Behavior Analysis: Research and Practice
2018, Vol. 18, No. 1, 4–15

2372-9414/18/$12.00 http://dx.doi.org/10.1037/bar0000123

The Importance of a Deeper Knowledge of the History and Theoretical Foundations of Behavior Analysis: 1863–1960

John M. Guercio
Benchmark Human Services, St. Louis, Missouri

The present article argues for the greater examination of the importance of studying the historical foundations of the field of applied behavior analysis (ABA). The increased volume of students in the behavior analysis field over the last 10 years underscores the need to emphasize the historical, scientific, and philosophical foundations that have made the field so strong. The philosophy of science of behaviorism and ABA was linked to several disciplines initially, and evolved into a role in the field of psychology. A detailed justification for the study of the history and philosophy of a science of behavior is presented and will flow into the earliest origins of behaviorism and the maturation of the field. Current financial contingencies have resulted in the misperception that the ABA field is primarily targeted at behavioral challenges related to the mitigation of autism spectrum disorder. As a consequence, there has been a departure from the philosophical and conceptual aspects of behavior analysis. A departure from the philosophical and scientific underpinnings of the field can prove problematic in the long run. This article will detail the contributions of the pioneers in the field, and end at the beginning of the second generation of behavior therapy in the early 1960s. Discussion of the foundations of behavior analysis will help new practitioners and students of behavior analysis to better appreciate the intellectual depth of the field.

Keywords: history of behavior analysis, theory, behavior analysis graduate training, philosophy of science, behaviorism

The field of applied behavior analysis (ABA) has significantly grown in the last 10 years (Guercio & Murray, 2014). Some recent reports on the proliferation of new students into the field shows that there were 7,419 certified behavior analysts documented in 2011. This number increased to over 14,000 by the year 2014 (see www.BACB.com). The drastic increases in the demand for behavioral services has led to significant growth in board certified behavior analyst (BCBA) course sequence curriculum that provides the requisite training for the profession (Dixon, Reed, Smith, Belisle, & Jackson, 2015).

There are presently over 200 colleges and universities across the world that offer course sequences that are approved by the Behavior Analyst Certification Board (BACB). The sheer volume of these programs should compel us to institute some manner of quality control and rigor related to the material that is presented (Dixon et al., 2015). There has been a recent call in the field to develop some type of metric for evaluating ABA training programs. Dixon and colleagues (2015) detail the process of program accreditation that the Association for Behavior Analysis International (ABAI) has had in place since 1974. This process takes into account the accreditation procedure that is used by ABAI that takes into consideration a number of factors including; curriculum, graduate employment rates, faculty curriculum vitae, and student progress (Dixon et al., 2015). All of these are important aspects of a well-grounded discipline based in the philosophy of science and the development of a science of human behavior that Skinner envisioned (Skinner, 1938, 1954). There is a danger that our pedagogical standards and instructional content will change due to the

Correspondence concerning this article should be addressed to John M. Guercio, Clinical Services – Behavior Analysis & Therapy, Benchmark Human Services, 1215 Fern Ridge Parkway #204, St. Louis, Missouri 63141. E-mail: johnmguercio@gmail.com

increasing volume of students and market driven force. It is unfortunate that many practitioners in behavior analysis today are pigeon holed, so to speak, into having expertise primarily in the assessment and treatment of autism spectrum disorders (ASDs). Behavior analysis is so much more than that. Though this is an important realm of what we do, it is not all that we do, nor have done. The clear and present danger that is present is a market-driven curriculum based on a narrow focus on ASD. Rather than an ASD curriculum, applied behavior analysis (ABA) programs would be better served by a curriculum that is as rigorous as possible by incorporating courses in the philosophy of a science of behavior and essential readings in behavior analysis. Students should be well versed in the diversity of applications of ABA and behavior therapy. All undergraduate psychology programs have history courses that orient students to the schools of thought from its inception to contemporary 21st century intellectual foundations and theories inherent to the field. A narrow focused, market-driven training sequence limits the extent to which behavior analysis will have an impact on society at all levels. The study of the history and philosophical foundations of behavior analysis are crucial to the training program of any behavior analyst. The interventions that we presently use in practice are built from the history of our science and we would be remiss to neglect them. A shift does appear to be occurring with respect to how we train behavior analysts in our academic settings. The course sequences approved by the BACB for graduate programs in ABA will have new requirements that focus on the philosophy of science and the historical foundations of the field of behavior analysis.

The BACB published its new fifth edition of coursework requirements in April of 2017 that will be implemented in 2022. Significant additions have been made to the content area of principles and concepts. Within these requirements there have been additions made to the preexisting content area of concepts and principles of behavior analysis. This content area currently requires approved course sequences to contain 45 hr of instruction that falls within this content area. Such a move emphasizes the increasing importance of training in the philosophy of science of behavior analysis. Such a focus brings with it an historical context.

Importance of the History of Behavior Analysis

Why study history? The American Psychological Association (APA) has described a compelling set of reasons to study history with respect to specific scientific disciplines (see www.apa.org/monitor/2010/02/history.aspx). The area of learning and conditioning, that is, behavior analysis remains a sub discipline of psychology, for example, Division 25 of the APA. For that reason alone, the history of behavior analysis should have closer scrutiny in graduate training programs.

Benefit to the Discipline of Behavior Analysis

Study of the history of behavior analysis is a pertinent field of study and relevant to the further evolution of behavior analysis training programs. Studying the history will illuminate the evolution of the science of behavior. The history of the field should illuminate those studying it as to the reasons that the conventional methods used in psychology were not effective and that and an alternative approach was necessary. The conceptualization of "mental disorders" occurring as a function of environmental variables was an important transition and radical departure from the mentalistic conceptions of psychological disorders and how they should be treated. One of the most pertinent reasons for the study of the history of the behavior analysis is the prevalence in the field of focusing on subject matter that is represented in the BACB exam as opposed to delving deeply into the work of the early contributors in the field. Behavior analysis as a field was made possible through the pursuit of a science of behavior as opposed to an amalgam of poorly defined constructs that were not amenable to accurate measurement. John B. Watson (1924) proposed his viewpoint on the basis of these early tenets of the behavioral revolution, stating that "Psychology as the behaviorist views it is a purely objective, experimental branch of natural science" (p. 158).

The evolution of the behavior therapies is one with a rich and variegated history that, as be-

havior analysts, behooves us to become familiar with. As students and practitioners of behavior analysis, we should be aware of the pioneers in the field. B.F. Skinner's early work was done in university physiology and biology departments. Our field is an extensive one with a very broad reach. Coleman (1988) gives us a multitude of reasons for making direct contact with the history of behavioral psychology and the evolution of the field of ABA.

Relation Between the History and Philosophy of the Science of Behavior

By studying our past at a deeper level, we can better understand the important work that has been done in our field. Increased awareness of the pioneering contributors to behavior analysis will help to avoid many future headaches when we are put in positions to defend the practice and science of our discipline. Many students of behavior analysis study furiously to pass their certification exam, but may miss the intellectual backdrop to the interventions that they are describing in rote fashion.

William Baum recently expounded on the importance of a thorough knowledge of the conceptual basis of ABA (W. Baum, personal communication, May, 29, 2017). He underscored the importance of being able to explicate the theoretical basis of our field as opposed to just using a "bag of tricks" in our repertoire of interventions. A strong foundation in conceptual issues allows the practitioner to approach issues from a scientific vantage point. This vantage point facilitates better problem solving behavior when things go wrong. Conceptually grounded scientists can troubleshoot to determine methodological and clinical flaws. A thorough background in the history of behavior analysis can buttress us with a conceptual and theoretical learning history upon which we can draw. Clinicians need to be aware not just that differential reinforcement of alternative behavior works, but why you use it and why it works as well. The ideas that we have built upon can inform our present decisions. Our history can also be argued to help us to become aware of the past and expand our current capabilities as a result. The current theories and intellectual debates in our field are built largely upon the work of our forefathers such as Skinner, Keller, Schoenfeld, and others. The strong reliance on scientific method can direct our efforts away from non-evidenced-based treatment approaches.

Massive swings of opinion have occurred in the history of behaviorism and we should be aware of what occasions them and what their consequences have been. Skinner long ago pointed out the fact that contingencies of reinforcement are ubiquitous. His vision was to have society realize the fact that a science of behavior can help us to maintain a more functional society as well as strengthening most of the institutions inherent in our society (Skinner, 1987). Those studying behavior analysis would benefit from being familiar with these aspirations in order to realize the impact that can be made using a science of behavior.

Our work is cumulative and the need to acknowledge that is significant. Students would benefit from poring over the literature and familiarizing themselves with our intellectual foundations. The formation and evolution of different theories of learning and how they have been applied have made a huge impact in behavior analysis to date. It is difficult to describe the excitement that can arise when some of the hidden gems of our vast literature are discovered and appreciated for the significance that they hold. The remainder of this article details the evolution of the field of behaviorism.

By expanding on our current knowledge base we are able to incorporate behavior analysis into areas that have never encountered our science, but can benefit, even on a societal and cultural level (Biglan, 2015). A stronger reliance on the history of our discipline will help to strengthen the field as new practitioners of our science emerge.

Recent divides in our field regarding the practice of behavior analysis versus the science of behavior analysis is a case in point. We want to make sure that the business of behavior analysis does not trump the science of behavior analysis. History can provide us with several stepping stones to building the virtues humility and tolerance that are needed in our field as we interact with other disciplines. We have not done well with this historically and need to improve on this and look at it as a lesson in sobriety. By becoming familiar with our concepts, events, and cultural landmarks, we can become better acquainted with this material and possibly contribute to it.

The detailed history that is presented in this article should serve as a guide to those interested in the field of ABA that the discipline offers a broad conceptual base. The licensure movement for applied behavior analysts has slowly spread across the nation (Guercio & Murray, 2014). It is our job as behavior analysts to provide an accurate yet thorough history of the field to the growing number of people entering it.

Conceptual and Philosophical Underpinnings

The history of behaviorism and the emergence of the science of behavior is rich and extensive. The star that was to become behavior analysis shown brightly at the turn of the 20th century.

Psychology as a Behaviorist Views It

The work of John B. Watson (1878–1958) is looked at by many of as the foundational work in behaviorism. He was responsible for serving as the catalyst for the objective examination of behavior. He firmly believed that once one eradicated all references to consciousness, a better formulation of psychological processes in particular, and behavior in general, would result. His classic stance on an objective approach and his view of behaviorism is evidenced in the following passage from his seminal work, *Behaviorism* (Watson, 1924):

> Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. The behaviorist, in his efforts to get a unitary scheme of animal response, recognizes the dividing line between man and brute. The behavior of man, with all of its refinement and complexity, forms only a part of the behaviorist's total scheme of investigation. (p. 158)

The science of behavior has its roots in the operant research of B.F. Skinner which has led to the development of ABA. The work of John B. Watson (1878–1958) had a profound impact on Skinner's work (Watson, 1924). Skinner's approach was so named based on the fact that behavior "operates" on the environment in order to produce the outcome that is the most advantageous to the human organism. The science of behavior that has evolved out of his work is the application of philosophical rules to discover knowledge. The application of the science of behavior has fallen under the headings of behavior therapy, behavior modification, and behavior analysis to name just a scant few (O'Donahue, Henderson, Hayes, Fisher, & Haye, 2001).

Natural Science Influences

The Russians. Some of the earliest work that was done and would contribute to the science of behavior was conducted in Russia. The early work of the Russian physiologists Ivan M. Sechenov, Ivan Pavlov, and Vladimir M. Bechterev served as the foundation upon which the theories and practice of behavior analysis and learning was built. Most people are familiar with the work of Pavlov, but are not aware of the earlier contributions of Sechenov and Bechterev (Kazdin, 1978). The most significant contributions that were made by theses scientists was their consistent use of operational definitions and their strict mechanistic interpretation or operational definitions of what had been termed subjective processes up to that time.

Their training in physiology led to a predilection for scientific experimentation and analysis of processes. This led to an objective formulation of their findings and the application of such an approach to the field of learning in psychology. Sechenov (1829–1905) completed most of his medical training in Russia and through his travels to Germany, Austria and France, he was exposed to the work of Johannes Muller, Karl Ludwig, and Claude Bernard. Sechenev's work led to him being called "the father of Russian physiology." He regarded the field of psychology as an "inexact science" and wanted to lend the objective methods of physiology to the study of psychological processes. His statement, "the initial cause of human action lies outside of man," (Sechenov, 1965) reflects that into which the science of behavior would ultimately evolve. His studies showed that the complex behavior of humans could be described as being acquired through learning. This thesis is consistent with the findings of another great Russian scientist, Ivan Pavlov.

Pavlov (1849–1936) was on the faculty of the Military Medical Academy of St. Peters-

burg. His main area of study was digestion and digestive processes. Through the measurement of saliva volume and its production, he was able to produce one of the earliest learning theories in behaviorism.

One of the observations made by Pavlov was that an animal tended to produce more saliva if it was able to see the food that was being placed into its stomach surgically than if it did not. He also noted that salivation took place in the presence of the experimenter as well (Pavlov, 1906, 1932). These responses were ruled out as being hereditary because they were related to the experiences of the animal in his laboratory (learning history). The preparation and results of his experiments ultimately led to the theory of respondent conditioning. The salivation response the animals displayed in the presence of food (a primary reinforcer or unconditioned stimulus) allowed extension of the relationship between the food and salivation to another stimulus. An eliciting stimulus (the food) had to be present to observe these responses. These distinctions were clarified by Skinner years later (Kazdin, 1978). The findings that Pavlov detailed included taking his observations of an animal salivating in the presence of a tone, or the sight of the experimenter (stimuli that were conditioned or paired with unconditioned stimuli) and calling them conditional (conditioned) stimuli as a result. This new process formulation of how a previously neutral stimulus could produce similar behavioral responses to stimuli it had been paired with it now offered a learning theory account of abnormal behavior (Pavlov, 1906). This new process by which learning could occur would be used by many behavior therapists to explain how new fears have been conditioned and why avoidance responses may have crept into a person's repertoire seemingly out of nowhere. The role of the Russian physiologists in the evolution of the science of behavior was vast. Another member of this elite group was Vladimir Bechterev.

Bechterev (1857–1927) was primarily interested in anatomy and physiology of the brain and the spinal cord. He also ventured out into the various mental and nervous diseases and their treatment (Kazdin, 1978). Building upon the work of Pavlov, he paired an aversive stimulus such as an electric shock with various neutral stimuli to determine the effects of such a pairing. This line of research helped to unify the research orientation of both Pavlov and Bechterev in their total rejection of using subjectivism to explain any psychological phenomena. The concepts and procedures of both men were later observed in the work of their counterparts in other parts of the world.

Biology and Mechanics

One of the hallmarks of behavior analysis is a commitment to experimental control. This tradition arose as much from the field of engineering and biology as it did in the science of behavior. Jacques Loeb, a German scientist, came to the United States in 1891. His influence on the development of behaviorism was significant and can be seen in the writings of many of the early proponents of behaviorism such as Watson and Skinner. Loeb's writings influenced W. J. Crozier who was an early mentor of Skinner. Most of those familiar with Loeb's work have heard of his studies on tropisms and how providing different sources of stimulation led to orienting responses in different organisms.

Loeb's work on tropisms led him to describe his approach to science which was very hands on and that placed the control of one's subject matter above formal theory testing as one of the primary aims of science (Hackenberg, 1995). The similarities in scientific approach and prediction and control, which Skinner espoused, can be seen in the following quote from Loeb: "'Instinct' and 'will' in animals, as causes which determine movements, stand upon the same plane as the supernatural powers of theologians, which are also said to determine motions, but upon which an engineer could not well rely . . ." (Hackenberg, 1995, p. 230).

Both Skinner and Loeb rejected mentalistic explanations for phenomenon stating that they were beyond the reach of experimental control and were unsatisfactory explanations as a result (Hackenberg, 1995). This insistence on prediction and control was a strong influence both on Watson and Skinner in their theories of behavior. Investigations into the contributions of some of the theorists in the natural sciences contributed to the refinement of theories of behavior.

Ernst Mach has been described as one of the most influential figures of the 19th century (Marr, 1985). His work paved the way for the

construction of a scientific framework for both physics and psychology in the 20th century. Skinner was introduced to Mach's *The Science of Mechanics* while at Harvard. This book would ultimately shape Skinner's thesis and exerted significant influence on Skinner's scientific behavior throughout his career. Mach (1960) succinctly described his approach in the introduction to his book *The Science of Mechanics*:

> The history of the development of mechanics is quite indispensable to a full comprehension of the science in its present condition. It also affords a simple and instructive example of the processes by which natural science is developed. (p. 1)

Mach (1960) looked at the operational definition in science as "the outcome of such an endeavor to establish the interdependence of phenomena and to remove all metaphysical obscurity" (p. 22). This line of thought has become the cornerstone of the science of behavior, and the guide by which it has conducted scientific inquiry. The future development of the science of behavior is based upon these precepts as we can see in the work of Edward Thorndike.

Early Experimental Demonstrations

The use of animals to discover the immutable laws of behavior did not stop with Pavlov.

Trial-and-Error Learning

In the United States, Edward L. Thorndike (1874–1949) used chicks, dogs, fish, and monkeys, though his most famous work was done with cats. He carefully constructed what he called "puzzle boxes" that contained certain means of escape for the cat placed in the box. As cats were placed in the boxes, they had been exposed to varying lengths of food deprivation. Thorndike (1911) found that the cats engaged in a variety of trial-and-error learning in order to escape. The time that it took to escape decreased significantly over the course of a number of trials. Thorndike's theory emphasized that the consequences of behavior either strengthened or weakened what he called "connections." It was not long before a synthesis of the approaches proposed by Pavlov and Thorndike was developed.

Skinner was familiar with the work of Pavlov while he was an undergraduate. His response to the respondent conditioning model can be seen from the following passage from his book *The Behavior of Organisms*:

> Operant behavior with its unique relation to the environment presents a separate important field of investigation. The facts of respondent behavior which have been regarded as fundamental data in a science of behavior (Sherrington, Pavlov, and others) are, as we have seen, not to be extrapolated usefully to behavior as a whole nor do they constitute any very large body of information that is of value in the study of operant behavior. (Skinner, 1938, p. 438)

Emergence of Operant Conditioning

Skinner's exposure to Bertrand Russell and John Watson's book, *Behaviorism,* while he was an undergraduate, served as an impetus for him to find out more about Watson's work and behaviorism. A professor in the department of physiology at Harvard, W. J. Crozier, influenced Skinner's approach to research through his emphasis on a "strong base of empirically established relationships" (Skinner, 1979). This would serve as the basis of Skinner's research model and an inductive versus deductive approach to science for the rest of his career. In Skinner's view, there was a great deal of behavior that could not be accounted for through respondent conditioning processes. Thus, his concept of the operant was born.

Skinner used a variety of apparatus to investigate the behavior of lower organisms. He used pigeons and rats for the majority of his studies. Because of his extensive interest in tinkering and working with objects to build his own apparatus, he was constantly trying to develop new devices to investigate the environmental effects on behavior. One of his most famous devices employed a horizontal bar that a rat pressed for food. The delivery of food was related to the responses of the rat. In Skinner's conception of the operant conditioning process, increases in responding by the organism produced some preferred event. The event that Skinner used most was the provision of food contingent upon lever pressing. The variety of schedules of reinforcement and a detailed analysis of the extensive principles of operant conditioning are beyond the scope of this article but contributed significantly to our understanding of human behavior. Skinner's work on the operant conditioning paradigm provides a great deal of insight when we examine competing and

replacement behaviors for unwanted responses. The expansion of operant techniques to human behavior began to occur with Skinner and his student, Ogden R. Lindsley.

Building a Technology of Behavior Change

As the "father" of behaviorism, John B. Watson was a pioneer in the development of psychological science. He was also a frontrunner in the evolution of behavior modification.

Starting Block

In one of the first significant applications of learning theory to human behavior, Watson examined the conditioned emotional response of infants. These observations led to an explanation of how these fears were developed. One of his most famous experiments was conducted with a graduate student at Johns Hopkins University at the time, Rosalie Rayner (1898–1935). Their subject was known as "little Albert" and is one that is familiar to most students of introductory psychology. Albert was an 11-month-old infant that had been raised in a hospital environment. In order to examine the conditioning of the fear response, Watson and Rayner exposed him to a number of stimuli, among them a white rat and a rabbit. As Albert was playing with the white rat, a metal bar was struck with a hammer producing a strong startle response. The startle response had been observed in previous interactions with the hammer and the steel bar, but were now paired with the white rat in the experiment (Watson & Rayner, 1920). The rat had not elicited any fear or startle response prior to its being paired with the clanging noise of the hammer on the bar. The rat now elicited these fear responses. What they also found was that Albert had startle responses in the presence of other white furry objects such as dogs, rabbits, fur coats, cotton, and wool. This experiment had clearly shown that fear could be learned. As many of these contributions to the field of behaviorism were being made in the United States, increasing strides were also being made overseas.

The work of the O. Hobart Mowrer and Willie M. Mowrer were essential to the progress of the behavioral model of therapy, yet they are rarely given the attention that is afforded to Thorndike, Skinner and other pioneers in behavioral methods and theory. The Mowrers were some of the first researchers to apply learning principles to significant clinical issues. In their groundbreaking 1935 study, 30 children who ranged in age from 3 to 13 years old and who were suffering from enuresis received treatment based on Pavlovian conditioning (Mowrer & Mowrer, 1938). They constructed an electronic pad that produced a loud sound when it was exposed to fluids. The pad was a cotton fabric that encased an electrical unit that allowed the pad to produce a loud sound when the child started to urinate. The loud noise, an unconditioned stimulus (US), elicited a startle reflex causing cessation of urination. By pairing bladder distension with the US the child learned to awaken when the bladder was distended but before urination.

Operant Applications

O. R. Lindsley started a detailed research program that was initially funded by the Office of Naval Research to determine how applicable the use of operant principles would be in chronically hospitalized individuals with mental illness. The bulk of the research was conducted at the Metropolitan State Hospital in Waltham Massachusetts (Lindsley, 1956). The operant behavior that was examined was plunger or lever pulling that produced specific consequences based upon the schedule of reinforcement that was in place for that specific lever. Reinforcers such as candy and cigarettes were used for the psychiatric patients that were participants (Skinner, Solomon, & Lindsley, 1953). The results from this work demonstrated that behavioral principles could be applied to human organisms that had been deemed incapable of learning (O'Donahue et al., 2001). When the therapeutic applications based on learning theory derived from research with infrahumans was applied to humans, the doors to behavior therapy were opened.

In an article often heralded as one of the first in the literature of behavior analysis, Teodoro Ayllon and Jack Michael (1959) documented the use of nurse's attention and its role in the maintenance of some of the undesirable behavior noted on the ward of a psychiatric hospital. The nurses were also educated about the use of tangible items to reinforce desirable behavior that they observed during scheduled observation periods. A number of behavioral challenges observed in the psychi-

atric milieu were addressed successfully through the use of operant procedures, thus demonstrating the efficacy of the approach in a setting where traditionally medically based approaches had been used. Additional samples of some of the early applications of operant conditioning involved the reinstatement of verbal behavior in chronically psychotic patients within a hospital setting. The researchers used tangible reinforcers to gain compliance to group attendance initially. This behavior was then shaped to the point that the client was attending groups and participating in them in order to obtain tangible reinforcement. This finding was replicated with another client described in that same article. The use of operant reinforcement in the form of chewing gum was used to shape his verbal behavior to the point that he would request the gum from the experimenter (Isaacs, Thomas, & Goldiamond, 1960). A firm grasp of the learning foundations of behavior would lead to better outcomes in the application of the science.

First Wave of Behavioral Applications

Human suffering has long been thought to be due to internal forces be it demons or unconscious wishes, instincts and drives. With the evolution of modern medicine human behavior became increasingly medicalized.

Medical Model and Psychoanalysis

The "disease model" looks for some underlying cause of a behavioral malady. Given that the etiology of mental suffering could not be readily identified through simple observation, the causes were assumed to be located within the individual (Kraeplin, 1962). Biochemical causes along with a series of assumptions that looked at mental disease as a physical lesion or a bodily disease that was to be addressed as all other diseases were. This type of an approach can lead to barriers to treatment, not to mention "a vast literature of iatrogenic irrelevancies." (Ullman & Krassner, 1965). Physiology became the petri dish within which the workings of behavior therapy were examined. Writers such as Thomas Szasz (1974) who wrote about what he saw as "the myth of mental illness" and Philip Pinel (1806) who wrote the classic *A Treatise on Insanity* pointed out that the insistence on physical lesions and bodily disease was errant for a number of reasons. Chief among these was eloquently described by Pinel in the following excerpt from his book:

> The successful application of a moral regimen exclusively gives great weight to the supposition that, in the majority of instances, there is no organic lesion of the brain or of the cranium. (p. 168)

Skinner had repeatedly stated that when we retreat into the organism, we are obscuring or flat ignoring some of the key variables upon which behavior is related. By employing these constructs or hypothetical entities, we remove our scrutiny from where it should be, the actual behavior of the person.

Previous conceptualizations of the therapeutic treatment process was based upon subjectively derived postulates that look at certain "neurosis" or complexes that have a questionable origin. By viewing maladaptive behavioral response from a behavioral viewpoint and looking at the conditioning of these unwanted responses, a more scientific basis from which to formulate a treatment approach was developed. The manner in which a response was conditioned in either an operant or a respondent manner contributed to how it should be treated. Stimuli that had been paired with aversive events took on aversive properties as Watson and Rayner had demonstrated years earlier. Examining this learning history led to informed treatment. The history of the problem held no increased meaning or benefit for proponents of behavior therapy.

Much of the work of the early psychoanalysts was based upon building extensive histories from their patients in order to make subjective formulations as to the origins of their "neurosis." The field of behavior therapy was more interested in looking at the current behavior as it was presented and analyzing the learning conditions that contributed to it. The current behavior was a better indicator of the maintaining variables that had to be addressed. By objectively dealing with the behavior itself, there was no need to formulate theories about complex neurosis or other theoretical entities that got in the way of an accurate examination of the contingencies that were in effect. As treatment has progressed in the field of behavior therapy new treatment approaches have been introduced that have their basis in the behavioral tradition.

Paradigm Shift

Whether it is biology, physics, or chemistry, the development of a science has a clear line of progression. (Kuhn, 1963). In Kuhn's formulation,

the beginnings of theories that lay the groundwork for what is to be a strong scientific program are endorsed as a series of scientific "puzzles" that are posed, debated, and ultimately solved by the pioneers of a given field of study. In the field of behavior therapy, these pioneers went through these same stages. Their attempts were to solve the puzzles of human suffering and to do so using the postulates of behaviorism and the principles of behavior derived from learning theory and histories of reinforcement. If the current paradigms are unable to solve the puzzles presented to it, there is a need for a new paradigm. This was the case with the emergence of behavioral approaches to therapy in the middle and later 20th century. Behavior therapy was able to present better solutions to the problems that abnormal behavior presented (Kanfer & Philips, 1970).

The behavioral research program (behavior analytic and learning-based (respondent conditioning) grew out of dissatisfaction with the approaches of the time. The focus on a science of behavior was steeply based in learning theory, with the significant influences of Skinner's experimental analysis of behavior. Joseph Wolpe's reciprocal inhibition for anxiety disorders was also a major contributing research program in the evolution of the behavior therapies (O'Donahue et al., 2001). This history does not revolve around a single event, but rather a series of developments and clinical innovations with evidence based of outcomes. The common theme was the translation of basic research findings, learning and conditioning, the science of behavior, and science of behavior and learning theory. A firm grasp of the learning foundations of behavior could lead to better outcomes in the application of the science.

Joseph Wolpe (1915–1997), a medical doctor by training, came to be known as the father of behavior therapy and a catalyst for the field of behavior therapy. His work was done predominantly in Johannesburg, South Africa in the 1940s and 1950s. He received his medical degree in the late 1940s. Wolpe, strongly influenced by Pavlov, impacted the work of Leo J. Reyna and Arnold A. Lazarus, both of whom were significant leaders in the first generation of behavior therapy. Wolpe melded the theories of Pavlov and Hull (1943) with the clinical work of Edmund Jacobson (1938), the father of relaxation training, into what he saw as a more functional evidence-based therapy. Wolpe's behavior therapy was a direct challenge to the ineffectiveness of psychoanalysis (Poppen, 1995) and with it systematic desensitization.

Systematic desensitization, based on respondent extinction, employs a gradual process of exposure to enable a person to come into contact with a feared stimulus that allows them to tolerate more intense levels in the future. Wolpe focused more on the conditioned stimulus (conditional stimulus [CS]) than on the US, and from his view it was the CS that distinguished neurotic from nonneurotic fears (Poppen, 1995). Wolpe's initial research dealt with the development of experimental neurosis in cats, done by the simultaneous pairing of a shock delivered to the cat when it approached food to eat (Wolpe, 1958). Some obvious outcomes to these procedures were that the cats avoided the cage in which they had received the shocks. They would also refuse to eat when forced into the cage in which the shocks had been delivered. The cats were shocked in the cage where the food was. When they were brought from the living quarters to the experimental chamber, conditioned emotional (fear) responses (CER) occurred, along with attempts to avoid the cage.

Wolpe noticed that the severity of the CER that the cats demonstrated was related to the similarity of the experimental and natural contexts. The relationship between the inhibition of eating and the occurrence of CER might also indicate that in a different situation, eating may inhibit fear. He described the process between the two responses as reciprocally inhibiting each other, or reciprocal inhibition and invoked a physiological explanation. In a systematic and deliberate process, he fed animals in the presence of the cage where they had experienced the aversive shock. He discovered that the strength of the CER tended to dissipate as the eating response had been established. Wolpe (1958) described the process in the following manner:

> . . . in every instance feeding was made possible in the presence of stimuli conditioned to anxiety responses which, under other circumstances, inhibited feeding. When stimuli to incompatible responses are present simultaneously, the occurrence of the response that is dominant in the circumstances involves the reciprocal inhibition of the other. As the number of feedings increased, the anxiety responses gradually became weaker, so that to stimuli to which there was initially a response of the anxiety pattern there was finally a feeding response with inhibition of anxiety. (p. 67)

The translation of this process and its use with humans was not far behind.

Through the course of his work with anxiety, Wolpe came across the writings of Edmund Jacobson, a physiologist working at the University of Chicago. Jacobson's (1938) book, *Progressive Relaxation: A Physiological and Clinical Investigation of Muscular States and Their Significance in Psychological and Medical Practice*, contained specific methods for reducing muscle tension. Jacobson asserted that the muscular tension observed in some individuals with disabilities could be addressed through the use of muscle relaxation training. Moreover, he documented its efficacy in phobic, general anxiety conditions, hypertension, colitis, and a host of other disorders. As proposed by Jacobson, relaxation training was so extensive and could take up to 200 training sessions in order to be proficient. Wolpe adapted the protocol so that it could be done in only a few sessions. Wolpe then employed relaxation as the inhibiting response as had been observed with eating food in his experiments with animals.

As a contemporary of Wolpe, Hans Eysenck's (1959) article, "Learning Theory and Behaviour Therapy" sharply criticized psychoanalysis and the disease model. The term *behavior therapy* also appeared for the first time in the literature (Eysenck, 1959). He also delineated the differences between Freudian psychotherapy and behavior therapy, which are still relevant to contemporary behavior science applications and other approaches to behavior change (see Table 1).

Eysenck strongly argued that the process of behavior therapy be grounded in learning theory, and further argued that all clinical psychologists have formal education in learning and conditioning (Eysenck, 1960). The burgeoning literature on the learning basis of behavior therapy at that time that was based on the experimental analysis of behavior using respondent conditioning preparations. For Eysenck, a scientific model based on learning and conditioning was the heart of behavior therapy. An evidence-based approach to the treatment of human suffering meant a great deal. The scientific foundation of a discipline should have research proving its efficacy and the maintenance of its treatment outcomes. The finding

Table 1
A Comparison of the Approaches That Encompass a Psychotherapy-Based Approach to Therapy and the Learning History Approach Inherent in Behavior Therapy

Freudian psychotherapy	Behavior therapy
1. Theory is inconsistent. Not presented in postulate form.	Consistent theory that allows its postulates to be tested.
2. Based on observations made without the proper controls in place for experimentation.	Derived from numerous experimental studies designed to test its basic theories and deductions.
3. Looks at symptoms as the manifestation of unconscious causes ("complexes").	Considers symptoms maladaptive conditioned responses.
4. Looks at symptoms as evidence of "repression."	Regards symptoms as the result of faulty learning.
5. Considers symptoms to be determined by defense mechanisms.	Symptoms need to be examined individually according to the persons learning history and accidental environmental circumstances.
6. Treatments of neurotic disorders must be historically based.	Treatments should be concerned with habits existing presently, historical development is not considered relevant.
7. Cures achieved through resolving underlying unconscious dynamics, instead of treating the symptom itself.	Cures achieved by treating the symptom itself and extinguishing conditioned maladaptive responses and establishing desirable conditioned alternative responses.
8. Considers symptoms to be determined by defense mechanisms.	Symptoms need to be examined individually according to the persons learning history and accidental environmental circumstances.
9. Interpretation of dreams seen as key elements in therapy.	Interpretation in this area is irrelevant and subjective.
10. Treatment of symptoms leads to the emergence of new symptoms (symptom substitution).	The treatment of symptoms is an integral part of therapy and leads to permanent recovery as long as autonomic as well as skeletal conditioned responses are extinguished.
11. Cures of neurotic disorders require a "transference relation" in order to be successful.	Personal relations are not necessary for cures, though they do have utility in certain circumstances.

that unwanted behavior was conditioned (learned) through contact with environmental events was a major contributing factor to the development of behavior therapy (Eysenck, 1959).

Summary and Conclusions

This article is meant to serve as a guide for training students and those new to the field of behavior analysis regarding the importance of the history of the field. As the science and application of behavior analysis continues to develop, it is vitally important that training programs for behavior analysis increase the imperative that we promulgate the scientific roots of our field. This is in contrast to the current practice of preparing large groups of students for clinical practice to the exclusion of training in the scientific and applied work that was critical in the maturation of behavior analysis. The first generation of behavior therapy focused on symptom/behavior reduction, with change in cognition being an indirect effect. Intervention was externally managed. Early ABA interventions, a part of the broader first wave umbrella, also followed the same model with few exceptions. The advent of the first wave of behavior therapy was followed by a second wave that focused primarily on covert events and has been dubbed the "cognitive revolution" (Greenwood, 1999). The strength and success of behavior analysis has been due to its reliance on the science of behavior and the efficacy of the interventions that are derived from such a science. Market driven approaches can lead to the production of ill equipped scientists and self-limiting outcomes. By placing greater emphasis on the scientific underpinnings of the field we may be able to stem this tide.

The practice-science divide, described so thoroughly by Critchfield (2011), underscores the importance of looking at the history of a given field in order to gain a better understanding of the progression of that field. He also underscores the importance of a dedication to the scientific underpinnings of a discipline in order to ensure its intellectual survival. His analysis points to the increases in issues around credentialing, employment opportunities, and systems of compensation that are competing with the scientific training of future behavior analysts. One of the most important questions that he poses is, "Are guild issues incompatible with science?" They do not always need to be, but they can dominate a field if they are allowed to so. We should celebrate the common conceptual framework and encourage "the foundation of intellectual discussions that stimulate innovation in both science and practice" (Critchfield, 2011, p. 305). Scientific advances in the field of behavior analysis, beyond ASD and developmental disabilities, are what we should be striving for. The first step is to increase education and training in the philosophy and science of behavior. The second article in this series will pick up with the advent of the second wave of behavior therapy.

References

Ayllon, T., & Michael, J. (1959). The psychiatric nurse as a behavioral engineer. *Journal of the Experimental Analysis of Behavior, 2,* 323–334. http://dx.doi.org/10.1901/jeab.1959.2-323

Biglan, A. (2015). *The nurture effect*. Oakland, CA: New Harbinger.

Coleman, S. R. (1988, May, 28). *What does the history of psychology have on sale today?* Paper presented at the 14th Annual Convention of the Association for Behavior Analysis, Philadelphia, PA.

Critchfield, T. S. (2011). Interesting times: Practice, science, and professional associations in behavior analysis. *The Behavior Analyst, 34,* 297–310. http://dx.doi.org/10.1007/BF03392259

Dixon, M. R., Reed, D. D., Smith, T., Belisle, J., & Jackson, R. E. (2015). Research rankings of behavior analytic graduate training programs. *Behavior Analysis in Practice, 8,* 7–15. http://dx.doi.org/10.1007/s40617-015-0057-0

Eysenck, H. J. (1959). Learning theory and behaviour therapy. *The British Journal of Psychiatry, 105,* 61–75. http://dx.doi.org/10.1192/bjp.105.438.61

Eysenck, H. J. (1960). *Behavior therapy and the neurosis; readings in modern methods of treatment of mental disorders derived from learning theory*. New York, NY: Pergamon Press.

Greenwood, J. D. (1999). Understanding the "cognitive revolution" in psychology. *Journal of the History of the Behavioral Sciences, 35,* 1–22. http://dx.doi.org/10.1002/(SICI)1520-6696(199924)35:1<1::AID-JHBS1>3.0.CO;2-4

Guercio, J. M., & Murray, W. J. (2014). Licensure for behavior analysts: The path to responsible and cooperative action. *Behavioral Interventions, 29,* 225–240.

Hackenberg, T. D. (1995). Jacques Loeb, B. F. Skinner, and the legacy of prediction and control. *The Behavior Analyst, 18,* 225–236. http://dx.doi.org/10.1007/BF03392710

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An*

experiential approach to behavior change. New York, NY: Guilford Press.

Hull, C. L. (1943). *Principles of behavior: An introduction to behavior therapy*. New York, NY: Appleton Century.

Isaacs, W., Thomas, J., & Goldiamond, I. (1960). Application of operant conditioning to reinstate verbal behavior in psychotics. *The Journal of Speech and Hearing Disorders, 25,* 8–12. http://dx.doi.org/10.1044/jshd.2501.08

Jacobson, E. (1938). *Progressive relaxation: A physiological and clinical investigation of muscular states and their significance in psychological and medical practice*. Chicago, IL: University of Chicago Press.

Jones, M. C. (1924). A laboratory study of fear: The case of Peter. *The Pedagogical Seminary and Journal of Genetic Psychology, 31,* 308–315. http://dx.doi.org/10.1080/08856559.1924.9944851

Kanfer, F. H., & Philips, J. S. (1970). *Learning foundations of behavior therapy*. New York, NY: Wiley and Sons.

Kazdin, A. E. (1978). *History of behavior modification: Experimental foundations of contemporary research*. Baltimore, MD: University Park Press.

Kraeplin, E. (1962). *One hundred years of psychiatry* (W. Baskin, Trans.). New York, NY: Citadel.

Kuhn, T. (1963). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.

Lindsley, O. R. (1956). Operant conditioning methods applied to research in chronic schizophrenia. *Psychiatric Research Reports, 5,* 118–139.

Mach, E. (1960). *The science of mechanics* (3rd ed.). T. J. McCormack (Trans.). LaSalle, IL: Open Court. (Original work published 1883)

Marr, M. J. (1985). 'Tis the gift to be simple: A retrospective appreciation of Mach's the science of mechanics. *Journal of the Experimental Analysis of Behavior, 44,* 129–138. http://dx.doi.org/10.1901/jeab.1985.44-129

Mowrer, O. H., & Mowrer, W. M. (1938). Enuresis: A method for its study and treatment. *American Journal of Orthopsychiatry, 8,* 436–459. http://dx.doi.org/10.1111/j.1939-0025.1938.tb06395.x

O'Donahue, W. T., Henderson, D. A., Hayes, S. C., Fisher, J. E., & Hayes, L. J. (Eds.). (2001). *A history of the behavioral therapies: Founder's personal histories*. Reno, NV: Context Press.

Pavlov, I. P. (1906). The scientific investigation of the psychical faculties or processes in the higher animals. *Science, 24,* 613–619. http://dx.doi.org/10.1126/science.24.620.613

Pavlov, I. P. (1932). The reply of a physiologist to psychologists. *Psychological Review, 39,* 91–127. http://dx.doi.org/10.1037/h0069929

Pinel, P. (1806). *A treatise on insanity*. London, England: W. Todd. http://dx.doi.org/10.1037/10550-000

Poppen, R. (1995). *Joseph Wolpe*. London, England: SAGE.

Sechenov, I. M. (1965). *Reflexes of the brain: An attempt to establish the physiological basis of psychological processes*. Cambridge, MA: MIT Press.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. Cambridge, MA: B. F. Skinner Foundation.

Skinner, B. F. (1954). *Science and human behavior*. London, England: Collier Macmillan Publishers.

Skinner, B. F. (1979). *The shaping of a behaviorist*. New York, NY: Knopf.

Skinner, B. F. (1987). *Upon further reflection*. Englewood Cliffs, NJ: Prentice -Hall.

Skinner, B. F., Solomon, H. C., & Lindsley, O. R. (1953, November 30). *Studies in behavior therapy. Status report*. Waltham, MA: Metropolitan State Hospital.

Szasz, T. S. (1974). *The myth of mental illness: Foundations of a theory of personal conduct*. New York, NY: Harper & Row. http://dx.doi.org/10.1016/B978-0-08-017738-0.50007-7

Thorndike, E. L. (1911). *Animal intelligence: Experimental studies*. New York, NY: Macmillan. http://dx.doi.org/10.5962/bhl.title.55072

Ullman, L. P., & Krassner, L. (1965). *Case studies in behavior modification*. New York, NY: Holt, Rinehart & Winston.

Watson, J. B. (1924). *Behaviorism*. Chicago, IL: The People's Institute.

Watson, J. B., & Rayner, R. (1920). Conditioned emotional reaction. *Journal of Experimental Psychology, 3,* 1–14. http://dx.doi.org/10.1037/h0069608

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition*. Palo Alto, CA: Stanford University Press.

Received November 30, 2015
Revision received January 3, 2018
Accepted January 4, 2018 ■