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Applied Behavior Analysis and Autism Spectrum Disorders: The Beginnings of a Successful Relationship

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Abstract

Hundreds of published research studies documented the effectiveness of applied behavior analysis (ABA) with children and adults with autism spectrum disorders (ASD) (DeMyer, Hingtgen, & Jackson, 1981; Helt, et.al., 2008; Green, 1996; Matson, Benavidez, Compton, Paclawskyj & Baglio, 1996; Roane, Fisher, Green, McClannahan, & Taylor, 2010; Schreibman, 2005). Although ABA and ASD is now a recognized 'couple,' few can recall the beginnings of this successful relationship. The purpose of this paper is to make a historical account of the events that established the foundations of ABA and ASD. I begin by presenting a brief history of autism. Then, I describe the foundations of behavior analysis and the beginnings of applied behavior analysis, especially the role of Charles B. Ferster and Mariam K. DeMyer at Indiana, and Sidney W. Bijou, Mont Wolf and others pioneers at the University of Washington. At the end I review the contributions of O. Ivar Lovaas to the treatment of autism.

Key words: autism spectrum disorders, applied behavior analysis, history of autism, history of behavior analysis

Autism: Brief History

Autism as a condition has probably been around since the beginnings of civilization. The word "autism," which has been in use for about 100 years, comes from the Greek word "autos," meaning "self." Paul Eugen Bleuler, a Swiss psychiatrist, was the first person to use the term to refer to one group of symptoms of schizophrenia, a term he coined to replace Kraepelin's *dementia praecox* concept. According to Bleuler, the main symptoms of schizophrenia were the loosening of associations, disturbances of affectivity, ambivalence, and autism (Fusar-Poli & Politi, 2008).

The first ever recorded case of 'autism' was made in 1801. That year, a Frenchman named Jean Marc Gaspard Itard wrote an account of a 12-year-old boy (his approximate age) who had been living alone in a forest until he was captured on Wednesday 8th, January 1800. Itard named the boy Victor, and by his descriptions he displayed the modern signs of autism. (Lane, 1976).

In the 1940s, Leo Kanner, a doctor from Johns Hopkins University, used the term “autistic” to describe the particular behaviors of 11 children (eight boys and three girls) he studied:

Since 1938, there have come to our attention a number of children whose condition differs so markedly and uniquely from anything reported so far, that each case merits-and, I hope, will eventually receive-a detailed consideration of its fascinating peculiarities (Kanner, 1943, p. 217)

Kanner concluded after the detailed description of the 11 children that:

These characteristics form a unique “syndrome” not heretofore reported, which seems to be rare enough, yet is probably more frequent than is indicated by the paucity of observed cases...The outstanding “pathognomonic” fundamental disorder is the children’s inability to relate themselves in the ordinary way to people and situations from the beginning of life...This is not, as in schizophrenic children or adults, a departure from an initially present relationship; it is not a “withdrawal” from formerly existing participation. There is from the start an *extreme autistic aloneness* that, whenever possible disregards, ignores, shuts out anything that comes to the child from the outside (Kanner, 1943, p. 242)

At the very time Kanner was studying the 11 children in Johns Hopkins, the Vienna-born Dr. Hans Asperger was studying several families with children who had similarity to the children Kanner was observing, except that they appeared not to have severe language delays (Asperger, 1944). Lorna Wing (1981) wrote an academic paper that popularized the research of Hans Asperger and introduced the term “Asperger syndrome” to refer to autistic people with high functioning skills.

Although Kanner gave vivid descriptions of the 11 children he observed, he did not operationalize his diagnostic criteria at this point. Years later Kanner and Eisenberg (1956/1958) discussed Kanner's original conception of autism and the five features they considered to be diagnostic. These were: (1) a profound lack of affective contact with other people, the inability to relate to people; (2) an anxiously obsessive desire for the preservation of sameness in the child's routines and environment; (3) a fascination/preoccupation for objects, which are handled with skill in fine motor movements; (4) mutism or a type of language that does not seem intended for inter-personal communication; (5) ‘good cognitive potentialities’. (as cited by Wing, 1993, p. 64 and Hutt, Hutt, Lee & Ounstead, 1965, p. 181).

For many years autism was synonymous of childhood-onset psychosis and that diagnoses and classification lead to erroneous interpretations of the conditioning such as Bettelheim’s “refrigerator mothers”, a theory that affirmed that children became autistic because of cold and emotionally distant mothers (Bettelheim, 1967). Bernard Rimland (1964) refuted that affirmation and stressed the plausibility of a biological basis for autism. In 1977, Folstein and Rutter published the first autism twin study, revealing evidence for a genetic basis for autism.

Wing and Gould (1979), in the Camberwell study, identified a group of children who were impaired in their capacity for reciprocal social interaction. These authors found that this kind of abnormality of social interaction was closely associated with impairment of communication and imagination, the latter resulting in a narrow, repetitive pattern of activities. They referred to this as the 'triad of social impairments' and have since been the 'backbone' of diagnostic criteria for autism.

In 1980, the third edition of the Diagnostic and Statistical Manual of Mental Disorders, known as DSM-III, use the term 'pervasive developmental disorder' for the general category of autism and related conditions separating autism from early onset schizophrenia. DSM III-R (1987) and DSM- IV (1994) further elaborated the PDD category.

Behavior Analysis: The Foundations

In 1913 John B. Watson published his landmark article *Psychology as the Behaviorist View it*, establishing behaviorism as a major school of thought:

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 (Watson, 1913, p. 158)

Burrhus Frederic Skinner expanded the field of behaviorism originally described by Watson. Skinner's research elaborated the basic principles of operant behavior. Starting in the 1930s, Skinner conducted numerous studies on the principle of reinforcement in laboratory animals such as rats and pigeons and published his data in *The Behavior of Organisms* (1938). Later in *Science and Human Behavior* (1953) Skinner investigated the role of reinforcement in diverse aspects of human behavior. Skinner's work (1938) served both as the empirical core and as the organizing framework for Fred S. Keller and Nat Schoenfeld *Principles of Psychology* (1950). Keller and Schoenfeld wrote the book to provide their students at Columbia University with a text in the experimental analysis of behavior course they initiated in 1946 (Dinsmoor, 1989).

In 1957 Charles B. Ferster and B. F. Skinner published *Schedule of Reinforcement* a critical element in the development of ABA as a means of controlling or altering behavior. In the same year Skinner published *Verbal Behavior*, a landmark analysis in the study of language (Skinner, 1957). In 1958 the Society for the Experimental Analysis of Behavior published the first number of the *Journal of the Experimental Analysis of Behavior*, a psychology journal primarily for the original publication of experiments relevant to the behavior of individual organisms. Murray Sidman, one of the distinguished behavior analysts that emerged from Columbia, wrote in 1960 *The Tactics of Scientific Research*, an influential account of individual organism research methodology. The new science of behavior analysis was taking form.

Applied Behavior Analysis: The Beginnings

The first published report of operant conditioning in a human being was done by Fuller (1949). The subject was an 18-year-old boy with profound mental retardation who was described in the language of the time as ‘vegetative idiot’. He was unable to roll over and would only lie on his back. Fuller filled a syringe with warm sugar-milk solution and injected it into the subject's mouth every time the young man moved his right arm, which he was capable of moving but would move it infrequently. Within four sessions the young man was moving his arm to a vertical position at a rate of 3 times per minute. Applications of operant techniques generally increased in the early 1960s. Ayllon and Michael (1959) reported the effects of operant interventions implemented by nurses in a psychiatric unit. Their report was the first to suggest the generality of operant methods across several patients and several behaviors within a hospital setting (Kazdin, 1978).

Charles B. Ferster and Marian K. DeMyer did the first experimental analysis of the behavior of children with autism. In 1961a they published “The Development of Performances in Autistic Children in an Automatically Controlled Environment,” which was followed by their 1962 replication and extension, “A Method for the Experimental Analysis of the Autistic Child.” Following his first behavioral research, Ferster (1961) provided an early conceptual analysis of autistic behavior by explaining it in operant terms. Ferster noted that problems of children with autism could be explained in part as a lack of responsiveness to delayed conditioned reinforcers, to behavioral deficits such as inadequate language repertoires, absence of certain forms of stimulus control, and to aversive social behaviors.

Charles B. Ferster and Marian K. DeMyer (1961b) published a one-page report in *the Journal of the Experimental Analysis of Behavior* titled, “Increased Performances of an Autistic Child with Prochlorperazine Administration.” It may be the first and only report of basic behavioral pharmacology research using both operant apparatus and measures and a within-individual replication design to analyze the behavior of a child with autism (Morris & Fouquette, 2009). Although Ferster conducted no more pharmacology research, he and DeMyer did additional work in autism, publishing articles and chapters on its analysis and treatment (DeMyer & Ferster, 1962; Ferster & DeMyer, 1961b; Ferster, 1966).

According to Kazdin (1978), and Morris, Fouquette, Smith and Altus (2008) the research and behavioral interpretation done by Ferster & De Myer provided a fresh basis for studying autistic behavior and was influential in Bijou’s decision of assigning a clinical case to Wolf and Risley years later.

Sidney W. Bijou and the University of Washington

In 1945, B. F. Skinner became the chairman of the psychology department at Indiana University. In 1946, Skinner asked Sidney W. Bijou to join the faculty and direct the newly formed clinical training program:

He took the job, and for the next 2 years played a key role in developing the clinical program. In his spare time, he audited classes taught by Skinner and J.R. Kantor and participated regularly in their respective lab meetings and discussion groups...These were formative times for Sid. He was impressed with Skinner's methodology and the orderly data that were flowing in from the animal laboratory and was eager to replicate the methods with young children under comparable conditions...The applied implications of Skinner's work in particular were not yet fully apparent to Sid; that would soon change, however, once he left Indiana for the University of Washington in 1948. (Ghezzi, 2010, p. 176)

Bijou assumed his role as associate professor of psychology and director of the Institute of Child Development at University of Washington (Giraldo, 2009). He organized a laboratory to study typically and atypically developing children and populated the department with the best faculty and graduate students available at the moment, all of them with a common interest in normal and deviant child behavior:

Sid was wildly successful in accomplishing his aims. He established a world-class (and well funded) program of basic and applied research in behavior analysis and a top-flight graduate training program and surrounded himself with a cast of faculty, graduate students, and psychologists in Seattle's community that reads like a who's who of pioneers in behavior analysis: Don Baer, Mont Wolf, Todd Risley, Betty Hart, Ivar Lovaas, Jay Birnbrauer, Hayden Mees, Bob Whaler, Rob Hawkins, Bud Wexler, Vance Hall, Jim Sherman, Eileen Allen, Howard Sloane, Barbara Etzel, Bob Orlando, Bill Hopkins, Bob Peterson, and Marion Ault, to name just a few. If applied behavior analysis has a birthplace, it would be in Seattle at the University of Washington's Institute of Child Development with Sid at the helm. (Ghezzi, 2010, pp. 176-177)

From Washington came the first demonstration of the application of operant principles and behavior methodology with a child with autism. Wolf, Risley, and Mees presented a report in the first issue of *Behavior Research and Therapy* in 1964 entitled, "Application of Operant Conditioning Procedures to the Behavior Problems of an Autistic Child." Dicky was a 3 year-old boy with autism who displayed temper tantrums and self-injury and who was at risk for blindness caused by failing to wear corrective lenses after a cataract operation. This article introduced the earliest applied behavior analysts, then called "behavior modifiers", to the reversal design, discrete trial, time-out procedure, and set the stage for what would come to be called "social validity." The final sentence of the Dicky article, which starts out as though it is a simple description of a follow-up, may be the best and most concise summary of the spirit and ethic of all good behavioral treatments (<http://www.baam.emich.edu/baammainpages/behavioralhistory.htm>):

According to a report from the mother six months after the child's return home, Dicky continues to wear his glasses, does not have tantrums, has no sleeping problems, is

becoming increasingly verbal, and is a new source of joy to the members of his family. (Wolf, Risley & Mees, 1964, p. 312)

At Washington, Bijou and his team authored seminal articles, books, and book chapters on intellectual and developmental disabilities, child development, behavioral assessment, and child behavior therapy (Allen, Hart, Buell, Harris, & Wolf, 1964; Bijou, 1955/57/58/61; Bijou & Baer, 1961/65/66; Birnbrauer, Bijou, Wolf, & Kidder, 1965; Birnbrauer, Wolf, Kidder, & Tague, 1965; Bijou & Sturges, 1959; Hart, Allen, Buell, Harris & Wolf, 1964).

In 1965 Bijou moved out of Washington for another university, the University of Illinois at Urbana-Champaign (Morris, 2008). In the same year Baer, Wolf and Risley went to the University of Kansas to start their own behavior analysis program and research labs in the newly formed Department of Human Development and Family Life (Poulson, 2002). In 1968 the three pioneers formally defined applied behavior analysis and set the standards for its practice (Baer, Wolf & Risley, 1968). (See Kazdin, 1978, and Morris, Todd, Midgley, Schneider, & Johnson, 1990, for a more detailed recount of the history of behavior analysis and his applications).

ABA & Autism: The UCLA Project

In 1958 Sidney Bijou offered a postdoctoral position to Ivar Lovaas at the Child Development Institute:

Sid Bijou placed me under increasing pressure to "do research" with the preschool children. Not knowing what to do, I set out to test whether one could demonstrate reinforcement control over the vocal utterances of preschool children, trying to replicate Greenspoon's experiments. I was not very enthusiastic about that project, but it seemed better than doing nothing. (Lovaas, 1993, p. 618)

After finishing his post-doc training with Bijou, Lovaas accepted a position as an assistant professor at the University of California-Los Angeles (UCLA) in 1961. The 60s was the era of Kennedy and Johnson, when the federal government was funneling huge amounts of money into programs designed to combat a host of social ills. As a result of President Kennedy's call for deinstitutionalization and increased community services, the Congress passed in 1963 the Mental Retardation Facilities and Community Health Centers Construction Act, authorizing federal grants for the construction of public and private nonprofit community mental health centers.

Lovaas obtained several grants and started studying several autistic children at UCLA Neuropsychiatric Institute and at the nearby Camarillo State Hospital. At the start Lovaas use aversive procedures (Lovaas, Schaeffer & Simmons, 1965; Lovaas & Simmons, 1969; Simmons & Lovaas, 1969) Over time, with the advances in research Lovaas eliminated the program's use of aversives. (Smith & Lovaas; 1997).

In the 1970s, Lovaas started at UCLA the Young Autism Project, which stressed early intervention. The subjects in the study were between the ages of two and four. The curriculum

emphasized language development, social interaction, and school integrations skills. After 2 to 3 years of treatment, 47% of the intensive-treatment experimental group (9 of the 19 children) versus 2% of the comparison group (1 of 40 children) were reported to have achieved “normal functioning” (Lovaas, 1987; McEachin, Smith & Lovaas, 1993). A replication done by the Wisconsin Early Autism Project was consistent with those reported by Lovaas and colleagues (Sallows & Graupner, 2005).

In June 1993, Catherine Maurice published *Let Me Hear Your Voice* an autobiographical case study of two of her children diagnosed with autism and the progress they made with Lovaas/ABA therapy (Perry, Cohen, & DeCarlo, 1995). The successful relationship between ABA & ASD was no longer a secret.

Summary and Conclusions

The stunning accomplishments of behavioral procedures in the field of autism started more than 50 years ago with Ferster and DeMyer, in Indiana University Medical Center, and Bijou, Wolf, Baer, Risley and several other investigators at the University of Washington. Lovaas continued the journey at UCLA. Maurice made it popular. Today, behavioral approaches in populations with ASD are well established (Cooper, Heron, & Heward, 2007; Mayer, Sulzer-Azaroff & Wallace, 2012; Miltenberger, 2008).

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