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SCIENCE AND HUMAN BEHAVIOR *AT FIFTY*

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The golden anniversary of *Science and Human Behavior* is cause for celebration. Toward that end, the present paper is largely an historical consideration of the book, its inception and reception, both at the time of its publication and in subsequent years. The range and intensity of reactions to *S&HB* mark its impact and show it to be among Skinner's most important works, if not the most important. *S&HB* was written as an introductory psychology text—a vigorous use of the book in our teaching could do much to benefit the dissemination of behavior analysis.

Key words: Science and Human Behavior, B. F. Skinner, history, teaching

The golden anniversary of *Science and Human Behavior* (hereafter *S&HB*) is cause for celebration, especially given precedent for reflections on behavior-analytic milestones at 50. Toward that end, and in the hopes of contributing to such a celebration, the present paper provides a mostly historical consideration of the book, its inception and its reception, both at the time of its publication and in subsequent years. Necessarily, information concerning the early days of *S&HB* comes primarily from Skinner's own writings and records, particularly as presented in part three of his autobiography, *A Matter of Consequences* (1983), that covered the relevant years. Later analyses and reactions have filled volumes and so are only sampled here to provide some feel for their range and their intensity. Indeed, it is this very range and intensity that marks the impact of *S&HB* and shows it to be among Skinner's most important works, if not the most important.

BEGINNINGS

In 1947 Skinner went to Harvard to deliver the William James Lectures and was invited to return there as professor, which he did the following year. Upon arriving at Harvard, one of Skinner's first responsibilities was to design a new introductory undergraduate course, but there was no text he considered appropriate for his purposes. If the historians are correct, *S&HB* was written for two very practical reasons; one—Skinner's students at Harvard were struggling with his new course; and two—he was having problems getting *Walden Two* (1948) published.

In fact, four major publishers had refused *Walden Two* (Bjork, 1993). Macmillan finally accepted it, but this agreement was made contingent on Skinner giving them first rights to an introductory psychology text he had proposed. The text would appear as *S&HB* (Skinner, 1983). Other projects were put on hold—notably a final version of *Verbal Behavior* was postponed—while *S&HB* was completed (Skinner, 1982).

Skinner's new course, Psychology 7, was called ''Human Behavior.'' (It was later moved from the Psychology Department to General Education and renamed Natural Sciences 114.) Its catalog description read, ''a critical review of theories of human behavior underlying current philosophies of government, education, religion, art, and therapy, and a general survey of relevant scientific knowledge, with emphasis on the practical prediction and control of behavior'' (Skinner, 1983, p. 15). Regarding this description, Skinner wrote:

> To Harvard and Radcliffe students that looked like a ''gut'' course, and by early January I was writing in some panic to Fred Keller: ''According to preliminary estimates, I will be starting off with at least 200, and perhaps 300 students instead of the small, intimate group I expected''. . . . In the end 438 students signed up, and when the course was underway I reported

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that it was ''a hell of a lot of work and I find myself doing nothing else but.''

The students soon discovered that it was not a gut course, and I discovered that I was not making myself clear. There was no text. Halfway through the term I was able to get mimeographed copies of Keller and Schoenfeld's *Principles of Psychology* [1950], but they covered a part of the course we had already finished. I began to hand out brief mimeographed summaries of my lectures. (Skinner, 1983, p. 15)

According to his biographer, Weigel (1977),

Skinner remembers his first teaching year at Harvard as not an easy time. Many students were attracted to Skinner's offerings, and liked the phrase ''human behavior,'' but did not anticipate Skinnerian rigor in an area still trailing clouds of philosophical speculations. To help such students Skinner wrote *Science and Human Behavior,* a more technical and thus less popular treatment of the ideas projected in *Walden Two.* Meanwhile Skinner continued his own research program as the Harvard students began, presumably, to be more cautious in their enthusiasm for ''psych courses'' taught by ''that fellow Skinner,'' who was reputed to be a kind of demon or dehumanized computer in his insistence of facts. (p. 34)

While this assessment may seem harsh, it is consistent in many ways with Skinner's (1983) own descriptions:

Upon request, the Harvard Testing Office would tell you how your grades compared with the other grades your students received during the same term. In 1950 I was grading low—by a rather wide margin. In 1951 I cut the curve more generously, giving more A's and B's and fewer C's and D's, but my average was still relatively low. Students were looking elsewhere for a gut course, and those who now chose Natural Sciences 114 were better students. I continued to move in the direction of more generous grades but never caught up. (p. 41)

Skinner described the beginnings of *S&HB* this way:

When I was sending the manuscript of *The Sun is a Morning Star* around to publishers, I said I was planning ''a book for the educated layman on the implications of a science of behavior—with enough on such a science at work to serve as an introductory text.'' Harcourt Brace, the 4th publisher to return the manuscript, said they would like to see the text, but Charles Anderson of Macmillan went further: he would publish the novel (renamed *Walden Two*) if I would give him first refusal on the text. He pictured a tantalizing financial future, citing the most popular current texts. When I called some of them ''potboilers,'' he said, ''Yes, but they boil an awful lot of pots.'' The book I had planned would not boil many.

In Psychology 7, face to face with more than 400 educated laymen (and women) (Harvard students) I saw more clearly what such a text would mean, and I set about writing it. For the first two hours of each day I shut myself in my office, and my secretary took phone calls and shielded me from visitors. I wrote against a supporting background of clicking relays heard through a cinderblock wall. A visiting statistician once listened to the clicking for a moment and said, ''Random.'' It was not as random as the clicking of a Geiger counter, but it was free of the beat of background music, and it reassured me that another kind of progress was being made. (Skinner, 1983, p. 44)

The book was essentially an elaboration of my lectures in Psychology 7 and Natural Sciences 114, but here I could give more space to difficult issues and add examples which I had turned up or my students had given me. (Skinner, 1983, p. 45)

And so, an introductory undergraduate textbook took shape.

Early Reactions

Skinner solicited reactions on his text before it was published, and he received others as publication neared. Naturally, the initial responses came from close associates. He had received feedback from Keller at several points, as well as from Percy Bridgman, and by 1952 had completed a mimeographed version of his manuscript that he used with his class (Skinner, 1983). Skinner commented that when he sent a copy to his publisher, he knew ''it was not the book he [Anderson] wanted'' (Skinner, 1983, p. 44). Anderson, in turn, sent an evaluation from a Macmillan reader, who had described the book as:

. . . a thoughtful, thorough, and logically consistent presentation of Skinner's psychological thinking and an application of his system to a number of extremely important social problems . . . . [But] now let's review the debit side of the ledger. As an introductory text people are going to find a number of things wrong with it. There is not a single figure, table, or

> other detailed presentation of experimental results in it. There are no chapter summaries, or other customary textbook paraphernalia. . . . It simply does not look like an ordinary textbook and that will detract from adoptions for ordinary classroom use. . . . The appearance and style are those of a trade book [but] the ideas are too closely reasoned and the subject matter not sufficiently spectacular to justify the expectation of a large trade sale. . . . I mention the liabilities not to indicate a lack of enthusiasm on our part but rather to prepare you for a realistic appraisal of sales potentialities. (Skinner, 1983, pp. 44–45)

One can only hope that this reader's predictions were more accurate for other Macmillan texts. In other circles, initial reactions to *S&HB* were more complimentary.

Skinner sent a copy of the manuscript to R. M. Elliott, his former department chair at Minnesota, and an advisory editor at Appleton-Century. Elliot wrote Skinner:

> At all stages in reading, my background refrains have been two: ''This is Fred's best writing yet'' and ''How definitely this belongs with the *Behavior of Organisms* [Skinner, 1938] and Keller and Schoenfeld [1950] in the Century Psychology Series!'' I am really depressed that Macmillan should have strings on it. (Skinner, 1983, p. 45)

Skinner seemed to have appreciated this note particularly, commenting that, ''Appleton-Century had had the first chance at *Walden Two* and had turned it down . . . '' (Skinner, 1983, p. 45).

Of course, there was also reaction from Fred Keller. Skinner dedicated *S&HB* to Keller and reports writing him in 1953 that a publisher's copy was en route to Keller's home. He invited Keller to bring the book to Cambridge for a personal inscription (for that inscription, see Todorov, 2003).

''Fred wrote back:''

> Our desk copies of *Science and Human Behavior* came today. George Renaud, one of our assistants, brought my copy to me on his way home from the lab. As he ran up our front steps, I asked him how it looked. He said he didn't know, that he had seen only one page—which he then showed to me. When he left we all looked at it, including John and Anne [Keller's children], until Frances [his wife] told me to stop crying! Then I gave a lecture on *What a wonderful book this is* to all who would listen. It is a fine book, Burrhus, and I'm proud to be in it. I'll never receive a greater honor. Thank you very much. (Skinner, 1983, p. 57)

Skinner was admittedly touched by this, and promised to keep Keller's note in his ''special file'' with several others he had received over the years, including a favorite from Robert Frost. According to Skinner, Keller's note gave him ''the same kind of feeling'' (Skinner, 1983, p. 57), though it is hard to imagine Frost's being as dear.

E. G. Boring was also positive, though not unconditionally so. He was ''unhappy about the language of the book'' (Skinner, 1983, p. 58), particularly with respect to determinism. He saw *S&HB* as critically important because it was, in his words, ''the first book to put this deterministic view clearly all through'' (Skinner, 1983, p. 59), but he complained that the book was ''not written in deterministic language'' (Skinner, 1983, p. 59). To illustrate, he sent Skinner sheets of translated passages that he had been using in a seminar. Skinner gave the following examples from the first page of *S&HB*:

> I had begun by quoting Francesco Lana's belief that God would not permit the invention of an airship because it could be used to destroy cities. Where I then went on: ''Contrary to his expectation, God has suffered this invention to take effect,'' Garry [Boring] wrote: ''Contrary to his expectation, history now records the fact that this invention was finally made.'' Where I continued: ''And so has Man. The story emphasized the irresponsibility with which science and the products of science have been used,'' Garry had: ''Man made it. The story shows that not every bit of historical advance is such as to benefit man and favor his survival.'' And where I had: ''Man's power appears to have increased out of all proportion to his wisdom,'' Garry had: ''Social evolution increases man's power out of proportion to its increase of his ability to use those powers only for his own good. (Skinner, 1983, p. 59)

Boring continued,

> Mike [Elliot] wrote me one sentence about *Sci & Hum Beh*. It's hardly fair to quote it since it needs a context he did not supply, but it was this. ''Did you ever know a perfect solipsist, except Fred Skinner?'' And that's it. You write as if you felt free and as if you did not feel you were expressing a delusion. The book could be redone in the language of determin-

> ism, and most of the excitement would leave it. That's why I amused myself awhile trying to get clear on this matter by translating sentences or paragraphs into deterministic language. (Skinner, 1983, pp. 59–60).

Where Skinner drew fire from most quarters for his radically deterministic views, Boring had called him on not being deterministic enough. And Percy Bridgman got a few shots in as well; again, this from Skinner:

> I had learned my operationism from Percy Bridgman, but evidently not well enough. When he saw the manuscript of *Science and Human Behavior,* he caught me up on two subtle points. He wrote:
>
> I think it would be better in discussing the principle of indeterminancy to say that relevant information does not exist than to say we cannot put ourselves in possession of it. And I would not like to say, as seems implied, that science has to assume that the universe is lawful and determined, but rather that science proceeds by exploiting those lawfulnesses that it can discover. Anything smacking of faith I think we can get along without. (Skinner, 1983, p. 60)

Apparently not even Skinner could be too careful under the scrutiny of former mentors!

Other friends were kinder. Skinner reported the following encouragements:

> Herbert Feigl, one on the ''philosophes'' I had known at Minnesota, reported that he was reading the book ''with genuine excitement, delight, and enormous intellectual profit.'' Charlie Curtis [an old friend and Boston lawyer], characteristically rhapsodic, wrote:
>
> ''. . . All I am quite sure of as yet is that if I prayed I'd raise my head instead of my hands and [say?] that you are God (may He save the mark!) when you push the button and let drop the manna. You are an intellectual therapist and I am sweating out more tautologies than ever I thought I had. You are a Hume to the believer, a Holmes to the lawyer . . . ''
>
> Leonard Carmichael (about to move from the presidency of Tufts University to the Smithsonian Institution), writing in the *Boston Sunday Post,* called it ''a landmark in the study of human behavior. Future historians of this aspect of science are almost certain to refer to it when most other books in psychology published in the last ten years have been forgotten.'' (Skinner, 1983, p. 58)

Of course, these were all personal communications.[1] What of published reviews in academic quarters, particularly within psychology?

Published Reviews

Interestingly, other than one short treatment of seven introductory psychology texts (to which I will return), no other full review of *S&HB* appeared in the *Psychological Bulletin,* the premier outlet for book reviews at that time, although clearly one had been discussed. In his autobiography (1983), Skinner reprinted this note from E. G. Boring:

> Because *Sci & Hum Beh* seemed so important to me, I wrote Girden [then Review Editor] to urge him to give it a specially competent reviewer for the *Psychol. Bull.* And to let it have lots of space. This got him and Wayne [Dennis] [then Editor] excited over the book. I suggested Hilgard, but Girden says he is doing some other big job for the *Psychol. Bull.* Girden assures me that they now have a competent reviewer. He does not say who. (Skinner, 1983, p. 58)

Unless the joint textbook critique qualifies, the planned review never appeared. In 1956, book reviews in American Psychological Association journals shifted from the *Psychological Bulletin* to *Contemporary Psychology,* that was established for the sole purpose of publishing timely reviews of all important books in psychology (Girden & Dennis, 1954, 1955). Again, no review of *S&HB* appears for the 10 years following the book's publication (al-

[1] Skinner also reported receiving feedback on the impact his course and *S&HB* had on students with religious convictions and on others who were deeply disturbed by the book's implications. He wrote, for example, that: ''Some students were seriously troubled, and, as the issue became clearer, a few of them turned up each year at the Health Services—where, I learned later, a ''Natural Sciences 114 Syndrome'' was identified (Skinner, 1983, p. 61). Of another, more serious case, Skinner wrote:

> When a Spaniard working in the Department of Pharmacology at the Medical School killed himself, I heard that he had ''cursed me in his ravings,'' but W. H. Morse, who was in the department at the time, has supplied the following account:
>
> I have no information on whether you were singled out in his ravings. He had been reading *Science and Human Behavior* and working through the Holland and Skinner program in the two or three weeks he was with us. He was immediately concerned with your writings just before he became sick, but I personally do not think that that has any particular significance. We learned later that he had been repeatedly hospitalized in Madrid. . .I leave it to you to decide whether reading Skinner should be contraindicated for a person with a psychotic history. (Skinner, 1983, p. 417)

though other books by Skinner were reviewed there during that time—*Verbal Behavior,* 1957; Ferster and Skinner's *Schedules of Reinforcement,* 1957; *Cumulative Record,* 1959; and Holland and Skinner's *Analysis of Behavior,* 1961). This seems particularly surprising given that E. G. Boring served as Editor of *Contemporary Psychology*—perhaps timeliness was the issue by that point. The other important review outlet of the time, the *American Journal of Psychology,* also went without mention of *S&HB* for at least the 10 years following its publication.

There were a few timely published reviews, however; one in the journal *Ethics,* one in the *American Journal of Sociology,* and the *Psychological Bulletin* review of introductory texts new at that time. The first two were generally positive, if predictable. For example, Harry Prosch, in *Ethics,* begins, ''This is a remarkable book—remarkable in that it presents a strong, consistent, and all but exhaustive case for a natural science of human behavior'' (Prosch, 1953, p. 314). He holds the book up ''as a splendid example of the truly vast extent to which a behavioristic approach to human character and action can deal with its subject'' (p. 314). And he goes on to laud Skinner's thoroughness in his deterministic approach and to review key themes of the book. Then he continues: ''This is obviously old stuff. But Mr. Skinner works hard and does wonders with the essentially simple behavioristic frame in which he operates'' (p. 314).

The crux of Prosch's argument comes later:

> Since Mr. Skinner is thoroughly consistent and true to his method, he comes upon, and recognizes, a nice problem with respect to distinguishing between knowledge, or fact, and superstition. For both knowledge and superstition, in this kind of analysis, turn out to be behavior, and all behavior has external determining antecedents. Thus that consequence of the behavior which reinforces the behavior may be only accidentally connected with it (in which case we repeat the behavior superstitiously) or it may be ''naturally'' connected (in which case we repeat the behavior knowingly). Mr. Skinner admits that no absolute line can be drawn between them. . . . It is at this point perhaps that most readers may find the author's distinction between ''control'' and ''self-control'' a little puzzling, not only because these problems of knowledge are apparently neglected here, but also because ''knowledge'' itself has been made out to be externally controlled behavior (like any other behavior) and yet the author seems to be assuming that it can be genuinely useful in something called self-control. (p. 314)

Old stuff, indeed.

The third review, by Finger (1954), deserves special mention. The review is beautifully written, entertaining, and witty, and teachers of introductory psychology will find it interesting, if not somewhat disheartening, to learn that the very same concerns facing today's instructors were at the forefront in the mid 1950's. Finger characterizes *S&HB* as the ''surprise entry'' in his review of seven texts. In fact, he wrote that its inclusion would probably be ''unexpected and even controversial'' (p. 86). He follows with an on-the-money review of the content highlights from *S&HB* (something he did not do for the other texts), and clearly he heard its message, though a modicum of editorializing is still found. *S&HB*'s Section II on basic operant principles, he writes, ''should be reprinted [for graduate students] as 'Skinner Almost Painlessly Revealed'" (p. 86) and so on. The highlights of the review, however, are quoted here. First, Finger asks about *S&HB*:

> How does this help us in introductory psychology? How can we develop in our students a respect for psychology as a quantitative and controlled mode of investigation if we omit the details of experimental design and procedure, if we fail to talk in terms of means and deviations? Can anything but a distorted view result from trying to survey modern experimental psychology from the confines of the Skinner box? What happens to all the time-honored observations and principles that we have come to know as general psychology? (Finger, 1954, p. 87)

Then, he answers:

> Perhaps the answer is that these facts and generalizations are unimportant and soon forgotten, that clear perspective can most economically be gained from a consistent vantage point, and that numbers and gadgets are not the essence of science. Surely the story of the science-behavior marriage in the typical text is by contrast to this exposition pale and unsubstantial, the attempt to relate psychology to other aspects of life pitifully tentative. For those who feel that this part of our job is the

> most important, a little more of the Skinnerian approach would seem to be in order. If the unsupplemented classroom use of *Science and Human Behavior* is precluded by limitations of curriculum and clientele, its assimilation by the serious teacher is most appropriate. (pp. 87–88)

And finally, after describing a lack of systematic theoretical bias in the other texts reviewed, Finger says this of *S&HB*:

> Skinner is of course not so universally inoffensive. With all its restrictive disadvantages, this at least can be said of such a persistent theoretical treatment—that the patient knows he has been treated. When the student finishes Skinner (or vice versa), he will be aware that he has been up against something, whether good or bad. Too few college experiences can be similarly characterized. (p. 89)

Alongside these published reviews, there were other indications that *S&HB* was having an impact on audiences. Skinner wrote this of his speaking engagements following the publication of *S&HB*:

> *Walden Two* was being read in courses on utopias and, with *Science and Human Behavior,* in sociology and political science, and when I lectured at other universities I often found myself playing a part in a stock comedy. Before the lecture the chairman of the Department of Psychology would warn me not to expect a large crowd; students were busy with examinations, a popular speaker was scheduled at the same time in another building, the publicity had come out too late. We would then go to the lecture hall and find it overflowing. My obviously astonished host would make frantic phone calls in search of a larger auditorium. One episode of that sort occurred during the Kennedy campaign for President, when a small crowd at Princeton was predicted because Kennedy was speaking in Trenton. The pattern prevailed into the seventies. (Skinner, 1983, p. 256)

Later Analysis

Moving beyond its early, heady days, *S&HB* continued to receive close scrutiny, of course, and this intensified after the publication of *Beyond Freedom and Dignity* (1971), which shared many of its themes. Critiques during this period were likely to target Skinner's body of work more generally, but a few continued to pay special attention to *S&HB*. The bulk of these critiques were, again, predictable. Some were outrageous.

As one example of the former, philosopher Stevenson (1974) lined up all of the usual suspects—Skinner was ''scientistic'' rather than scientific, he ignored physiology and genetics, his extensions to humans were unjustified, cultural planning is sinister, and so on, ad nauseum. To illustrate his style of analysis:

> There are deep problems—factual, conceptual, and ethical—about how the purely scientific approach to a person, as an organism whose behavior has identifiable and manipulable causes, can be combined with the ordinary assumption by which we treat our fellows as rational beings who are responsible for their intentional actions. Skinner assumes that the two are simply incompatible, and that the latter must give way to the former [reference is to Skinner (1953, p. 449)]. But this is just the dogmatic and uncritical position taken by one particular psychologist. It would be a great pity if this discouraged us from seeking better understanding of human nature from experimental psychology. (Stevenson, 1974, p. 117)

Stevenson goes on to cite Fodor's *The Modularity of Mind* (1983) as evidence of ''just how much the subject has changed'' (p. 118). In a second example,

> Skinner's diagnosis can be seen as the exact opposite of Sartre's. Sartre maintains that we are free, but keep pretending that we are not. Skinner says we are determined, but still like to think that we are free. He analyses our current social practices as based on theoretical confusion. . . . This diagnosis of ''the unhappy condition of the world'' seems very dubious. Admittedly there are important practical problems about deciding the extent of responsibility, and these are closely connected with deep theoretical and philosophical questions about the concept of freedom. But Skinner's dismissal of the concept is an inadequate and unargued response to these problems. In his book, he seems to be saying that just as it was the mistake of animism to treat inanimate *things* as if they were people and attribute thoughts and intentions to them, so it is a mistake to treat *people* as people and attribute desires and decisions to them! Of course, this is absurd. (pp. 114–115)

It is not difficult to find reviews that are yet more scathing and with even more creative logic. Consider the twists of the following argument, just one of many such from Proctor

and Weeks in their book, *The Goal of B. F. Skinner and Behavior Analysis* (1990):

> One major misunderstanding of Skinner's writings arises from their nature. That is, the writings have been scrutinized from both scientific and philosophical perspectives and found to be lacking. Yet, Skinner has gone to great lengths to make the point that his writings are neither science nor philosophy. Rather, he characterizes all of his major books on human behavior as *interpretation*. Similarly, he also characterizes his canonical papers (Catania & Harnad, 1984) as interpretations.
>
> Fortunately, Skinner leaves little room for misunderstanding what he means by the term ''interpretation'': ''I would define it as the use of scientific terms and principles in talking about facts about which too little is known to make prediction and control possible'' (Skinner, in Catania [& Harnad, 1984], p. 578). He emphasizes that interpretation is neither science nor philosophy but ''something else'' (p. 578). Thus the fine point that Skinner makes is that his works mistakenly have been evaluated according to the criteria of science and philosophy. Consequently, evaluations of the works often conclude that they are neither good science nor good philosophy (p. 131).
>
> . . . Because, by his own admission, Skinner's major works are not scientific, classifying him as a great scientist is a category mistake. Instead, he more appropriately should be classified as a great interpreter on the level with Sigmund Freud. That is, Skinnerian behavior-analysis, as an interpretive system, bears a remarkable affinity to Freudian psychoanalysis. Freud developed a system to interpret the dynamics of the psyche from his observations of a few Viennese individuals. Similarly, Skinner developed a system to interpret the dynamics of human behavior from his observations of a few rats and pigeons. (pp. 132–133)
>
> . . . However, whereas psychoanalysis is not regarded by many people as being a sound, *scientific* system (e.g., Hines, 1988), behavior analysis is. Given the relative lack of scientific evidence for behavior-analytic accounts of human behavior, the scientific esteem accorded behavior analysis should be no greater than that accorded psychoanalysis. (p. 133)
>
> . . . Skinner's interpretations pose a far greater danger than just being misunderstood by adherents and critics, alike. . . . From our perspective, the danger arises primarily because Skinner's controversial views regarding the determinants of human behavior and the structure of human society are promoted ''in the name of science.'' That is, Skinner has taken his system, which has very little scientific support as a viable account of human behavior, and packaged it in such a manner as to have the system regarded by many academicians and nonacademicians alike as the pinnacle of scientific psychology. In this regard, Skinner can be considered not only a great interpreter, but also as a great pseudoscientist. (pp. 133–134)

As was his custom, Skinner refused to join the fray over the ''controversies'' at issue here. Indeed, in a rather clever move, he denied them:

> In what sense is my work controversial? When I am asked what I regard as my most important contribution, I always say, ''the original experimental analysis of operant behavior and its subsequent extension to more and more complex cases.'' I see nothing controversial about that. Either my results have been confirmed or they have not. At times I have made mistakes and no doubt other flaws will be found in my work, but for the most part I think it stands.
>
> . . . I would make the same point about *Walden Two, Science and Human Behavior,* and *Beyond Freedom and Dignity,* in which principles drawn from the experimental analysis are used to interpret other facts of daily life. The differences between my interpretations and those to be found in political science, economics, theology, philosophy, and so on, may be argued, as one argues differences between one political theory and another, one religious principle and another, or one philosophy and another, but so far as I am concerned, the only useful question is whether I have successfully done the job I set out to do. Whether it can be done better in a different way is a question worth raising, but is not a matter of controversy about my work.
>
> I am not trying to place my work above criticism. On the contrary, as in all science, both laboratory practices and concepts and principles need to be constantly examined, but I see no point in arguing with those who want to do things in a different way. (Skinner, 1987, p. 11)

So much for the critics. Needless to say, other retrospective analyses of *S&HB* have been of a different kind entirely, revealing the seminal status of many of its contributions for behavior analysis. There are many of these, and even more quotes to document them, but given issues of space, just a few examples will be offered to illustrate.

Skinner's first discussion of selection by consequences (or the so-called ''metaphor of selection'') took place in *S&HB,* and for all three levels of selection (e.g., Skinner, 1988c). He developed his arguments on the unique function of culture and verbal behavior there (e.g., Skinner, 1983), and provided the first behavior-analytic account of private events (e.g., Lyons, 1988). *S&HB* also witnessed the first discussion of the skin as boundary (or not; e.g., Gunderson, 1988), of the self as a repertoire of behavior (e.g., Skinner, 1988a), and of self-control. In fact, *S&HB* ''was said to be the first textbook in psychology with a chapter on self-control, albeit in quotation marks'' (Skinner, 1983, p. 336). We have the first discussion of problem solving as the manipulation of discriminative stimuli (e.g., Skinner, 1988d), the first functional analysis of emotion (e.g., Skinner, 1988b), and the first textbook analysis of religion (e.g., Skinner, 1983). *S&HB* provided the translation of a great many mentalistic terms (e.g., Skinner, 1983), and has been seen by many as the inspiration for applied behavior analysis (e.g., Michael, 1980). Not bad for one undergraduate introductory psychology text!

Updates?

As Skinner continued to develop the conceptual elements of *S&HB* in subsequent years, he also continued work on his course, and on his plans for the text. Teaching machines were added to the mix in 1954, with James Holland's help, and with generally good results (Skinner, 1983, p. 420). A new edition of *S&HB* was also considered, first by Skinner alone, and then with Richard Herrnstein:

> In 1958 I had thought of revising *Science and Human Behavior* to make it more of an introductory text. I would omit the more difficult sections, add a few figures, tables, graphs, and pictures, describe a few demonstrations, and give more examples from daily life. In an ecumenical move I would add something about traits and attitudes and spend more time on Freud. A second book, an advanced analysis, could contain the material removed from the first, with more attention to technical issues such as perception, decision-making, and value judgments. It could be a book to which economists, political scientists, linguists, and educators might turn.
>
> When Dick Herrnstein began to help in Natural Sciences 114, he and I considered a more sweeping revision. It would be even closer to a standard introductory text, with some coverage of all the conventional fields. I was interested in it primarily as a potboiler. Retirement would be costly, but good introductory texts were making their authors hundreds of thousands of dollars. When we sent an outline of a revision to Macmillan, they reported that *Science and Human Behavior* was enjoying the biggest sales in its history. Herrnstein and I were really planning a different book, which they would be happy to publish, and they sent us a contract and a small advance. (Skinner, 1983, pp. 228- 229)

Skinner reported having doubts by 1961: ''I don't need the money as much as I need the time; and it would be a bad bargain'' (Skinner, 1983, p. 229). A sabbatical postponed the revision further, and the plan was soon abandoned.

We cannot help but be curious about what the revision would have brought us, and one can even imagine a modern update. Certainly much has been added to the analysis and interpretation of behavior since 1953, and a strong case can be made for new efforts to bring our best before the broader public eye once again. But this would necessarily be a very different book, and not a replacement.

Present

S&HB remains in print today—it continues to boil some pots—and citations speak to a significant, steady, and ongoing impact. Figure 1 shows the results of a citation search (*Social SciSearch and SciSearch*) conducted via *Dialog,* an on-line database of scientific journals from 1974 to the present. The database includes all records from the *Science Citation Index* and from the *Social Sciences Citation Index.*

Another indicator of *S&HB*'s influence comes from a recent paper by Saville and colleagues (Saville, Beal, & Buskist, 2002), who reported a survey of the *Journal of the Experimental Analysis of Behavior (JEAB)* and the *Journal of Applied Behavior Analysis (JABA)* boards of editors. The goal of the survey was to obtain a list of essential readings for graduate students in behavior analysis. Twenty-eight individuals responded, 12 from the *JEAB* board, 16 from the *JABA* board. The authors were interested in the frequency and percentage of

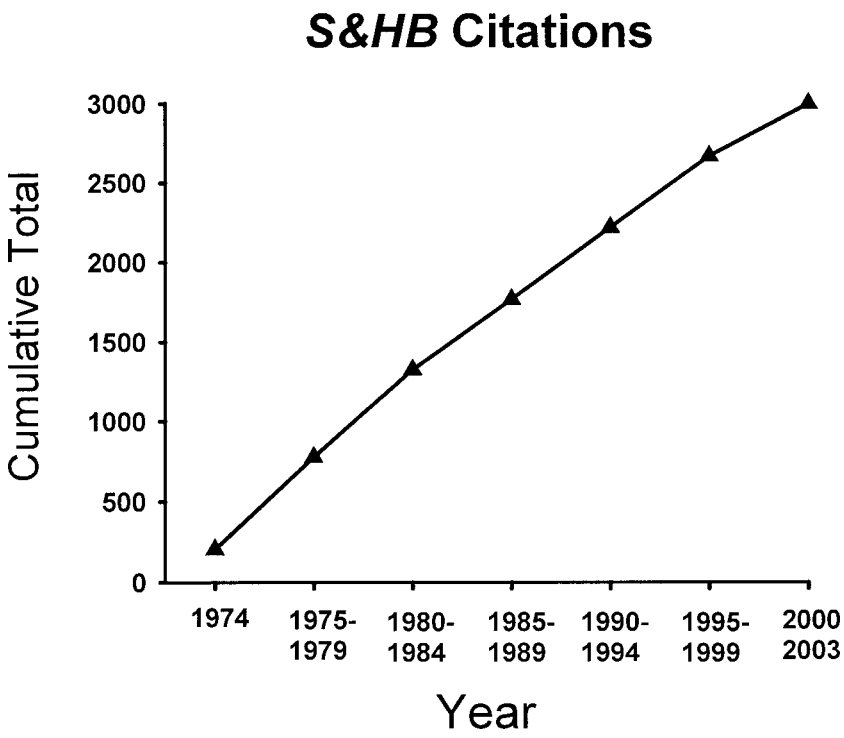

Fig. 1. Cumulative number of citations to *S&HB* shown in *SocialSciSearch* and *SciSearch* from 1974 through July, 2003. Note that the first data point represents the total for 1 year only, and the final date point represents the total for 2 years, 7 months.

respondents listing individual readings for each board, and in the degree of overlap between the boards. Perhaps not surprisingly, consensus was high for *S&HB*. It was listed by 75% of the respondents from each board; it was the most often listed reading (for either articles or books) for the *JEAB* board and the second most often listed for the *JABA* board (topped only by Baer, Wolf, & Risley, 1968). And while these results may not seem surprising, they are striking in light of the remaining survey outcomes that showed little consensus on what was essential, between boards or even within them. *S&HB* clearly enjoys a respected position for training in behavior analysis, at least at the graduate level, and at least by verbal report.

It is difficult to assess the actual degree to which *S&HB* forms part of the curriculum in graduate training programs in behavior analysis, and virtually impossible to get a sense of this for undergraduate programs. Still, most of the graduate programs listed in the Association for Behavior Analysis Graduate Training Directory include course listings and descriptions for which *S&HB* would be an appropriate text (e.g., conceptual foundations in behavior analysis). For many of these listings, the instructor's web materials make use of the book explicit. Certainly, *S&HB* has been a recommended component of graduate training at least since 1980. It was then that Michael (1980) outlined a program to establish a "minimal doctoral repertoire in behavior analysis," as a way to remedy what he saw as unwanted developments in the field. In his view, graduate training was both the culprit and the solution to such developments. Michael's plan was for an intensive program focused on the basics—the experimental analysis of behavior, applied behavior analysis, and behaviorism, and *S&HB* was an essential element (included under the heading of the experimental analysis of behavior).

More recent authors have also focused on teaching as problem and solution to current challenges for the field, specifically for its lack of growth. For example, in a recent *JEAB* paper, Machado and Silva (1998) put it this way:

In this essay, we focus on another reason for

> the current lack of growth in the field of learning, namely its teaching. We believe that those of us who study learning too often have gone about the business of teaching the discipline in an isolated, unreflecting, stereotyped, and occasionally even perfunctory way, a way that, were it not also tragic, would be quite ironic, for the very community that investigates the phenomenon of learning has remained largely silent about its teaching.
>
> It is clear that we have failed to continue to convince students of the importance of learning, to excite them about its investigation, and, more generally, to spawn a new generation of scholars interested in the subject. Not surprisingly, then, the number of jobs in the field has dwindled, the scientific progress in the area has slowed down, and the false perception that learning is only a convenient toolbox has been strengthened. The greatness of the discipline may be overshadowed by the unreflecting way we too often have been teaching it. (Machado & Silva, 1998, p. 216)

These authors then set out ''to describe some of the problems in the way that learning is currently taught and to suggest potential solutions to these problems'' (Machado & Silva, 1998, p. 216). In doing so, they enumerate multiple teaching evils, including overemphasis on facts, insufficient conceptual analyses, motivation at the expense of understanding, and lack of integrated reasoning. Their proposed solutions include educationally sound and principled suggestions such as placing an emphasis on general themes rather than factual particulars, and making provisions for active learning, questioning, problem-solving, reasoning, and so on. It is difficult to quarrel with any of the specifics offered by Machado and Silva. The problems for our field are very real ones, and the teaching issues they target are important. My own experience in teaching a psychology of learning course for many years mirrors their description in a number of ways—students do tend to find the content of basic behavior analysis dry, the concepts and terminology foreign, and the experiments esoteric. Unfortunately, my experience is also that these reactions seem to persist despite best efforts at exactly the sorts of solutions offered by Machado and Silva.

A slightly different analysis of the problem seems possible. Perhaps what is lacking for our students is an appropriate context in which to appreciate the importance, the scope, of the principles we teach about in a learning course. There simply is no magical number of times students can be told, ''This is the basis of everything you do!'' that will make the point clear. That statement (or others like it) is dutifully entered into notes, and treated as functionally equivalent to all the other ''overemphasized facts'' we might relay about behavior. What seems missing is an effective establishing operation—a basis for making it important to deal effectively with our core concepts and empirical foundations, despite the work it might take.

One of my favorite quotes from *S&HB* is the opening sentence from the chapter on education. There Skinner writes, ''In an American school if you ask for the salt in good French, you get an A. In France, you get the salt'' (Skinner, 1953, p. 402). Clearly, we want to give our students salt (in addition to their A, of course). But how to put the spice into our dry, foreign, esoteric subject matter? This is *exactly* the function of *S&HB*. The book was designed specifically to communicate to broader audiences who do not yet care about lever presses or key pecks. It provides an entrée into a conceptual framework that establishes the need for, and importance of, proper laboratory science. Consider it a sort of gateway experience from which further study of learning follows naturally.

It is easy to underestimate the function a book like *S&HB* can serve for students. As seasoned behavior analysts, the broad implications of a radically behavioristic approach have become the automatic lens through which we see the world. But it wasn't always this way for us, and it isn't yet for our students. Recently I taught a graduate seminar entitled ''Conceptual Foundations of Behavior Analysis.'' *S&HB* provided the framework and organization for the course, with additional readings (primarily by Skinner) assigned as relevant to the material. The students were all first or second-year master's students studying behavior analysis, all strong academically and highly motivated. Each had had a graduate course in basic experimental analysis of behavior and in applied behavior analysis, and had completed at least one year of behavior-analytic thesis work. As one of the weekly seminar requirements, for each read-

ing assignment, students submitted an outline or summary of the key take-home points and of the new ideas or perspectives to which they had been introduced. I found the key-points assignment to be an effective exercise—it helped students learn to distill, synthesize, and articulate the bottom line of some very sophisticated arguments, and gave me a clear assessment of what was, or was not, coming across well. The latter task (the new ideas), however, proved a difficult one. There was no balking when the assignment was given—it seemed straightforward enough—but there was considerable angst each week when I asked, ''What was new for you here?'' The typical response was, ''All of it,'' and the students worried that their key points and new ideas were redundant. If these had not been such strong students I might have been concerned, but this was not a case of neglecting the assignment. The conceptual analysis and interpretation of *S&HB* really was all new to them, which is exactly the point, of course. That all-important ''big picture'' does not emerge automatically from the separate pieces that we layer so carefully. It helps to have that picture first—then the rest is salt.

It could be argued that the scenario just described has been true, not just for beginning students, but also for the development of behavior analysis as a discipline. As others have noted (e.g., Dinsmoor, 1988; Michael, 1980), Skinner's fundamental concepts for analyzing environment-behavior interactions were laid out in *Behavior of Organisms* (1938). These concepts (e.g., stimulus, response, three-term contingency) were generic by design, allowing them to transcend any particular behavioral phenomenon and have the broadest possible scope. Critical units with universal applicability could then provide for progress toward the sort of general theory that behavior analysts are comfortable with. All that was there in 1938, but the concepts were couched in foreign terms and based on unfamiliar criteria. It seemed to take *S&HB* to help most audiences appreciate just how far that handful of basic principles could take us. Later generations of behavior analysts could find their basic lessons in more accessible sources than *Behavior of Organisms,* and with updated analyses. But even though our analytic tools for approaching complex human behavior have evolved considerably since 1953, I know of no better source for capturing the full promise of our science.

Perhaps the picture I paint here is overly autobiographical. Certainly I became interested in studying behavior analysis seriously only after reading Skinner. My discussions with many other behavior analysts, however, reveal not dissimilar histories. Although there will always be some students who are taken by the science from the start, many, perhaps most, can benefit from that bigger picture going in. The upshot of all of this seems to bring us full circle. *S&HB* was written as an introductory text—behavior analysis might profit from its use as directed.

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