What Happened to Behaviorism

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The year 2004 marks the centenary of B. F. Skinner's birth. I doubt that most members of the American Psychological Society (and even a smaller proportion of all psychologists) will pay much attention. After all, hasn't behaviorism passed from the scene? Don't we live in the age of the cognitive revolution, which still roars along and dominates most subfields within psychology? Doesn't the field of animal learning psychology, the spawning ground of behaviorism, belong to the 1950s, the same era as black and white television, three TV channels, and antennas on the house? Many readers in APS would probably answer yes to all three questions. If this is the right answer – and as you'll see, I don't necessarily think it is – then we can ask what happened.

Let's go back a hundred years when psychology was a new field. The first labs date from 1879 or thereabouts (let's not revisit this controversy), and in 1904, Skinner's birth year, the field was struggling to emerge as a science. However, the methods were varied, and the papers in journals were often long on observation and speculation. Careful experimentation was in short supply if not absent altogether. Some papers bordered on murky nonsense. In St. Louis, from where I write, there was a famous World's Fair in 1904 and an assemblage of many of the greatest scholars of the day, including psychologists, gathered with the aim of providing a state-of-the-art set of lectures on their fields and, of course, to show the field off to its best advantage. Examination of their talks, reports of which were preserved for posterity, permits a capsule summary of the state of the art 100 years ago. I'll examine these contributions in an upcoming column.

In 1913, nine years after Skinner was born, John B. Watson published his famous paper "Psychology from the Standpoint of a Behaviorist" in *Psychological Review*. It was brief but powerful. Watson said that psychology should rid itself of introspective studies of mental events that were not directly observable – imagery, memory, consciousness, et al. – and study behavior. Watson endorsed the statement of Walter Pillsbury that "psychology is the science of behavior" and went on to say that "I believe we can write a psychology, define it as Pillsbury [did], and never go back on our definition: never use the terms consciousness, mental states, mind, content, introspectively verifiable, imagery and the like" (1913, p.116). Heady stuff! To study only behavior! Older psychologists probably judged Watson as somewhat off his rocker, but younger psychologists flocked to him, and his position continued to attract strong adherents over the years. If psychology was to be the science of behavior, then its goals would be (as Skinner said years later) the prediction and control of behavior. Behavior control! How exciting!

Behaviorism was intended to make psychology a natural science. During the years when behaviorist ideas were being developed, they were in harmony with the philosophical position of logical positivism being championed in physics and elsewhere. Concepts should be defined by the operations used to measure them, to keep science tightly grounded to observable data and to remove flights of speculative fancy.

The decades that followed revealed behaviorism in ascendancy, and the animal learning laboratory was the hotbed of study, the white rat and the pigeon the organisms of choice (with an assumption that all organisms and all behaviors obey similar laws).

Edgar Chace Tolman championed the methodology of behaviorism and contributed important work. Some of his concepts (latent learning, cognitive maps) still appear today, even in the cognitive literature. Pavlov's books were translated in the 1920s, and Clark Hull began publishing his important series of Psychological Review papers in the late 20s and early 30s. Hull's most famous student, Kenneth Spence, also began his important work in the 1930s. Edwin Guthrie published his ideas on the role of contiguity in learning and the notion of one-trial learning. In 1938, B. F. Skinner published *The Behavior of Organisms* and launched his operant approach, which became the most famous behaviorist position and today, among many, seems to represent behaviorism. One of my favorite courses as an undergraduate was *The Psychology of Learning*, taught by my undergraduate mentor, David G. Elmes, using a book by James Deese and Stuart Hulse of John Hopkins University with that title.

Now, returning to behaviorism, let's consider the cartoon view of the history of psychology that many cognitive psychologists (which is to say, most of the field these days) seem to believe. In this caricature, the History of Psychology is something like the History of Western Civilization and goes as follows: Early psychologists like William James had great ideas and speculations, and psychologists studied, as best they could, cognitive phenomena like imagery. (James et al. correspond to the ancient Athenians – Socrates, Plato and Aristotle, perhaps). However, later, due to Watson, Skinner and their ilk, the Dark Ages descended – the religious orthodoxy of Behaviorism blanketed the land and smothered creative thought about cognitive phenomena and other topics. Finally, the Renaissance occurred beginning in the 1950s when the experimental work of George Miller, Donald Broadbent, Wendell Garner and others, as well as the writings of Noam Chomsky, led psychology from the dark ages and into the light of the cognitive revolution. The movement picked up steam in the 1960s and Ulric Neisser's great book, *Cognitive Psychology*, both named the new field and ably summarized its content in 1967. Behaviorism was still lively during the 1960s and early 1970s, so this story goes, but as viewed today this was only as a rear guard intellectual movement that was in its last gasp of popularity. By the 1990s the domination of cognitive approaches across almost all areas of psychology (even animal learning!) was nearly complete. Look at the ads in the APS *Observer* as one measure – how often does one see cognitive or cognitive neuroscience in an ad relative to behaviorist or animal learning?

So, back to my original question, what happened to behaviorism? Here are some possible answers. I'll let people wiser than I grade them and decide if the answer should be some combination of these alternatives, or none of the above.

One possibility is that the decline of behaviorism represents an intellectual revolution, and young scientists (like youth in all times) like the heady fervor of a revolution. So, with behaviorism having been in ascendancy in psychology, especially (and mainly) American psychology, for so long, the time for a new intellectual revolution was ripe. The analyses of the early cognitive psychologists (Broadbent, Miller, Garner, et al.) were rigorous, provocative, and opened new intellectual vistas. Many problems that were somewhat outside the purview of behavioristic analyses – perceiving, attending, remembering, imagining, thinking – were approached in a radically new way. In this telling, nothing really "happened" to behaviorism; it was not really shown to be "wrong" in any real sense. Rather, the cognitive approach simply generated adherents at the expense of the established order, opened new techniques and methods

of study, and created excitement that attracted graduate students away from animal laboratories. (Some types of cognitive analyses that seemed so great in the 1960s seem to be growing long in the tooth now. For example, metaphorical models and box and arrow diagrams, so popular at one time, seem quaint compared to cognitive neuroscience approaches to mapping brain networks underlying cognitive performance). In brief, cognitive analyses swept the day as being more exciting and interesting in opening new arenas of study.

A second possible reason is that behavioristic analyses were becoming too microscopic in the 1970s. As in most fields as they develop, researchers began studying more and more about less and less. Rather than focus on the central, critical problems, behavioristic researchers begin looking at ever more refined (that is to say, picayune) problems, with experimental analyses increasing in complexity all out of proportion to the gains in knowledge that they enabled. (It is remarkable how many of the fundamentally great discoveries in most fields are often direct, simple, straightforward, so that after the fact others can wonder, "why didn't I think of that?"). The number of parameters and epicycles in the Hull-Spence approach ballooned. Examine Ferster and Skinner's ponderous *Schedules of Reinforcement* (1959) relative to the more direct writing of Skinner in *The Behavior of Organisms* (1938). In this version of history, there was something wrong with behaviorism in the 1970s and 1980s – it became too focused on specific problems and lost the big picture.

Another way in which behaviorism lost is that many psychologists (especially cognitive psychologists) do not focus on the learning history of the organism. As John Wixted wrote to me in commenting on this column, "researchers have forgotten to explain why we behave as we do. Much of what we do is a function of the prior consequences of our actions. And we learn from those consequences. Cognitive models are often a surrogate of that learning history (they refer to a magic computer in the head without considering what is responsible for its computational abilities …). So, to the extent that cognitive psychology and cognitive neuroscience don't care about the learning history of their subjects (and, for the most part, they don't), behaviorism lost."

A third answer is that there is, thank you, nothing wrong with behaviorism today. The premise of the analysis at the beginning of this column is simply wrong. Behaviorism is alive and well and nothing "has happened" to it. The *Journal of the Experimental Analysis of Behavior* is still a lively outlet (and edited now by my colleague, Len Green), as is the *Journal of Applied Behavior Analysis*. Both journals are published by the Society for the Experimental Analysis of Behavior, which has been going strong since 1957. The primary meeting of behaviorists is the Association for Behavior Analysis, or ABA, which has over 4,200 members in 2003, and at the 2002 meeting there were 3,200 registrants. Counting affiliate organizations around the world, there are some 12,000 members (Jack Marr, personal communication). ABA has grown tremendously over the years and still attracts around 250 new members a year just in the U.S. The Society for the Quantitative Analysis of Behavior meets before and during ABA, with its own mathematically sophisticated membership. Much of the work reported at these meetings is based on research with humans (and not just pigeons and rats, as in the stereotype).

Why the enthusiasm? Because behavioristic analyses work! We know how to alleviate or eliminate phobias through extinction-based therapies; we know the power of a token economy in regulating behavior on a mental ward; we can reduce problematic behaviors and increase the probability of desired behaviors by judiciously providing and withholding reinforcements. Even for problems that cognitively oriented psychologists study, behavioristic therapies are the treatments of choice. For an autistic child,

Lovaas's behavioristic techniques provide the greatest (indeed, so far the only) hope. (Theory of mind debates about autism are fine, but not if you want therapies and treatment – go to behaviorism). Similarly, for stuttering and aphasia, as interesting as their analysis by psycholinguists may be, the treatments come largely from the behaviorists' labs. In the field of neurobiology of learning, the central paradigm is classical conditioning and the main theoretical model is the Rescorla-Wagner model. And behavioristic analyses exist in self-management programs, in industry (Organizational Behavior Management), in sports, in parenting guides, and of course in animal training programs for pets and for zoos. Anywhere that prediction and control of overt behavior is critical, one finds behavioristic analyses at work. In sum, this answer maintains that, although most psychologists don't know it, behaviorism still is alive and thriving, albeit perhaps not as much in the mainstream of the field as it once was.

Another framing to the previous answer (owing to Endel Tulving) is that there are several valid sciences of psychology. He wrote to me in an e-mail comment on an earlier draft of this column that: "It is quite clear in 2004 that the term 'psychology' now designates at least two rather different sciences, one of behavior and the other of the mind. They both deal with living creatures, like a number of other behavioral sciences, but their overlap is slim, probably no greater than psychology or sociology used to be when the world was young. No one will ever put the two psychologies together again, because their subject matter is different, interests are different, and their understanding of the kind of science they deal with is different. Most telling is the fact that the two species have moved to occupy different territories, they do not talk to each other (any more), and the members do not interbreed. This is exactly as it should be."

Perhaps the most radical answer to the question I posed is that behaviorism is less discussed and debated today because it actually won the intellectual battle. In a very real sense, all psychologists today (at least those doing empirical research) are behaviorists. Even the most cognitively oriented experimentalists study behavior of some sort. They might study effects of variables of pushing buttons on computers, or filling out checklists, or making confidence ratings, or patterns of bloodflow, or recalling words by writing them on sheets of paper, but they almost always study objectively verifiable behavior. (And even subjective experiences, such as confidence ratings, can be replicated across people and across conditions). This step of studying objectively verifiable behavior represents a huge change from the work of many psychologists in 1904. Today the fields of cognitive psychology and cognitive neuroscience are highly behavioral (if one includes neural measures of behavior). True, there is nothing necessarily inherently interesting about pushing buttons on computers, but on the other hand, the basic laws of behavior in the animal lab were worked out on rats pushing levers and navigating runways, or pigeons pecking keys – not exactly riveting behaviors in their own right. In all these cases, the scientist's hope is to discover fundamentally interesting principles from simple, elegant experimental analyses. The cognitive researcher goes further and seeks converging evidence from behavioral observations on internal workings of the mind/brain systems. But as experimentalists, both cognitive and behavioral researchers study behavior. Behaviorism won.

I could go on with reasons or speculations, I suppose, but let's leave it at five. And let me explain why I left out a popular explanation that I have read in history textbooks. Didn't Noam Chomsky's review of Skinner's *Verbal Behavior* devastate behavioristic analysis and show that it was bankrupt as pertains to language? I have read the debate a couple of times and, although interesting, it always seemed to me that the protagonists were arguing at cross purposes, from fundamentally different paradigms. Chomsky was and is a rationalist; he had no uses for experimental analyses or data of any sort that pertained to

language, and even experimental psycholinguistics was and is of little interest to him. My guess is that Chomsky's review deserves to be credited as a minor cause of the cognitive revolution. To most psychologists, empiricists at heart, it was the great new experiments that researchers were conducting on cognitive topics that created the cognitive revolution and not Chomsky's review of Skinner's book (rather effectively refuted in a commentary by Kenneth MacCorquodale, by the way).

I am a cognitive psychologist, true, but I have sympathy for several answers. Behaviorism is alive and most of us are behaviorists. That may be truer of me than many. My theorizing is often rather functional in nature. Some reviewers complain that I don't have "real theories" or that I am redescribing the data; some have argued that my ideas are too descriptive to be testable; yet others, undercutting the previous point, have busily tested them and found them empirically wrong (hmm … both sets of critics can't be right, methinks). It is true that I feel comfortable sticking closer to the data and engaging in fewer flights of theoretical fancy than many of my cognitive colleagues, having been partly raised in the functional intellectual tradition of John McGeoch, Arthur Melton, and Robert Crowder.

A few years back, Robert Solso edited a volume entitled *Mind and Brain Sciences in the 21st Century* (MIT Press) for which I wrote a chapter in which I made fearless predictions on the future of cognitive psychology. My eleventh and last prediction was that a strong form of behaviorism would make a comeback in mainstream psychology. That does mean I believe the movement went "away" in some sense, even if I think that the behaviorist revolution was largely successful and the central tenets have been incorporated into psychology. After all, even the most ardent behaviorist would agree that the great debates that swirled among and between behaviorists in the 1950s do not arise in the mainstream literature today. As John Wixted pointed out in the quote above, cognitive psychologists tend to ignore learning history in their theories. If we at least begin incorporating learning history back into our considerations, then behaviorism will be making a comeback. Still, at the same time, it is clear that many aspects of behaviorism never went anywhere at all. Rather, many psychologists simply ignored the good work researchers in the behaviorist tradition have been doing.

Let me suggest a way you can celebrate Skinner's centennial and learn the elegance and power of behavioristic analyses. Treat yourself and read Skinner's 50-year old book, *Science and Human Behavior*, which is still in print. The book was meant as an introduction to behaviorism and is powerfully and elegantly written. The *Journal of the Experimental Analysis of Behavior* has published five retrospective articles in the November, 2003 issue entitled "The Golden Anniversary of Skinner's Science and Human Behavior." Read the book and celebrate the power of behavioristic analyses yourself, even if (or especially if) you are one of those cognitive psychologists who believe that behaviorism is irrelevant, passé and/or dead. It isn't.

Author's Note: Len Green, Jack Marr, Jim Neely, Endel Tulving, Ben Williams, and John Wixted provided comments that greatly aided my conceptualization of these issues. I appreciate permission to quote from messages I received from Drs. Tulving and Wixted.