

Windows on the 21st Century

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Behavior analysis is a cultural system of which the Association for Behavior Analysis is a component cultural system. As cultural systems, they are composed of interlocking behavioral contingencies that constitute their cultural practices. Critical to the survival of both cultural systems is the frequency of interaction with and the nature of the content of the behavioral contingencies composing those cultural practices. The strengths of behavior analysis as a cultural system include its disciplinary character and its worldwide community of scientists and practitioners; its ability to be integrated into a scientific worldview; its track record in providing effective solutions to problems of importance to society; and the high levels of intellect, competence, and commitment that are characteristic of its participants. Weaknesses of behavior analysis are its status as an academic orphan, its relatively small size and its underdeveloped professional identity, and a lack of sociopolitical sophistication among many of its members. Behavior analysis will need to maximize its strengths and mitigate its weaknesses if it is to take advantage of the many opportunities available for growth in the modern world.

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On the occasion of their presidential addresses, Michael (1980) and Baer (1981) explicitly formulated their remarks as "state of the union" messages. The present state of the union message will take the form of a strategic overview. I will begin by delineating the union whose state is being reviewed. Then I shall examine the union in terms of some of its strengths and weaknesses. Finally, I will outline our opportunities to increase

our strengths and mitigate our weaknesses as we approach the 21st century. Those opportunities are our windows on the future.

ABA AND BEHAVIOR ANALYSIS AS CULTURAL SYSTEMS

The union under consideration is the Association for Behavior Analysis (ABA) as well as behavior analysis in general. Both ABA and behavior analysis exist as entities at the cultural level of analysis. So I turn first to some characteristics of ABA as a cultural system.

One might be inclined to say that ABA as a cultural system is composed of its members. But that puts undue emphasis on the organisms whose names are on the membership roll. Equating ABA with its members is indicative of a strong cultural bias that locates existence in *objects*: Organisms—like brains and cells—clearly exist as entities. We know, of course, that *activities* exist too, but there always seems to be an object that is acting—cells replicate, neurons fire, and organisms behave. Replicating, firing, and behavior are evanescent and sporadically observable, however, whereas cells, brains, and organisms are solid and continuously observable.

As a cultural system, however, ABA's existence is not coextensive with its

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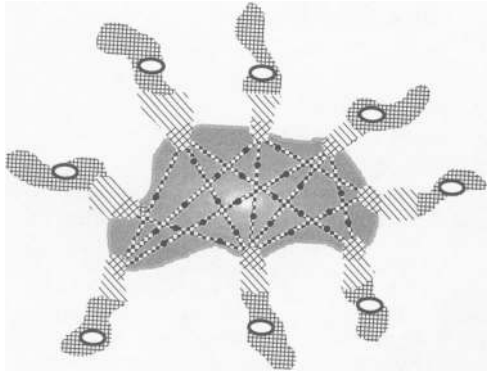


Figure 1. Schematic of relations among organisms, repertoires, interlocking behavioral contingencies and ABA as cultural system. Please see text for details.

members. Rather, ABA's existence is co-extensive with some portion of the *behavior* of its members. Each member of ABA has a behavioral repertoire, some part of which enters into the cultural system of ABA. How does ABA as a cultural system exist, then, beyond the evanescent behavior of its individual members? ABA's continuing existence lies in the interlocking behavioral contingencies that constitute its cultural practices (Glenn, 1988). I shall briefly consider the general characteristics of ABA as a cultural entity.

ABA—A Cultural Entity

ABA exists in the interlocking behavioral contingencies *that define its particular cultural practices*. The first part of this sentence is about the relation between cultural practices and their parts; the second part is about the content of the practices of this particular cultural entity—ABA. I first consider the characteristics common to all cultural entities and then consider some of the particulars.

All cultural entities are composed of interlocking behavioral contingencies, just as all organisms are composed of cells (Glenn, 1986, 1988). Figure 1 schematizes the relations between cultural entities and their parts. In discussing Figure 1, I shall particularize its elements in terms of ABA as cultural entity. Figure

1 shows members of ABA as organisms, depicted as ellipses with clearly defined boundaries. Each member has a behavioral repertoire that extends that member's "presence" in the environment. The repertoires appear somewhat amorphous, and their boundaries are difficult to discern. Each organism, as a concrete object, is a very small part of the natural world, but the *behavior* of the organism reaches well beyond the boundary of its skin in its effects on the natural world. The hatch marks designate that part of each repertoire that enters into the cultural entity of ABA. The dashed lines connecting repertoires of the members show the interlocking contingencies of reinforcement that are the components of ABA as a cultural system. Nodes on the dashed lines are the products resulting from the behavior entering into the interlocking contingencies. These products are the results of previous behavior and a part of the present environment that enters into the current contingencies. ABA as a cultural entity is the cloudy space that encompasses ABA-related behavior in member repertoires as it enters into interlocking contingencies, as well as the response products of past behavior that enter into current interlocking contingencies.

Although all cultural entities exist in the interlocking behavioral contingencies that depend on the behavioral repertoires of individual participants, a cultural entity is also a unique individual. The cultural content of ABA, for example, is not duplicated exactly in any other cultural system. That is so because ABA's cultural content is a function of (a) the particular repertoires of its members and (b) the particular interlocking contingencies that characterize its cultural practices. Thus, ABA as a cultural entity differs from entities having different combinations of practices, and the aggregated products of these entities will differ. (Even when many of the same individuals are members of different cultural systems, the cultural systems may remain quite different from one another.)

I shall particularize this schematized

entity by providing a few examples of cultural content that are particular to ABA. ABA's cultural content includes (a) the behavior of the speakers presenting at its conferences and the response products of their behavior; (b) the behavior of the conference listeners and the response products of that behavior; (c) the social contingencies provided by others for the behavior of the speakers and the listeners (which is more behavior); and (d) the behavior of various committee members, board members, and council members, with respect to ABA's goals and objectives, including the behavior emitted at the conference and the behavior emitted throughout the year.

ABA's practices have outcomes that are important to ABA's survival as a cultural system. One such outcome is attendance at the convention itself and at the various presentations. A more subtle measure might be frequency of conversation at the convention relating to papers presented and to ABA's business in general. Many different cultural practices characterize ABA, and their outcomes may differentially affect ABA's likelihood of surviving as a cultural system.

As a cultural system, ABA itself is part of the larger cultural system we know as *behavior analysis*. ABA is the locus at which the functions of the other parts of behavior analysis are most likely to become related to one another. In this regard, ABA's role in behavior analysis may be likened to the role of a central nervous system in organisms. Thus, the continuing existence of behavior analysis and ABA are related to one another. Because ABA and behavior analysis stand in a part-to-whole relation, we turn now to behavior analysis as the cultural system that encompasses ABA.

Behavior Analysis—A Cultural System

Behavior analysis exists as a cultural system only in terms of the behavior of organisms that participate in the practices of behavior analysis. Further, the behavior of participants must enter into interlocking contingencies with the

behavior of others if it is to contribute to the evolution of behavior analysis as a cultural entity. For example, imagine that Jodi Student obtained a PhD in the experimental analysis of behavior and promptly relocated to a space station circling the moon, where she continued doing experimental research with her experimental subjects. If Jodi does not report to discuss her results and methods with other behavior analysts, they cannot enter into the cultural entity known as behavior analysis. Similarly, imagine that Tony Student obtains a MS in applied behavior analysis and takes a position at Eastern Outergalactic Developmental Center. He successfully oversees the origin and maintenance of complex behavioral repertoires in people previously designated as having profound mental retardation. Tony's procedures and outcomes contribute to the evolution of behavior analysis as a cultural entity only if they are reported or otherwise enter into the interlocking contingencies that maintain the behavior of other behavior analysts.

As in the case of ABA, behavior analysis as a cultural system exists in the interlocking behavioral contingencies maintained by participants in the cultural practices of behavior analysis. Like Jodi and Tony, one can practice behavior analysis independently. But one cannot participate in the evolution of the cultural entity or contribute to the survival of the cultural system unless one's behavior enters into interlocking contingencies with other participants in the cultural system. At the very least, the response products of one's behavior-analytic work must enter into the contingencies that maintain the behavior of other participants in behavior-analytic cultural practices.

Figure 2 depicts relations among behavior analysis, ABA, the organisms participating in the cultural practices of ABA and of behavior analysis, and the repertoires of those organisms. Members of ABA have behavior-analytic repertoires that extend beyond their ABA-related repertoires. Their behavior enters into

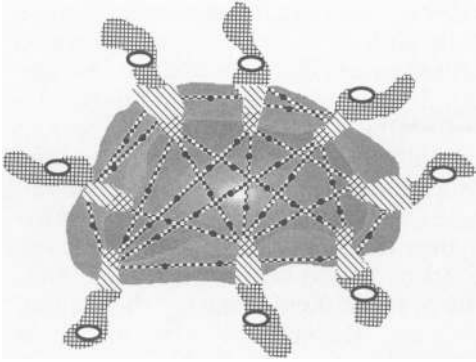


Figure 2. Schematic of behavior analysis as a cultural system that includes ABA as a subsystem. Please see text for details.

interlocking contingencies outside of the cultural practices of ABA. Behavior analysts who are not members of ABA also participate in those interlocking contingencies. ABA and its cultural practices (illustrated in terms of the interlocking behavioral contingencies among its members) constitute a component of the larger cultural entity of behavior analysis.

In addition to ABA, the cultural entity known as behavior analysis is composed of many other cultural units or subsystems. These units and subsystems include (a) academic programs in behavior analysis, whether in departments of behavior analysis, psychology, education, rehabilitation, social work, and so forth; (b) state, regional, and national organizations of behavior analysis; (c) certification boards or committees; (d) behavior-analytic treatment centers and consulting firms; and (e) organizations with the mission of promoting behavior analysis, such as the Society for Advancement of Behavior Analysis (SABA) and the B. F. Skinner Foundation.

As cultural systems, ABA and behavior analysis are, then, interdependent. Whether behavior analysis would continue to exist without ABA may be debatable, but it is highly likely that ABA would not exist without behavior analysis. So I now turn to the state of the union—behavior analysis as a whole—to consider its strengths and its weaknesses

as a cultural entity and to consider opportunities for growth and healthy development.

STRENGTHS OF BEHAVIOR ANALYSIS AS A CULTURAL SYSTEM

Although behavior analysis has many strengths, I shall focus on five that appear to be among the most important. These are (a) the disciplinary character of behavior analysis; (b) its universality across cultures; (c) its ability to be integrated into a scientific worldview; (d) its track record in offering practical, data-based solutions to serious social problems; and (e) the behavioral characteristics of its participants.

Disciplinary Character

As a cultural system, the greatest strength of behavior analysis may be its disciplinary character. Among the behavioral and social sciences, there may be none whose parts form such a coherent whole as behavior analysis. Prominent among its components are the experimental analysis of behavior, applied behavior-analytic research, behavior-analytic applications and technologies, and the conceptual integration of behavioral concepts in a loosely constructed but coherent theoretical framework.

The experimental analysis of behavior has resulted in a small number of general statements about lawful behavior–environment relations that rightly can be called *behavioral principles*. These behavior–environment relations are currently classified as *operant* and *respondent* relations (see Michael, 1985, for review). The principles describing these relations meet the requirements of scientific generalizations because they successfully “divide up the world into classes that function in natural regularities,” and they are “generalizations that are spatiotemporally unrestricted” (Hull, 1984, p. 145).

Building on basic principles formulated by Pavlov, Thorndike, and Skinner, experimental analysts have systemati-

cally extended the range of phenomena entering into the "natural regularities," proceeding only as quickly as their data allowed. For example, Herrnstein (1961) initiated the study of operant behavior as a lawful function of relative rate of reinforcement for target behavior and alternative operants; Neuringer (e.g., Page & Neuringer, 1985) has systematically explored variability as a dimension of operant behavior following introduction of the topic by Schwartz (1982). Sidman (1971) launched the behavior-analytic study of behavioral relations required indirectly as a function of four-term contingencies involving arbitrarily related conditional and discriminative stimuli. Also underway is the investigation of modulating or contextual variables in respondent conditioning (e.g., Miller & Spear, 1985).

The experimental analysis of behavioral processes in laboratory research blends seamlessly into applied behavior analysis. Applied behavior analysis itself may be seen as a continuum of scientific effort, blending on one end with laboratory research on behavioral processes and on the other end with the systematic use of techniques based on previously established principles that have been previously validated through applied research (Johnston, 1993). On the end that blends into laboratory research, applied behavior analysis studies processes such as generalized imitation (e.g., Baer & Sherman, 1964), response class organization (e.g., Peterson, 1968), and behavioral units in reading (e.g., Matos & d'Oliveira, 1992).

On the technological end of the applied research continuum, the focus is on validation of tactics that are based on behavioral principles and that produce change in particular behavioral *content* as a result of manipulation of *particular* environmental events (e.g., Foxx & Shapiro, 1978; Geller, Paterson, & Talbott, 1982; Krantz & McClannahan, 1993). Between basic research (process oriented) and problem-oriented applied research (content oriented) lie laboratory analyses that explore both content and process and sometimes the relation between them (see Morris, 1992). In this vast domain lies

research comparing the behavioral effects of different drugs (e.g., Burgio, Page, & Capriotti, 1985) as well as research examining the effects of a specific drug on work performance (e.g., Brady, 1992). Also on the applied research continuum are analyses of controlling variables for a particular problem behavior (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982).

Conceptual/theoretical work in behavior analysis derives from and complements experimental analysis and synthesis (see Catania, 1984) accomplished in the laboratory or in natural settings. The operant as a unit of analysis has been the focus of conceptual analysis (e.g., Catania, 1973; Glenn, Ellis, & Greenspoon, 1992; Schick, 1971; Thompson & Zeiler, 1986). Synthesis began as early as 1950 (Keller & Schoenfeld); interpretation of complex human behavior in terms of the principles was added to conceptual integration or synthesis as early as 1953 (Skinner) and has continued since that time (see, e.g., Bijou & Baer, 1978; Skinner, 1957, 1969, 1974; Staats, 1968). Integration of behavioral principles with scientific principles from other domains, particularly the biological and cultural domains, is currently underway (e.g., Glenn, 1991; Skinner, 1981; Zeiler, 1992).

Evidence of the interrelatedness among the discipline's parts can be seen in the cross-referencing that occurs among basic, applied, and conceptual literatures. From the current perspective, such cross-referencing demonstrates the coherence of behavior analysis as a discipline. The relative ease with which practitioners move from one content area to another is additional evidence of the coherence of the discipline. If a professional's knowledge of the discipline remains current and knowledge of particulars in a content area is continually related back to the principles, a practitioner will be able to make use of much of what is learned in one content area (e.g., developmental disabilities) to solve problems in other content areas (e.g., organizational behavior management, eating disorders, or classroom management).

Worldwide Contributions to the Discipline

Behavioral principles describe behavioral processes that occur without respect to the particular forms that the behavior takes or the particular cultural contingencies within which environmental events enter into functional relations with those forms of behavior (Glenn & Malagodi, 1991). For this reason, a single set of principles is useful in explaining behavioral content observed in any part of the world; these principles form the basis for successful intervention in any part of the world. The findings of experimental analysts in nations all over the globe contribute to the scientific understanding of behavior. For example, publications of Barnes and Keenan (1993) in Ireland, Joyce and Chase (1990) in the United States, Bentall and Lowe (1987) in Wales, Matos (1992) in Brazil, and Torgrud and Holborn (1990) in Canada are part of a continuous pattern of research on instructions and behavior. This research can provide the basis for intervention by practitioners in any nation, speaking any language, and working with any population or behavioral problem.

Although science is itself a cultural product, the power of good science lies in the universality of its laws and principles. Process-based scientific enterprises may have arisen from cultural practices in a local cultural system; however, to the extent the principles derived are universal, the principles and laws of such scientific domains can be further extended and used to develop local technologies in any cultural system. In this regard, behavior analysis is in a class of scientific domains that includes physics, chemistry, genetics, evolutionary biology, and cultural materialism. Whether or not the particular theoretical perspectives in any of these scientific areas gains or holds universal *acceptance*, at least some of the lawful relations described in all of them appear to "refer to any entities that happen to have the appropriate characteristics" (Hull, 1984, p. 145). The multicultural participation of scientists in research on lawful behavioral relations

is one of the most important strengths of behavior analysis as a discipline.

Ability to be Integrated into a Scientific Worldview

The various scientific disciplines each focus on generalizations that hold with respect to some range of natural phenomena. Although some scientists appear to believe that the generalizations pertaining to the phenomena of particular interest to them are "fundamental" in some way, the evidence suggests that evolutionary processes have resulted in what may be described as integrated, multiple *levels* of natural phenomena. Processes at one level produce phenomena that enter into new kinds of relations, which can be understood only in terms of processes occurring at *that* level (Glenn, 1986). These processes in turn produce phenomena at a level requiring yet additional principles to describe the relations that obtain among events at that level. Natural lines of fracture mark off phenomena occurring at various levels, and the business of science is to discover those lines of fracture (Skinner, 1938) and to invent principles that describe relations that occur in the natural universe.

The lines of fracture that interest behavior analysts are those that involve relations between the activities of organisms and other empirical events. The business of the science is to describe the kinds of functional relations that obtain between organismic activities and environmental events. Related phenomena, each with their own lawful relations, include those studied by geneticists, evolutionary biologists, neuroscientists, and cultural analysts. At some point, one might hope that a metascientific conceptual framework will clarify the relations among the phenomena occurring at the varying levels of analysis and possibly even result in statements of lawful relations that subsume the scientific generalizations established with respect to the various scientific domains. Adams (1988), Laszlo (1987), and Pantin (1968) are examples of preliminary attempts at

such integration. Because the principles of behavior analysis describe lawful relations among empirical events, all of which enter into other scientific domains, these principles appear to be among those that necessarily must be considered in any metascientific framework that purports to integrate the principles describing phenomena at the various levels of analysis.

Practical Solutions to Serious Social Problems

Another strength of behavior analysis is of potential import to virtually every individual on the planet: its ability to generate solutions to problems resulting from human behavior and to provide methods of evaluating those solutions. Most of the serious challenges facing the human race result from human activity (including both verbal and nonverbal behavior). But human activity has also resulted in virtually everything that humans value highly, including material goods and social values. Only recently has it become clear that the *same principles* account for the behavior producing the problem outcomes and the behavior producing the valued outcomes. Thus, a single set of principles can be used to develop methods of (a) increasing the complexity of behavioral repertoires and the rates of behavior conducive both to the well-being of the individual behavior and the cultural system in which the behavior is embedded, and (b) preventing or decreasing the rates of behavior that is not conducive both to the well-being of the individual behavior and the cultural system in which the behavior is embedded.

We are increasing our understanding of the complexity of behavior–environment relations characteristic of human repertoires and of the importance of time as the dimension against which evolutionary behavior change is measured. Although often lumped together as issues pertaining to “context,” there seem to be many different kinds of complexity under consideration. They include (a) higher

order contingencies (e.g., Sidman, 1986), (b) interrelations among the contingencies that maintain behavior in individual human repertoires (e.g., Lubinski & Thompson, 1986), (c) evolution of complex behavioral entities from less complex ones (e.g., Glenn & Field, 1993), and (d) interactions among environmental contingencies affecting behavior (e.g., Russo, Cataldo, & Cushing, 1981). Increasingly understood is that intervention with respect to any particular behavior requires consideration of the contingencies maintaining other units, the lack of critical behavior units in a repertoire, or the lack of behavioral contingencies to maintain behavior previously acquired.

Although it is not clear whether increasingly sophisticated behavior technology is the result of improved understanding or improved understanding is the result of issues fostered by the successes and failures of technology, behavior analysts have clearly and steadily extended the range of events they consider in developing intervention strategies. In the area of education, for example, Johnson and Layng (1992) report technologies (based on earlier work of Lindsley, Engelmann, and their colleagues) that are effectively remediating the academic deficits of hyperactive children and producing literacy in adult learners with poor learning histories. Tucci and Hursh (1991) have developed a “competent learner model” to assist educators in designing instructional systems.

The relation of problem behavior in developmentally disabled persons to environments that are inadequate for the generation and maintenance of socially desired behavior is becoming better understood (Horner, 1980), as is the importance of the overall rate of reinforcement in a particular environment (McDowell, 1988). Such findings make very clear the need for specialists with a thorough knowledge of behavioral principles and the ability to intervene systematically and effectively in deficient environments to ensure that behavioral contingencies and rates of reinforcement are adequate to support desirable behavior.

ior and to preclude behavior that is seriously harmful to the behaving individual and to others. In business and industry, solutions based on behavioral principles have been applied with beneficial effect in the areas of accident prevention and safety skills (e.g., Geller, 1990; Sulzer-Azaroff, Loafman, Merante, & Hlavacek, 1990) and worker productivity and efficiency (e.g., Abernathy, Duffy, & O'Brien, 1982; Wilk & Redmon, 1990; Wittkopp, Rowan, & Poling, 1990), among others. Behavioral principles have been used in prisons to humanize the behavioral environments of both inmates and prison personnel (Ellis, 1991) and in providing responsive care for institutionalized elderly persons (Hussian & Davis, 1985).

By researching the characteristics of behavioral environments that produce repertoires characterized by productive, creative, caring, and healthful behavior, applied behavior analysts can supply important information regarding what it will take to solve some of the pressing problems facing society now. The day may be approaching when the problems accruing from inadequate environments are sufficiently painful to enough people to result in serious consideration of systematic change in those environments. The need for *effective* solutions will likely result eventually in consideration of behavior-analytic technologies that have proven effective.

Behavioral Characteristics of Participants

The foregoing has focused on characteristics of behavior analysis at the cultural level. Cultural systems, however, are entirely dependent on the behavioral repertoires of their participants. The repertoires of behavior analysts are notable, from the present perspective, for high levels of intellect, commitment, and competence.

Behavior analysis, like all scientific disciplines, requires something more than "ordinary knowledge" (Lee, 1988). The amount of serious study required to obtain in-depth knowledge of scientific

methods and concepts virtually ensures that a significant number of people so trained will have strong intellectual interests and abilities. And if mentors have done their job adequately, they will have arranged behavioral contingencies so that scientific behavior is likely to be maintained in the absence of educational contingencies (Vargas & Fraley, 1984).

To me, behavior analysts appear to be disproportionately competent and committed to their work. It is not clear whether behavior analysis appeals to people who have repertoires characterized by competence and commitment or whether those behavioral characteristics are acquired as a result of training in behavior analysis, or both. Perhaps the criterion of *effectiveness* (whether in terms of experimental control over environmental causes or successful remediation of everyday problems) as a *sine qua non* of the discipline is relevant.

WEAKNESSES OF BEHAVIOR ANALYSIS AS A CULTURAL ENTITY

Building on strengths may be an important strategy, but recognizing one's weaknesses is also useful. The weaknesses of behavior analysis mitigate against maximizing its strengths. Some of the weaknesses of behavior analysis as a cultural entity are that (a) it is not institutionalized in higher education; (b) it is underdeveloped as a distinct profession; (c) its numbers are relatively small; and (d) its members have generally neglected to recognize, analyze, and deal with the political contingencies that affect their professional futures and the future of their discipline.

An Academic Orphan

Perhaps the most serious weakness of behavior analysis is that it is an academic orphan. The orphaning of behavior analysis probably has multiple causes, not the least of which is the preparadigmatic character of psychology, out of which behavior analysis arose. As succinctly stated by Scott (1991),

Psychology . . . is a federation of often unrelated disciplines placed in one administrative category during their first century of existence because each could be defined as taking an experimental approach to the study of human behavior. (p. 975)

Scott goes on to suggest that the "often unrelated disciplines" constrained by "the paper membrane of departmental boundaries" (p. 975) are finding homes in various other disciplines and departments with whom they share common research interests and whose course work is more relevant to their graduate students than is the potpourri of conceptually unrelated courses that compose psychology curricula.

From a behavior-analytic perspective, many of the subject matters of the unrelated disciplines housed in psychology departments could, in principle, be conceptualized in terms of behavior-analytic principles. Researchers in those disciplines, however, rarely view their subject matter in terms of behavior-analytic principles, which suggests that they define themselves in other ways. An early version of behaviorism (Watson, 1924/1970) was offered, probably prematurely, as a theoretical underpinning for all of psychology, and later versions have been offered as well (e.g., see Skinner, 1953, 1969, 1974). Behaviorist conceptual frameworks have been explicitly rejected, with or without careful consideration, by various disciplines that are currently straining against the artificial boundaries of psychology departments. These psychological disciplines are evidently going to work out their own destinies independent of one another. As described by Scott (1991), they have passed or are passing from interest groups to programs to degree-granting programs and on to independent departments. Although there seems to be no discipline of psychology, there are many psychological sciences (some prefer to be called "cognitive sciences" and others prefer to be called "behavioral sciences").

Behavior analysis may have been the first of these disciplines to seek alliances outside of psychology departments. Such alliances may have been responsible for the survival of behavior analysis as it was

nudged out, thrown out, or relegated to marginal status in most psychology departments over a period of two or three decades. As a result, excellent graduate programs in behavior analysis exist in departments of rehabilitation, social work, education, special education, and human development, as well as in scattered departments of psychology. The good news is that these programs exist; the bad news is that most of them are perennially at-risk because of changing faculty and directions of their host departments. One of the consequences of being an orphan is the necessity of gratefully accepting anything doled out by proper owners of resources. This potential problem is not important as a matter of status or territory per se; it is important because it is difficult to develop an appropriate curriculum when that curriculum must be designed to meet the interests of people outside our discipline.

A different kind of problem may ensue when adopted behavior-analytic programs become the favorites of department chairs and deans. Outliving or outlasting members of other mini-disciplines occasionally results in inheritance of the department itself, and the department then becomes, de facto, a department of behavior analysis even though it may be formally designated as something else. This outcome poses its own risks, such as rivalry with other disciplines still residing within the department (who consider themselves rightful heirs) and/or insistence that a department claiming to be rehabilitation, psychology, human development, and so on, is "narrow" if it houses only behavior analysts, even if among them are basic researchers, applied researchers, practitioners, and theoreticians. This problem may lessen as more of the disciplines previously housed in psychology departments follow the path described by Scott (1991) and seek alternative homes.

Underdeveloped Professional Identity

Unlike many other practitioners, behavior analysts cannot be identified in

terms of any particular population served (e.g., developmentally disabled, employees, or school children), or the problems in which they specialize (e.g., academic deficits, eating disorders, or problems in living), or the settings in which they work (e.g., schools, hospitals, corporations, or institutions). The practice of behavior analysis is properly based on the creative application of general principles to specific cases, so the defining feature of behavior-analytic practitioners is that they help people bring about changes in behavior by rearranging how environmental events relate to the activities of humans and other organisms with whom they work. In doing so, they rely on established behavioral principles and on current research (both basic and applied) to guide their activities.

The application of behavioral principles to complex cases is not a simple activity. The thorough training required to practice behavior analysis ethically and well cannot be obtained by taking a course or two or a few workshops (or even a few dozen workshops). Because programs in behavior analysis exist in a variety of academic departments, there are well-trained behavior analysts who are psychologists, rehabilitation specialists, social workers, educators, and others. But *most* psychologists, rehabilitation specialists, social workers, and educators are *not* well trained in behavior analysis. In addition, many of the professionals with the very best training in behavior analysis, whether obtained in departments of behavior analysis, psychology, or human development, are not licensable or certifiable as professionals in those professional fields because they do not meet all the licensing requirements. These differences in training are likely to increase as training requirements for behavior analysts continue to increase as the knowledge base of the discipline continues to broaden. The lack of a professional credential in behavior analysis is, then, a serious weakness (see Shook, 1993).

Small Size

Although it is difficult to estimate the number of behavior analysts worldwide,

it is certain that the number is small compared to the number of scientists and science-based technologists (e.g., engineers) who participate in other disciplines. Small size is considered to be a weakness here because it carries certain disadvantages. I shall review those disadvantages and leave discussion of their associated opportunities for the next section.

One disadvantage of being small is the accompanying lack of visibility in the scientific firmament. The scientific findings and technological achievements of behavior analysis tend to be lost amid the findings of more well-established sciences. Unlike the findings attributed to "cognitive science," behavior-analytic findings are often not clearly identified as attributable to "behavior analysis." Thus, lack of name identification contributes to the disadvantage of small size.

Sometimes the smallness of behavior analysis is considered a disadvantage because it mitigates against the political clout that accrues to large identifiable groups of voters in a democratic political system. This disadvantage is particularly apparent in the professional arena at the state level, where professional groups with large numbers potentially can pressure legislators into passing laws that may not be in the best interests of consumers, to say nothing of behavior analysts and behavior analysis as a discipline and profession.

Perhaps the greatest threat posed by our small numbers will occur when the possibility of successful solutions to serious social problems is more widely recognized. The danger here is twofold. First, there will be far too few properly trained people to meet the demand, which could result in inadequately trained people jumping into the breach. Indeed, this is a fact of life even today. Second, the call for behavior analysts may result in makeshift graduate programs that do not provide the thorough training in all aspects of the discipline that a professional will need to order to continue developing as a behavior analyst during posttraining years.

The problems associated with small size will not be solved by increasing the number of people who *call themselves* be-

havior analysts. Further, the problem of size is not likely to go away. Because rate of growth is to some extent a function of size, the small size of the discipline virtually guarantees that it will remain relatively small for the foreseeable future. Overall, however, the number of participants is likely to be far less important than the content and the frequency of behavior that behavior analysts emit with respect to their scientific and professional work and their scientific and professional organizations.

Lack of Political Sophistication

Perhaps because their scientific efforts focus on the behavior of individual organisms, behavior analysts appear reluctant to take the sociology and politics of science seriously, or even to recognize that such realities exist. If so, this reluctance would be a case of confusing *what one studies scientifically* with the facts of one's behavior in the context of complex cultural systems that contain the behavioral contingencies accounting for the behavior of scientists, practitioners, and everybody else. In any case, neither the cultural practices of ABA nor the behavioral repertoires of most individual behavior analysts have been directed toward understanding and dealing effectively with cultural realities.

One manifestation of naivete is what might be called "the better mousetrap fallacy." Emerson said, "If a man can write a better book, preach a better sermon, or make a better mousetrap than his neighbor, though he builds his house in the woods the world will make a beaten path to his door." Such is not always the case, even in the industrial world at the heart of contemporary cultural infrastructures. Not only does the writer, the preacher, or the manufacturer need a good product, but the product must also be marketed effectively. Marketing appears to be even more relevant to the practices of the cultural structure—the political, educational, and domestic practices—than those of the infrastructure. Reasons for this may be that (a) there is no universal measure of effectiveness comparable to the industrial bottom line, and

(b) the "buyers" are not always the "consumers" at the structural level of cultural systems, where educational, domestic, and political practices occur (Harris, 1979).

When technology results in products that relate to the business of the cultural structure, the "buying" of that technology (or its products) does not necessarily occur. That technology either must be marketed to the real buyers or cultural contingencies must be rearranged to allow the real consumers to make clear the criterion of effectiveness. Perhaps obvious is that if the cultural structure continues to "buy" products that do not support the cultural infrastructure, the cultural system will not survive (cf. Harris, 1979). The failure of behavior analysis as a cultural system to deal with these realities is as real as the failure of the larger cultural system to recognize and deal with practices inimical to its own survival.

Behavior analysts, as well as ABA as a cultural system, historically have paid little attention to establishing behavior analysis as a presence in the scientific community and among scientific organizations. Instead, much effort has been wasted to "make psychology over" as behavior analysis. By failing to recognize that behavior analysis and other behavioral and psychological sciences are actually different cultural systems, behavior analysts have missed opportunities to identify common interests and work together to realize common goals. One obvious example is the need to work together with other scientific disciplines on behalf of science itself.

OPPORTUNITIES FOR BEHAVIOR ANALYSIS

When behavior analysts recognize their discipline as a unique cultural system that has interests in common with other disciplines, they can work within their cultural system to strengthen it in a number of ways, particularly through the organizational structure of component associations, departments, schools, and companies. Some recommendations for how to strengthen behavior analysis as a cul-

tural system, and to mitigate its weaknesses, are discussed below.

Strengthen Disciplinary Character

Although the disciplinary character of behavior analysis is, from the present perspective, its greatest strength, it is also at risk for reasons touched on in the paragraphs above. The future of the discipline will soon be left to its current graduate students and their students. It is imperative that graduate curricula include all components of the discipline. In addition to being well versed in the principles of behavior, all students need verbal repertoires with respect to the experimental and applied literature, the discipline's history and philosophy of science, and its scientific methodologies.

The importance of ABA's Accreditation Board in establishing and maintaining strong behavior-analytic graduate curricula cannot be overstated. Faculty with a behavior-analytic orientation often have difficulty providing an adequate behavior-analytic curriculum when behavior analysis programs are housed in academic departments with other disciplinary ties. As the need for practicing behavior analysts becomes more apparent, our discipline must be prepared to ensure that training is adequate and that well-prepared graduates are sent out in the name of behavior analysis to deal with some of the most difficult problems society has ever faced. The Accreditation Board is an obvious and important means for behavior analysts to maintain authority over its own future.

A second way to strengthen the discipline is to continue establishing behavior-analytic curricula everywhere possible on university campuses. Diversity among its homes is a step toward academic independence, as is the case for other disciplines that have broken out of the "academic membrane" of departments of psychology (Scott, 1991). *Where* behavior analysis is taught surely matters less than *what* is taught as behavior analysis.

A third way to strengthen the discipline is to continue to increase active di-

alogue among basic and applied researchers, technologist/practitioners, and conceptual integrators. Each of these facets of the discipline is critical to the future of the discipline as a whole. Especially in a time when public support of science is increasingly tied to the fairly short-term potential for scientific findings to help solve serious social problems, behavior analysis can benefit from the close relation between its applied and basic research bases. That relation can certainly be strengthened, and the need to do so appears to be recognized.

A fourth way to strengthen the discipline is to present ourselves to the public *as* a discipline. As such, behavior analysis is unique in that its focus is on understanding relations between behavior and environment. It is growing, as shown by the increasing number of academic programs being offered, the increasing number of members in the Association for Behavior Analysis, and the increasing number of international presentations at the annual convention. And it is a discipline whose organizations are seeking to establish positive relations in equal partnerships with other scientific organizations.

Use Full Capacities of Computer Technology

The time lag between the prediction of a technological revolution and the occurrence of this revolution may never have been so short as in the case of the "computer revolution." Within a scant 20 years, computers have gone from huge, rare, cantankerous machines operated by an elite cabal for esoteric purposes to reliable and portable tools used by people of all ages and levels of education for purposes ranging from computer games through desktop publishing to modeling chaotic systems.

The importance of technological breakthroughs to scientific progress (as regards both theory and experimentation) is well known, as is the contribution of technological innovation to the practical affairs of living cultures—for ex-

ample, in agriculture, industry, and daily life. Technological innovation is a powerful force in cultural evolution, whether the cultural system at issue be a scientific domain (as in the case of the telescope's contribution to astronomy) or a socio-political domain (as in the case of the longbow or the printing press). The computer, however, may be unique in its potential for cultural change in that it is concurrently changing science, industry, education, finance, agriculture, and the ways in which people go about their daily lives.

The impact of the computer on the growth of scientific domains promises to be exponential. Maximum benefit could accrue to behavior analysis, in particular, for two reasons: (a) Behavior analysis is in its youth, and increasing acceleration in the earlier stages could result in reaching maturity faster than might otherwise happen. (b) The parts of behavior analysis form a coherent whole so that rapid advances in any one area automatically give rise to the possibility of advances in its other parts.

There are many ways computers can contribute to the rapid advancement of behavior analysis. With respect to scientific methodology, the computer allows experimenters to collect data on behavioral processes at a level of specificity previously out of reach (see Mechner, 1992). It allows multiple, simultaneous measures of ongoing behavior in real time (e.g., Vaidya, 1993) as well as experimental analysis of processes involving rapid change in the dimensions of behavioral units (e.g., Pear & Legris, 1987). New possibilities for data collection and data analysis allow conceptual advances and increase the likelihood of basing applied research on recent experimental work (e.g., Martens & Houk, 1989) and of integrating behavior-analytic principles with principles derived from other disciplines (e.g., Donahoe, 1991). With respect to advancing behavioral technologies, the computer opens a range of possibilities in education, industry, training and development, and behavioral medicine, among others.

Finally, worldwide electronic network-

ing among behavior analysts has enormous potential for strengthening behavior analysis as a discipline. It will increase the number of individuals each behavior analyst can interact with, increase frequency of interactions, reduce delays in transmission of information across the world, and broaden the range of resources available to individual researchers and practitioners.

Build Bridges Toward Related Disciplines

Behavior analysis, as the science of functional relations between organismic activities and environmental events, is only one of many scientific disciplines. It is important to recognize its unique role among the sciences and at the same time to recognize that other sciences also play unique roles. The fact that behavior analysis has passed the disciplinary threshold may be most evident in the concurrent recognition that behavior analysis has its own identity and that it can build both *organizational* and *conceptual* bridges between itself and other disciplines and organizations.

Recognition of the importance of organizational bridges has led to ABA's membership in the Federation of Behavioral, Psychological, and Cognitive Sciences. Although the scientific activities of some of the Federation's other members may be entirely orthogonal to the activities of behavior analysts, all members of Federation organizations can benefit from increases in government and public understanding and funding of scientific research. Any number of important alliances could arise from the participation of ABA in the Federation.

Another joint effort to which ABA has committed is the Human Capital Initiative (HCI) spearheaded by the American Psychological Society. Over 70 organizations are contributing to the Initiative, which addresses the issue of the importance of basic research to the solution of social problems in the areas of job productivity, aging, substance abuse, education, and health. ABA has been recognized by HCI leaders as contributing

to the Initiative to an extent out of proportion to its size.

ABA participates in these joint efforts on equal terms with other organizations. By representing behavior analysis in these two arenas, ABA is spreading the word about behavior analysis—a far more productive approach to gaining recognition as a discipline than complaining about what some might consider a lack of recognition. Only time will tell which of the different disciplines making up the behavioral, psychological, and cognitive sciences will grow and prosper in the coming years. Ultimately, scientific usefulness will probably tip the scales. If behavior analysis is to be among the survivors, then it is imperative that behavior analysis remain an integrated, evolving discipline while establishing itself as a useful partner in cooperative endeavors in which win-win strategies are possible.

Building conceptual bridges has been underway for a number of years. Because behavioral phenomena clearly depend on the presence of organic phenomena, one might expect that the scientific disciplines that study them would relate conceptually to one another. The same is true for possible relations between the scientific disciplines that study cultural phenomena and behavioral phenomena, because the first clearly depends on the presence of the second. Such relations are not always immediately apparent, however, and they may not always be formulated satisfactorily.

One reason may be that the formulations of the related disciplines (theories, principles, and concepts) are inherently incompatible, even though the phenomena on which the formulations are based are somehow related to one another. Another reason may be that the scientists who attempt to understand the interrelations may not be in a position to distinguish between critical and more superficial linkages, which can lead to unsustainable links. Yet another reason may be that apparent points of contact leave a conceptual gap so wide that only a missing scientific discipline can fill it.

Despite the possibility of unfavorably skewed hit-miss ratios, behavior analysts

have considered relations between behavior analysis and signal-detection theory (Goldiamond, 1962), cultural materialist anthropology (e.g., Glenn, 1991; Malott, 1988; Vargas, 1985), neuroscience (e.g., Donahoe, 1991), attribution theory of social psychology (Hineline, 1986), behavioral biology (Robinson & Woodward, 1989), and many others. In addition, scientific formulations arising in other disciplines have been used to guide exploration of behavioral phenomena (e.g., Alessi, 1992; Glenn et al., 1992; Killeen, 1992; Nevin, 1992; Skinner, 1981).

Whether the bridges under construction are socioorganizational or conceptual, behavior analysis stands to gain in the long run from such bridge-building attempts. Not all of them will stand forever. Some will be abandoned in the planning stages or when construction proves impossible; some bridges will not (and should not) even be considered. The building of bridges between behavior analysis and other disciplines and organizations will prove most useful when all parties stand to gain from the process and when the bridges are anchored in firm ground on both sides of the chasm.

At more local levels, behavior analysts can seek out working relations with colleagues in other departments and disciplines within their universities, research centers, institutions, and agencies. Because it is critical that such relations prove beneficial to all parties and that mutual respect and cooperation characterize them, it is probably obvious that care must be taken in selecting individuals and cultural entities with whom to forge partnerships. Of import to the future of behavior analysis is that partnerships allow behavior analysis to retain its identity and to function as an equal partner in joint endeavors.

Credentialing of Behavior Analysts

Evidence abounds that a serious shortage of appropriately trained practicing behavior analysts exists. At the same time, some of the nation's best trained behavior analysts are not licensable as

practitioners in many states. The reason for this discrepancy is that professions whose practitioners are currently licensed or certified in most states include extremely little training in behavior analysis, whereas well-trained behavior analysts do not receive much of the training required by those professions. One cannot conclude that either group of practitioners is poorly trained. For example, most clinical psychologists, social workers, and behavior analysts are trained quite differently. Although the clinical psychologists and social workers generally spend a week or two (perhaps even have a course or two) on behavioral principles and techniques, the vast majority of their training is focused elsewhere. Similarly, although behavior analysts might have a course in psychological testing or social welfare, the majority of their training is focused elsewhere. Unless the clinical psychologist or social worker is one of the rare individuals who seeks extensive training in behavior analysis, he or she will not be prepared to practice *as a behavior analyst*. Similarly, unless the behavior analyst is one of the rare individuals who seeks extensive training in clinical psychology or social work, he or she will not be prepared to practice those professions. The problem is that although there is a growing (albeit insufficient) number of practicing behavior analysts, professional regulation is almost nonexistent.

This state of affairs endangers the future of the discipline. The profession of behavior analysis is not tied, of course, to any particular domain of practice—mental health, mental retardation, organizational behavior, classroom management, instructional technology, or whatever. It is defined only in terms of a focus on relations between behavior and environment. Although it is true that professional behavior analysts have specialized and may continue to specialize in a particular area, the domain-specific knowledge is acquired in practice, internships, through professional literatures, and in continuing education, much as in the case of medical practitioners who have a particular specialty. Before

specializing, however, the practitioner must have adequate general training; there are few mechanisms to ensure that the practitioners have received such training.

The credentialing of behavior analysts is a mechanism that can be used to deal simultaneously with these related problems. In combination with accreditation of academic programs in behavior analysis, credentialing of individual practitioners can improve the quality of professional training. Credentialing can also ensure that properly trained individuals are able to practice their profession and that persons not trained as behavior analysts cannot claim to be practicing behavior analysis. In the process, a well-designed credentialing process could clarify the range of phenomena that behavior analysis addresses. Philosophical, political, and practical issues regarding credentialing of behavior analysts have been addressed by Johnston and Shook (1987) and Shook (1993).

Increase Public Understanding

It is painfully evident that scientists in general and behavior analysts in particular have not succeeded (and perhaps may not even have tried systematically) in making the relation between basic scientific research and solutions to social problems clear to the public. True, the picture is confused by the fact that in some cases there is little or no relation. In other cases, behavior analysis being one, there is a very clear relation. The public—including legislators, funding agencies, and citizens in general—cannot be expected to know how basic research has given rise to much of the technology that people would not want to do without. Nor are most of us likely to predict the possibilities that are just around the corner in our own disciplines, to say nothing of other disciplines.

Whether scientists like it or not (and most apparently do not), the shrinking world makes more and more necessary the “selling” of science to the public. As Madison Avenue has known since John B. Watson joined the advertising firm of

J. Walter Thompson, conditioned reinforcers can be created by associating one's product with currently reinforcing events. Behavior analysts appear to have overlooked the importance of ensuring that their products become conditioned reinforcers. Although it is doubtless true that behavioral technology can result in children who read better and feel better about themselves, in persons with retardation who behave more effectively with less supervision and more self-confidence, and in workers who are more productive and more satisfied, the second outcome in each of these pairs is often overlooked. But that outcome is what is currently valued by the general public. By associating (in the verbal environment of listeners) reading and self-worth, independent behavior and self-confidence, productivity and satisfaction, behavior analysts will clarify the relations among actions, outcomes of actions, and feelings. In the process, the technology that produces the desired actions, outcomes, and feelings may acquire conditioned reinforcing functions, which would benefit behavior analysts and society in general.

Curiously, behavior analysis has sometimes been associated in the verbal repertoires of others with an indifference to human welfare. Yet, behavior analysis is the very discipline that has (a) provided the impetus for the dewatering of retarded and mentally ill persons and the technological means for doing so, (b) demonstrated the possibility of successfully teaching academic skills to at-risk children, (c) improved significantly the safety of industrial workers, and (d) decreased vehicular injuries by increasing safety belt use. The association of behavior analysis with indifference to human welfare probably cannot be successfully argued against, even though it is inappropriate and unfair. Pitting reason against emotions that have been preestablished is probably not going to succeed in righting such wrongs. To get a fair hearing, behavior analysts need to take lessons from their detractors on the use of the principles of respondent conditioning and at the same time clarify the

relation between behavioral contingencies and feelings of happiness, satisfaction, confidence, and a sense of belonging.

Accomplishment of these objectives will require that individual behavior analysts who work with legislators, funding agencies, and the general public take every opportunity to demonstrate, verbally and nonverbally, the relation between behavior analysis and the values of their listeners. Further, behavior analysis may need to be popularized, much as physics and biology have been popularized, in the mass media. Finally, ABA and other behavior-analytic organizations will probably need to invest some of their organizational resources (behavioral and financial) in marketing activities, as do other scientific organizations.

Respond to the Need for Solutions to Important Social Problems

Certain social problems are widely recognized as critically important to the future well-being of individual humans as well as to cultural systems such as corporations, businesses, schools, nations, states, and so forth. Many of them are included in the HCI discussed above. There is no question that behavior analysis has something to contribute, both in basic research and technological solutions, in the areas addressed by the HCI. One result of the HCI may be that more funding will be available for research and demonstration projects in the areas of aging, worker productivity, substance abuse, education, health, and the occurrence of violence. Recent graduates and graduate students who have not yet settled on a field of research or practice might do well to consider whether one of these areas fits their interests and abilities. Likewise, faculty who provide graduate training would serve their students well if they took care to familiarize their students with behavior-analytic research and technologies in these areas.

CONCLUSION

Behavior analysis is small compared to older scientific disciplines. Although

it has great strengths, behavior analysis also has serious weaknesses as a cultural system. Nevertheless, we have many opportunities to build on our strengths and to mitigate our weaknesses. We must continually monitor our own behavior and its effects and our cultural practices and their effects. Are our efforts having the desired outcomes? What can we do better?

Let us not turn our backs on a world searching for solutions to problems that seem to threaten the very existence of the world as we know it. To paraphrase the words of B. F. Skinner: Why should we work for the survival of our cultural system? There may be no good reason, but so much the worse for the cultural system that does not convince its participants that they should work for its survival.

Behavior analysts must behave in ways that increase our knowledge of behavior, that strengthen behavior analysis as a discipline, and that bring our world closer to humane solutions to our cultural problems. Because behavior analysis is only a very small part of world culture, whatever we do—as an evolving discipline, an evolving organization, or as individuals with evolving behavioral repertoires—can only result in minor perturbations of larger and more complex systems. But if “a butterfly stirring the air today in Beijing can transform weather systems next month in New York” (Gleick, 1987, p. 8), a small scientific enterprise like behavior analysis can provide the initial conditions for constructive change in a much larger arena.

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