

Epistemology: A Behavior Analytic Perspective

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ABSTRACT

The field of behavior analysis contains three distinct elements. The practice of applied behavior analysis, the research methodology known as the experimental analysis of behavior (largely relying on single-subject designs), and the philosophy of science known as behaviorism. Behaviorism has well articulated positions on a variety of traditional topics contained within conventional philosophy, topics such as consciousness, aesthetics, ethics and values, ontology, free will and determinism, ontology, and epistemology. A review of the general field of behavior analysis is followed by a description of this field's perspective on epistemology, which is largely realist, parsimonious, and centers around demonstrations relating to the prediction and control over selected behavior. Notions of causality as eschewed in favor of demonstrating functional relationships between environmental events and subsequent behavior. To the extent that one can effectively predict and control behavior, one has arrived at a limited understanding that is truthful.

EPISTEMOLOGY: A BEHAVIOR ANALYTIC PERSPECTIVE

I often called epistemology my first love.
(B. F. Skinner, 1983, p. 395)

One of the ultimate accomplishments of a science of verbal behavior may be an empirical logic or a descriptive and analytic scientific epistemology.
(B. F. Skinner, 1957, p. 431)

I came to behaviorism...because of its bearing on epistemology, and I have not been disappointed.
(B. F. Skinner, cited in Smith, 1986, p. 263)

This paper will present an overview of a behavior analytic perspective on the topic of epistemology. Many readers may not be familiar with the field of behavior analysis, and providing an overview of this thriving discipline will be helpful in placing the epistemological discussion into a larger context. While behavior analysis is often seen primarily as a field within the larger discipline of psychology, the application of behavior analysis within a wide range of professions, including social work, education, sociology, political science, philosophy, economics and many others, is leading to the position that behavior analysis emerging as a credible independent professional discipline in its own right. This view is supported by the expansion of graduate degree programs in behavior analysis, an accreditation mechanism for such programs, the emergence of state-endorsed certification or licensure programs for the practice of behavior analysis, thriving professional associations and journals, and a professional code of ethics.

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Behavior analysis, hereafter abbreviated as BA, has three general areas, the practice of *applied behavior analysis*, a research methodology known as the *experimental analysis of behavior*, and the philosophy of science known as *behaviorism*. BA is supported by a number of professional associations, foremost of which is the Association for Behavior Analysis – International (ABAI, see <http://www.abainternational.org>). ABAI has over 65 affiliated chapters located around the world, including over 13,500 members, with 5800+ in the United States alone. Its annual conference attracts over 3000 attendees, and the organization sponsors several highly cited journals. The practice of behavior analysis is legally regulated in a number of states in the USA, and a national behavior analysis certification board helps assure that the practitioners of applied behavior analysis possess certain minimal qualifications (see <http://www.bacb.com/>). We will review each of these three elements of behavior analysis, as they are essential to understanding the field's epistemological positions.

APPLIED BEHAVIOR ANALYSIS

Applied behavior analysis (ABA) is the discipline's practice wing, consisting of certified behavior analysts, as well as professionals within other disciplines who are trained in ABA and make use of its principles in the delivery of professional services in diverse fields such as psychology, social work, medicine, and education. As outlined in Baer, Wolf, and Risley's (1969, p. 91) seminal piece, "analytic behavioral intervention is the process of applying sometimes tentative principles of behavior to the improvement of specific behaviors, and simultaneously evaluating whether or not any noted changes are indeed attributable to the process of application". ABA has several defining attributes:

- The problem under investigation must be socially significant. Applied behavior analysts are not usually interested in studying trivial issues.
- Both the intervention(s) and the outcomes must be behavioral in nature. The interventions studied must be derived from principles of learning theory, and the outcomes include objective measures of what people actually do, not merely what they may say they have done, will do, or marks they place on a piece of paper, as in completing a symptom questionnaire, rating scale, or attitudinal measure.
- The approach is analytic, in that each case is a small scale experiment aimed at providing plausible evidence that the intervention was functionally related to observed changes in behavior.
- The approach is technologically based, explained as "The best rule of thumb for evaluating a procedure description as technological is probably to ask whether a typically trained reader could replicate that procedure well enough to produce the same results, given only a reading of the description (Baer, Wolf, & Risley, 1968, p. 95). Similarly, the ways used to measure the outcome variables should be similarly technologically described.
- The approach must be conceptually systematic, with the presumptive effects of the intervention explicable in terms of contemporary learning principles, and the results having a bearing on the validity of these underlying behavioral principles.
- The approach must be effective, in that behavioral outcomes are clinically improved.
- The approach must be generalizable, ideally yielding long-term changes, not simply temporary ones, and generate effects replicable among other individuals with similar problems.



Thus, in summary, an *applied* behavior analysis will make obvious the importance of the behavior changes, its quantitative characteristics, the experimental manipulations which analyze with clarity what was responsible for the change, the technologically exact description of all procedures contributing to that change, the effectiveness of those procedures in making sufficient change for value, and the generality of that change (Baer, Wolf, & Risley 1968, p. 97, emphasis in original).

These features are contended to raise the field of ABA to that of a genuine science of human behavior and its control.

The approach of ABA is used in a wide variety of areas, including mental health, health care, education, developmental disabilities, all of the applied health professions, etc. Behavior analysis is distinct from the field of professional psychology by limiting itself to the analysis of behavior-environment interactions. In contrast, the American Psychological Association states that "Psychology is the study of the mind and behavior" (downloaded from <http://www.psychologymatters.org/psychdefinition.html> on 29 September 2009). Well and good. This seems clear enough, and quite legitimate. Just as geneticists solely focus on genetic contributions to understanding behavior, physiologists the functioning of organ systems for the same purpose, neurochemists the role of hormones and other aspects of chemistry as they effect one's actions, the behavior analyst's niche in science is the intersection of the environment with human activities and their reciprocal interactions.

THE EXPERIMENTAL ANALYSIS OF BEHAVIOR

The aspect of BA called the experimental analysis of behavior (EAB) refers to an approach to empirical research which is generally known as single-case research designs. Much conventional inquiry in the social and behavioural sciences uses nonomethic designs, research involving large groups of individuals and in putting hypotheses to the test using the hypothetico-deductive method. Differences between groups (e.g., one that receives a treatment compared to one that did not) or within groups (e.g., the level of functioning of a group of individuals before and after they received a given treatment) are examined using inferential statistics. The external validity of such studies is typically claimed on the basis of conducting a study on a randomly selected or otherwise representative sample of persons reflective of a larger population of persons of interest (e.g., people with a particular type of problem or diagnosis).

EAB uses a different approach to scientific inquiry. Instead of taking a few observations from many clients, as in nomothetic research, the idiographic EAB method obtains many observations from one or a very few number of people, ideally a number of times before and after their exposure to some environmentally-based treatment. If the pretest measures (known as a baseline) are stable, and change in the outcome measures is seen immediately after the introduction of the intervention, with these changes being both rapid, obvious, and important, this is construed as preliminary evidence of a causal link between what was done (the deliberate change in the environment) and changes in behavior. A single such demonstration is of course very weak evidence, which is why EAB relies on an array of sophisticated research designs, through which using a process of replicated findings involving the deliberate introduction and sometimes the removal of an intervention, increasingly plausible evidence can accrue supporting the contention that there is a genuine functional relationship between intervention X and outcome Y. Sometimes this can occur within an individual client, and sometimes the research involves replicated findings across a number of clients. The 'interventions', experimental manipulations or independent variables of the behavior analyst usually consist of environmentally-based stimuli, often construed as



reinforcing or aversive consequences, changes in the physical environment, the presentation or removal of antecedent stimuli, and the use of verbal methods of control.

The methodology of single-case research is laid out in a number of textbooks on behavior analytic designs (e.g., Sidman, 1960; Johnston & Pennypacker, 1993; Thyer & Myers, 2007; Riley-Tillman & Burns, 2009), and although this approach did not originate with the behaviorists (the field of medicine seems a more likely candidate), they elevated it to their primary approach to scientific inquiry. Certainly when the level of analysis involves individual subjects, single case designs possess numerous advantages over nomothetic research. The primary method of inferring change in single-case designs consists of visually inspecting data presented in the forms of line graphs. This produces a very conservative approach to inference because if the data are highly variable, a change in behavior is minor, or otherwise not obvious, it is easy to overlook. This results in the conclusions drawn from EAB research findings being fairly robust ones in that without compellingly dramatic changes in a client's pattern of data (say from pre-treatment to post-treatment levels of behavior), the natural tendency is to infer that no differences occurred. This EAB methodology of single-case designs has been widely employed in a variety of basic sciences and applied professions, such as psychiatry (Barlow & Hersen, 1973; Chassan, 1967). Within the domain of evidence-based practice, single-case research designs are said to be the highest level of evidence useful in making decisions and represent the most rigorous investigatory methodology for making causal inferences at the level of individuals (Guyatt & Rennie, 2002).

BEHAVIORISM

The philosophy of science known as *behaviorism* represents the third domain of behavior analysis and the term is not intended to refer to the application of learning theory principles to applied problems, or to the research methodology. Rather, «Behaviorism is not the scientific study of behavior by a philosophy of science concerned with the subject matter and methods of psychology» (Skinner, 1969, p. 221). Although the focus of the present article is on a behavior analytic approach to epistemology, behaviorism as a philosophy has its own perspective to most of the traditional concerns of general philosophy, including ethics, consciousness, free will, values, determinism and self-control, language, and aesthetics (see Chiesa, 1994; Thyer, 1997; Lattal & Chase, 2003; Leigland, 2005). There is a wide-ranging journal called *Behavior and Philosophy*, established in 1973 and published by the Cambridge Center for Behavioral Studies (see [http://www.behavior.org/behavior/index.cfm?page=http%3A//www.behavior.org/behavior/what is behavior analysis.cfm](http://www.behavior.org/behavior/index.cfm?page=http%3A//www.behavior.org/behavior/what%20is%20behavior%20analysis.cfm)). This journal is explicitly devoted to examining the behavioral perspective to philosophical issues and of course articles reflecting a behavioral orientation regularly appear in mainstream philosophy journals (e.g., Addis, 1982; Day & Moore, 1995; Hayes, 1985; Moore, 1990, 1998; Reed, 1981). This trinity of applied behavior analysis, the experimental analysis of behavior, and of behaviorism comprises the general field of behavior analysis.

The term 'behaviorism' is subject to different interpretations, including methodological behaviorism, philosophical behaviorism, and radical behaviorism.

Methodological behaviorism contends that the proper subject matter of psychology consists solely of overt behavior - actions or functions that can be detected through direct observation or proper instrumentation. Methodological behaviorism attempts to explain overt behavior, and while accepting the existence of inner states such as thoughts and feelings, holds that they cannot be studied scientifically. Philosophical behaviorism "...stands for analyzing or reducing mental states into dispositions to behave..." (Day & Moore, 1995, p. 78).



The position taken in the present paper presents that known as radical behaviorism, with the word radical meaning ‘complete’ as opposed to some extreme position. Radical behaviorism views behavior as everything that a person does, overt behavior as well as everything that occurs within the skin, phenomena such as feelings, thoughts, dreams, hallucinations, etc. With radical behaviorism, the phenomenon of the toothache pain is as real and legitimate a subject for theorizing and research as is the act of consuming an aspirin. Both are behavior of the person’s body. The fact that one is private, not visible to others, does not vitiate the reality of these inner events.

The position of radical behaviorism is most commonly associated with the psychologist B. F. Skinner and is significantly different from methodological behaviorism in that radical behaviorism *does* accept the reality of private events and attempts to develop effect ways to explain, predict and control them. The view that Skinner only considered publically observable activities as suitable subjects for scientific is an unfortunately widespread misconception. His early 1953 text titled *Science and Human Behavior* contains chapters on topics such as ‘Emotion’, ‘Thinking’, ‘Private Events in a Natural Science’, ‘The Self’, and his last book, *Recent Issues in the Analysis of Behavior* (1989) published in the year of his death had chapters on ‘The Place of Feeling in the Analysis of Behavior’, ‘The Origins of Cognitive Thought’, ‘The Initiating Self’, and ‘The Listener’. Clearly, attempting to develop theoretical accounts of the inner life of human being, while remaining consistent with the natural science orientation of behavior analysis, was an endeavor which consumed Skinner’s professional life.

The quotes presented at the beginning of this article suggests that epistemological concerns, explaining what knowledge is and how we know things, was actually a central facet of Skinner’s theorizing, methodology, and to a lesser extent his empirical research.

This philosophy of science called radical behaviorism is comprised of an amalgam of axiomatic positions, each of which is individually susceptible to debate, but are also widely held and respectable perspectives. A selected number of these are listed in Table 1 and will be discussed below, and it will be seen how these converge into a coherent behavior analytic approach to epistemology.

Table 1
Selected Philosophical Positions Associated with Behaviorism

<p>An Acceptance of:</p> <ul style="list-style-type: none">RealismNaturalismPhysicalismDeterminismPositivismEmpiricismOperationismParsimonyPragmatismScientific Skepticism	<p>A Rejection of:</p> <ul style="list-style-type: none">MentalismMetaphysicsDualismCircular ReasoningReificationRadical Skepticism
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SOME PHILOSOPHICAL ASSUMPTIONS OF RADICAL BEHAVIORISM

Realism

This assumption accepts the objective reality of an external world which exists independently of the perceptions of the observer. Realism is a commonly accepted assumption of most philosophies, especially philosophies of science. To accept realism is not to dispute the premise that human beings, to some extent, socially construct aspects of our world. For example, when the writer was growing up, science explained that there are nine planets, with the outermost one being Pluto. A few years ago, members of the International Astronomical Union voted Pluto 'off the solar system' in the sense that it is no longer designated as a true planet. Thus children today are taught that our solar system has only eight true planets. The construction of social reality has indeed changed. Pluto, however, has not changed. It swims along the periphery of our solar system, possessing an objective reality that is undisturbed by the machinations of man to classify it. Similarly, homosexuality was defined as a mental illness for many years, and it was not until 1974 that a vote of members of the American Psychiatric Association led to changes in diagnostic nomenclature so that it was no longer seen as a disease. The reality of human sexual orientation and preferences exists, unchanged in its nature, although the lives of gay men and lesbians have certainly been altered by this more congenial appraisal. The distance between Rome and Paris is an objective fact. Whether this distance be measured in kilometers, miles, furlongs or cubits matters not. Temperature is an objective reality, regardless of how it is measured (using the Celsius, Fahrenheit, or Kelvin scales). A person has behaved in a certain way, and these actions can potentially be objectively measured, and by doing so behavior analytic research comes into closer contact with nature's realities in this regard. One may choose to study how human beings socially construct the world in which we live, or one can choose to study the objective realities represented by behavior/environmental interactions. Behavior analysis focuses on the latter, although the process whereby people socially construct aspects of reality would of course also be a legitimate topic for behavior analytic inquiry.

The assumption of realism is also associated with a number of similar perspectives, such as physicalism, which has been defined as: «the doctrine that the only measures through which reality comes to be known is through an understanding of physical matter» (Reber, 1995, p. 437) and «the view that only the physical world exists and that mental processes are a mere by-product of physical ones» (Corsini, 2002, p. 605). Here are some representative quotes illustrating the realistic, physical, world as addressed by radical behaviorists:

- «We operate in one world, the world of physics. Organisms are a part of that world, and they react to it in many ways» (Skinner, 1953, p. 139).
- «It might be simpler for the radical behaviorist to say that the world that we observe (which is variously called the 'material' or 'physical' world) is sufficient to account for 'psychological' phenomena» (Leigland, 1993, p. 351).
- «What is lacking is the bold and exciting behavioristic hypothesis that what one observes and talks about is always the 'real' or 'physical' world» (Skinner, 1945/1988, p. 160).
- «Behavior is treated as basic physics...Few have attempted to exhaust the power of a simple, physicalistic description of behavior; that is the goal of this paper...This article sketches the outlines of a mechanics of behavior, in the hope that it will encourage the reconsideration of our procedures from the vantage of a unified physicalist



perspective...The forces that bend an organism toward an incentive are no less real than those that bend light toward the sun» (Killeen, 1992, pp. 429, 457).

- «The behaviorists rejected the structuralists' attempt to distinguish between the world of physical events and the world of conscious states (philosophical dualism); they were steadfast materialists» (Dinsmoor, 1999, p. 1).

Not all behavior analysts endorse physicalism however. Leigland (1993) contends that materialism is a sufficient foundation without the reductionism associated by some with physicalism.

Most behavior analysts however do not actively deny the existence of nonphysical, supernatural, mental, or incorporeal entities. Realizing that it is impossible to prove that «There are no such things as black swans», it is similarly seen that asserting that there is no such thing as the ego, the self-concept, ghosts, or aliens from outer space is a logically weak position. Rather than asserting that, say, 'the mind' does not exist, behavior analysts try and extend the scope of their research to develop satisfactory natural or physicalist explanations for supposedly non-material phenomena. To the extent they can be successful in this effort, the need to invoke metaphysical or mentalistic mechanisms is unneeded. But doing so, it is hoped, the role of the mind as a causal or activating agent explaining human behavior will be progressively more and more circumscribed, and, perhaps, eventually discarded as unnecessary. This leads to the next principle.

Parsimony

Behavior analysis favors *parsimony*, a preference to accept the simpler of the available and adequate explanatory accounts for a given phenomenon. Epstein (1984) presents an excellent review of the philosophical and scientific value of parsimony, and within psychological theorizing this view is widely known by the example of Morgan's Canon, explained as:

In no case is an animal activity to be interpreted in terms of higher psychological processes, if it can be fairly interpreted in terms of processes which stand lower in the scale of psychological evolution and development (Morgan 1903, p. 59).

For example, the so-called mirror test is said to be an indicator of 'self-awareness' or of a self-concept. A child or other animal 'passes' the mirror test and is thus said to demonstrate self-awareness when it can use a mirror to locate an object on its body which it cannot directly see (Gallup, 1979). The behavior of using a mirror in this manner could perhaps be an indicator of an inner-initiating mechanism of behavior called a self-concept (the view favored by most animal ethologists) *or* it could be more parsimoniously explained via an animal's (or child's) experiences with mirrors, and history of being shaped to use them for various purposes, such as to obtain reinforcement. Very few non-human species can pass the mirror test, and thus self-awareness was conventionally seen as a property limited to the higher primates, including man. Skinner and his colleagues attempted to see if passing the mirror test could be accomplished by a naïve pigeon, using conventional training techniques of reinforcement via successive approximations. The answer was clear – pigeons could pass the mirror test, after proper training. This leaves researchers with at least two explanations for an animal's ability to use mirrors to locate an object on its body which it cannot see. The traditional account involves hypothetical, invisible, and mental inner mediators such as a 'self-concept', an account which poses the risks of reification and circular reasoning (e.g., «The chimpanzee has self-awareness. How do you know that? He passes the mirror test. Why does he pass the mirror test? He has self-awareness»). The second account is much more parsimonious, and



attributes the animal's abilities to its history of interactions with its environment, and of its past successful (e.g., leading to reinforcement) use of mirrors to detect unseen objects. The latter explanation is completely naturalistic, much simpler and does provide an adequate explanation for the phenomena. It is also a common-sense accounting which most lay-people can understand, especially after watching a film of the initially naïve bird slowly being shaped into passing the mirror test criterion. The need to use hypothetical mental entities such as self-concept completely evaporates once a thorough account is provided of an organism's learning history. The behavior analyst is interested in developing similarly parsimonious explanations (defined as the ability to both predict and control behavior) for a wide range of infrahuman and human activities, particularly those commonly considered to reflect the operation of supposedly mental mechanisms, whose existence is inferred from the behavior they are said to cause. Examples include thoughts, wishes, dispositions, impulses, drives, insight, self-concept, and so forth. In general, any occult entity said to reside within the individual and cause him or her to act in certain ways is grist for the conceptual and methodological millstones of the behavior analyst. To the extent that the behaviors said to be caused by these inner entities can be more parsimoniously explained, predicted, and controlled for by a retrospective examination of a person's learning history, and/or the contrived prospective manipulation of contingencies of reinforcement, punishments, and other aspects of one's environment, the need to hypothesize these inner causes is eliminated in favor of a more parsimonious accounting requiring fewer assumptions and inferences. Theoretical and experimental attempts, considered successful by many, include efforts to behaviorally operationalize a variety of these presumptive inner causes, including various psychological terms (Skinner, 1945), anxiety (Skinner & Estes, 1941), psychosis (Skinner, 1956), the ability to solve problems (Skinner, 1966), consciousness (Skinner & Blanshard, 1967), value judgments (Skinner, 1971), and feelings (Skinner, 1987). Many other behavior analytic writers have continued this tradition in the hope to move the field away from attempting to explain behavior on the basis of hypothetical inner causes to variables external to the individual.

Just as physical science gave up concepts such as the aether and phlogiston when more parsimonious and empirically supported ways to explain the transmission of light through a vacuum, or of the process of combustion were developed, it is hoped that similar advances can be promoted in explaining human behavior. For example, various racial groups in the United States score differently, on average, when taking standardized tests of intelligence. Rather than viewing these differences as a function of some innate attribute called 'intelligence', the behavior analyst explores the role of the stimulating (or lack thereof) intellectual environment in which children are raised. It has been shown that racial disparities on intelligence tests are largely attributable to the degree to which children are exposed to a varied and challenging verbal community and to stimulating parental and familial interactions (Hart & Risley, 1995). African-American children tend to do less well on standardized tests, likely due to a more impoverished intellectual and family environment, whereas Asian students tend to outperform Caucasian children because of the greater number of hours in the school day, number of days of school attended to per year, and to cultural practices involving students attending enrichment classes after regular school hours. This behavior analytic perspective is also an optimistic one. It is technically possible to enrich children's intellectual environments, and to improve their test score, but we have yet to develop a method to improve 'intelligence' directly, such as by manipulating one's genetic endowment.

Morgan's Canon was important in the latter part of the 1800s and early 1900s in reducing anthropomorphism in comparative psychology, and behavior analysts attempt to use it as an intellectual and methodological lever to pry out the lingering tendency to ascribe human



actions to internal and hypothetical entities, cleverly labeled dryads (an inner spirit inhabiting trees) by Ebel (1974) in a brilliant essay on this topic.

A Rejection of Dualism and Mentalism

The behavioral perspective on two issues has been alluded to above and are closely linked. If one is committed fully investigating a materialist, naturalist, physicalist account of behavioral phenomena, little attention is given to dualist (the human consists of the material body and the immaterial mind) or mental mechanisms as meaningfully coherent explanations.

- «Being opposed to mentalism is at the very heart of what radical behaviorism is all about...When talking of inner states, Skinner does not deny that they exist. Rather he disputes the causal role that functionalism assigns to them» (Day & Moore, 1995, p. 81).
- «I am a radical behaviorist simply in the sense that I find no place in the formulation for anything which is mental» (B. F. Skinner,, cited in Day and Moore, 1995, p. 83).
- «Behaviorism ... rejects a dualistic view of the person that divides the person into behavior and something else and which consequently treats behavior as the superficial manifestation of processes taking place at some other, inaccessible, unobservable, and usually hypothetical level» (Chiesa, 1994, p. 201).
- «The practice of looking inside the organism for an explanation of behavior has tended to obscure the variables which are immediately available for a scientific analysis. These variable lie outside the organism, in its immediate environment and in its environmental history» (Skinner, 1953, p. 31).
- «The philosophy of a science of behavior treated as a subject matter in its own right apart from internal explanations, mental or *physiological*» (Skinner, 1989, p. 122, emphasis in original).
- «A radical behaviorism denies the existence of a mental world, not because it is contentious or jealous of a rival, but because those who claim to be studying the other world necessarily talk about the world of behavior in ways which conflict with an experimental analysis» (Skinner, 1969, p. 267).

Avoidance of Reification and Circular Reasoning

Reification involves transitioning from discussing a hypothetical entity as a descriptive label to ascribing reality status to that entity. Here are two similar formal definitions:

- «The error of regarding an abstraction as concrete, and attributing causal powers to it» (Corsini, 2002, p. 822), and
- «Acting as if one believed that the abstract or hypothetical were real. From a purely rationalistic perspective it is a cognitive/emotional act of children and other unsophisticated folk; in reality it is one of the more seductive ways in which social scientists distort and misrepresent the status of many of their hypothetical entities and constructs » (Reber, 1985, p. 651).

Behavior analysts contend that viewing human activity as the expression of some inner, causal agent of the mind usually represents the logical error of reification. For example, in 1977 Bandura postulated the existence of an inner agency he labeled self-efficacy. Self efficacy was said to be causally responsible for much that human beings did, or failed to undertake. A PsycINFO search undertaken by the author on 3 October 2009 found no articles with the term self-efficacy in the title, prior to 1975, and over 5000 published since 1975. This concept of



self-efficacy, as originated by Bandura (1977), has proven to be incredibly generative of conceptual research in a wide array of areas. Productive and heuristic, self-efficacy possesses these theoretically desirable qualities to a very strong extent. However from the perspective of behavior analysis, when used to *explain* the actions of people the term is both a reification and promotes the logical error of circular reasoning. Bandura (1977) himself said that the best way to change self-efficacy in a positive way is to provide individuals with successful experiences in mastering some task. One can explain a person's reported high levels of self-efficacy largely on the basis of their past successful *behaviors*, behaviors which have been reinforced. Their subsequent behavioral skills, *and* sense of self-efficacy are seen more parsimoniously as a direct function of these past person-environmental interactions. There is no need to postulate that success enhances self-efficacy, and this enhanced self-efficacy is causally responsible for one's future anticipated and real success in mastering other task. The behavior analyst is more likely to explain currently successful behavior directly on the basis of past successful learning experiences, bypassing the need for any internal causative agents such as self-efficacy.

Similarly, Seligman (1976) hypothesized that exposure of an animal to inescapable aversive events engendered an internal state he labeled 'learned helplessness'. Moreover, this internal state of learned helplessness, once created by the negative vicissitudes of life, was causally responsible for an individual's subsequent lethargic behavior, depressed affect, and inability to resolve life's difficulties, in a word, depression. The behavior analyst asks 'Why is it necessary to insert this hypothetical inner causal mechanism?' It is more parsimonious to explain depression (behaviorally, affectively, and cognitively) on the basis of exposure to punishing, often difficult to escape, life experiences. Seligman himself found that the best way to help animals overcome his experimentally-induced learned helplessness and learn to escape from aversive stimuli was to manually move them away from uncomfortable shocks to a safe part of the cage. With some negatively reinforcing experiences like this behind them the animals soon resumed their previous practice of moving away from aversive stimulation to a safe part of the cage, as opposed to passively lying there without attempting to escape.

Here is what Ebel (1974) had to say about the practice of inventing inner causal agents:

in the physical world today there is less room for supernatural influences than there used to be. There are fewer homes for dryads. But in the world of the mind, some of them still seem to lurk in the woods and thickets. Of course they are not called dryads. Those who speak with scholarly care call them hypothetical constructs. Sometimes they are called traits...Those who accept them as real and important do not inquire too closely what stuff they may be made of. But they are cherished because they seem to explain why different people behave in different ways (p. 485)...as the mind took up residence principally in the brain, the dryads reappeared in the guise of mental faculties; attention, perception, memory, reasoning, imagination, will power and the life (Ebel 1974, p. 486).

The invention of these dryads of the mind can give rise to circular reasoning, as in:

- «The only evidence we have that a person is more or less intelligent is that he behaves more or less intelligently. To say he behaves intelligently *because* he possesses intelligence is completely circular...The only evidence we have of a person's creativity is the quality of his creations. To say that he creates effectively *because* of his creativity is completely circular...Careful psychologists are no doubt aware of this kind of circularity and do their best to avoid it. But when hypothetical constructs are used to explain observed behavior, it is very difficult to avoid...In none of these cases do we



have any evidence for the existence or nature of the presumed cause apart from the effect it is supposed to produce» (Ebel, 1974, p. 486).

- «When we say that a man eats *because* he is hungry, smokes a great deal *because* he has the tobacco habit, fights *because* of the instinct of pugnacity, behaves brilliantly *because* of his intelligence, or plays the piano well *because* of his musical ability, we seem to be referring to causes. But on analysis these phrases prove to be merely redundant description» (Skinner, 1953, p. 31).

How can one escape this potential trap?

To validate an explanatory construct one must show that it is functionally related to some behavioral variable rather than the one it was invoked to explain (Ebel, 1974, p. 490)

and

The objection to inner states is not that they do not exist, but that they are not relevant in a functional analysis. We cannot account for the behavior of any system while staying wholly inside it: eventually we must turn to forces operating upon the organism from without (Skinner, 1953, p. 35).

Thus to say that my client meets the current diagnostic criteria for specific phobia, because she is observed to scream and run away at the sight of dogs, has a very high heart rate in their presence, and talks a great deal about her fear of dogs, is to perhaps legitimately describe in a summary form her condition. To say that she *has* a phobia commits the error of reification. There is no evidence for the existence of the entity labeled a phobia apart from the avoidant behaviors, fearful self-reports, and physiological arousal the phobia is said to cause. This is reification. To further say that she runs away screaming from dogs *because* she has a phobia commits the error of circular reasoning. The solution is to always refer to labels such as phobia (or self-efficacy, learned helplessness, intelligence, the superego, etc.) as unproven hypothetical constructs, and to seek causal explanations external to the individual. For example, my client displayed no phobic behavior towards dogs until, at the age of 67, she was savagely attacked by a large dog. Since that time she avoided dogs whenever possible and was very fearful in their presence. The presumptive *cause* of her phobic behavior, elevated heart rate when near dogs, *and* self-reports of high anxiety related to dogs, can all be parsimoniously accounted for by her terribly aversive experience of having been attacked by a dog. This is a true anecdote, by the way, (see Thyer, 1981) and demonstrates the superior explanatory utility of seeking environmentally based explanations over hypothetical inner mechanisms of causation.

Here are other ways behavior analysts have addressed this problem:

behavior itself can be taken as nothing but 'evidence' for a disposition to behave at a particular time in one way rather than another. The dispositions then become inner entities of focal importance in any analysis. As a result, when people speak of dispositions to behave, the opportunity all too frequently presents itself for reifying these dispositions to behave back into some special kind of causal inner state. Doing so, of course, turns dispositions into causes that are just as occult as any mental cause, an ironic turn of events for a position trying to circumvent any appeal to mental events (Day & Moore 1995, p. 79).



Pragmatism

Pragmatism is «A philosophical doctrine in which values, meanings and truths of proposition are taken as equivalent to the practical, empirical consequences derivable from them» (Reeber, 1995, p. 587). Here is how a number of writers have linked behaviorism and pragmatism:

- «Skinner’s (1956) autobiographical case study describing this approach to psychology is a powerful endorsement of pragmatism...The description is of research methods designed to obtain useful results, that is, results that lead to the prediction and control of behavior. The greater significance of the review is that it is an epistemological statement: Knowing about something is achieved by making it work» (Lattal & Laipple, 2003, pp. 49-50) «...Skinner’s position with respect to theory and in more general terms is thoroughly and undeniably pragmatic...» (Lattal & Laipple, 2003, p. 51).
- «It is clear that Skinner’s views on the goals of science, as well as his general view of truth, could be described as strongly pragmatic in nature» (Leigland, 1999, p. 483).
- «The philosophy of radical behaviorism is a descendent of the pragmatism of C. S. Pierce. Truth is ‘successful working’ in the words of one modern behaviorist» (Staddon, 2001, p. 96).
- «Explanations that assist the scientist in dealing with behavior in a productive way, of that support the expert in solving the same kind of problems efficiently, will be considered valid» (Toueinho & Neno, p. 64).
- «The ultimate criterion for the goodness of a concept is not whether two people are brought into agreement but whether the scientist who uses the concept can operate successfully upon his material – all by himself if need be. What matters to Robinson Crusoe is not whether he is agreeing with himself but whether he is getting anywhere with his control over nature» (Skinner, 1945, p. 293).
- «Responses to some forms of stimulation are more likely to be ‘right’ than responses to others, in the sense that they are more likely to lead to effective behavior» (Skinner, 1953, p. 139).
- «Scientific knowledge is verbal behavior, though not necessarily linguistic. It is a corpus of rules for effective action, and there is a special sense in which it could be ‘true’ if it yields the most effective action possible» (Skinner, 1974, p. 235).

Herein we obtain glimpses of the epistemological position of the radical behaviorist. We ‘know’ something truthful about behavior-environment relations when we can effectively predict and control behavior. Note that this is a limited form of ‘knowing’. Behaviorists avoid discussing knowing or truth in ideal terms. Typically the search for causes of behavior is eschewed in favor of the more modest goal of attempting to establish functional relationships between the manipulation of contingencies of reinforcement and punishment, and changes in behavior. This functional analysis of behavior (FAB) is illustrated in the practice of applied behavior analysis, wherein (typically) a problem behavior is identified, careful observations in the person’s natural environment are made about what precedes the targeted behavior, and what consequences follow it. Analysis may also be undertaken of possibly relevant biological factors (illness, medications, states of deprivation such as thirst or hunger, etc.). These observations may lead to tentative guesses about factors which appear to influence the target behavior. These guesses are tested by the deliberate alteration of environmental stimuli to see if they effect the target in the predicted manner. If this is actually observed, and the effect



replicated, then in a very real sense we know how to predict and control behavior (at least in a limited sphere) (see discussion by Tourinho & Neno, 2003).

A concrete example may help. A behavior analyst is asked to consult regarding an elementary school child who is constantly demanding attention from the teacher. It has reached the point of being intrusive to the classroom's normal activities and to teaching. The behavior analyst observes the child in his/her classroom setting and notes what happens before and after episodes of demanding attention. It may appear that attention seeking is mostly likely to occur when the child is not working on her assigned tasks, and it may also be obvious that the child is generally ignored while she is working, and that she appears to enjoy the teacher's attention. Attention-seeking behavior could be operationally defined and measured over some representative time period (called the baseline) during which no specific intervention is introduced. Then, after the child's baseline is stable (e.g., not clearly going up or going down) the behavior analyst could introduce a simple contingency-based intervention, namely the teacher is instructed to periodically walk over to the otherwise demanding student, *but only* when she is appropriately working, and quietly praise her for being on task. When the student is off task and demands attention, she is quietly directed to get back in her seat and resume working, with no other attention being paid to her. This manipulation is maintained for a sufficiently long period of time for it to be conspicuously obvious if the child has increased her on-task work and decreased her demands for attention. These data would be formatted in a simple line graph and inferences made about changes in behavior via visual inspection. If there were no obvious changes, then it would appear that the behavior analyst missed picking up on the genuinely relevant factors responsible for the demanding of attention. If however, under the new regimen on-task behavior increased and inappropriate demands for attention declined, then this would support the view that teacher attention was inadvertently reinforcing the child's demands for attention. To complete the functional analysis the behavior analyst would arrange for the teacher to resume her prior practices of ignoring the student when she was diligently working, and of paying attention to be when she made inappropriate demands. If the child's behavior reverted to near baseline levels, this is stronger evidence that teacher attention was inadvertently maintaining the inappropriate demands. The final step to complete the FAB would be to reinstate the new contrived contingency program, and have the teacher resume the practice of attending the student only when she was on-task, and of redirecting her to her desk when she made inappropriate demands. If improvements were again seen, it would appear that the behavior analyst had completed the functional analysis and found a way to predict and control the behavioral patterns which were the cause for the original referral.

Has the behavior analyst discovered the true 'cause' of the child's inappropriate attention-seeking? Yes, if the goals of prediction and control have been satisfactorily met. Further analysis beyond a satisfactory demonstration of the functional relationship between an intervention and behavior change often leads to the problem of infinite regress. For example it could be asked why the child listened to the teacher, or followed her pointed finger. At one level, an answer to this question could involve explanations related to optics or acoustics. From the eye, further explanations would involve the anatomy of the eye and physiology of the retina and from the retina to the conduction of electrical impulses along the optic nerve to the brain. From there the neurochemistry of synapses, the actions of molecules, the operations of atoms, neutrons, protons, and electrons, and then down to the level of other sub-atomic particles, could all be invoked as possible 'causes'. However, from a pragmatic perspective, the problem was solved by manipulating how the teacher provided attention to the demanding student. No further level of analysis is required. This illustrates how, curiously, behavior analysis is a *non-reductionistic* science. The analysis focuses on the level of person-



environment interactions, delves no deeper, and invokes no more fundamental levels of analysis. Further investigations may indeed be useful, say of physiological variables, but these are outside the field of behavior analysis.

Epistemology

Given the above, it would appear the epistemological position of the behavior analyst is a rather limited one, involving the effectiveness of the techniques of behavioral control derived from experimental research. In a real sense the position is «If it works, it is right» This is a more modest goal than that undertaken by traditional philosophical approaches to epistemology, as described by Garrett (1999, p. 69): «As responsible thinkers we all want to hold a belief if and only if it is true. The central goal of epistemology is, therefore, to help us distinguish truth from falsity» and «our goal is not simply to believe what is true, but also to *avoid believing what is false*»(p. 78, emphasis in original). Garrett (1999) rightly points out that both criteria, believing ‘truth’ and disbelieving ‘falsity’ are important. If one only values the first principle then one, to be secure, should believe *everything*, as truthful beliefs would be thereby encompassed. If only values the latter principle, avoiding falsity, then one should adopt the position of the radical or Pyrrhonian skeptic and believe *nothing*, since false beliefs would thereby be excluded. The crux of the matter is arriving at the right balance to successfully adopt true beliefs and reject false ones. For the behaviorist, the solution consists of experimentation, what the scientists of the mid-1800s called a positive demonstration. Using the methodology of an experimental analysis, the behaviorist can make a valid determination of the relationship between selected environmental manipulations (e.g., introducing certain arrangements of reinforcement, punishment, shaping, discrimination learning, schedules of reinforcement, etc.) and their subsequent effects on behavior. Given sufficient successful demonstrations of an apparently functional relationship, one tentatively generalizes to other circumstances, including the future. The supposed problem of induction is largely ignored. If something has been reliably demonstrated in the past, one may assume with modest assurance that the functional relationship will be valid in the future. Not with certainty, but with some measure of practical assurance. An assurance every critic of induction makes use of when they seek to turn on the lights, flush the toilet, or start an automobile. Certain operations have produced certain effects fairly reliably in the past, and we both infer and act on the supposition that these operations will remain similarly effective in the future.

In Skinner’s view:

- «We may now take that more humble view of explanation and causation which seems to have been first suggested by Mach and is now a common characteristic of scientific thought, wherein, in a word, explanation is reduced to description and the notion of function substituted for that of description» (Skinner, 1931/1972, pp. 448-449).
- «The terms ‘cause’ and effect’ are no longer widely used in science...A ‘cause’ becomes a ‘change in an independent variable’ and an ‘effect’ a ‘change in a dependent variable’. The old ‘cause-and-effect’ connection becomes a ‘functional relation.’ The new terms do not suggest *how* a cause causes its effect; they merely assert that different events tend to occur together in a certain order...We want to know why men behave as they do. Any condition or event that can be shown to have an effect upon behavior must be taken into account. By discovering and analyzing these causes we can predict behavior; to the extent that we can manipulate them, we can control behavior» (Skinner, 1953, p. 23).



- «So Skinner’s view is that knowledge is action, or the capacity to act. To know a thing in the world is to act or to have the capacity to act differentially with regard to it. To know a thing slightly is to have a limited capacity for differential action regarding the thing; to know a thing thoroughly is to have a comprehensive repertoire of behavior regarding it» (Schnaitter, 1987, p. 59).

The search for absolute truth is dismissed by the behavior analyst as an essentially unresolvable problem. And this dismissal is a feature the behaviorists share with the logical positivists, who postulated as their *verificationist principle*, the assertion that a statement is meaningful if and only if, it is, in principle, capable of being convincingly verified or falsified. Statements incapable of such resolution were dismissed by the logical positivists as essentially meaningless or as pseudoproblems. Pseudoproblems are themselves problematic if for no other reason as they distract the attention of researchers from solvable issues, and divert large resources of time and energy in their investigation. This of course leaves large segments of the metaphysical domains of philosophy excluded from serious consideration (What is the good? What is beauty?) , and similarly the behaviorist tends to avoid (if not dismiss) discussions of ultimate truth, goodness, or cause.

The perspective that the utility of some behavior (its truthfulness, in a limited sense) in helping us interact with the world says nothing about the ethical appropriateness of the behavior. If I am the strongest passenger on a life boat, I may survive, through recourse to cannibalism, long enough to safely reach land. In terms of my personal survival this could be seen as a reinforcing outcome. That does not necessarily make it a desirable one. Staddon (2004) addresses the problems of the naturalistic fallacy implicit in behaviorist epistemology, the view that what *is* is synonymous with what *ought to be* or what is good. For example,

Skinner gave us no real answer to the ancient questions ‘What is the good?’ Uninterested in pure speculation, driven to action, he was much more interested in using science to do good than in using philosophy to discover what good is. Radical behaviorism purports to tell us how to modify the environment so that people will act virtuously. It neglects to specify what virtue is (Staddon 2001, p. 97).

This is not necessarily a weakness. Extending the purview of science to domains in which it lacks adequate expertise commits the sin of scientism, the unjustified application of scientific opinion into non-scientific areas.

Moore (2008, pp. 435- 436) provides a series of statements which summarize the behavior analytic position on epistemology:

1. The most significant and relevant form of human behavior said to show scientific knowledge is operant behavior, which is analyzed in terms of contingencies of reinforcement that control both the verbal and nonverbal operant behavior of the scientist.
 - 1.1 Scientific knowledge does not differ in principle from any other kind of knowledge...
 - 1.2 Knowledge is power, and the fundamental issue is the extent to which claims of scientific knowledge function as forms of discriminative stimulation that contribute to effective action with respect to the environment.
2. Claims of scientific knowledge (e.g., theories, explanations) and the terms or concepts therein are instances of verbal behavior; they are always and have only been matters of differential behavior in differential circumstances. Any such claims of scientific knowledge may therefore be analyzed in terms of contingencies of reinforcement that control the verbal behavior of the scientist in question.



- 2.1 The same principles that apply to understanding the sources and development of operant behavior in general apply to understanding the sources and development of (verbal) behavior said to show scientific knowledge.
- 2.2 The sophisticated (verbal) behavior said to show scientific knowledge develops and is maintained through the action of environmental consequences, which selects its most important forms.
3. Some elements may well be accessible to only one individual. Those elements may be parts of the contingencies controlling the behavior of the scientist doing the speaking or of the person being spoken about...
4. Accounting for knowledge claims is not a matter of appealing to unobservable acts, states, mechanisms, processes, structures, or entities elsewhere in some other dimension, at some other level (e.g., neural, mental, cognitive, conceptual, psychic, hypothetical, subjective), for which observable behavior is the license that makes such appeals scientifically respectable [...] (Moore 2008, pp. 435- 436)

This summary by Moore (2008) encapsulates much of the preceding discussion.

Behaviorism is keen interested in epistemology, and define knowing as our ability to predict and control behavior. It established a rigorous methodology for exploring, developing and demonstrating such predictive and controlling technology, and applies this successfully to human affairs.

SUMMARY

A short anecdote is appropriate to include in this closing section

When the young Skinner was told by Alfred North Whitehead that a psychologist should closely follow developments in philosophy, Skinner replied, It is quite the other way around—we need a psychological epistemology (Skinner, 1984, p. 29) (cited from O'Donohue & Ferguson, 2001, p. 70).

B. F. Skinner and those associated with behaviorism have attempted to develop an epistemological position, one based on a number of conventional philosophical assumptions, each of which is axiomatic, being seen as almost self-evident but incapable of strong philosophical or experimental proof. With its central concern over developing effective demonstrations of the ability to predict and control behavior, behavior analysis has an epistemological position that is both limited yet far-reaching. Limited in the sense that traditional concepts of how one arrives as knowledge of 'truth' are seen as unresolvable, and thereby dismissed from serious consideration as pseudoproblems. To the extent one can effectively predict and control behavior, one has arrived at a limited but truthful understanding of functional relationships which are valid across persons, and over time, relationships between environmental events and their effects of behavior. However this limited epistemological understanding is at the same time far reaching in the sense that when tested using the methods of the experimental analysis of behavior and extrapolated into the world of helping persons solve socially significant problems through the field's practice domain, applied behavior analysis, the results have been astonishing. As demonstrated in an incredible array of disciplines and problems, behavior analysts have, over the past 50 years, developed an effective technology of human behavior change with practical and effective applications to education, medicine, psychology, social work, economics, and most human service professions. As a conceptually consistent model, behavior analysis enjoys an evidentiary foundation, conceptual richness, and applicability achieved by no other approach



to human behavior change. This is a significant achievement, one made possible by the field's narrow focus on only one aspect of epistemology – If a technology works in reliably controlling human behavior, then one has achieved some level of a valid, truthful understanding of the real world. And that, says the behavior analyst, is what epistemology is all about. As inscribed on the tomb of Karl Marx in London's Highgate cemetery, «The philosophers have interpreted the world in various ways. The point however, is to change it».

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