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WHY BEHAVIOR ANALYSTS SHOULD STUDY EMOTION: THE EXAMPLE OF ANXIETY

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Historically, anxiety has been a dominant subject in mainstream psychology but an incidental or even insignificant one in behavior analysis. We discuss several reasons for this discrepancy. We follow with a behavior-analytic conceptualization of anxiety that could just as easily be applied to emotion in general. Its primary points are (a) that language-able humans have an extraordinary capacity to derive relations between events and that it is a simple matter to show that neutral stimuli can acquire discriminative functions indirectly with no direct training; (b) that private events can readily acquire discriminative functions; (c) that anxiety disorders seem to occur with little apparent direct learning or that the amount of direct learning is extraordinarily out of proportion with the amount of responding; and (d) that the primary function of anxious behavior is experiential avoidance. We conclude that the most interesting aspects of anxiety disorders may occur as a function of derived rather than direct relations between public events and overt and private responses with avoidance functions. Implicit in this conclusion and explicit in the paper is the assertion that anxiety is a suitable subject for behavior-analytic study.

DESCRIPTORS: anxiety, emotion, avoidance, stimulus equivalence, relational frame theory

Anxiety is a topic of primary importance in most approaches to psychopathology. Anxiety co-occurs so prevalently with psychological distress that it, along with depression, has been described as the psychological equivalent of fever (Carson, 1997). Major theoretical positions ranging from Freudian psychoanalysis (May, 1950; Strachey, 1966) to existentialism (Yalom, 1980) describe anxiety as a central feature (sometimes *the* central feature) of behavioral disorders. There are several peer-reviewed journals devoted exclusively to the topic (e.g., *Anxiety, Journal of Anxiety Disorders, Anxiety, Stress, & Coping*). The *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM-IV*; American Psychiatric Association, 1994) lists 12 distinct anxiety diagnoses. A search for the term using the electronic psychFirst database produced 6,425 referenced articles from 1993 to 1997. In contrast, contemporary behavior analysts have published very little on anxiety, or indeed on the scientific study of emotion in general. In this paper we discuss reasons for this reluctance, describe recent developments in the experimental analysis of human behavior that make behavior-analytic study of anxiety (and emotion in general) more tenable, and briefly examine some applied implications of these recent developments. The paper will conclude with a caveat pertaining to the

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term *anxiety* and a recommendation for increased research on the conditions that occasion its use.

Reasons for Limited Behavior-Analytic Research

As a research focus, anxiety is perilous for behavior analysts who wish to maintain fidelity to their view of science. For example, even Freud thought the term was imprecise (Freud, 1917/1966). Precision refers to the number of ways that a specific phenomenon may be construed verbally within a technical analysis; as the number goes down, precision goes up and vice versa (Biglan & Hayes, 1995). Precise definition of terms is differentially valued across various approaches to science; it is fundamental to behavior analysis (Poling, Methot, & LeSage, 1995). Despite the enormous intellectual energy devoted to anxiety since Freud, the number of verbal constructions organized under the term seems to have grown larger and more ambiguous rather than smaller and more precise (cf. Hallam, 1985; Keedwell & Snaith, 1996; Levitt, 1967).

One of the obstacles to precision is the metaphorical, idiomatic basis of the term *anxiety.* Similar to other emotional terms, anxiety was inaugurated as an "as if" descriptive idiom or metaphor (e.g., "it is as if there is stuff that controls thinking," Sarbin, 1968, p. 413). Among its primary predecessors was *anguisse* from the Old French which became *anguish* in Middle English and *anxiety* in modern English (Sarbin, 1964, 1968). *Anguisse* referred to choking sensations in the throat, which, in its subsequent form, anxiety, was helpful in communicating vague or excessive feelings associated with aversive events (Oxford University Press, 1971, p. 95; Sarbin, 1964, 1968; Skeat, 1963). The absurdity of the transition from anxiety as metaphor to its current masquerade as technical term is revealed by posing the possibility of a similar transition for other metaphors with related usages such as butterflies in the stomach. The possibility of butterfly disorders, butterfly management techniques, butterfly scales, and debates on the causal role of butterflies seems remote.

Another obstacle to behavior-analytic study of anxiety is the illusion of its status as an empirical phenomenon and the reality of its status as a mere concept or category (see Ryle, 1949). Categories are not empirical events, that is, they cannot be observed directly, and thus they are unappealing as research targets for behavior analysts. Yet conditions that govern category membership are empirical events, and these have generated abundant behavior-analytic study (e.g., Fields, Reeve, Adams, & Verhave, 1991; Herrnstein, 1984) that has profitably converged with research from other fields (e.g., Medin & Smith, 1984; Rosch & Mervis, 1975). A seemingly suitable topic for behavior-analytic study is thus the conditions that occasion anxiety as a categorical response. An apparent obstacle to this potentially productive line of inquiry is the conventional but false assumption that anxiety, as a category, has an essential composition.

This essentialistic position on anxiety is readily undermined with logical arguments (Wittgenstein, 1958a, 1958b). For example, a common definition of anxiety is physiological reactivity to events with uncertain but potentially aversive outcomes. Walking across a street that is free of cars and suddenly being overwhelmed by high-intensity physiological responding (e.g., elevated heart rate, respiration, perspiration, and blood pressure) is a well-accepted instance of anxiety (e.g., agoraphobia; American Psychiatric Association, 1994; Beck & Emery, 1985; Hallam, 1985). Walking across the same street and almost being hit by a car produces the same physiology but is not an instance of anxiety. It is an instance of fear. Both are related by physiology and avoidance and are separated by the actuality of the threat (Beck

& Emery, 1985; Epstein, 1967; May, 1950). Being in the presence of a formerly reinforcing commodity after an extended period of deprivation (e.g., water, addictive substances, sex) also produces much the same physiology but is not an instance of anxiety or fear. It is an instance of craving (Wickler, 1973; see also Pavlov, 1927, pp. 35–37). It has neither the uncertainty nor the avoidance. Thus physiology cannot be the essence of anxiety, because it is part of many kinds of avoidance (e.g., of events with known and unknown threat) and of many kinds of pursuit (e.g., for sex, drugs, fluids, food). Similar cases are readily made for the other elements said to compose anxiety. For example, demonstrably dangerous events can evoke the physiology of fear but no avoidance and little uncertainty (e.g., contact sports, skydiving). Neutral events that are conditioned to evoke the physiology of fear and avoidance (e.g., phobias) sometimes produce neither (Rachman, 1977, 1991). Some events are avoided or escaped (i.e., avoidance or escape responses are reinforced) but do not produce the physiology of fear, nor are they associated with danger (e.g., alarm clocks, obnoxious persons).

Not surprisingly, given the persuasive logical counterarguments, the essentialistic position on anxiety has generated little empirical support. The gold standard of psychiatric diagnostic research is essentialistic; it involves identifying sensitive and specific biological markers for psychiatric disorders (Hoes, 1986). Yet the abundant research on numerous nominated markers, accompanied by experimental preparations appropriate for anxiety (e.g., salivary cortisol, lactate infusion, carbon dioxide inhalation, mitral valve prolapse, monoamine oxidase levels), has yet to yield a sensitive and specific (i.e., essential) marker (e.g., Margraf, Ehlers, & Roth, 1986, 1988; McBurnett et al., 1991; Rapee, Brown, Antony, & Barlow, 1992; Sofuoglu, Dogan, Besim, Basturk, & Tanrikulu, 1992). In sum, anxiety appears to have no essential or nonreducible component, the presence of which distinguishes participant from nonparticipant events. This conclusion seems to set the stage for a behavioral analysis of the various usages of the term *anxiety*. One more obstacle remains, however, and it is a theoretical one within behavior analysis itself: Skinner's analysis of emotion.

Skinner's analysis provided an opening for behavior-analytic study of emotion and simultaneously made stepping through it seem unnecessary. Consistent with our comments above, he criticized traditional ways of speaking about emotion. In fact, Skinner's career-long opposition to mentalism in science could have employed anxiety as a textbook case. Mentalism commonly involves explaining behavior by appealing to independent variables that are inferred from the behavior explained (Hayes & Brownstein, 1986; Skinner, 1969; see also Wittgenstein, 1958a, 1958b). For example, in their influential book on anxiety and phobia, Beck and Emery (1985) state that anxiety disorders are caused by an "upset in the cognitive system" (p. 86). As a case in point, they describe the most frequently occurring features of generalized anxiety disorder (GAD), some of which involve upsets in the cognitive system (e.g., difficulty in concentrating, fear of losing control, etc.). The frequency of these features is then adduced as evidence of the causal status of cognitive impairment. Yet if these cognitive upsets are an intrinsic part of GAD, using them to explain it is circular, misleading, and mentalistic because the upsets themselves remain unexplained.

Skinner went further than mere criticism of mentalistic use of terms such as anxiety, however; he also offered a coherent behavior-analytic alternative. In his landmark paper on the operational analysis of psychological terms, Skinner laid the philosophical and theoretical foundation for a behavioral analysis of emotion (Skinner, 1945). Con-

trary to caricatures of behaviorism that suggest a denial of private events such as emotion and cognition, radical behaviorism "does not insist upon truth by agreement and can therefore consider events taking place in the private world within the skin" (Skinner, 1974, p. 16). In contrast to many emotion theorists, Skinner downplayed the scientific value of research on the form of emotional responses and recommended study of the contingencies that govern emotional talk instead (Skinner, 1945). To Skinner, the meaning of a term (e.g., anxiety) resides in the functional relationship between its use and stimuli that are antecedent and consequent to the use. In other words, understanding the meaning of the statement, "I'm anxious," requires knowledge of the context, both current and historical, that occasioned the utterance. Skinner's arguments were elegant, plausible, and directly pertinent to emotion, but they were derived entirely from an analysis of direct contingencies.

Although Skinner's approach provided a needed opening for scientific analysis of emotion (and private events in general), his emphasis on direct contingencies limited the potential scope of research programs when they were conducted with fidelity to his views. Such programs would be simultaneously viable and valid, yet not very productive. Understanding how this conclusion was reached is an important step towards a more contemporary and potentially important approach to behavior-analytic study of emotion.

The two fundamental goals of scientific explanation in behavior analysis are prediction and control of the phenomenon under study (Biglan & Hayes, 1995; Hayes & Brownstein, 1986; Skinner, 1969). To the layman (and many, possibly most, psychologists outside behavior analysis), emotional talk itself is satisfactory as an explanation for behavioral events involving emotion. For example, if a crying child complains that he or she feels anxious and then runs away, most parents (and other persons including psychologists) are likely to attribute the running to anxious feelings (i.e., the child ran *because* he or she felt anxious). This explanation, however, is predicated on a behavior–behavior relationship and is thus incomplete. Feeling anxious is a behavioral event that cannot be directly manipulated in a way that establishes a functional relationship between it and running. Thus, although the role of feeling anxious as predictor can be readily established, its role as controlling variable cannot. To be complete in behavior analysis, an explanation must ultimately appeal to manipulable environmental events.

Skinner develops this logic using an example of a situation in which an electric shock has been reliably preceded by a bell. "The bell comes to elicit reactions, primarily in the autonomic nervous system, which are felt as anxiety" (Skinner, 1974, p. 61). The individual's behavior "does not change because he feels anxious; it changes because of the aversive contingencies which generate the condition felt as anxiety. The change in feeling and the change in behavior have a common cause" (Skinner, 1974, pp. 61–62). In this and other instances, Skinner argues that emotional feelings are co-occurring products of the same contingencies that precipitate overt behaviors which the feelings are said to "cause" (e.g., running) and that they have "no functional significance, either in a theoretical analysis or the practical control of behavior" (Skinner, 1953, p. 181). Thus, although Skinner did establish the scientific plausibility of analyzing private events, he also suggested that such analyses were theoretically and practically unnecessary.

Why Emotion is a Viable Behavior-Analytic Topic Now

The central theme of the previous section was that anxiety is still not well understood.

Perhaps the rigor of behavior-analytic theory and methods is needed for increased understanding of this seemingly ubiquitous, yet misunderstood, phenomenon. Although the initial promise of Skinner's radical approach to human behavior was a complete science of private and public events, study of the former has lagged far behind study of the latter. Now, however, the field of behavior analysis is changing, and, correspondingly, the possibility of experimental analysis of private events is increasing. The dangers for science, discussed in the previous section remain relatively intact. But the intellectual barrier created by Skinner's position is gradually giving way to empirical developments in the analysis of human verbal behavior that, in turn, expand the possibilities for behavior-analytic study of emotion.

Skinner's analyses of schedules of reinforcement benefitted from a wealth of experimental evidence (e.g., Ferster & Skinner, 1957; Skinner, 1938). In striking contrast, his analyses of verbal behavior were virtually devoid of experimental evidence (Skinner, 1957) and thus did not benefit from the selective effects that data have on theorizing. In recent years, a large body of empirical evidence from the experimental analysis of human behavior has been published. Of particular relevance to the analysis of emotion is the literature on derived relational responding such as stimulus equivalence and the transformation of stimulus functions (e.g., Barnes, 1994; Hayes & Hayes, 1989, 1992; Hayes & Wilson, 1993; Sidman, 1994; see also Horne & Lowe, 1996). This rapidly growing line of investigation may fundamentally change the behavior-analytic view of verbal events and, with it, the analysis of private events.

The research shows that humans readily learn derived stimulus relations. If a language-able human, while in the presence of one stimulus, A, learns to select an arbitrarily related stimulus, B, then this trained, unidirectional relation will lead to a derived, bidirectional relation. That is, given B, A will be chosen, without additional direct training, even in children as young as 16 months (Lipkens, Hayes, & Hayes, 1993). By the age of 2 years, children learn even more remotely derived stimulus–stimulus relations. For example, if A-B and A-C relations are trained, then B-C and C-B relations are derived (Devany, Hayes, & Nelson, 1986; Lipkens et al., 1993). These relations have been termed *stimulus equivalence* (Sidman, 1971, 1994; Sidman & Tailby, 1982).

Recent research shows that many relations other than equivalence (e.g., greater than, less than, opposition, difference, etc.) can be learned, applied arbitrarily to stimulus events, and combined into networks of stimulus relations of almost unimaginable complexity (Dymond & Barnes, 1995, 1996; Steele & Hayes, 1991). In addition, other processes, such as stimulus generalization, can combine with derived relational responding to merge large and diverse classes of responding (Fields et al., 1991). Furthermore, the psychological functions of the elements in these "relational networks" tend to change or transform in accord with the underlying derived stimulus relation. In the case of equivalence relations, several demonstrations of this transformation are available, and they include conditioned reinforcing functions (Hayes, Brownstein, Devany, Kohlenberg, & Shelby, 1987; Hayes, Kohlenberg, & Hayes, 1991), discriminative functions of public (Hayes et al., 1987) and private (DeGrandpre, Bickel, & Higgins, 1992) stimuli, elicited conditioned emotional responses (Dougher, Augustson, Markham, Greenway, & Wulfert, 1994), extinction functions (Dougher et al., 1994), and sexual responses (Roche & Barnes, 1997). In the case of relations other than equivalence (e.g., opposition), demonstrations of corresponding transformed stimulus functions are

also increasingly available (Dymond & Barnes, 1995; Roche & Barnes, 1997).

Studies documenting the transformation of stimulus functions propel a more contemporary behavior-analytic account of verbal behavior and approach to emotion and other private events. In addition, new behavioral terms might be needed (Hayes & Hayes, 1992). For example, if a child is taught stimulus relations between three stimuli, A, B, and C, that bear no formal similarity to each other, and then B is given a discriminative function through direct training (e.g., reinforcement for waving in the presence of B), the function will obtain for C (i.e., waving is now likely in the presence of C) without direct training (Hayes et al., 1987). In this example, B is a discriminative stimulus but C is not, because a greater probability of reinforcement for waving in its presence than in its absence has not been established. Waving in the presence of C is also not an instance of stimulus generalization, because there are no formal stimulus properties to account for the generalization. Nonetheless, C functions like a discriminative stimulus, but it is produced indirectly by the transformation of stimulus functions through derived stimulus relations, not by a history of direct contingencies (as in the conventional Skinnerian account). Recent papers have suggested that such functions are not just "verbal"; they may be a defining property of verbal behavior (e.g., Barnes, 1994; Hayes & Hayes, 1992; Hayes & Wilson, 1994, 1996; Roche & Barnes, 1997). Thus C, in the preceding example, might profitably be referred to as a *verbal* discriminative stimulus (Hayes & Wilson, 1993). Although logically consistent, the argument for a modified nomenclature has yet to recruit a consensus among behavior analysts (e.g., Leigland, 1997; J. Spradlin, personal communication, October 23, 1997).

The comments above suggest the breadth that derived relational responding adds to behavioral accounts of complex behavior, especially when private events are involved. A synthesis of just a few of the many related lines of research will underscore this point and set the stage for application of derived relational concepts to anxiety disorders. A large, long-standing, cross-disciplinary line of research shows that generalized responding to stimuli with discriminative function (discriminanda) spreads to novel stimuli that resemble the discriminanda (via stimulus generalization), resulting in large relational, polymorphous, or fuzzy categories of responses (Fields et al., 1991; Herrnstein, 1984; Medin & Smith, 1984; Rosch & Mervis, 1975; see also Wittgenstein, 1958b). A more recent behavior-analytic line of research shows that events in relational classes spread not just with stimulus equivalence effects but also with these stimulus generalization effects. For example, once Stimulus Events A and B are entered into a relational class, the events related discretely to A and to B via stimulus generalization can become related to each other via stimulus equivalence (Fields et al., 1991). Thus, large relational, fuzzy, or polymorphous categories created via stimulus generalization can merge with other large relational, fuzzy, or polymorphous categories if a member from one is entered into an equivalence relation with a member from another. Another recent line of behavior-analytic research shows that private and public events can become part of the same relational class (DeGrandpre et al., 1992). In other words, these large relational categories can (and usually do) include both public and private events. Lastly, a rapidly expanding line of research shows that respondent (e.g., Dougher et al., 1994; Roche & Barnes, 1997) and other behavioral functions (e.g., Hayes et al., 1987, 1991) participate in relational networks and transform the behavioral functions of their constituent responses. Collectively, these lines of research provide a preliminary basis

for penetrating the complexity of anxiety disorders.

Anxiety disorders seem irrational because they primarily involve high-rate avoidance of, or escape from, events that have no readily detectable direct relationship with punishment (e.g., open spaces, doorknobs, harmless insects). Analysis of anxiety-like responses in animals suggests "a combination of historically real and currently adventitious contingencies" (Sidman, 1960, p. 66). Thus, even with a direct contingency analysis of pertinent behaviors in organisms with much simpler response patterns than humans, anxiety responses are puzzling (i.e., seem irrational). In the analysis of human anxiety responses, the puzzles multiply in number and complexity because human response patterns are also strongly influenced by *indirect* relationships between events and public and private responses to public and private events.

Of course, not all avoidance responding is puzzling. Responses that are reinforced by avoidance of events with phylogenetic significance (e.g., fire, large fur-covered carnivores, heights) readily surrender to analysis. So too do responses that are reinforced by avoidance of seemingly nonsignificant events when those events can be linked formally or functionally to aversive consequences. But clinically significant anxiety appears to refer to avoidance responses whose initiating conditions are direct but very remote and whose perpetuating conditions are mostly derived. The life of the clinically anxious person may thus be influenced by iterations and reiterations of public and private events with reactive properties traceable to initiating conditions only through an almost fractal pathway involving the processes of stimulus generalization, derived relational responding, and transformation of stimulus function (cf. Hayes & Wilson, 1993, 1994; see also Anderson, Hawkins, & Scotti, 1997). It seems safe to say that a true behavior analysis of the concept of anxiety will require an extraordinary research effort.

Implications for the Analysis of Anxiety

A major implication of derived relational responding involves the potentially powerful effect it can have on self-discriminations: It can render them reactive (Dymond & Barnes, 1995, 1996). A related issue is that these effects are unlikely when nonverbal organisms self-discriminate because they are not nearly as prepotent for derived responding as humans are. In fact, whether animals can exhibit derived responding at all is a contested issue (Devany et al., 1986; Hayes, 1989; Horne & Lowe, 1996). Even if research ultimately unequivocally documents derived relational responding in some nonhumans, the argument here remains intact. That is, behavior resulting from derived relations requires an analysis that is somewhat different from that offered by Skinner. Thus, when anxiety-like responses (e.g., avoidance) in any organism (human or nonhuman) are traceable to direct contingencies, Skinner's analysis of emotion seems to be sufficient. That is, when only direct contingencies are involved, it follows that "the change in feeling and the change in behavior have a common cause" (Skinner, 1974, p. 62; see also Sidman, 1960). When the anxiety-like responses cannot be traced to direct contingencies and the organism is prepotent for derived relational responding (e.g., languageable persons), additional analyses are required.

Consider two situations: In one, a hungry rat can obtain food immediately but the delivery is accompanied by a small shock; in the other, a small delay is required for the food but no shock occurs. If the values are set properly, the rat will consume the food immediately (i.e., impulsively) and will be shocked. If the rat is trained to press one lever for food if it has been shocked and another if it has not been shocked, it, in

effect, will have learned to report whether it has been shocked (e.g., Lattal, 1975). The difference between a rat and a language-able human is that the rat's report (or self-discrimination) is unlikely to have an effect on subsequent similar (i.e., impulsive) responding. That is, the report is unlikely to be bidirectionally related to the event being reported; for rats and most (perhaps all) nonhuman organisms, an event–report relation does not entail a report–event relation. Absent this bidirectionality, there is no known pathway for the report to influence subsequent events similar to those reported. Similarly, there is no known pathway (absent additional experimental preparations) for the rat's report of shock to become aversive itself. The report would not be bidirectionally related to the event of shock, and thus it would not share its functions. Functionally, the report is related to food, not to shock. Reports of punishing events are simply not aversive for organisms that are not prepotent for derived relational responding.

As indicated above, the responses of language-able persons in similar circumstances are different than those of simpler organisms such as rats. For the human, the shock and the report are likely to be bidirectionally related and thus share functions; some of the effects of the shock are likely to occur when the shock event is reported. In addition, distinct from the simpler organisms, a person's report of the behavior that led to the shock is likely to affect the probability of being shocked in similar circumstances, because verbal (i.e., derived) reports are bidirectional (event–report entails report–event). Thus, a person's self-discriminations (or self-knowledge) can affect his or her behavior. To appreciate this point experientially, imagine biting into a lemon. Some of the perceptual functions of biting occur merely as a function of the thought, that is, the thoughts are reactive. Similar to thoughts about lemons, self-referential thoughts can be reactive. For example, mere thoughts about engaging in public speaking can instigate autonomic arousal and self-limiting appraisals that are highly correlated with reluctance. As another example, mere thoughts about engaging in sexually related behavior can instigate arousal of a different sort that is correlated with approach. A vast, albeit nonbehavioral, literature documents the adverse influence of persistent self-deprecatory thoughts (Peterson & Seligman, 1984). Skinner acknowledged the behavioral impact of self-knowledge: "Self-knowledge has a special value to the individual himself. A person who has been 'made aware of himself' is in a better position to predict and control his own behavior" (Skinner, 1974, p. 35). However, Skinner did not supply an account of how the behavioral effects occur. Such an account is not readily obtained from an analysis of direct contingencies (refer to the behavior of the rat above). When indirect responding through derived relations is added to the analysis, however, a verbal basis for the behavioral effects of self-knowledge is suggested.

Human emotion is a rich source of examples that suggest a verbal basis for many important behavioral effects. Emotions are integrated into loosely defined and labeled categories. Yet, loose definition and labeling notwithstanding, under the right circumstances, merely saying or thinking about the label renders self-discrimination of the labeled emotion a verbal (bidirectionally reactive) event (at least in part). To the extent that this is true, it is not true that "the change in feeling and the change in behavior have a common cause" (Skinner, 1974, p. 62), because both nonverbal and verbal contingencies are mixed in the control of the behavior and the feeling, and they may be mixed in different ways. For anxious language-able persons, reports of anxiety are not necessarily mere statements whose sole function is communication (for self or other)

about various contexts, bodily states, or behavioral predispositions associated with anxiety. The reports can also be reactive and thus generate untoward effects. That is, they not only describe the person's behavior and circumstances but can also alter the function of the behavior and circumstances described. For some persons, anxiety is a potentially debilitating category whose members include a variety of functional altering verbal components (e.g., unpleasant memories, negative self-evaluations, unfavorable social comparisons, etc.) and related bodily states (e.g., autonomic arousal). In a colloquial sense, anxiety is what anxiety does, and what it does includes what anxious persons *say* it does.

Thus, many public and private events are integrated in the category of responding known as anxiety. A common observation about anxiety episodes is the appearance of surplus responding. That is, the related responses (e.g., arousal, avoidance, escape) are not fully explained by the direct contingencies in the present nor by those in the apprehensible past. The derived relational account seems to supply some of the missing information, however. As described previously, through transformation of stimulus functions some of the behavioral functions of one class of stimuli can carry over to another class, and this other class then begins to exhibit behavioral functions that are similar to those of the first class.

For example, if a person feels anxious and a punishing event occurs (e.g., social rejection), the functions of the feeling and the event may merge through bidirectional stimulus transformation. Circumstances similar to those that occasion the feeling, as well as the verbal report of the feeling, may subsequently exhibit punishing properties, and the punishing event may become more anxiety provoking. This merging of function can create clinically debilitating response patterns (e.g., arousal, avoidance, escape, etc.) especially if, through derived relational responding, the feeling and the thought of anxiety are strongly influenced by the properties of punishment. Illustrative examples are plentiful. Recounting a highly aversive event often instigates some (often much) of the arousal and avoidance responding that was occasioned by the event itself. Merely thinking about the event can produce similar effects (Hayes, Strosahl, & Wilson, in press; Hayes & Wilson, 1993, 1994). Complicating matters further is the expanding confluence of functions that gather in anxious episodes as circumstances change from episode to episode and the relational class grows. Highly anxious persons generally do not exhibit the pertinent responses (e.g., arousal, avoidance, escape, etc.) in the presence of just one thing (American Psychiatric Association, 1994). Their responses occur in the presence of so many things that they sometimes behave as if they are "afraid of their own shadow."

Some of the complaints about anxious episodes involve emotional subcategories and the phenomena integrated under them. The labels for the categories and their associated public and private events can, similar to anxiety, produce clinical effects through direct and derived relations. For example, a common complaint about some forms of anxiety involves a "sense of loss of control" (e.g., panic). Other forms involve "embarrassment" (e.g., social phobia). Some involve "social humiliation" (e.g., agoraphobia). There are numerous other examples. The point here is not that these labels, or anxiety itself, should be accepted into the argot of behavior analysis. As indicated earlier, anxiety is a vaguely defined, largely metaphorical term and is unlikely to ever become a truly technical term. If anything, these other category labels are even more vague and metaphorical. Rather, the point it is that (a) the labels are important members of the language of the English-speaking culture, (b) they refer to important psychological phe-

nomena, and (c) through derived relational responding, they can have adverse influences.

There are other important implications of this verbal account of anxiety. For example, the account provides some support for talk therapy. If verbal events are functionally related to behaviorally and clinically important events in a client's current and previous environments, it follows that knowledge of the relationships could help the therapist and client predict and influence important behavioral outcomes. The client's self-reports are likely to be informative on a number of levels, including the direct communication of relevant information and the exhibition of clinically relevant psychological functions (Kohlenberg, Hayes, & Tsai, 1993; Kohlenberg & Tsai, 1991; Wulfert, Greenway, Farkas, Hayes, & Dougher, 1994). Events that are presented verbally in clinical sessions (e.g., events "presented in imagination") may also generate effects similar to those generated by directly presented events. A well-known case in point is the imaginal exposure used in systematic desensitization (e.g., Wolpe, 1990).

More generally, a verbal account of emotion underscores the value (for clinical behavior analysts) of attention paid to the client's private events. Those events include potentially maladaptive verbal and nonverbal responses that are the direct and indirect results of socialization within a client's verbal community. The English language contains myriad emotional terms, in part because the verbal community at large trains its members to use the terms to discuss their behavioral histories and to respond to those histories in a socially acceptable manner.

The preceding comments constitute an argument for the theoretical importance of a behavioral account of emotion. Toward the end of the argument, applied implications of such an account began to emerge. This was a natural progression. Behavior analysts are pragmatists, and applied behavior analysts are especially so. To recruit agreement with our view of emotion as an important topic for applied behavior analysts, it is essential to show how study and treatment of clinically significant behavior can be improved when an analysis of emotional talk is conducted.

To begin this task, we will argue that behavior resulting in avoidance of or escape from negative emotional states, as verbally construed by an individual, is negatively reinforced. Critical to the analysis is that some (perhaps most) of the aversive properties of the emotional states and reinforcing properties of the avoidance are primarily derived through arbitrarily applicable relational responding. That is, emotional avoidance appears to be an integral component of human verbal behavior (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Our aim in making the argument is to supply applied behavior analysts with theoretical and applied reasons to step through the opening Skinner provided in 1945.

Anxiety Disorders and Experiential Avoidance

Conventional Diagnoses and Behavioral Alternatives

A wide variety of anxiety disorders are identified as distinct entities in the *DSM* diagnostic system. Over time, the various revisions of the *DSM* have systematically increased the number of purportedly distinct disorders. In the most recent half-step, from the third revised edition to the fourth edition (American Psychiatric Association, 1987, 1994), the number of diagnosable anxiety disorders increased from 9 to 12. With no theory to restrain the increasing proliferation of disorders, and with professional reinforcement for finer and finer distinctions in their formal properties, an infinite number becomes possible (Carson,

1996, 1997; Follette, Houts, & Hayes, 1992). These disorders are also often arbitrary with respect to function, which is evident in the following comparison of phobias with sexual aversion. If a person is fearful of and therefore persistently avoids snakes, shopping malls, blood, heights, social interactions, elevators, or germs, he or she is diagnosed with an anxiety disorder. If the person is fearful of and therefore persistently avoids sex, however, he or she is diagnosed with sexual aversion, which is not an anxiety disorder. This theoretically unguided diagnostic proliferation and functionally arbitrary diagnostic application could be reduced substantially through use of a functional-dimensional approach to diagnostic classification.

The functional-dimensional approach has recently been proposed as a behaviorally sensible alternative to the *DSM.* The approach involves organizing diagnoses according to behavioral processes (therefore functional), and these processes are seen as continua (therefore dimensional rather than categorical; Hayes et al., 1996). Experiential avoidance has been suggested as one functional dimension that could integrate a variety of diverse *DSM* diagnoses.

Experiential Avoidance as a Functional Dimension

Early in life, humans, and most other animals, learn a large and versatile repertoire of strategies (e.g., vigilance, withdrawal) for avoiding events (e.g., pain, danger). As humans develop, their verbal repertoires quickly become quite elaborate, and, correspondingly, their responses to aversive events exhibit verbal properties. That is, the responses (e.g., bodily sensations, emotions, thoughts, memories, behavioral predispositions) occasioned by the events begin to participate in derived relations with the events. Through a transformation of function, the responses themselves can become aversive, resulting in two categories of phenomena whose avoidance results in negative reinforcement: the events and the responses to them (cf. Gifford, 1994; Hayes & Wilson, 1993; Hayes et al., 1996). This outcome may be specific to language-able persons. As indicated previously, simpler organisms (e.g., rats) do not exhibit bidirectional derived relational responding, and thus there is no known pathway for their responses to aversive events to also become aversive. In other words, it may be true that only language-able persons exhibit experiential avoidance or behavior whose primary function is the elimination, minimization, or reduction in the form, frequency, or situational sensitivity of various private events (Hayes et al., 1996). Relatedly, it seems that all of the anxiety disorders could be cogently classified as experiential avoidance disorders. Below is a brief review of a sample of *DSM* anxiety disorders; its purpose is to show the unifying effect of the functional dimensional approach to diagnostic classification.

Obsessive compulsive disorder (OCD). OCD involves the presence of unacceptable thoughts (obsessions) and disruptive maladaptive responses (compulsions) that provide temporary avoidance or escape from the thoughts and the physiological responses associated with the thoughts (Hollander, 1993; Rasmussen & Eisen, 1992). Among individuals diagnosed with OCD, unacceptable thoughts dominate conscious awareness. These thoughts involve themes such as self-contamination, doubts about whether one has performed an important act (e.g., turned out lights, left doors open), or the desire to engage in socially unacceptable behavior (e.g., profanity, aggression). When such thoughts occur to persons diagnosed with OCD, they try to ignore them, distract themselves, or develop elaborate rituals to avoid or escape from the thoughts. For example, if the person's thoughts involve unclean hands, he or she is likely to systemat-

ically and repetitively wash them. If interrupted, the person is likely to become distressed, believing the interruption has interfered with the quality of the washing, which amplifies the presence of the thought about having unclean hands. Therefore, washing begins again and the cycle continues until the thought is absent or present in a much diminished form (e.g., "I'm almost clean").

Consistent with our experiential avoidance approach to anxiety disorders, the disruptive washing has important functional properties: reducing, avoiding, or escaping private events (experience). Thoughts are private verbal behavior. OCD-type responses are reinforced by avoidance of related, highly unpleasant thoughts (e.g., "My hands are not clean") and the various other private events that occasion or follow these formulations.

Panic disorder with agoraphobia. Panic involves intense autonomic arousal that is not as related to actual events as it is to the reaction to those events; in a colloquial sense, it is fear of fear (Taylor, 1995). For example, persons with agoraphobia do not avoid public places (e.g., the mall) per se; they avoid the possibility of what might happen if they enter a public place. Thoughts of a panic attack in the public place, and of the constellation of embarrassing responses that would become public if the attack were to occur there, are the negative reinforcers for staying home (e.g., Amering et al., 1997). This account does not fully explain panic, but it provides an advance when combined with a contemporary behavioral view of verbal events.

Persons diagnosed with agoraphobia become extremely reactive to changes in their physiological state (Barlow, 1988). Small increases in heart rate may be interpreted verbally as catastrophic (Pauli et al., 1991). This catastrophic interpretation has been theorized to result in a "positive feedback loop between perceptions of physiological activity [that] can culminate in a panic attack" (Pauli et al., 1991, p. 137; see also Clark, 1986; Ehlers, Margraf, Roth, Taylor, & Birbaumer, 1988; Taylor, 1995). In this "feedback loop," bodily states and other reactions occasion a verbal formulation that links the present to an impending dire future (e.g., "I'm losing control. I'm going crazy. I am about to die."). Unfortunately for those afflicted with panic, the bodily states occasioned by bona fide peril and those that occur through derived relational responding (i.e., their reactions to their reactions) are virtually indistinguishable. Thus, panic can be very behaviorally disruptive. In addition, autonomic arousal (fear) occasioned by the thought of panic is a stronger negative predictor of treatment outcome than is frequency or intensity of panic itself (Keijsers, Hoogduin, & Schaap, 1994; cf. Chambless & Gracely, 1988). In sum, panic disorder with agoraphobia is cogently categorized as an experiential avoidance disorder.

Posttraumatic stress disorder (PTSD). PTSD is the most recent and the most widely applied diagnostic category for trauma-related emotional disturbance. Previous descriptors were more colloquial and specific but appeared to refer to the same emotional phenomenon (e.g., shell shock, rape trauma syndrome). PTSD involves direct exposure to a traumatic event and the subsequent emergence of three clusters of symptoms: reexperience (nightmares, flashbacks), avoidance in active (avoiding trauma-related stimuli) and passive (numbing, disassociation) forms, and increased arousal (e.g., insomnia, hypervigilance, exaggerated startle responses; American Psychiatric Association, 1994; Foa & Meadows, 1997; Foa & Riggs, 1995). The pertinence of the experiential avoidance approach to classifying PTSD is evident in its symptom clusters. The first cluster involves the unpleasant experience and reexperience of the traumatic event, the avoidance or escape from which reinforces re-

sponses in the second cluster: numbing, active avoidance, and disassociation. The third cluster involves persistent arousal that has an apparently elicited basis, at least part of which is due to formal similarities between the traumagenic and current events. The pervasiveness of the arousal, however, seems to unduly tax respondent conditioning as its sole explanation. It seems likely that some (perhaps most) of the arousal is verbally produced.

The hyperarousal of PTSD often extends to conditions that bear no formal similarity to the original traumagenic settings. Situations that are only verbally or metaphorically related, such as unknown or unpredictable situations, may also generate hyperarousal. Although it is conceivable that such responses are due solely to higher order conditioning (cf. Forsyth & Eifert, 1996a, 1996b), experiential avoidance and derived relational responding contribute to a precise account with considerably more scope. For example, the respondent account cannot readily explain why avoidance would lead to increases in hyperarousal (in fact, from a respondent perspective, decreases would be expected). Consistent with an experiential avoidance perspective, PTSD is better predicted by the avoidance symptom cluster (e.g., numbing, avoidance, and dissociative symptoms) than by the aversive stimuli (fear and horror) that were present at the precipitating event (Foa & Riggs, 1995). From this perspective, the reactivating role of the avoidance cluster stems from a derived reciprocal relationship between avoidance, guided by verbal formulations that increase sensitivity to emotional reactions, and perceived (imagined, verbally formulated) direct consequences that instigate more reactions.

The previous discussion was used to show very briefly the application of the experiential avoidance approach to three prevalent anxiety disorders. Although we could readily apply the approach to all 12 of the current *DSM* anxiety disorders, the redundancy of such an effort would likely place an unnecessary burden on the reader. Before moving to treatment implications, we want to briefly reiterate two central points. The first point is that when analysis of anxiety disorders incorporates derived and direct learning patterns, it encompasses vastly more of the relevant phenomena than a solely direct contingency analysis does, and it does so without resort to hypothetical constructs (i.e., it is strictly learning based).

The second point is that the functional classification of behavior disorders is fostered by an analysis of verbal relations and that the anxiety disorders have a dominant, verbally established function of experiential avoidance. As indicated above, a core constituent of anxiety is avoidance. What is needed is a fuller understanding of all the phenomena that are avoided. Anxious persons are fearful not only of environmental events but also of their responses to those events. A person with panic disorder does not just avoid public places; he or she avoids the full range of private behavior associated with those places. Skinner's contention that emotion and overt behavior are controlled by the same events is thus incorrect or at least incomplete. A fuller understanding requires an analysis of the complex verbal contingencies that are involved in the human disposition to categorize arbitrary events (e.g., a pounding heart) as negative emotions and respond accordingly ("I'm feeling panicky, I have to get out"). An analysis of direct contingencies might reveal the basis for the person's avoidance of public places, but it cannot readily account for the avoidance of his or her thoughts and feelings about those places.

These points yield the central themes of this paper: A behavior analysis of human emotion is not only possible but is ultimately necessary for understanding and treating anxiety disorders. To complete the analysis,

an examination of both direct and verbal contingencies is needed.

Treatment Implications

The functional benefits from the study of emotion are perhaps most apparent in the context of treatment. The dominant behavioral approach to anxiety disorders is straightforward: Expose the anxious persons to the feared phenomenon repeatedly and allow other behavioral processes (e.g., habituation, positive reinforcement) to extinguish the maladaptive avoidance response class. Although many investigators recognize that private events may also be important, a common belief is that extinguishing public reactivity to the feared object will concomitantly extinguish this private reactivity (e.g., Skinner, 1969, 1974). A wide variety of exposure techniques have been developed that roughly accord with this view (e.g., systematic desensitization, response prevention).

If the present account is correct, however, that view may often be insufficient. To be fully effective, exposure may frequently have to include all, or at least more, of the events that functionally occasion maladaptive avoidance. Most anxious persons seek treatment to master being in the presence of the feared object or event while not thinking about or feeling fear. This means that the verbal aspect of fear is part of the feared event. To incorporate more of the phenomenology of fear in treatment, knowledge of the feared events and of the verbal behavior occasioned by the events is therefore needed.

There are data from several laboratories developing exposure-based treatments for anxiety disorders that illuminate this problem. An expanding body of evidence shows that attention to avoided private events improves outcomes in exposure-based treatments (Barlow, 1988). For example, Craske, Street, and Barlow (1989) gave persons who had been diagnosed with agoraphobia instructional sets to either focus on feared somatic sensations or to engage in distraction tasks during exposure to feared settings. Results showed that, although the distraction group exhibited greater improvement posttreatment than did the focus group, the focus group exhibited greater improvements at the 6-month follow-up. Similar results have been shown in persons diagnosed with OCD (Foa & Kozak, 1986; Grayson, Foa, & Steketee, 1982).

Thus exposure is crucial for effective treatment of anxiety, not merely in the brute physical sense (e.g., reinforce successively closer movements to a feared object) but also in the psychological sense, which is considerably more difficult. Experiential avoidance is an integral part of language itself, psychological avoidance is often readily available through distraction or other means, and exposure-based procedures generate a significant rate of resistance or refusal (cf. Hayes et al., 1996; McCarthy & Foa, 1990). Thus, exposure-based treatment requires special components that undermine covert avoidance, maintain participation, and reduce avoidance of private verbal events. Absent a detailed analysis of the client's emotional constructions, effective programming of the needed exposure will often be difficult and sometimes impossible.

Recently, some behavior analysts have developed treatments whose primary component is effective exposure. For example, acceptance and commitment therapy (ACT) is an exposure-based behavioral intervention that deliberately focuses on psychological exposure and the weakening of avoidance of private verbal events (Hayes et al., in press; Hayes & Wilson, 1993, 1994; Kohlenberg et al., 1993). Consistent with the experiential avoidance perspective of anxiety, the ACT perspective is that event-based unpleasant emotion is not the essence of the client's dysfunction; it is the cluster of responses whose function is to reduce, avoid, escape, or otherwise modify the unpleasantness.

ACT therefore strives to attenuate the relation between the problematic responses and their avoidance function. Among other goals, the method attempts (a) to experientially demonstrate the futility of the client's self-avoidance responses, (b) to redefine experiential control as the problem rather than the solution, (c) to reinforce the client's efforts to remain in the presence of the previously avoided experiences, and (d) to reduce the linkage between overt behavior and private events. In a general clinical setting, clients of therapists who have been trained in these concepts and techniques improved significantly more than did clients treated with mainstream methods (Strosahl, Hayes, Bergan, & Romano, in press).

There is another reason that understanding emotion may be important for treatment. Fears (anxieties) can spread and recede in idiosyncratic ways. That is, fear can generalize to events that bear no formal similarity to the originally feared event and can diminish in the presence of feared events that were neither the focus of treatment nor formally similar to events that were. Solving the apparent puzzle requires understanding the derived relations between events. For example, the panic-disordered person's fear of elevators or small spaces may generalize to his or her marriage, even though the two situations share no formal properties. Yet both situations may occasion the verbal formulation, "I feel trapped," resulting in the functions of "trapped" affecting the elevator and the marriage in similar ways.

A recent study of a boy with insect phobia partially illustrates these points (Jones & Friman, 1997). At the beginning of the study, the boy would not enter a room if he was merely told that an insect was present within. Classmates could instigate extreme disruptive behavior in the boy by saying they had seen an insect (thus the word *insect* and actual insects appeared to be in an equivalence class and to have similar functions). The highly successful extinction-based treatment involved reinforcing completion of math problems in the presence of live insects. The boy's most salient fears were of spiders and ladybugs, which were relatively unavailable, so live crickets, which were readily available at a local pet store, were used instead. Eventually the boy completed high rates of math problems with insects present on his work table. Following treatment, the boy's aversion to crickets (part of treatment) and spiders and ladybugs (not part of treatment) subsided to below clinical levels. The reactive effects of classmates' comments about insects were also eliminated. On the last day of the study, while he was seated at his desk in class, the subject saw a spider near his leg, picked it up with a tissue, placed it in a wastebasket, and returned to his schoolwork.

Although the boy's successes were achieved with a conventional approach to insect phobia, explaining them seems to require an appeal to direct and derived contingencies. As described earlier, respondent functions (which are central to emotion) spread readily through equivalence classes and other forms of derived stimulus relations (Dougher et al., 1994; Roche & Barnes, 1997). In the study mentioned above, the effects of extinction appeared to spread from accessible insects (crickets) to less accessible insects and related verbal taunts (neither of which were the focus of treatment), suggesting that all were members of a fear-based equivalence class. The spread of effects from insect to insect may be attributed persuasively to direct contingencies because of formal resemblance (Fields et al., 1991; Herrnstein, 1984; Medin & Smith, 1984; Rosch & Mervis, 1975). To account for the spread of effects to classmates' taunts, however, verbal analysis seems necessary.

A Caveat for Behavior Analysis

The first part of this article elaborated on the vagueness of the term *anxiety* and the

phenomena to which it refers. Two cautionary points need to made here, however. First, problems with the term should not deter behavior analysts from study of an area of psychology that is so vast and important. Second, the problems should also not inhibit use of the term in common social parlance. The problems merely indicate that the term is not sufficiently precise to be considered a technical term.

Skinner advocated not just forbearance but acceptance of ordinary "mentalized" terms in everyday parlance: "The words they use are part of a living language that can be used without embarrassment by cognitive psychologists and behavior analysts alike in their daily lives. But these words cannot be used in their science!" (Skinner, 1989, p. 18). This distinction needs to be stressed. Employing the term *anxiety* in everyday nonscientific life can help persons to know each other better, predict what the other might do in given situations, and advance relationships. Denying such use seems to have no advantage; quite the contrary, denial would almost certainly instigate a long list of disadvantages, with professional segregation, frequent misunderstanding, and occasional ridicule near the top of the list (cf. Bailey, 1991; Deitz & Arrington, 1983; Foxx, 1996).

In addition, words that are technically imprecise (e.g., *anxiety, fear, embarrassment, shame, stress*) and thus unsuitable for the laboratory may have great value for application, just as some words that are technically precise (e.g., *negative reinforcement, punishment*) are exceptionally ill suited for the language of application (Lindsley, 1991). Despite its apparent technical opacity, the term *anxiety* does have well-established functional value for virtually all of the social-verbal community except behavior analysts. Thus, at the very least, the term has an important role in clinical settings.

Behavior analysts might be tempted to avoid using the word *anxiety* in articles pertaining to the phenomena associated with the term and may avoid listing the term in a subject index. This type of linguistic conservatism has some clear disadvantages, an important one of which is the difficulty that potentially interested nonbehaviorists would have in finding the research. Expanding the influence of behavior-analytic research beyond the boundaries of the field requires communications that cross disciplinary and ideological boundaries. These communications will sometimes involve use of vague terms, such as *anxiety,* that appear to be valuable virtually everywhere but the laboratory.

There is a final reason that behavior analysts should treat these terms seriously, even if they are imprecise or mentalistic. The most distorted lay concept may refer to distinctions that are important within a technical account. For example, the concept of *intention* may underline the importance of verbal temporal frames in behavioral regulation (Hayes & Wilson, 1993); the matter-spirit distinction may be understood as an important and reasonably accurate distinction between verbal content and verbal context (Hayes, 1984). There are numerous other examples. We can never know a priori if a lay distinction or concept is nonsense until a technical account is attempted. Eschewing lay terms and the domains to which they refer merely because they are in conflict with a scientific account can limit scientific progress. The scientific task is to understand the source of control over lay terms and their use—not their dictionary meaning and literal conflict or agreement with preferred terms. Understanding lay terms often requires a detailed examination of the content to which they refer. Some terms may refer to nothing of scientific value, but others (e.g., emotion) may. In the latter case, an adequate behavioral account can sometimes

be aided by the cultural wisdom that is embodied in language traditions.

Concluding Remarks

According to poets, political pundits, and philosophers, we seem to be living in an "age of anxiety." To date, behavior analysts have largely avoided the study of anxiety (and emotion in general), whereas mainstream psychologists have devoted enormous resources to it (but have avoided behavior analysis). Admittedly, *anxiety* is a vague metaphoric term for a diverse array of prevalent psychological phenomena for which a widely accepted technical definition is not available (and we have not offered one here). This vagueness is the primary reason for the behavior-analytic avoidance of the topic. Imprecision of a term, however, is not a sufficient justification for such avoidance when the phenomenon to which it refers is so vast and so central to the psychology of human beings. In addition, relinquishing anxiety to mainstream psychology virtually guarantees that proper analyses of functional relations between environment and behavior, the metier of behavior analysts, will not be conducted. The literatures on the experimental analysis of verbal behavior and experiential avoidance provide numerous productive leads for those who wish to pick up the trail. While remaining ever vigilant of the philosophical dangers presented by study of vaguely defined phenomena, behavior analysts should end their avoidance and begin their empirical and theoretical approach.

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