotions*. Paper presented at 7th International Conference on Artificial Intelligence, Vancouver, British Columbia, Canada.
- Solomon, R. C. (1976). *Passions*. New York: Doubleday.
- Spielberger, C. D., Jacobs, G., Russell, S., & Crane, R. S. (1983). Assessment of anger: The State-Trait Anger Scale. In J. N. Butcher & C. D. Spielberger (Eds.), *Advances in personality assessment* (Vol. 2, pp. 161-189). Hillsdale, NJ: Erlbaum.
- Stearns, F. R. (1972). *Anger: Psychology, physiology, and pathology*. Springfield, IL: Charles C Thomas.
- Storm, C., & Storm, T. (1987). A taxonomic study of the vocabulary of emotions. *Journal of Personality and Social Psychology*, 53, 805-816.
- Stringer, P. (1967). Cluster analysis of non-verbal judgments of facial expressions. *British Journal of Mathematical and Statistical Psychology*, 20, 71-79.
- Tiller, D. K., & Harris, P. L. (1984). *Prototypicality of emotion concepts: A discussion of normative data*. Unpublished manuscript, Oxford University, Oxford, England.
- Tomkins, S. S. (1962-1963). *Affect, imagery, consciousness* (Vols. 1 and 2). New York: Springer.
- Tomkins, S. S., & McCarter, R. (1964). What and where are the primary affects? Some evidence for a theory. *Perceptual and Motor Skills*, 18, 119-158.
- Tyrrell, R., McCarty, F. H., & Johns, F. (1977, February). The many faces of anger. *Teacher*, pp. 60-63.
- Wallace, A. F. C., & Carson, M. T. (1973). Sharing and diversity in emotion terminology. *Ethos*, 1, 1-29.
- Watson, J. B. (1929). *Psychology from the standpoint of a behaviorist*. Philadelphia: Lippincott. (Original work published 1918)
- Wittgenstein, L. (1953). *Philosophical investigations*. New York: Macmillan.

Received March 6, 1991

Revision received December 23, 1993

Accepted February 4, 1994 ■