Behavioral Science:
*Tales of Inspiration, Discovery, and Service*
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Preface:
Up from the Ashes

As long as mankind has been gathering in groups, we have shared stories. It is easy to see why. We sought food when hungry, water when thirsty, relief when in pain, partners when in need of sex. Sharing stories helped us with all of these needs. It also did more. Stories conveyed our ancestors’ versions of our history. They inspired us to go beyond our comfort levels and explore new lands. They prompted us to make new discoveries about our world and its diverse people and their adventures. But it is one thing to be told of exotic places, and quite another to get there. Science emerged and flourished and added guidance to our quests.

A separate science with behavior as its subject matter emerged out of the early works of an eclectic group of scientists from other fields. Physiologists like Ivan Pavlov and Charles Sherrington began to describe processes that would lead others to begin to understand people in a new and exciting way.

During the first half of the twentieth century this movement gained greater traction due to the pioneering works of B. F. Skinner at Harvard and Fred S. Keller and William (Nat) Schoenfeld at Columbia University. Skinner and Keller were graduate students together at Harvard during the 1930s and remained close friends throughout their lives. Their students also formed friendships as the two departments became the focal points of a new discipline. The early reactions to this new science were often less than cordial. Some of that bitterness and skepticism remains, but these and other researchers persisted in building a foundation for an empirical science of behavior. Meanwhile, a growing number of clinical issues in medicine and psychology remained largely unsolved.
The Cambridge Center for Behavioral Studies

In the early 1980s our Center was formed in Cambridge, Massachusetts to advance the new science and seek applications that might reduce human suffering. We took on many projects and were joined by some brilliant academicians and practitioners. In 1989 a fire destroyed our building and most of our accumulated resources, but as often happens, it also brought new life and attracted new people to take up the cause. We now operate as a charitable nonprofit corporation thanks to the generosity of our donors and revenue from our professional conferences and activities.

We are fortunate to list among our trustees and advisors a number of first or second generation disciples of the original founders, including many recognized leaders in the field, some of whom served as presidents of the new science’s various scientific and professional organizations. By charter, we are limited to 75 trustees, but we also have access to a great many advisors and exceptional graduate students.

In looking over this distinguished list, a few questions occurred to us: How did these people come to adopt this discipline? Why did they abandon a conventional course in favor of this new and often controversial one? Most importantly, how did their behavioral solutions differ from others that addressed similar problems?

This book is the result of our decision to follow a fundamental dictate of the science: collect the data! We asked each of the contributors to prepare a response to the question: Why and how did you come to this field? We asked them to tell their first person accounts in a way that would give the reader not only a sense of who they are but also how they applied the science to their unique area. We selected contributors who represent different areas of our science to give the reader a peek into how it was applied to different challenges. We imposed no stylistic guidelines, believing that authors would reveal much about themselves by the manner in which they chose to comply with our request.

The resulting contributions are as varied as the individuals themselves. Nevertheless, some interesting generalities emerge. For example, some of our contributors have intellectual roots in philosophy. Many abandoned traditional psychology in favor of the more pragmatic approach of the new science of behavior. You will find stories from women and men who took on some incredible challenges. You will read about a man who spent his early years running from the Nazis and became an innovative behavioral scientist. You will hear from a woman who took on the male academic establishment and won. Several contributors were unwilling to accept the notion that kids with autism couldn’t communicate and learn to live outside of institutions. Today the behavioral strategies they developed are so well established that they are now endorsed by the surgeon general of the United States. One of our contributors was so appalled by how inadequately women were being trained in breast self-examination that he devoted the rest of his career to building a system and a company that helped solve the problem. Some writers took on the issues of behavioral safety and others brought our science to bear on issues faced by businesses and industries.

In fact, the science of behavior has now penetrated nearly every aspect of human endeavor. We hope that the courage and persistence of our pioneers will be apparent in their stories and will serve to inspire future generations.
Acknowledgements

It has been an inspiring and humbling experience to share stories with the authors of this book. We owe much to their openness, their insights, and their willingness to share their time to make this happen. It is very clear from reading their stories that they also owe a lot to those pioneers who took on the established forces in Psychology to continue to pave the way for a science of human behavior. Even the most casual reader will come to appreciate that these women and men took to heart the old adage: Do not walk in my footsteps but rather stand on my shoulders. These shoulders were indeed very broad.

As inspiring as that was, it would have remained isolated if not for the efforts of many people associated with the Cambridge Center for Behavioral Studies. Foremost among them, our friend, Bill Webber of Sloan Publishing, who donated all of his time and considerable talents to bringing this manuscript to print. We want to thank Rebekah Pavlik, who added her administrative support and artistic senses to add coherence to the events referenced in the book. Amanda Kelly was kind enough to donate the artwork you see in the preface and Sorah Stein assisted with last-minute copyediting. We offer a heartfelt thank you to our colleague, Dr. Leasha Barry, for her encouragement, support, and suggestions.

To you the reader, we offer our thanks and appreciation. Our center is a volunteer, non-profit agency and we rely on your support. By reading, sharing, and, with hope, purchasing this book you are supporting the advancement of behavioral science. You are also keeping alive the memories of those who helped in its application to problems of human suffering.

Finally, we want to thank our wives, Susanne and Heidi. When you have previously committed time and effort to get a manuscript to print, the people closest to you understand that their own sacrifices are coming. In this case, it started with conversations about the excitement we felt following the annual meetings of the trustees. We had stories to share and fortunately they were polite enough to show an interest. It just so happens they are also charming. This combination of factors led us to the belief, rightly or not, that others might also be interested. A little positive reinforcement early on followed by the inevitable leaning of that schedule, kept the project moving through its early phases. It cannot be easy or typical to share your time, children, grandchildren, and a bed with a partner who is genuinely turned on by science. We did indeed get lucky. The subtitle of this book may also bear relevance to those relationships. There is inspiration and discovery throughout. However, without joyful service to others, those two lack deeper meaning.

RDH
HSP
Taking Behavior Analysis to Work

Aubrey Daniels
Founder, Aubrey Daniels International and The Aubrey Daniels Institute
It was a Saturday in 1964. I was playing golf with three fellow graduate students. We were on the first green when we saw a golf cart streaming down the fairway toward us. When it arrived, the man in the cart asked, “Is there a Dr. Daniels in this foursome?” I remember looking to see if there was when I realized he was asking for me. He said, “They want you at the hospital Emergency Room.” It was my first psychological emergency. It made me very nervous. No one had told me how to handle psychological emergencies!

I was in the middle of my internship at J. Hillis Miller Health Center in Gainesville, Florida. I had completed all my coursework for my Ph.D. in clinical psychology and was in the last phase of my internship, which meant that I was beginning to see patients. When I arrived at the ER I saw my client, Mrs. A with both wrists bandaged, sitting in the treatment room crying. She had cut both wrists in an apparent attempted suicide. I had seen her earlier in the week in an intake interview and scheduled her for therapy the following week. She was my first patient.

I had, until this point, been trained in a very traditional psychology department. I had been exposed to all the traditional therapies, primarily in the classroom, and I could tell anyone what those therapies were and how they differed from one another. Most practicum courses I had taken focused on assessment. None that I recall were in individual therapy with a real person. What to do?

Mrs. A was in a very messy affair with a neighbor—her husband’s best friend—who lived across the street. Some days she was very happy and some days she saw no way out of her situation that would be pleasing or acceptable to her. This Saturday, things seemed hopeless and she thought there was, indeed, no way out of her dilemma, with the exception of suicide. I actually didn’t know what to do, but I did everything I could think of. I listened, reflected her feelings, empathized, and sympathized. After an hour or so when I began to repeat myself, I left the room and called my supervisor. When I explained the situation to him, he said that because I was going to see her in a couple of days that he thought she would be fine to go home. I pushed back, but he prevailed. On Sunday, I looked at the paper to see if she had gone home to finish the job. I must say that I had no idea what she might do. I wasn’t sure if she would kill herself, kill her husband, her lover, or her dog—none of which would be a satisfactory outcome for me or her.

On Tuesday I waited very nervously for her arrival. As my memory serves me, she was late, which heightened my anxiety considerably. All of a sudden she was standing in the office doorway with her arms outstretched saying, “Oh, Dr. Daniels, you will never know how much you have helped me.” I thought to myself, “Lady, you are absolutely right.” Because I had done everything I had ever studied, there was no way I could have determined which technique had helped, if any, and which had not. The thought hit me: “Daniels, you don’t know what you are doing! You are about to make your living doing something supposedly designed to help people and you have no way of determining whether what you are doing is effective.” To this day I don’t know what I did that helped her. I don’t really think I did anything. I didn’t realize it at the time but this experience with Mrs. A was to have a huge impact on my career.

Fortunately, earlier in an internship rotation with Child Mental Health Services, Dr. Bill Wolking and Dr. Vernon Van de Reit had introduced me to behavior modification. We worked on school projects, mostly with individual cases and usually in the classroom. I read all that I could find about the subject during this time. There were no behaviorists on the staff, but I considered myself a behaviorist although I had no formal training as a
behavior analyst. Dr. Nate Perry was on my doctoral committee and advised me that a behavioral dissertation would be risky. My dissertation was titled, “Verbal Behavior in Group Psychotherapy.” At least I got the word behavior into the title and while the results were not spectacular, it got me through.

My first job as a clinical psychologist was in 1965 at the Georgia Mental Health Institute in Atlanta, Georgia. The Georgia Mental Health Institute was created after a scandal involving the treatment of the mentally ill in the only mental health facility in Georgia, Central State Hospital. At one point Central State Hospital was the largest facility of its kind in the country with over 13,000 patients. It was severely overcrowded, understaffed, and underfunded. The hospital had many “back-wards” where treatment was practically non-existent. The new plan for the state was to build several regional hospitals throughout the state to bring patients closer to their families, and the Georgia Mental Health Institute was created, primarily, for the training of staff to fill them.

The Institute treatment program was under the supervision and direction of the Emory Department of Psychiatry, which had been recently certified by the Columbia University Psychoanalytic Institute. The treatment methods they were teaching the Emory staff and how I was to begin treating patients were about as far apart theoretically as possible.

In those days psychologists could do therapy only under the supervision of a psychiatrist. Although the Institute was a state-run facility, the Emory University Department of Psychiatry was in charge of all the clinical programs and treatment. One might say that it was not behaviorally friendly. To my good fortune, the state began to look at the small number of patients being treated at the Institute and put pressure on the administrators to treat more. This meant that the psychiatric residents and staff could not treat the increased number of patients and they had to turn to other mental health disciplines for help.

As one might expect, psychiatric residents were assigned the “good patients” and the rest of us were assigned chronic patients or those who were considered poor risks for psychoanalytic treatment. (Of course I thought they all were poor risks for psychoanalytic treatment.) I ended up with the phobics and some patients who had been in psychotherapy for many years. That suited me as any improvement they made under my treatment would be noteworthy.

Because I was only one of several therapists on Unit 1, I was unable to put all patients on a token economy as Azrin and Ayllon had done at Anna State. Therefore, each of my patients was on an individualized token plan. I had great cooperation from the nursing staff that managed the tasks of awarding tokens to the Unit’s patients assigned to me and saw significant improvement in all of them.

The first case remains the most prominent in my memory. She was a 52-year-old agoraphobic who had been receiving electroshock treatments for 26 years. She told me she saw her psychiatrist only once in 26 years. That was the day her husband first took her in for treatment. I have often wondered how many years the psychiatrist would have treated her before the thought occurred to him, “I don’t believe this is working.” In his defense, she did get better for varying periods of time. When she would begin to retreat to her bed, her husband would take her back for another round of shocks. Ultimately, her husband was the one who suggested that they needed to try something else. When the Institute opened, her psychiatrist agreed to transfer her.

The psychiatrist’s diagnosis mentioned something like “having a desire to return to the womb” and that her fear of the outdoors was related to some trauma in early life that caused
The Longest Journey

Tristram Smith
Professor of Pediatrics
University of Rochester Medical School
When we get together, we go down to Manhattan together. The longest journey begins with a single step.

—Matthew

Scarcely looking at me or the board, Matthew reeled off move after move until he captured my last checkers piece. Then he quizzed me on vocabulary words: hyrax, bashibazouk, mackle, veena, fulcible, opuscule. His face remained still and impassive; I couldn’t tell whether he was bored, amused, distracted, pitying, or annoyed. Before I could decide, he drifted away.

Observing my astonishment, an onlooker said, “Oh, that’s Matthew. He’s very interesting. He has autism.” The onlooker and Matthew were both members of the Fellowship Club, a gathering place for outpatients from a local psychiatric hospital. It was spring, 1982, and I had just begun volunteering at the club. I was a college junior majoring in psychology. As far as I knew, Matthew was the first person with autism I ever met.

Over the next few weeks, I enjoyed interacting with many other people at the club, but my matches with Matthew became a regular part of my visits. He always sought me out to challenge me to a checkers game. Intrigued by him, I always accepted, even though the outcome was swift and inevitable. I couldn’t engage him in conversation, so he remained an enigma to me. But after a few months, the club directors noticed that he and I were getting along, and they asked me to become his buddy and spend a couple of hours with him in the community every other week. I was elated. Seeking to make the most of this chance, I persuaded the psychology department to let me write a literature review of autism and case study featuring Matthew for my senior thesis.

When I arrived for our first outing, Matthew was waiting at a street corner near his residence. Seeing me, he leaned forward on one foot as if at the starting line for a race. He said, “When we get together, we go down to Manhattan together. The longest journey begins with a single step.” Then he made a clicking sound and rose to his full height. We walked two blocks in silence to the Yankee Doodle diner for breakfast. Even sitting alone with Matthew in a booth, I wasn’t sure how to strike up a conversation. He seemed content to order, briefly check up on my vocabulary, and stare out the window. After several outings, though, he disclosed that he was 35 years old and lived by himself in a board-and-care facility. He had graduated from high school but hadn’t gone to college. He had held a series of jobs, most recently doing laundry, but hadn’t kept any of them for long and was currently unemployed.

Matthew also told me about his relationships. He had intermittent contact with his mother but not with other relatives. He apparently didn’t have friends or romantic attachments. However, he did go to the Fellowship Club regularly, and he also joined many student clubs at a local college, appearing in many photographs in my yearbook. Although he couldn’t (or wouldn’t) tell me how he became a checkers virtuoso, he did say that he liked dictionaries and often hunted through them in search of new words.

Our outings soon fell into a familiar routine that began with the never-explained remarks about Manhattan, continued with a trip to the Yankee Doodle, and ended with a walk back and closing remarks about Manhattan. Occasionally, however, he cancelled, and the directors of the Fellowship Club informed me that he was having a “difficult time” and...
had “lost his temper.” With me, however, he invariably wore the inscrutable facial expression that had puzzled me at our initial meeting.

Awed by Matthew’s skills and touched by his struggles with everyday life, I delved into the literature on autism hoping to understand him more and to become a better buddy. I found out that some individuals with autism, like Matthew, had superior cognitive and language skills, but others were severely delayed and never learned to speak communicatively. I saw that investigators had recently ruled out parental abuse or neglect as a possible cause of autism and deduced that the disorder must be biological in origin. However, they had not identified the precise etiology or etiologies and had made little progress in developing effective treatments. Applied behavior analytic (ABA) interventions, pioneered by investigators such as Ivar Lovaas, aimed to change behavior by using techniques developed from laboratory studies on learning. These interventions could be handy for teaching specific skills or deterring disruptive acts, but seldom improved long-term outcomes. Although none of this information was especially helpful in my interactions with Matthew, it added to my fascination with autism.

Because all my readings described autism as quite rare, affecting about one in every 2,500 people, I had doubts about working with this population as a career. Nevertheless, my experience with Matthew and my curiosity about autism featured prominently in the essays I wrote when applying to doctoral programs in clinical psychology. As luck would have it, Lovaas was looking for a graduate student to come to UCLA that year. He called to say, “We’re doing some interesting things here.”

THE UCLA YOUNG AUTISM PROJECT

“RESEARCH!” pealed down the hall, in tenor tones and a lilting Nordic accent. Lovaas rounded the corner with a swashbuckling stride, wearing a huge smile, tiny yellow shorts, and a shirt with the top two buttons open to reveal a gold chain. He looked and sounded like a Viking who had just raided Los Angeles.

Actually, Lovaas moved from Norway to the United States in 1950 on a violin scholarship. He attended Luther College in northern Iowa, completed his doctoral and postdoctoral training at the University of Washington, and assumed a faculty position in the Department of Psychology at UCLA in 1961. Besides being a musician, he was a skilled draftsman, devotee of Romantic poetry, and keen reader of the New York Review of Books. His initial interest in psychology arose from a desire to understand the evil he had witnessed in Nazi-occupied Norway. His decision to dedicate his career to autism grew out of the hope that he could discover how to impart the gift of language to children who had not learned to speak on their own.

Although Lovaas was exceptionally artistic and compassionate, his research strategy did bear some resemblance to a Viking campaign. He pressed his students to study only the most potent interventions they could find, using the most stringent experimental controls and exacting measures they could devise. He extolled ABA as the finest technology available for achieving this aim. He urged students to steer clear of fashionable research topics, rarefied theories, and timid ideas. Lovaas demanded that they sally forth and collect data to bring back to weekly research meetings, and he responded with contempt when told it
Inside and Outside Behavior Analysis

Karen Pryor

Behavioral Biologist
Author
I first came across behavior analysis in the spring of 1963, over a tankful of dolphins in Hawaii. I was a young mother with three small children, living in Hawaii with my husband, Tap Pryor. After a tour of duty in the Marine Corps in Hawaii, Tap had gone to work planning and raising money for a new concept: a public marine park, with a living coral reef exhibit and science-based dolphin shows, combined with a marine science research institute. Aside from cheering Tap on I had little to do with the project. I was raising three little children and doing some graduate work in marine zoology at the University of Hawaii. I had spent the past three years researching and writing a book for mothers, *Nursing Your Baby*, which had just been published by Harper & Row. I had a keen interest in ethology, the study of innate behavior in animals, sparked in my undergraduate years at Cornell by the work of Konrad Lorenz. However, I had never heard of B. F. Skinner nor had I heard of behavior analysis, a totally different field of study in animal (and human) behavior.

Tap’s creations, Sea Life Park and the adjoining Oceanic Institute, were scheduled to open in October, 1963. Dolphin shows were a necessity. However, other than a few circus trainers who worked with sea lions, there were no marine mammal trainers in those days. People held out fish and lured dolphins into jumping into the air; that was more or less the extent of the training. However, our scientific advisor, Kenneth S. Norris, Ph.D., a biologist from California, had a psychologist research assistant, Ron Turner, who was using a new way to train a dolphin for Ken’s sonar studies. Norris told Tap that with this new system, called operant conditioning, any intelligent person could train a dolphin.

Turner was hired to create a training manual for Sea Life Park. Our training tanks held ten healthy, wild-caught dolphins. Tap hired three intelligent people and gave them Turner’s 20-page manuscript and an ample supply of frozen fish. And, as Tap put it, the dolphins then trained the trainers to give them fish for nothing. Now it was July, we had three months until opening day, and no shows. Tap called Ken Norris in California and said we needed to hire a trainer—maybe one of those sea lion trainers. Now. And preferably cheap.

Ken said, “Why don’t you ask your wife?”

Why me? Under advice from a couple of dog trainers and a horse-owning friend I had trained one dog, a Weimaraner, and competed successfully in obedience trials. I had also trained a Welsh pony colt to drive in harness, using traditional methods. I was intelligent, I was conveniently located, and being the boss’s wife I presumably would work for next to nothing. And I of course said no. My children, then 3, 6, and 7, needed me. I had enough to do already, and I thought working for my husband might be a bad idea (I was right about that, as it turned out.)

“Just read the manual,” Tap suggested. So I did.

The manuscript was densely written, using complicated language and a strange new vocabulary. It was liberally (and unnecessarily) laced with mathematics. No wonder the people we’d hired couldn’t get much out of it. The manual also recommended procedures that were, no doubt standard, in laboratories but biologically inappropriate for our animals, such as four-hour-long training sessions (arrgh, exhausting for the animal, and I would hate it, too) and severe food deprivation (our fragile dolphins were picky eaters as it was, and food deprivation was out of the question). But I read it through, comparing it to my traditional training experiences as I went; and I saw how this new system worked. Turner’s typescript explained some very crucial discoveries. Fish as a reinforcer was key of course; but the most important new idea was the event marker, an audible conditioned reinforcer used to identify behavior as it was happening, followed by—not preceded by—the payment of fish. Next most important was shaping, using the event marker to develop behavior
incrementally without physical restraints or coercion. That would be very nice for an animal that, if miffed, just swims away. And the third really important concept was a system for establishing a discriminative stimulus, or cue, to inform the animal about what behavior you wanted next.

I was hooked, not by the dolphins, but by this exciting new science-based system. The dolphins would make perfect practice animals, not because of their purported intelligence, but because they were large and needed a lot of fish. I had room to make plenty of training mistakes before they filled up. I just had to try it.

I took the job.

The day I went into the training area I discovered we had not one but three species of dolphins, all differing in looks, lifestyles, and opinions (in my ensuing ten-year tenure as head trainer we would have nine different species in our tanks, and yet others came after I left). I provided the initial training and shared the training system with the other three trainers. Soon, they could do it too.

Of course just teaching the dolphins and the trainers was not the whole job; someone had to decide what the animals were going to do in the two show arenas that were being constructed. In college I had acted in a lot of plays and also written for the theater. So I walked around with a notebook, stared at the construction sites, and designed two different dolphin shows. One was outdoors, historical, poetic, full of Hawaiian music, with trained native sea birds flying around overhead. The other was under a roof in a glass-sided tank with narration and up-to-the-minute scientific demonstrations. We opened on time with the dolphins happily doing four or five shows a day in each arena. Good shows. They’re still running.

I have written extensively elsewhere about the next few years: the training, the dolphins, the difficulties; the visitors, including my first scientific hero, Konrad Lorenz, plus Ken Norris, Gregory Bateson, Navy scientist Bill McLean (who funded my first serious research study), and Fred Skinner himself (Pryor, 1973.)

There were three other oceanariums on the mainland, and soon more. Technology rapidly spread within the marine mammal training community, through the work of Skinner’s protégés Keller and Marian Breland and others who advised the United States Navy’s dolphin research program; their employee Kent Burgess, who worked for the new organization Sea World, and other psychologists. United States Navy trainers initiated a professional organization, the International Marine Animal Trainers Association, which allowed interested parties to exchange information about what we were doing, such as training marine mammals to work at liberty in the open ocean. But somehow all this excitement and burgeoning training technology, so visibly displayed in dolphin shows, didn’t spread to the general public. Why would you need it, if you didn’t have a dolphin? For the next thirty years, like Greek and Roman literature kept alive for centuries by Irish monks, our particularly powerful applications of Skinner’s discoveries stayed solely in the marine mammal training community. No one else seemed to care.

BEHAVIOR ANALYSTS: FIRST ENCOUNTERS

In 1965, Swedish ethologist and Sea Life Park trainer Ingrid Kang and I developed a demonstration for the public of the steps in training a new behavior. The animal we trained for this work, a rough-toothed dolphin (Steno bredanensis) named Malia, turned out to be a
Reinforcement in the Key of C

H. S. (Hank) Pennypacker

Professor Emeritus, University of Florida
Founder and Director, MammaCare
“Beware! He is the reincarnation of Mephistopheles!” With that caveat, Gregory Kimble, my doctoral mentor at Duke University, introduced to me Ogden Lindsley in early September, 1961. None of us could have known that my life’s trajectory would take an abrupt turn as a result of that simple courtesy. It is customary for prominent mentors to bestow on their fledgling students the opportunity to actually meet other renowned figures.

The occasion was breakfast at a meeting of the Psychonomic Society being held at Columbia University. In those days, the Psychonomic Society met at a nearby university a few days before the start of the annual APA meeting. The Psychonomic Society was a newly-formed breakaway organization of traditional experimental psychologists whose interests were thought to be underrepresented by APA.

With his flaming red hair, raucous laugh, and generally hyperactive manner, Ogden impressed me as probably one of psychology’s true characters from whom much would be expected. I was there, however, to deliver my first paper at an APA meeting and was totally consumed by the anxiety usually felt by students in such circumstances. I was amused by Ogden in this first encounter, but I had more important things to worry about.

The paper delivery was uneventful. The topic was GSR conditioning and there were perhaps 15 people in the little room where our paper session was scheduled. I fielded a question or two and sat down, wondering why I had been so distraught.

Later during the APA Convention, my wife Susanne and I found ourselves at a party in a penthouse in midtown Manhattan. This was the residence of an Iowa Ph.D. under Kenneth Spence who had forsworn the academic life for a career on Madison Avenue. The surroundings attested to the possibility of a better lifestyle than I had observed in my limited exposure to the academic life.

As is typical of such gatherings at conventions, the din at 3:00 a.m. was intense. Nonetheless, I picked up a familiar but thoroughly incongruous sound coming from a distant back bedroom. Someone was strumming a guitar and singing old country songs. I left Susanne and sought out the source of this Scylla-like music. I opened a door and there on the floor sat Ogden, playing and singing songs that I knew from my earlier life in Montana. Our eyes met, we nodded, and I sat down beside him and began to sing a little harmony. The Everly brothers we were not, but the bond was instantaneous!

Montana: The Prewar Years

I was born in Missoula, Montana in late May of 1937. I was raised on a homestead in the Swan Valley. The Swan Valley sits between the Swan and Mission Ranges of mountains, approximately 80 miles north northeast of Missoula. Our nearest neighbor was more than a mile away and I had no siblings until I was seven. My only peer was Ronnie, the son of a family that operated a truck farm outside Missoula and spent summers in a cabin about a mile and a half from us. I was taught to swim in Holland Lake by his mother.

In 1943, my father decided to enlist in the Army and we moved to Missoula so I could start elementary school. I was so terrified on the first day that I ran screaming to the second grade and hid under Ronnie’s desk. I adjusted slowly. We then moved to California so we could be near my father as he went through basic training. In 1944, we came back to Missoula so my sister could be born in an environment familiar to my mother. Then it was off to Buffalo, New York to stay with my paternal grandparents. I remember doing well
in school there; I was even selected for a try out for the Whiz Kids, a radio show featuring bright youngsters, but my grandparents nixed that idea.

Montana: The Postwar Years

Our final stop was New York City where we celebrated both VE Day and VJ Day. I was enrolled in third grade in PS 33. We returned to the Swan Valley in November of 1945 and I entered the Smith Flats School. This was a typical one-room school with two outhouses and a well for drinking water. There was one teacher for all eight grades and approximately 25 pupils. I was immediately advanced to the fourth grade and remained in that school until another school closer to home was built to meet the needs of sawmill workers’ children. Again, this was a one-room school with two outhouses, one teacher and five pupils. The year I graduated. I was told that I had placed second on a state-wide achievement test for graduating eighth graders. The same teacher I had at Smith Flats came to the new school, so I had her from grades four through eight. Talk about individualized instruction!

It was during these years that my interest in music emerged. My father had been an accomplished jazz banjoist who, along with his Princeton roommate Jose Ferrer, played in a jazz combo that provided entertainment on cruise ships and transatlantic crossings.  

This talent was marshaled to the musical needs of the Swan Valley community and the frequent dances that were held in the Community Hall. Piano, guitar, fiddle, and banjo were the basic instruments; sometimes more than one of these was on hand. When I was eight, my father bought me an ukele and taught me the basic chords. Soon, I was sitting in with the locals, but only on tunes that had no more than four chords. At age ten, I graduated to a Sears Harmony guitar and was allowed to play anything with the men. This meant I had to fake the more complex chord patterns, but I soon learned most of them. Our only outside source of entertainment was the radio and I listened to the Grand Ole Opry every Saturday night, learning the songs that they played. My father, with his good ear and training, played along and helped me do the same. This input was supplemented by periodic trips to Missoula for supplies. On the way home, we would stop at Seeley Lake and I would go into the bar and listen to the live musicians singing and playing the country music of the era. Clearly, I had the repertoire necessary to supplement Og’s offerings that night in New York City.

In 1950, we moved to Missoula where my father continued his involvement with a lumber company that he and a friend had started in the Swan Valley. During that first summer, I worked in the truck farm mentioned above for the princely sum of $1.25 per nine hour day, six days per week. With the proceeds of this employment, I upgraded my guitar to a 1949 Gibson L7C.

The Seattle Years

In September, the Gibson and I were dispatched to boarding school in Seattle. This was a major cultural shift—from a one-room country school in the mountains of Montana to an elite boarding school from which, many years later, Bill Gates would emerge. I remember vividly my first day. My roommate was not in the suite when I entered, but he had already

1How he met my mother and they wound up in Montana is another story.
Picture This

Andy Bondy

Co-Founder and President
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The path involving the development and dissemination regarding the Picture Exchange Communication System (PECS) and the Pyramid Approach to Education has been a long and curious one. I first started working with children with autism and related disabilities back in the summer of 1969 in a camp in New York State. I grew up in New York City but my father, from a small woody town in what was then Czechoslovakia, liked to assure that we got out of the big city for our summers. That led to going to camps, and then working as a counselor. After working with a particularly difficult teenager, I looked for a camp for “special kids” and found one in 1969. The influential young man—labeled “emotionally disturbed”—always wore two belts. When I asked him why he replied that when he got into a big fight he could use one belt to swing while the other belt held up his pants! Seemed rather clever to me. Although I went to college as a physics major, my summer experience led to focusing on working with young children with autism during my senior year at Stony Brook on Long Island, NY. My mentor, Robin Winkler, was not a specialist in autism but he was an ardent behavior analyst and guided my clinical work as well as a lengthy literature review. I also was fortunate to have teachers such as Howard Rachlin and Grover Whitehurst to help guide my initial verbal behavior.

I then went to the University of North Carolina at Greensboro because they were starting a doctoral program in behavior modification and our class was to be the guinea group to help achieve APA credentialing. Because the program was not yet clinically approved, we had to do everything to meet those guidelines plus do everything to get a doctorate in experimental behavior analysis—just in case we didn’t achieve the APA approval. In fact we did, but it was quite an interesting experience. There were days when I would work in a clinic, run back to the lab on campus, change a pigeon and zoom off to get back to the clinic for the next family.

My work with pigeons followed course work with Drs. Aaron Brownstein and Rick Shull. Both were enormously helpful in teaching me about the basic principles of learning. I give them credit for teaching me “how to think”—though that might seem non-behavioral. Dr. Brownstein was the more intimidating of the two because as long as you would say something not-quite-right or absolutely stupid (and I certainly did that many times) he would just look at the floor intensely or ask another question. I learned that some of his questions were actually the third or fourth question of a series, and you had to figure out the first few and their answers to have a chance to answer his actual question. But when he looked up because you were on the right track, that gentle smile was a powerful reinforcer! Dr. B (as we called him) also helped me with programming the equipment to run the experiments, and I was always grateful for that help. Dr. Shull helped me with the difficult recognition that the key in the Skinner box was not itself the discriminative stimulus for pecking—it was merely a “manipulandum” that allows us to define the response we are interested in. Rather, a particular light might serve as a discriminative stimulus. The work I did with pigeons related to observing how providing “free” reinforcers in one condition might influence another condition. For example, providing many food rewards without any response requirement on one of two keys would tend to decrease the number of obtained pecks on the other key. In loose terms, if you give me lots of money for doing nothing, I’m likely to not work as hard at my piece-rate job!

The work I did with children while in Greensboro began with learning how to conduct various standardized assessment tests as well as learn how to talk with parents and professionals about the results and meaning of those tests. At times, this task was extremely
taxing—I was often the first professional to test a parent’s child and realize that the child
had a significant developmental delay. Trying to share this with parents and guide them
with regard to the next choices they needed to face was often daunting. Most of my work
involved children with mild and severe difficulties. In one practicum placement I worked
with a teacher who provided special education services for all of the elementary school
children (from kindergarten to grade six) in a small trailer outside of the main school
building. Although the teacher was not a great educator, she certainly taught me the value
of selecting functional goals. For example, many of children came from extremely poor
families. She made sure each child had underwear (often buying it herself) and then the
first activity each day was to wash and dry that single item.

In this setting I also learned the risk associated with making assumptions rather than
testing things directly. I was working with one young girl who had several older siblings
who had been part of this special class. She was very shy but everyone assumed she was
“slow” like her siblings. As I worked with her, I began to see that she actually had very
good reading and math skills. So I began to push her academically so that she would
achieve a grade-average score on standardized tests. Late I in the spring, as I began to more
carefully plan for her to join the regular fifth grade class, I asked to visit the classroom to
more directly observe what was to be expected of her. I watched the fifth grade teacher
begin a history lesson—and then watched her read the book to the class because she did
not expect that most of them could read it themselves—a skill my student already had
mastered! So, although I helped her into the class for the following fall, I realized that by
assuming her peers all had typical fifth-grade skills, I had not pushed her to participate in
that class during the current school year.

In addition to learning about working with children, I also learned a great deal about
working with teachers and administrators. When I introduced myself to the principal, he
looked at me and said, “You know, young man—good teachers are born that way.” I think
I simply stared not knowing what to say—I knew I had no tricks to change the genetic
makeup of the staff, but I was confident I could help them become better teachers. A few
weeks later, when I visited his office, I noticed a large refrigerator-delivery box in his
office. I knew that some people had used such large boxes as a type of portable time-out
area so I looked with wonder at it. He said, “This is my new time-out box!” I asked him
how he used it and he told me something along this line: “Just last week Billy was sent to
my office for acting out in class. I told him to sit in the box until he thought he was ready
to behave himself. He sat in that box for almost five days! During that time, different
parents and staff would come in and out of my office but he just sat there. I’d talk to him
at other times about my job and how important it was to learn at school. Periodically I’d
say “Are you ready to go back to class?” and he’d say “No sir.” Of course we let him to
go to lunch, gym and outside time each day. But it took almost the entire week for him to
think he could behave himself in class!” Once again, I sat rather speechless as it was clear
the principal thought this was a great success! How could I tell him that five minutes was
the evidence-based time—not 5 days? How could I tell him that sitting in the office was
far more reinforcing that sitting in his classroom? Now that I’m wiser I’d love another
shot at this!

In the clinical area, my main teachers were Marilyn Erickson (my mentor), Rosemary
Nelson, and Scott Lawrence. I also had the opportunity to learn from other excellent teach-
ers including Eve Segal, Kendon Smith, and Sunnan Kubose (who over 30 years later
Driven to Make a Difference:

*From Chance Encounters to Focused Dream Chasing*

E. Scott Geller

Alumni Distinguished Professor
Department of Psychology
Virginia Tech

Director:
Center for Applied Behavior Systems

Senior Partner:
Safety Performance Solutions
My teaching of practical ways to apply behavioral science for solving real-world problems has progressed significantly over the years. This brief autobiography traces my journey and evolution. Along the way, I have learned continuously from research and have had the good fortune to learn from a number of inspirational servant leaders.

The influence of my parents is the best starting point. Throughout my childhood in Allentown, Pennsylvania I was asked, “What do you want to be when you grow up?” My naïve response was always the same, “I’m not sure yet, but I want to make a difference.” With my dad a medical doctor (a general practitioner) and my mom a registered nurse, my boyhood dream was to make a difference someday as a medical doctor. In the ninth grade, I entered and won the Lehigh Valley Science fair, solidifying an expectation for a future career in medicine. I was set on following in the footsteps of my dad—my hero.

The photo below depicts my dad and me in front of my science-fair project. It appeared on the front page of the Morning Call (the Allentown newspaper), making public my commitment to pursue a career as a physician. That display of my science-fair project included me holding a bull’s heart with key parts marked with arrows, a life-size drawing of the human circulatory system with red and blue yarn depicting arteries and veins, and at the top was my original oil painting of the human heart. (I had attended the Baum Art School most every Saturday from age 10 to 14).

As a teenager, I was quite shy and naïve. My parents correctly perceived I needed to attend a small liberal arts college where individual attention from professors is the norm. My mother, born and raised in western Pennsylvania, knew just the right college for me—The College of Wooster in Wooster, Ohio. At the time (1960) Wooster was ranked fourth in the nation among small liberal arts colleges, behind Oberlin, Denison, and Swarthmore.

I’m convinced my parents wanted me to find a vocational interest other than medicine—though I didn’t realize it at the time. They spoke often about the eventuality of “socialized medicine” and the loss of choice, compassion, and one-to-one caring between health-care workers and their patients. “It’s becoming more about business than service,” I’d hear them say, “and it’s bound to get worse.” More than once my mother suggested, “Why not consider becoming a minister?” I never did consider that profession but Wooster is a Presbyterian-affiliated college.

I took the recommended pre-med courses at Wooster, and majored in psychology. I was convinced the physicians who make the most beneficial differences in their patient’s lives understand the human dynamics of the particular health-care situation.

As a psychology major, research involvement is not an option at Wooster. Juniors and seniors are required to complete an Independent Study (IS) project that includes writing and defending a research proposal to a
three-faculty-member committee, conducting the proposed research with mentoring from a primary advisor, analyzing and interpreting the empirical results, preparing a professional research report for your IS committee, and finally defending your research and scholarship in an oral exam before your committee. Many readers will recognize this as the basic process for fulfilling the thesis and dissertation requirements in graduate school.

Throughout my senior year at Wooster, I struggled with a critical approach-approach conflict: medical school or graduate school in psychology. My decision to enter the Ph.D. program in experimental psychology at Southern Illinois University (SIU) in Carbondale, Illinois was not based on a commitment to pursue a particular career. A graduate research assistantship would remove the financial burden my parents had already endured to cover my costly undergraduate education. Moreover, my IS experience at Wooster enabled me to feel more prepared for graduate school than medical school. Yet, I held on to the possibility of entering medical school if graduate school did not work for me.

SAVED BY A DRUM

In May 2011, I received a very special and memorable award: an Honorary Doctorate of Humane Letters from my alma mater—the College of Wooster. My acceptance speech for this distinguished honor was the commencement address for a class of about 500 and an audience of about 3,000, with a few faculty having been my teachers at Wooster. I used a snare drum to illustrate key principles of self-motivation which were key to my educational and career achievements.

On seeing a drum on the stage, the President of the College of Wooster, Dr. Grant H. Cornwell, remarked, “The drum is just a prop, right? You aren’t planning to play it here, are you?” Coyly, I replied “What a great idea!” As shown in Figure 2, I did play that snare drum.

Unlike most commencement addresses, I stepped out from behind the lectern and to the front of the stage. Without a written script, I shared with the audience how my early experiences with a snare drum illustrate the basics of self-motivation. Readers will note distinct deviations from these notions and applied behavioral science (ABS). This chapter illustrates an evolution of my conceptions and perspectives regarding human dynamics and how to change them.

I began my commencement address with three autobiographical facts: I repeated second grade; my sixth-grade teacher told me I didn’t have “what it takes” to pursue a college education; and my SAT scores were well below average. Fortunately, the College of Wooster paid more attention to applicants’ grade-point averages and extra-curricular activities than a score on a single, timed exam that assessed more reflexive than reflective thinking. I revealed I was a shy but studious college student, and a “late bloomer.”

Then, I walked to my snare drum and demonstrated research-based lessons about self-motivation, reflecting on early drum lessons and related life exposures. More than 60 years ago, at age 10, my parents, asked me if I’d like to take drum lessons. I remember my emphatic “yes” response and my immediate vision of playing a drum set like those used by Gene Krupa, Buddy Rich, and Cozy Cole—well-known and extremely talented drummers at the time.

Present at the Creation of Applied Behavior Analysis

or How a Summer Job Changed My Life

Teodoro Ayllon, Ph.D.

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Timing is everything or nearly everything. In my own case (in 1958), I was just looking for a summer job as an MA psychologist so that I could afford to go back to school and finish my doctoral program at the University of Houston. Next thing you know, I was working at a mental hospital, observing patients in various wards and situations. It did not take long to notice the repetitive nature of the patients’ daily behavior, a fact that was not at all surprising to the hospital staff. What was both intriguing and contrary to the teachings of basic drives or needs was the discovery that there were patients who persisted in their refusal to eat.

THE CASE OF “SPOON-FEED ME, OR I WON’T EAT!”

Mary (age 42) refused to eat. Mary had had a feeding problem since her admission to the hospital seven months before. When asked why she did not eat she complained that the food was poisoned; other times she said she was diabetic and could not eat the food that was given to her. The staff spent a good deal of time trying to reason with her and coax her to eat but she remained adamant to any pleas. She refused to eat. As the staff failed to convince her that the food was not poisoned and that neither was she diabetic, the staff found a practical solution to insure that Mary was properly nourished: they spoon-fed her every meal. This daily routine was successful in that it assured that the staff was in compliance with the hospital standards of patient care. The problem was that after a few months of being spoon-fed, she intermittently refused to open her mouth to be fed or to feed herself. In other words, it was difficult to know when she would resume eating on a reliable basis.

In the past, the nursing staff had used tube-feeding but with no appreciable success.

Mary was a withdrawn, shy, person who kept to herself, and rarely participated in ward activities; nor did she seem concerned with leaving the hospital even for a visit. In the words of the chief nurse, “She doesn’t care about anything except keeping her clothes nice and clean,” so I decided to check that out. Indeed, Mary was rather fastidious about her clothes, she washed her clothes, ironed them neatly, and kept them in order in her bureau. It was this background that led me to design a treatment intervention that might motivate Mary to feed herself.

What Was the Treatment?

Because she already allowed staff to spoon-feed her as if she were a baby, I suggested they continue doing so—but in a way that was less efficient, resulting in two-to-three drops of food accidentally falling on her dress. Staff was neither to announce their new routine nor to overdo these natural accidents. By so doing, Mary was spared any undue anxiety anticipating a new situation. To allay the staff’s discomfort with this approach I pointed out that when spoon-feeding a baby even loving mothers cannot help food spills. The idea was to keep things going “au natural,” or as close to reality as possible.

Guess what happened when a few drops of food fell on Mary’s dress the first two days of the treatment? Mary looked annoyed, hesitated for minute, but remained sitting at her table until the staff resumed spoon-feeding to the end of the meal. Then, without a word, she got up, left the dining room and went to the bathroom to wash her dress, dry, iron, fold, and put it away in her bureau. Within a few meals, Mary was observed repeating the same reaction to the food spilling.
I became worried at this time because I had thought she would quickly find a way to take her meals. But, she did not. Instead, she seemed to cope with the inconvenient and annoying meal routine despite the fact that it demanded so much work on her part to keep her clothes clean. At that moment it looked like Mary was adapting to the situation, or possibly that her mental condition was taking a turn for the worst. Either situation might make it most difficult to help her return to normal eating. I was worried. After all, I had never worked with this kind of problem. The question was how long could the staff continue with this “accidental” spilling? Put differently: should the treatment be discontinued? I will tell you what happened, but first, you have to know the context within which psychology operated at that time.

I was in graduate school at the University of Houston and had just completed the usual basic courses in psychological theories, the history of psychology, etc., and frankly was rather disenchanted with psychology in general. To relieve the funk I was in, I took a course on Jean-Paul Sartre and Existentialism in the Philosophy Department. I really enjoyed the course and the excellent professor who taught it (who later went on to teach at the New School for Social Research in New York). The next semester I took the required course in Theories of Learning, taught by Jack Michael. I found his style of teaching rather different. He was very structured, starting and stopping his lectures at a precise time. He used a timer that you find in research laboratories. He entered the class and stopped his lecture as soon as it timed out with a noisy ring! I was somewhat intimidated by his style, plus the fact that he did not seem interested in discussing the type of psychology I had been exposed to. He did make interesting points to introduce an alternative way of approaching problems, but he would not insist on his being right; rather, he would leave the discussion or speculation with “that’s an empirical question.” Also, he emphasized Skinner’s learning theory. He taught this new, unusual, and rather too-technical learning theory, often referring to animal research as the basis for learning principles. The laboratory research included rats or pigeons, but the operant methodology diverged too much from the customary experimental approach of the period. Admittedly, the relevant literature for students in the applied area of psychology included titles such as, experimental manipulation of verbal behavior; reinforcement of statements of opinion; social reinforcers as drive conditions; and the like. Typically, the behavior studied was verbal behavior. By and large, the subjects for these studies were college students. For students with clinical interests, Skinner’s learning theory approach seemed too academic and tangential to their interests: still, what came through these studies was that adults are reinforced by social approval and attention, even when these seemed trivial.

Personally, I found this theory interesting but rather simplistic and naïve as far as clinical relevance was concerned. After all, I had spent a year and a half working with schizophrenics, mentally retarded patients, and even the criminally insane housed in a full-security ward of a mental hospital. In short, I did not believe that the mentally ill could be helped using this approach. Still, what I found most refreshing was that the approach allowed one to check if the theory worked by looking at a measure of observable behavior before and after the introduction of some known event. As a student, I liked that idea instead of simply relying on the clinical wisdom of the sages—Freud, and the usual suspects—or on the complex learning theories that involved biological research or a mathematical-deductive approach. The heavy-duty statistical models emphasizing large samples of individuals did not help me either, because I could not see how one could employ a treatment that was
Barking up the Right Tree

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The lab was quiet. Everyone had gone to lunch, that is, everyone but me. I sat in front of the enclosure, peering through the one way vision mirror as Fritz, the wirehaired fox terrier circled inside the small box. I was doing what all well-trained operant conditioners know how to do, that is, wait for the first response so that you can reinforce it and watch the resultant behavior increase in frequency. To be sure, you can get to the desired behavior by starting with an approximation that you shape and then reinforce ever closer approximations to the desired response, but that is quite difficult to do when the required response is barking. What is an approximation to a bark? Clearing his throat? Waiting for the dog to open his mouth? I didn’t want it to be an emotional response because I was trying to show that barking is very often an operant that acts upon its environment, and therefore a forerunner to language in human beings, not just an emotional response. Of course, I had already been waiting for that primal first bark from the time I had come in this morning to show up B. F. Skinner and John Paul Scott (I know, I was young then), who both claimed that barking and meowing are responses that occur only as emotional responses. On the other hand, there was no one in the lab…. I took one more look around and without giving it any further thought, I banged on the box. Fritz, who had been quietly circling the box looking for the bar that he had been trained on, which I had removed so that he could earn food only by barking, accelerated his run inside the box. I don’t exactly know what happened at that point, but I can report that I lifted the one way vision-mirror out of its slot, put my face in the opening and… barked. Fritz who had gone over to the source of the noise gave me the once over and… returned my bark. I was so surprised when the much-desired potentially operant response finally occurred, I almost forgot to drop the food in his chute, but I did it and Fritz was well on the way to helping me demonstrate that barking in dogs is an operant. He had learned to recognize the sound of the food magazine, and so as soon as he heard it, he dashed over to the food tray, devoured the food pellet, and returned to face me, seemingly waiting for me to bark. I did not disappoint him and barked once more; he responded likewise, I dropped another food pellet in the tray and he dashed over to devour it. We went on like this—Fritz and I—until I realized that I could extricate myself from this situation. When he returned the next time, I barked again, but this time I wisely waited for him to bark twice before dropping the food pellet. Having caught on to the happy notion that I would get to have lunch that day, I waited for an increasingly longer series of barks from Fritz until I was eventually able to extricate myself entirely by allowing a sound switch to take over for me. Fritz learned not only to bark for his supper but to do so in exotic ways, as in learning to bark ten times, to nuzzle the bar that I had now inserted back into his experimental chamber, ten times and only then to receive a food pellet.

The next dog that I worked with was a beagle that started barking shortly after I had placed him in the box—no circling the box, just an immediate howl that I was able to reinforce in no time. Indeed both for this beagle and a subsequent one, the demonstration of typical operant behavior was no trick. Indeed I was able to leave the lab in the care of a voice switch, doing other mischief in the meantime. The voice switch, in whose care I was able to leave the conduct of the experiment was also able to shape the usual beagle howl into a more discreet bark because the howl brought one pellet of food in the same time that several more discreet barks could earn several food pellets.

As you can tell, this was a real fun experiment. A year before, I had found an advertisement offering an opportunity to do some behavioral research at the Jackson Memorial Laboratory in Bar Harbor, Maine. Besides the opportunity to conduct an experiment in a well-equipped lab, they offered a little house complete with kitchen and other facilities for
a couple of months in the summer where you and your family could spend your free time right near a lake swimming and picking berries. Having long been interested in animal language, I jumped at the chance. Mark Waller, who had been doing operant research in Bar Harbor, liked the idea and together we were able to work on barking in dogs (Salzinger & Waller, 1962). At that time, I had my first of four children and having learned early on to work most of the time, this presented an opportunity to combine work with pleasure.

**HOW IT ALL STARTED**

Before I describe my professional life, allow me to present a brief sketch of how I got there. I was not born in this country; I came here from Vienna as a refugee with my parents and brother, escaping the Nazis who annexed Austria in 1938 when I was 8 years old. As Jews, there was little good (to put it mildly) in store for us in Vienna, and my parents decided to try to make our way to the United States. “Give us your tired, your poor…” etc. but only according to some prescribed rules allowing some from one country, more from another, less from still another, etc.—the luck of the draw. My parents, who were born in the part of the Austro-Hungarian Empire that eventually became Poland, did not have a favorable quota number, which resulted in our having to wait for two years until our quota number (literally) came up. We had to leave Austria in any case because Jews were arrested on the basis of any cause thought up by any Gentile, but particularly by those who had been underground Nazis before the annexation of Austria to Germany. As a lawyer, my father had made a number of enemies against whom he had won cases, thus making it necessary to flee greater Germany.

We first traveled to Memel, Lithuania on a three-month vacation visa, but shortly after we arrived, Hitler was making noises about Memel “actually” being a German port. My father decided that we had to leave to wait in another place before we could get to the United States. Neighboring Latvia seemed available, although not so much, because we had to make our way there illegally. Early in the morning, a horse and buggy took us to where the train stopped for refueling, allowing us to board it surreptitiously. Eventually, a conductor came by and, inspecting our passports, approved our passage. By that time, I had already learned that we did not have a visa to enter the country legally and that, had everything been on the up and up, he should have stopped us from entering Latvia. I asked about that only to be told it was okay, because he had been given a woman. Although I had no idea what that meant, something about my parents’ manner stopped me from inquiring further.

We spent a good part of two years in Latvia with the aid of a Jewish organization that was able to prevail on the government to allow us to stay, provided my parents did not attempt to work for a living and thus take away jobs from its citizens. A couple of Jewish organizations and a certain “Herr Dubin,” a legendary personality, along with the organizations, intervened to make our stay legal and to sustain us with money for rent and food.

The small country of Latvia, with a history of invasion and occupation alternately by Germany and Russia, provided schools taught in German which I was able to attend and thus continue my early education without interruption. After I entered the school (and to make the financial support that we received stretch over a longer period), the teacher in my class announced that I was able to provide company to other pupils if invited for a daily lunch. A girl named Ruth, whose mother had recently died, offered to take me in and for
The Journey of a Pioneer Woman Applied Behavior Analyst

Beth Sulzer-Azaroff
Professor Emeritus
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The year was 1935. As a first-grader attending P.S. 173, Manhattan, I determined I would be a teacher, just like our Miss Bouton. Patiently, she guided us to read, write, and do our sums. I was eager to become as skillful a reader as my older sister, Cynthia, who was able to transport herself into the settings of tales of Betty Gordon, Nancy Drew, Heidi, and the Oz series. I longed to do the same. With her example and Miss Bouton’s and Mother’s guidance, that miracle came to pass.

Although I can’t recall the exact moment when I no longer had to rely on Cynthia or my mother to read to me, I do remember that triumphal day in the New York City 42nd Street Public Library, when I found myself capable of reading practically the whole Grimm Brothers’ *Twelve Dancing Princesses* with just a few hints. Afterward, I depended on contextual cues from the story to help me decipher most of the words, but didn’t bother to learn how to spell them. Yes, clearly, I was hooked on reading and Mother was overjoyed!

Indeed, positive recognition, especially from the women in my family—my mother, Celia Winer (later Golden) and my aunt, Sylvia Haskel, my mother’s youngest sister—impacted my life in significant ways. One of five girls and a boy, my mother was born in in 1900 in a small town in the Pale,¹ Lithuania, to a gentle father, Lewis, and a warm, socially-active mother, Ida Horwitz. Grandma had learned to read and write in Yiddish, her native tongue—an unusual accomplishment for women in that society. Along with many other Jewish people at the time, the family immigrated to America to escape the dangers of the pogroms.² Once settled in the United States, besides playing her role as wife and mother, Grandma became socially active—organizing the ladies auxiliary at her temple, feeding starving scholars, and performing numerous other good deeds in her community.

Though described by her family as “a good girl,” Mother did have a bit of a rebellious streak. To illustrate: Without informing her parents, who she felt would not approve, she walked the long distance to school, saving her carfare to take lessons in modern interpretive dancing of the kind performed by her heroine, Isadora Duncan. Like the Queen Mother in the Brothers Grimm’s *Twelve Dancing Princesses*, Grandma wondered why Celia’s shoes wore out so rapidly.

Although Mother was determined to obtain an education, family finances were such that her parents asked her to drop out of high school to join the workforce. So at age 16, she applied for and received a clerical job at United Artists films (progenitor of Warner Brothers). When Sylvia, the baby in the family, reached age 16, my mother confronted her parents and declared, “If Sylvia isn’t allowed to complete high school and college, I’ll give up my job and return to school myself!” The outcome: Sylvia was permitted to continue her education. Majoring in mathematics, she eventually graduated from Hunter College (free for gifted New York City “girls”). Given the lack of availability of teaching jobs during the “Great Depression,” upon graduation she became a salesgirl, then a buyer of lingerie for women’s chain stores.

Meanwhile my mother had been enrolling regularly in individual college courses of interest to her. She continued that practice following her marriage to my father, Ben Zion Winer, then after my sister Cynthia’s birth, my own birth and childhood, her divorce from my father, during her own career as a buyer, her re-marriage to Arthur Golden, and her later return to work in the legal department at Warner Brothers. Ultimately, at about age 67, she

¹This comprised specific locations in Russia to which Jewish people were restricted.

²Episodes of violence committed by gangs of anti-Semitic peasants, often encouraged by their superiors, right up to the Russian Tzar.
graduated college with a major in dance therapy. Following graduation, she attended the Dance Therapy Institute and earned a post-graduate certificate in dance therapy. Surely, readers can recognize why, at a time when women generally were relegated to home and hearth, both my sister, Cynthia and I accepted it as a matter of course that we would have both a career and a family!

In retrospect, it is no wonder that Mother took up social activism herself. Her own mother had led the way. In one instance, immediately after the law was changed in 1937 to allow women to serve on juries in New York City, she was among the first to volunteer to do so.

Not surprisingly, Mother was determined to provide us with as broad and dense an education as feasible. At the time, New York City had an abundance of free or very low-cost cultural venues to which we were taken regularly: Art museums like The Metropolitan Museum of Art, The Frick Collection, The Museum of Modern Art, the Guggenheim (I fell in love with Frank Lloyd Wright’s architectural wonder Fallingwater, which had been reproduced there); the Central Park and Bronx Zoos, Rockefeller Center’s Museum of Science and Industry (long since gone, as are Diego Rivera’s stunning murals depicting Central American workers).

Figure 1 Sylvia Haskell (left), Rita Lipman, a friend (center) and Mother, Celia (right) were depicted in the New York World Telegram as being among the first women in the city to register for jury duty.

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3 Students and personnel at the Walden Learning Center (a laboratory pre-school program affiliated with our Developmental Disabilities Training Program at the University of Massachusetts) will recall Mother, or as the children addressed her, “Grandma Cele,” who in her eighties and nineties led an integrated group of typically developing preschoolers and those with special needs in various dances, songs, and games. Others may remember her teaching a dance class at the Association for Behavior Analysis Convention during my presidential year, 1982.

4 Cynthia ultimately became the Director of Operations of a major organization, the ARA Food Company; then assumed the Presidency of the Riverside Cemetery—a multi-generational organization on my fathers’ side.
The Analysis of Behavior: What’s In It For Us?

Murray Sidman
Senior Fellow, Cambridge Center for Behavioral Studies™
Sarasota, Florida
The term “experimental analysis of behavior” does not just summarize a set of behavioral facts and theories. It is also a name for a set of behavioral repertoires; it summarizes features of the behavior of behavior analysts. And, as we all know, if we want to understand what anyone does, we have to identify the reinforcers for their acts. What are the reinforcers for the behavior of behavior analysts? What keeps them going?

Do basic researchers, applied researchers, and practitioners experience different sets of reinforcers? When asked, “What’s in it for you?” do they each have different answers? Well, yes, they do different things and produce some obviously different consequences. Applied researchers and practitioners, for example, rarely refine the science’s systematic principles. Basic researchers rarely bring about improvements in a particular client’s troubling or troublesome behavior. Even though they display different response repertoires, however, they still have many reinforcers in common. I believe that a functional analysis—the same kind of functional analysis that tells us why our clients and subjects behave as they do—would reveal many reinforcers that are similar for researchers and practitioners. A more explicit and more general recognition of their reinforcer similarities would perhaps help bring workers in these seemingly disparate kinds of activity into more harmonious relationships.

The kinds of reinforcing consequences I want to emphasize here are not the obvious ones. Much has been written about such matters as salaries, promotions, titles, power, fame, prizes, and so on. Less often discussed are some consequences of scientific activity that are difficult to observe and almost impossible to measure. Even worse, these kinds of consequences seem to be disappearing as major determiners of the conduct of behavior analysts. In trying to enumerate those reinforcers, I will have to appeal largely to my own experiences, because those are the only ones I have been able to observe directly. I cannot believe, however, that other behavioral scientists have not been sustained by the same kinds of reinforcers that it has been my good fortune to experience. There are many who could surely tell the same kinds of stories I am going to tell. I wish they would. I believe that today’s young investigators and practitioners are in special need of hearing about those experiences.

Let me summarize my thesis in advance. In our scientific writing about behavior, we fail to transmit the excitement of doing research. We rarely describe the thrill of finding out things no one knew before. Although the prevalent public conception is that scientists are cold, logical creatures, it is easy to demonstrate that scientists are also lovers of worldly pleasures. They are often, for example, quite sophisticated appreciators and even participants in the worlds of music, literature, and the humanities in general. What scientists seem reluctant to acknowledge, however, is the poetry in what they themselves do, the poetry that is intrinsic to the process of discovery.

Nobody acknowledges the musical features that are inherent in the process of reasoning, in the logical progression of thought. A dictionary definition of music is, “The art of arranging sounds in time so as to produce a continuous, unified, and evocative composition.” One could apply this definition almost word for word to the progression of an experimental investigation: “The art of interacting with an experimental subject so as to produce a continuous, unified, and evocative study.”

We also fail to reveal the passion with which we try to distill orderliness out of chaos, and the exhilaration we feel in the discovery of such orderliness. And although we try to avoid superstition and unverifiable doctrine, we nevertheless come close to religious fer-
When we succeed in placing the conduct of human beings—what humans do and why they do it—within the realm of natural phenomena, thereby bringing the behavior of living beings, including ourselves, into the grand scheme of order in the universe.

People have little problem understanding the reinforcers that are available to behavior analytic practitioners. Curing the sick, turning nonlearners into learners, getting people to stop smoking, to eat less, to practice safe sex, increasing safety and productivity in the workplace—all of these accomplishments and many others are generally recognized not only as socially worthwhile but also as emotionally satisfying. Researchers, however, even many applied researchers, have not been as successful in conveying to others some notion of the reinforcers that are inherent in their work. Because scientists must evaluate data dispassionately, people mistakenly assume that they are dispassionate also about the implications of their data for human life.

In view of the popular misconception that scientists are detached and uncaring, I may perhaps be excused for feeling some pride when a former student dedicated her book “to… Murray Sidman for proving to me that being scientific and data based is the operational definition of caring.” These days, we seem not to be passing along this definition of caring. As a result, many potential students, as well as the general public, turn away from a science of behavior because it seems cold and uncaring. Many who go on and do become behavior analysts are not only turning away from research but are coming to devalue it—basic research for sure, but even applied research.

Changing the World

How did I get to the point where I experienced poetry, music, and passion in the experimental investigation of behavior? Like many young people, both then and now, I was worried, not so much about what kind of a job I was going to end up in, but rather, how I was going to go about helping to change the world for the better.

My readings and other observations had convinced me that people create their own world. Therefore, if the world was going to change, people would have to change. Considering the intensity with which people seemed bent on subjugating or destroying each other, even on setting up the conditions for eventual self-destruction, it was clear to me that changes were going to have to be engineered deliberately, not left to the slow pace and uncertain outcome of natural evolution. What kinds of changes would do the job? How were those changes to be brought about? Was change even possible? In college, none of the many sciences I looked into suggested practical answers to those questions until I found myself in the pioneer introductory psychology lab that Keller and Schoenfeld were initiating at Columbia University back in the late 1940’s (Keller & Schoenfeld, 1949).

Creating behavior. There, in the very first lab session, I found myself creating behavior. Without any words being exchanged between me and my experimental subject, that little white furry animal was doing exactly what I told it to do—things it had never done before, things that gave it no evolutionary advantage, and even more incredibly, exactly what the lab manual said the animal was going to do when I set up specified contingencies.

As we moved along in the course, I was able not only to get that little beast to press its lever and pull its chain, but to stop whenever I turned on a light; to work rapidly, slowly, or cyclically as I changed the reinforcement schedule; to press or pull with a force greater
Special Children

Rob Holdsambeck

Executive Director, Cambridge Center for Behavioral Studies™
Founder, Holdsambeck and Associates, Inc.
While visiting with my mom around the occasion of her ninetieth birthday in Alabama, an elderly gentleman asked me what I did for a living. The term “elderly” has become a moving target as I go through my own years, but in general it usually refers to someone of the generation before mine. I don’t recall his name, but based upon the facial expressions he showed, let’s just call him Professor Grumpy. I suspect Grumpy wanted a simple answer, say; I was a medical doctor or a lawyer or something nefarious but more recognizable. However, I chose to say that I worked with children who had “special needs.” After the obligatory reference to all children being special, he launched into a lecture I suppose he had oft repeated. “In my day” he proudly proclaimed, “we didn’t have all those parents demanding that their kids get special treatment. In fact,” he continued “I can’t remember ever having issues at school or work with those types of kids.”

In my younger days when a conversation began to take an ugly turn, I felt compelled to jump in. It took time to learn that there are situations where the chasm between what you have learned and what someone else thinks they know, is simply too broad. I was there to celebrate with my mom and this conversation was not adding to that experience. I decided instead to revert to a tactic I learned to move on and move forward. When he paused to take a breath, I used the simple southern phrase of “I heard that.” Then I went for cake. To him I suspect it was confirmation that his points were somehow important to me. However, for me they meant that I heard your words and now I don’t want to hear them anymore. On the trip home I confess I gave them much more thought than originally planned. In some ways he was right.

I finished the first part of my graduate education at a turbulent but exciting time. The Vietnam War was ending, the civil rights movement was in full force, the hippies were dropping out, and I needed a job. Fortunately for me, Uncle Sam had paid for my schooling, began to teach me to fly airplanes, then decided I was better suited to a desk job. It wasn’t a case of crashing the equipment or not showing up for marches, but rather a matter of timing. To be honest, on one solo training flight I did manage to put a Cessna 150 into a modified spin while practicing a stall avoidance maneuver. I did this by accident as my instructor warned me we had lost too many students to allow them to practice that particularly frightening situation. I was told later that it really isn’t easy to do that with that type of plane but somehow I managed. Pilots during my year were in high supply and fortunately for many of us the demand was waning. My brief career in the Air Force was not remarkable but the timing was excellent. I made my way to California to a small town near Vandenberg Air Force Base. It was a place I knew and I needed to find work. I had applied to fifty or so colleges to ply my trade of psychology professor to no avail. It seems my resume was thin.

1I first committed in 1971 and managed to make captain by the time of my honorable discharge from the reserves in the mid-1980s. This brought a modicum of pride to my parents but an odd mix of amusement and contempt from my academic colleagues. To paraphrase the poet Dylan, the times they were, indeed, a changing.
So I took work where I could find it, ended up teaching night courses and landing a job as a behavior analyst working with children (and adults) with “special needs.” At that time in my life I had a level of confidence in my understanding of behavioral science that far exceeded my competence. I suspect if I understood the challenges more fully I might have gone back to school immediately rather than spend the next 13 years learning from the kids how little I really knew.

At this time, California was coping with a challenging problem. Historically, our kids with the most needs often ended up in large institutions called “state hospitals” or “developmental centers.” They were not really hospitals or centers of development but more like warehouses. Large groups of people were housed here, with well-intentioned but often misguided care. The revolution in social awareness and the growing interest in helping these people get out were about to collide with a science that had been growing in the laboratories at Harvard, the University of Florida, Arizona State University, the University of Washington, the University of Kansas, the University of Oregon, and UCLA. Fortunately for me, I attended Florida and was mentored by an exceptional behavioral scientist, Henry Pennypacker. Hank was smart, compassionate, and had just the right amount of mischief in his demeanor to instantly attract an audience. I took as many of his courses as my Air Force scholarship would allow. The net result of all of that was I left with a great deal of enthusiasm for what is now called Applied Behavior Analysis (ABA). As it turns out, many of the first human applications of this science were with people with “special needs.” I had almost no experience with real-world challenges that these kids faced, but I did have a way of looking at the issues. Like many of my classmates at the time, I sold most of my textbooks on the used-book market for pizza money. (Actually it was probably more for beer money, but that is a story for another chapter.)

I left the University of Florida with only a few texts that had shaped my thinking about our emerging behavioral science. Skinner’s *Science and Human Behavior* (Skinner, 1953) was perhaps the most influential reading material I encountered. T. S. Kuhn’s *Structure of Scientific Revolution* (Kuhn, 1970) was another that was just too good to trade for pizza or beer. I kept the *Psychology of Learning* by Hulse, Egeth and Reese (Hulse, 1967) not so much because it moved me, but for two solid reasons: First, I bought it second-hand and very used books were hard to sell. Second, I wrote copious notes on the pages as I tried to get my head around the technical language. The only other books that have survived on my bookshelf are one from Whaley and Malott on the *Elementary Principles of Behavior* (Whaley, 1971) and one from Ulrich, Stachnik and Mabry on the *Control of Human Behavior* (Ulrich, 1966). The former of these is now in its seventh edition (Malott, 2014), while the latter actually helped me get my first ABA job.

In *Control of Human Behavior* were various stories about pioneering behavioral scientists looking at significant social issues. Included were Teodoro Allyon’s work with people with schizophrenia. Ted is a wonderful man I later met through the Cambridge Center for Behavioral Studies (CCCBS). This volume also included Og Lindsley’s work in geriatrics, Baer and Sherman’s work on teaching imitation, and most importantly to me, a section by Wolf, Risley and Mees on the use of behavioral procedures in the treatment of an autistic child, little Dicky. In another article were reports from Risley and Wolf explaining how they were able to shape language in a child with autism who had not previously used language in a functional way. These and others pioneers of application were building a body of clinical work and applied research that was shocking the public consciousness and changing the paradigm of how we viewed the world. For me, I had the sense that psychology
Behavior Analysis Can Thrive in General Education Too

Kent Johnson

Founder and Executive Director
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When I Was a Boy

I am an Educational Psychologist who has a passion for how people learn, particularly how those who are not learning can begin to learn more effectively. My interest dates back to my childhood in the 1960s. I remember being in third grade and watching the teacher ask questions, call on students who were likely to give good answers, and move on. I would look around and notice other students who were not keeping up. I was troubled about their fate, and I wondered how she could continue her lessons when others weren’t learning. I remember Stephen in particular, a friend of mine in the neighborhood, whom I would help after school. I asked my teacher about how she knew that Stephen was learning. I told her I knew she knew I was learning because I could answer her questions, and she usually gave me stars and such on my papers. She told me that some students do not learn as well as others but as long as everyone was trying that’s the best anyone could hope for.

My mother listened to my comments about my teacher and Stephen and others who were not learning. She asked if I would help my sister with math. Our work went well: my sister learned a lot of math and appeared to actually enjoy it. My mother told other relatives about what my sister and I were up to. My aunt asked me to help her son learn how to write sentences and paragraphs. He learned how to do that when I used the same approach that I used with my sister.

To earn a living, many people in my family worked for themselves or in partnership with other family members. They were not employees in the burgeoning corporate business movement. Soon I was imitating the entrepreneurial spirit of my family heritage. I combed my neighborhood with flyers to tutor other children who weren’t successful in school. I charged 10 cents a session. Within 3 years, by the time I was 12, I had tutored 40 students in “summer school” in my back yard and one stall of our two-car garage. I would group students together who needed similar help: rhyming needs at one table, long division at another table, and so on. A couple of other neighborhood kids would help me with the work. Each September the Principal and teachers at the public school we all attended would ask me, “Who did you tutor this summer, and what did you teach them?”

The effective approaches I discovered in my work with my sister, my cousin, and other children in the neighborhood are key aspects of more formalized and sophisticated behavior analysis procedures in education: (1) maintaining attention through teacher initiated interactions, (2) providing opportunities for student initiated interactions, (3) providing extra practice until the student does it well, and (4) the efficiency of grouping students together with similar needs and goals. All of these procedures, of course, hinge on the power of reinforcement. Positive reinforcement increases the likelihood of behavior that precedes it. It’s about what happens after the learner’s behavior that is most important. Behavior is always a function of its consequences, positive reinforcers being those consequences that make the behavior more likely to occur. Let’s look at each of these 4 procedures more closely. (1) As long as I initiated an interaction that produced a learner behavior that I could then support with smiles and praise, I could maintain my learner’s attention. (2) As long as I encouraged questions, and reinforced my learner’s questions with comments that helped the learner complete new problems more successfully, then my learner would continue to ask questions. The reinforcement here is correct completion of problems, along with my praise. (3) As long as I provided enough problems so that the student could do them correctly without hesitation, they were more likely to successfully complete more
problems the next day, and the day after that, garnering more reinforcement from correctly completed problems and glee from me. (4) And if I grouped students together who needed the same instructions and practice, I could provide the same amount of reinforcement to each learner and teach more learners at the same time. And 4 dimes per hour is also more reinforcement for me than 1 dime per hour.

The fact that I discovered these procedures, albeit in primitive form, as a child interacting with his environment illustrates behavior analysis as a natural science and practice. Anyone can discover behavior principles if they keep close track of their activities with others. Behavior analysis provides a technical vocabulary for describing complex behavior in the natural environment, and as such it is a microscope through which we can observe and make sense of how people and other animals interact with their environment.

In keeping with my childhood interests and concerns, when I was 29 I started a school, Morningside Academy, for struggling learners—the 40 percent of school-aged children who do not qualify for special services, and who “get by” in school, never particularly liking it but doing their time. These struggling learners are bright, average to above-average intelligence, and show the potential to be successful students just like the kids I worked with as a child. Today these students, if diagnosed at all, may exhibit mild learning disabilities; or attention, organization, and focusing deficits like students with ADD and ADHD. Morningside teaches these ‘typical’ learners who are on the fringe in general education.

In a way I am doing the same things now that I was doing all those years ago with my Spanky and Our Gang approach. I have even preserved the name of my neighborhood in my current work. Morningside is named after the neighborhood in Milford, Connecticut where I tutored other children.

I call Morningside Academy a laboratory school, in the sense that we are continually developing a system of teaching and learning that provides struggling learners the opportunity to achieve the same intellectual levels as the best performing kids in school. Before I tell you about Morningside, let me tell you about all those years after my stories about Stephen and my sister and my cousin and those kids in my back yard and garage. Those years provided the missing ingredients to my original childhood enterprise: formal behavior analysis concepts, principles and procedures.

When I was in high school I became very interested in comparative government and United States constitutional history. When I applied to colleges I picked those that were well-known for their work in these areas. I went to Georgetown University in Washington D.C., both for its reputation in grooming lawyers, ambassadors, and government experts; and its location “where the action is” in United States government affairs. However, a funny thing happened on my way to a government degree.

A Funny Thing Happened on My Way to a Government Degree

During the summer before school began we were asked to select a freshman math course among several options. One of those options was a self-paced, personalized course in calculus. Course material was divided into small units. Students moved at their own pace through the units, taking a quiz or engaging in an interview over the material after they studied each unit. Students took their completed quiz or their prepared interview “bullets” to a student who had completed the course in a previous semester, called a proctor. If they achieved 90 percent or better, they moved to the next unit (reinforcement). If not,
Always the Back Door

Abigail B. Calkin
Calkin Consulting Center
Calkin Writing Center
PREPARATION

I started working in special education in the second grade in Miss Davis’s class in Framingham Centre, Massachusetts. I had just turned six and there were 41 students in the class. I sat in the last row by the door. One day I counted and the room had 11 corners, which the teacher filled for the slightest infraction. Eugene sat in front of me and couldn’t read. He slouched in his seat and set his book perpendicularly on his desk. I leaned forward to read or write. When he had a word he didn’t know, he pointed to it. I either told him or helped him figure it out. Anytime I was caught, Miss Davis sent me to a corner for talking. At some point, Miss Davis told me that if I kept up my misbehavior, she would reserve the same corner for me she had reserved for my brother years earlier. Because I adored my older brother I perceived that as an honor and reward.

By fifth grade we had moved to Maine and I had a much kinder teacher. Mrs. Holmes put me next to an entire row of retained older students, ages 12 to 15. They had the row next to the window in that cold and snowy Maine winter that often remained below zero for weeks. In the classroom, though, I tutored Jeanne and the other older students around me. I remember her more than some others because she had enviable blonde curly hair and two rows of upper and lower teeth. The teacher never told me to hush and in my spare moments, I also did the extra multiplication and division sheets she had available in the box at the back of the room, 100 facts per page. I don’t remember timing myself, but I must have because I always wanted to beat my previous time.

A bridge crossed the Penobscot River from Marsh Island, where I lived near the university, to the main part of town. I stared down at the tumble of whirlpools on my walks across in fall and spring. The snow lay especially deep in that bone-chilling cold winter. A small group of us walked across the Penobscot in morning, twice at lunch, and again to our homes in late afternoon. I always looked over to view the stark and dangerous mass of jumbled ice. We scraped bottle caps on the concrete posts in fall and spring, a shaping procedure that enabled me to increase the intensity of the scream and scrape of nails on the chalkboard when the teacher was out of the room. Repeated practice kept me from squealing like all the other girls did when the boys intentionally scraped their nails. During recesses we built and repaired snow forts for our daily snowball fights I loved. What mattered then was the ability to aim or take a hard hit, especially if it went between the jacket collar, scarf, and hat. Math and reading abilities were irrelevant on the winter playground: toughness, physical skills, and aggression were the order of the day.

My parents did not listen to their 10-year-old daughter who wanted to stay in this small university town. They moved back to New York City. I went to Grace Church School where, according to one of my older sisters, I had more homework in sixth grade than she had at university. When I graduated from there, I went to Friends Seminary, a Quaker school founded in 1786 and the oldest continuously coeducational school in the City. I like that. At these two schools, I received an education that taught me knowledge and habits, which continue to serve me well. At Grace Church School, an Episcopal school, I wrote voraciously and served as the editor of the school newspaper. I didn’t know until our fiftieth grammar school class reunion that I stood alone as the one who followed the instructional option of revising essays or stories three or four times. Since we had weekly writing assignments, this meant I worked on three to four different English papers each week. I also learned to write research papers at Grace Church School. I still use 3” x 5”
index cards, mandated for our first project. I like the cards as opposed to a computer device because I find it easier to sort and shift within topics, which at present include teaching reading, inner behavior, military and veteran issues, poetry, nonfiction about commercial fishing, and novels.

At Friends, I was on the field hockey, volleyball, basketball, and softball teams all four years. I captained hockey, volleyball, and softball my senior year. For some reason we never had games on Friday so I volunteered Friday afternoons at New York University’s Hospital, its research hospital. For three to four hours every Friday I worked on the children’s ward with those who were newborns with spina bifida, cancer, urological issues, and undiagnosed diseases. I remember a beautiful newborn boy with hydrocephalus whom I bottle-fed for the nine months of his life. Toward the end, his head so heavy, my arm went numb from shoulder on down, but his comfort in those last weeks seemed more important than my temporary discomfort. I remember Debbie. By the age of two years, she had had so many shots and painful procedures that she cried whenever anyone approached her crib. I made it my task to walk in her room and approach her as closely as I could before she began to whimper or cry. I then backed up a step and waited until she stopped crying. The first day I got as far as the doorway. I don’t know how many months it took before I almost reached the side of her crib. I never made it to the edge before she died in 1958. I wanted to reach in to touch her, to let her know she had nothing to fear from at least one fellow human being. I wish I had told Joseph Wolpe when I met him the story of my naive use of systematic desensitization. I would have said I knew about the procedure by the time his book came out and hoped I used it well, but I did not read it till the early 1970s. Instead, we talked about my use of the 1-min timing to increase positive thoughts and feelings about oneself. That was 1987 and I get ahead of myself.

PROFESSIONAL BEGINNINGS

My father died six weeks before graduation from Friends Seminary and I moved 2,000 miles from home for college. When I started at the University of Colorado in 1959, I took algebra, fencing, beginning German, graduate level Latin, music theory, and piano. I didn’t have to take the freshman English or math because my SAT scores exempted me. I studied a total of 44 hours that semester and came up with a rousing 2.5 average. Shortly after Thanksgiving, I read the ads in the Colorado Daily—I must have been really bored—and saw one about working with children, “3–9 p.m., M–F.” I misread it as three to nine, Monday and Friday. I applied for the job. I wore red flats, black tights with red fleur-de-lis up the side, a red jumper, and a white blouse with puffy sleeves. I put my below-my-waist hair in a ponytail. I got the job…Monday through Friday, despite the fact that my first boss hated flats, black tights, the color red, puffy sleeves, and long hair. I wondered what impressed her because I, still a teenager, younger than some of the students, had no experience. I worked at Wallace Village full time for three years and took all my classes beginning at 9:00 and ending by 2:30. The children were diagnosed with minimal brain dysfunction and emotional disturbance, the terms of the day. It never occurred to me until after my master’s degree that I could have cut back and not been a full-time student. Hooked on these children with special needs, I switched my major from Greek and Latin to psychology and philosophy. I then moved to Edinburgh, Scotland for graduate work in
Some Historic Roots of School Reform

Francis Mechner
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INTRODUCTION

Those of us who are old enough can remember the big splashes that educational technology made in the 1960s and 1970s, involving the national media, the White House, Congress, state agencies, and corporate America, with international reverberations via UNESCO and the OECD. What follows is my attempt to weave the connecting threads of these achievements into a story that reveals them as precursors of current work in school reconfiguration and education reform.

THE COLUMBIA UNIVERSITY PSYCHOLOGY DEPARTMENT OF THE 1950S

That’s where the story begins. It was a time of unabashed idealism, of graduate students giddily discussing the ways in which the emerging science of behavior would transform society. We were on fire with a sense of mission.

Each of us had reached it by a different path. My own featured a war-whipped childhood with multiple close calls in the Holocaust. Survivor’s guilt? Maybe. What I know for sure is that I was left with a strong sense of obligation. Perhaps it was my Viennese upbringing that led me to assume that I would fulfill it as a painter or pianist, but at age 20, I discovered what seemed like a more impactful way—the science of behavior. In any case, I adopted a monastic existence in which personal comforts had no standing. I spent 14-hour days, 7-day weeks in the lab, feeling dedicated to the advancement of behavioral science and its application to human affairs.

The Other Zealots

There was Thom Verhave, the whimsical, intense Van Gogh lookalike with a Dutch accent and deep knowledge of the history of science and classical music; Donald A. Cook, the erudite conversational virtuoso known for an encyclopedic knowledge of literature, the arts, and the sciences, ready with an Auden or Yeats quotation for any occasion; Bob Thompson, leader of the Red Onion Jazz Band; Robert Berryman, the gifted apparatus wizard and connoisseur of art, philosophy, and world cultures; Bill Stebbins, Jack Findley, and many other exceptional people. The legendary firebrands of the preceding generation—Murray Sidman, Don Bullock, Jim Dinsmoor, and Joe Antonitis—had just moved on, and Charles Ferster had left Columbia for Harvard to work with Skinner.

Some of the Faculty Members

The founder of the Columbia psychology department’s behavioral orientation was the affable, modest, and beloved Professor Fred S. Keller. When he didn’t approve of someone, the worst he would say is, “I don’t know about him.” Ever ready with the perfect quip, he used to call Don Cook “Silver Tongue” for reasons that became evident as soon as Don
open his mouth. Don was a spellbinding speaker, and when Keller could not give one of his Psych 1–2 lectures for any reason, he had Don give it in his place.

Professor William “Nat” Schoenfeld delivered his colorful metaphors with the dramatic inflections of a radio announcer, punctuated with backward and sideways head jerks as his eyebrows rose and fell and his eyes widened and squinted. He taught his graduate students that to pin down a phenomenon experimentally, it is valuable to define the entire function by using several (not just two) values of the independent variable, and when possible also varying one of the function’s parameters.1

Professor Ralph Hefferline’s calm demeanor exuded warmth and wisdom. His ideas were among those that had influenced me to replace my early passions for painting, piano, and chess with a commitment to behavioral science. Hefferline and I were usually the only people left in our labs on the second floor of Schermerhorn Hall at three in the morning.

Professor Henry Garrett tended to side with Lionel Trilling of the English Department and Robert K. Merton of the Sociology Department in attacking the Skinner-Keller-Schoenfeld orientation as fatally narrow and misguided in its seeming tenet that the complexities of the human mind were reducible to bar pressing by rats. Keller made no secret of the unhappiness and battle weariness these attacks caused him.

How Schoenfeld Challenged His Students

“There is no real evidence for the theory of evolution.” “The brain has nothing to do with behavior.” “Genetic factors have no significance.” The rantings of some kind of ideologue? No. Statements by Nat Schoenfeld in his seminars. Outrageous though these statements were, he pretended to believe them and would invite refutation. And when a brave soul did pick up the gauntlet, Schoenfeld would lunge at any soft spots with one of his stock jabs—“What do you mean by that?” “How do you know that?”—and with erudite ridicule reduce the protagonist to silence, fury, or even tears. When taken to task for bullying, Schoenfeld explained that his goal was to provoke scrutiny of unexamined beliefs. No one disputed that this worked, and worked well. I confess that my own tendency to question widely held beliefs resonated with this goal, though not necessarily with the method.2

Jobs I Owe to Keller

Shortly after being accepted into the department, I asked Keller if he could suggest a way for me to earn some money. “Talk to Don,” he said. Don Cook, who was heading up Keller’s Air Force contract on Morse code learning, thereupon hired me, first as a test subject and then to collect and analyze the data. Don became my mentor, and his scientific erudition inspired me to try to broaden my own scientific education.3

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1The dissertation on avoidance behavior that Murray Sidman did under Schoenfeld has rightly been held up as a model of that methodology.
2Few training systems are more effective than a culture-hopping childhood, such as mine, for instilling skepticism of strongly held beliefs.
3Since Columbia allowed its graduate students to take courses in other departments for free, Don and I took courses together in differential equations, mathematical statistics with Herbert Robbins, symbolic logic, modern algebra, and Professor Lofti Zadeh’s information theory course. I also took biochemistry, physiology, electronic circuit theory, genetics with Theodosius Dobzhansky, and anthropology with Margaret Mead.
Journey Through Behavioral Safety

Terry McSween
CEO and President
Quality Safety Edge
Our civilization is running away like a frightened horse. As she runs, her speed and her panic increase together. As for your politicians, your professors, your writers—let them wave their arms and shout as wildly as they will. They can’t bring the frantic beast under control.

—B. F. Skinner’s Frazier in *Walden Two*. 1948

On September 20, 1971, B. F. Skinner was featured on the cover of *Time* magazine. The article referenced the book *Beyond Freedom and Dignity* which I bought within the week. As a hippy and antiwar Vietnam War protestor, I was in my second year of a chemical engineering program and spending more time partying than studying. The time in my life and the content of those two documents caused me to reflect on both my direction as well as the way I was living. Skinner’s view of behavior as a function of the environment was one of the primary concepts that I took from those articles. On a very personal level, I realized that I needed to make changes to my environment to change my behavior and the direction of my life. That semester, I transferred to University of North Texas (UNT)—North Texas State University at the time—where Don Whaley was teaching the behavioral psychology that Skinner was promoting. The textbook he coauthored with Dr. Richard Malott, *Elementary Principles of Behavior*, enhanced my understanding and enthusiasm for behavior analysis and would influence choices I would make years later as I pursued graduate training. I was unsuccessful in arranging my schedule to formally take one of Whaley’s classes, but I audited every graduate class he offered during my year-and-a-half tenure there.

After finishing my bachelor’s degree at UNT in December of 1972, I was accepted into a Ph.D. program in experimental psychology at University of Texas at Arlington (UTA). I was eager to get started in the new program because my bachelor’s degree in psychology had netted me a job doing construction work. Anyone who has ever worked construction through the summer in central Texas can appreciate my enhanced motivation to return to my studies.

My studies at UTA confirmed my interest in behavior analysis. The only behavioral faculty member was Dr. James Kopp. I quickly affiliated myself with him and began working in his labs. He also worked with the local school district and provided several of us with the opportunity to work part-time in special education. During this time I conducted the UTA equivalent of a master’s thesis through a study with kids having academic problems. I trained these students to provide positive feedback to teachers for positive attention. We spent time operationally defining the behaviors they would look for from the teacher, then the behaviors that they would use to reinforce the teacher’s attention. They recorded data using wrist counters to record the number of times they did something to reinforce their teacher, either through their attention (leaning forward, making eye contact, taking notes, etc.) or their verbal comments. At the end of the semester, these problem high-school students increased their academic performance by an average of one full grade. As a result, I was further hooked on both our technology and research. I would never discover whether their academic performance actually improved, or whether the teachers just gave them better grades because of the reinforcement the students provided, though I always believed that the improved relationships translated into better learning. Imagine training disruptive
kids to reinforce positive attention from their teachers! I must confess that some of my friends suggested that I was training them to be little con artists.

I presented a paper on that research in my first-ever presentation at the first ABAI conference, which was actually the 1975 Midwestern Association for Behavior Analysis (MABA) at the Blackstone Hotel in Chicago, Illinois (see Peterson, 1978, for a complete history of MABA). The conference was amazing—so many behavior analysts, so many research papers, so much good work being done, so many parties—the hook was set even deeper! I would continue to attend ABAI religiously for the next 20 years. It remains my favorite conference, though the fact that it falls on both Memorial Day and my birthday makes it difficult for my family to support my attendance these days.

After two years at UTA, the experience in Chicago convinced me that I wanted to pursue work in an applied field rather than pursue the life of a scientist. The UTA program was competitive and aversive, and, other than Dr. Kopp’s work, UTA had no faculty interested in applied behavior analysis or even real-world applications. I decided that I had neither the intellect nor the dedication to be a pure experimental psychologist, and further decided that I needed to pursue my passion for the application of behavioral psychology.

With Dr. Kopp’s encouragement, I joined a number of other students in that program (Larry Morse, Mike Dorsey, and Tim Wysocki among others) who left UTA and transferred into the graduate program at Western Michigan University (WMU). I left a Ph.D. program to begin the master’s program at WMU, with the hope that I would be successful in continuing on in their Ph.D. program. I began at Western in the fall of 1975. I had worked with special-needs children in Texas and continued to finance my education through work in similar programs in the Kalamazoo school system. I worked with Mike Dorsey and others in the Kalamazoo school system, providing services to the developmentally disabled. I was now working among many of the behaviorists and students that I had seen at the Chicago conference!

This was an exciting time for me, moving from Ft. Worth, Texas, to Kalamazoo, Michigan, and from UTA to WMU. I was studying with Jack Michael and began participating in his weekly research meetings, conducted at his home on Saturday mornings. Most of us worked in the Kalamazoo school system so we were all studying and applying the science. I remember the thrill of using behavioral techniques to teach a 13-year-old child to walk for the first time and participating with my friends in a variety of studies within the school system. I tried to take every course Jack Michael taught on B. F. Skinner’s writings, along with a broad spectrum of other courses on behavior analysis.

While at Western, I discovered that behavioral principles were being applied to organizations in a field that was becoming known as Organizational Behavior Management (OBM). During my second year, I was inspired by the Behavioral System’s Analysis courses that Dr. Malott was teaching and soon entered the Ph.D. program in behavior analysis under his supervision. During Dr. Malott’s course, I got involved with the Student Centered Education Project (SCEP). SCEP was one of Malott’s systems in the psychology department, a personalized system of instruction (PSI) that evolved out of the work of Fred Keller (Keller, 1968). It was an educational system using student teaching assistants and well-programmed written materials broken into small units. This system allowed me to gain experience with staff training and ultimately provided an opportunity to conduct a master’s thesis on the use of feedback to improve the accuracy of grading on daily tests.
Teachers and Students
Passing it On

Carl Binder
Co-Founder, The Performance Thinking Network
President, The Fluency Project, Inc.
“Totalitarian! Mind control! Sounds like 1984!” Words like these filled my thoughts when I first read B. F. Skinner’s utopian novel, Walden Two, assigned during my junior year at Seattle University in 1969. I was a Philosophy major at a Jesuit University where I’d begun as a math major. After exposure to the “big ideas” of several millennia in the Great Books curriculum of the Seattle University Honors Program, I switched my major to Philosophy (to the dismay of my mother, who wanted me to be an engineer). In addition to a two-year tour through western history, literature, and thought from ancient civilizations to the mid twentieth century, I studied the history and literature of eastern cultures, including the Upanishads and the Bhagavad Gita, early Buddhist writings, the Analects of Confucius, Taoism, and Zen, with haiku and Chinese nature poetry. We read the Old Testament with an Orthodox Rabbi and the New Testament with a Jesuit theologian. This was the liberal arts at its best. It kick-started my life-long study of how philosophies and cultures describe the human experience, our place in the universe, and how we should live.

Trained in critical thinking at a Jesuit high school, I decided in college that Catholic theology was inconsistent with my growing understanding of cultural evolution. It seemed clear that Jesus was not the only “self-realized” person in history. Others had recognized their identity with the whole of the universe, as well—in whatever form they chose to describe it. Having been a science geek in high school, I was inspired by the medieval theologian, Thomas Aquinas, who spent his career aligning Christian theology with the science of his day—Aristotle and the great Arabian philosopher-mathematicians. Aquinas argued that if there were inconsistencies between science and revelation, something must be revised. His argument appealed to me, and in combination with readings of eastern non-dual philosophy, established my understanding of the person and the world together as a single system of interdependent experience and causality.

I still struggled with the western concept of the separate self, often called the ego in psychological and spiritual writings. My study of Vedanta, Buddhism and Taoism, combined with psychedelic experiences that melted perceived boundaries between self and other, made it clear to me that there could be no truly separate, self-caused agent in this body. Even mystical Christian writers described experiences that cast doubt on the notion of a self-determining individual agent. Natural science suggested, for example, that the air outside my face probably had been “me” biologically just moments earlier; and what I was breathing, drinking, eating, and absorbing through my skin was just about to become “me.” The idea of independence from so-called external causality seemed contrary to what I had learned so far.

But this was at the end of the 60’s. Freedom was on our collective minds, and I had not yet taken my systemic understanding of human existence to its full implications. So when I read Walden Two, which seemed to threaten the idea of individual freedom, my reaction was typical. I was appalled, outraged, and maybe a little threatened. “Who is this guy telling me that we can control human behavior like rats in a box? What gives him the right to question my freedom?”

Knocked Off My Horse

I was fortunate to have a history professor who often invited me and other students to his home. His wife, Jan Larrey, was a Ph.D. student with Robert Kohlenberg, an emerging thought leader in behavior therapy at the University of Washington. I did not meet Kohlenberg at the time, and I don’t recall what Jan said to me. But I re-read Walden Two with a
fresh perspective. To use a Catholic metaphor, it was as if I had been knocked off my horse like St. Paul on the way to Damascus! It was obvious to me in this second reading that Skinner was simply suggesting that if we approach our own behavior with the same scientific rigor and measurement that we apply in other fields of natural science—biology, chemistry, physics, and so on—we can make discoveries to improve education, therapy, management, and every other aspect of human affairs. What could be more inspiring to a Jesuit-trained young man who’d heard the first Catholic President’s admonition to ask what you can do for your country? I was inspired with the idea of using behavior science for the betterment of society. I also saw how a Skinnerian understanding of human behavior fit better with my philosophical and experiential insights about the non-dual nature of human existence than the psychodynamic models of the person and the ego that ruled conventional wisdom and most psychological theories. My enthusiasm was unbounded!

Writing a Letter that Changed My Life

It was then that I wrote my fateful letter to Dr. Skinner. I don’t have a copy of the letter, since it was scrawled hurriedly on notepaper, edited, and typed for mailing to Dr. Skinner at Harvard. But I have a copy of the thoughtful, kind, and life-changing response that he sent back within a few weeks.

He definitely reinforced my behavior! By taking time from his exceptionally busy life to compose an encouraging message to me, an unknown college kid, he changed the course of my life. He also taught me by example to always take time to respond to genuine inquiries, to always reinforce interest, and to take what we learn and pass it on whenever pos-
Why Is Dick So Weird?

Richard W. Malott

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SEX, ART, & PSYCHOLOGY

At the age of four, in the loft of our barn, I was seduced by an older woman, Miss G. She was five. She showed me her vagina—the weirdest thing my four-year-old eyes had ever seen. A few months later, she arranged a ménage à trois with me and Miss S, a three-year-old girl. Miss G had us take off our pants, hold hands, and dance in a circle. Miss S, had not yet acquired the sophistication to appreciate our ménage à trois (technically, to find our ménage à trois reinforcing); so she ran screaming into my house where our three mothers were playing bridge with the other members of the Converse, Indiana Bridge Club. It turns out our mothers were also not sophisticated enough to appreciate our ménage à trios; but what can you expect—Converse was just a small, rural farm town (population 987).

By junior high, I had become a skilled artist, copying pictures of dogs and horses. This allowed me to join my hero, John Miller, and become a charter member of the Converse Hobby Arts Club, an otherwise all-woman organization. And my greatest artistic achievement was tracing a picture of Wonder Woman¹ from Wonder Woman Comics. But I neglected to draw her Wonder Woman superhero costume. Instead, I creatively added nipples to her impressively large breasts, as well as a vagina to the center of her belly, where I thought vaginas belonged, despite my earlier experience with Miss G. However, because I’d come to understand the provincial nature of Converse, IN, I did not share this artistic creation with the ladies of our Hobby Arts Club.

As all the students in Converse High had cars and the cars had back seats, few virgins graduated from CHS. Unfortunately, I was one of those unhappy few. So you can imagine my shock and disgust (aversive reaction), when years after graduating, I discovered that God and/or Darwin had misplaced women’s vaginas.

Art has continued to be a major source of pleasure (reinforcement) for me, which may account for my writing and publishing the world’s first (and almost the last) behavior-analytic comic, Contingency Management in Education & Other Equally Exciting Places or I've Got Blisters on My Soul and Other Equally Exciting Places, featuring Captain Contingency Management, Behavior Man, and Behavior Woman. We published this with our funky little publishing company, Behaviordelia (being behaviorists and not believing in the psyche, we selected the name Behaviordelia rather than Psychedelia). However, appreciating my artistic limitations, the siblings Pat and Stu Hartlep drew the comics.²

For the last 60+ years, art has continued to be a major source of visual reinforcers for me, which may account for my creating and taking on the road the world’s first behavior-analytic slideshows (later PowerPoints) loaded with cool art. (In fact, these presentations may have just been an excuse to experience and share more cool art.³)

¹https://www.google.com/search?q=wonder+woman&biw=823&bih=445&source=lnms&tbm=isch&sa=X&ei=hKUMVJ3VEsqgyASqjYGwAg&ved=0CApQ_AUoAQ#q=wonder+woman&tbm=isch&tbs=itp:clipart
Yes, We Are Behaviorists

Like all the autobiographers in this book, I’m a behaviorist (a behavioral psychologist). We behaviorists don’t believe in the psyche, the mind, mental activity, none of that stuff. All we believe in is behavior, what a person actually does. The other stuff is just conveniently invented explanatory fictions. But our goal is to understand all humanity, strictly in terms of behavior, without reference to the mind and mental activity. So you can well imagine that this grandiose, behavioristic endeavor requires a high level of mental activity; I mean covert verbal behavior.

But we’re also a special type of behaviorist; we’re behavior analysts. Mainly what we do is analyze behavior in terms of the effects of a person’s behavior on their environment and the reciprocal effects of their environment on their behavior. I behave: I tell a really cool joke. And my behavior affects the environment: You acknowledge my comedic brilliance by rolling on the floor in hysteric laughter. And the reciprocal effect is that I’m likely to tell more jokes. Your laughing approval is music to my ears, a reward. In behavior-analytic jargon, your laughter is a reinforcer for me. And so I’ll be more likely to tell more jokes, because you rewarded (reinforced) my joke telling. And we call the relation between my joking and your laughing a reinforcement contingency. But, if you’d sneered and walked out of the room when I joked, that would have been a punishment contingency.

I apologize, gentle reader, for burdening you with this jargon, but we behavior analysts simply can’t function without our jargon (we even consider that a virtue!).

Preschool Fatalism

In part, I developed the concept of preschool fatalism when reading and thinking about efforts to help older children labeled autistic. That’s even more difficult than it is when we get to the children with our very intensive, careful, behavioral intervention during preschool; and even then, it ain’t easy. My analysis was that, once the child has acquired autistic values (e.g., the aversiveness of some sounds and human eye contact) and an autistic repertoire (e.g., tantruming and stimming) and has not acquired a more functional set of values and repertoire, it is really, really tough to retrain those values and that repertoire. (Yes, I know that many, if not most, argue that autism is a thing and that thing is biologically determined. And no, I’m not blaming the mamas, neither so-called refrigerator mamas nor oven mamas. Actually, I’m saying something that some might find even weirder, that it’s amazing the autistic values and autistic repertoires we all have learned don’t slip out of the closet more often than they do.)

And then preschool fatalism seemed to describe efforts to help students with poor language skills. If, before grade school, mama hadn’t talked to the child frequently, using a large vocabulary while she did so, he was essentially doomed to academic failure.6

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Imagination in Science

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One of my favorite science quotations is undated from Maria Mitchell who lived 1818–1889, the first professional woman astronomer in the United States, who said, “We especially need imagination in science. It is not all mathematics, nor all logic, but it is somewhat beauty and poetry.” I believe this applies much more than most of us may prefer to believe to the field of behavior analysis.
The early twentieth-century philosopher Charles Sanders Pierce wrote, “There is a kink in my damned brain that prevents me from thinking as other people think.”

As early as I can remember I shared that proclivity, an overwhelming desire to understand what made things around me function as they did, from how it was catepillars were able to chew pieces from, and digest a leaf, how baby loons seemed to immediately know how to climb on their mother’s backs in the water as she searched for food, and what caused the stunning blushing sky at dawn, which I later learned Homer had described as “rosy fingered dawn.”

That kink had to do with a scientific philosophical way of thinking. Pierce later added, “It is the man of science, eager to have his every opinion regenerated, his every idea rationalized, by drinking at the fountain of fact, and devoting all the energies of his life to the cult of truth, not as he understands it, but as he does not yet understand it, that ought properly to be called a philosopher.”

When growing up, I wondered many times where that mode of thinking arose within me, and finally accepted that I may never understand its origins. But I was inescapably drawn to natural science.

Among the many forward thinking things the nineteenth century physiologist Claude Bernard said and wrote, one encapsulates the main thrust of much of my professional work. “Our ideas are only intellectual instruments which we use to break into phenomena; we must change them when they have served their purpose, as we change a blunt lancet that we have used long enough....” B. F. Skinner’s and Claude Bernard’s approaches were fundamentally alike in most basic epistemological assumptions, but differing in the essential importance of Bernard’s views of reductionism, which Skinner rejected. In the coming pages it will become apparent that melding of Bernard’s and Skinner’s approaches has been much of my professional life’s work.

GROWING UP PIERCIAN

I had developed in a family with divided views about religion, my father’s and mine coming down on the atheist or agnostic side, my mother having been raised Roman Catholic, retaining a good dose of Thomistic mysticism in her outlook in daily life. She thrived on inexplicable mystical events and experiences. My mother was the daughter of a small town butcher and a home-maker mother, from a long line of devout Irish Catholics. She was a loving mother with a keen sense for what matters most in relationships. She had an artistic bent, but with no training or opportunity to refine her skills, had few ways to express herself other than needlework.

My father had grown up on a farm in the rocky glacial terrain of Northern Minnesota, and was very much an empiricist by inclination, though not based on formal education. Because of the Great Depression, neither parent attended school beyond 8th grade in order to help support their families. My father had been a head grower for a large florist in Minneapolis, where he was responsible for planning, planting, cultivating and nurturing all crops, a complex horticultural endeavor. Despite his limited formal education, he was

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accomplished, an intellectual sponge for new scientific information that would be useful in his work. He provided much of the standard for my progressive social ethical framework.

As a preadolescent I had begun to despair of ever finding a rational pathway to understanding the way the world actually operated. I was discouraged by widespread magical claims and culturally beliefs about the how the world functioned, which seemed foolish to me. It seemed obvious much of what some of my family members and others in my immediate community believed made little factual sense. I didn’t resent adults who held what seemed absurd ideas, because I realized they were doing their best to make their way in a world not of their choosing. They had created an imaginary world, one that was more comfortable for them with cryptic and inscrutable explanations of daily natural events. It was in this context, that I had been struggling to find a reality-based footing.

During my pre-teen and early adolescent years, without knowing much about psychology other than the little we learned in school social studies classes, I assumed it was largely quixotic mental voodoo. I had always been strongly drawn to the natural sciences, building telescopes, growing mold cultures and studying them under a microscope, and dissecting embalmed cats with latex injected blood vessels in our basement using a dissection manual from a used bookstore. I had made sketches of the moon seen through my refracting telescope, and of the black spores of bread mold exploding silently on agar dishes under my rented binocular microscope. Psychological phenomena seemed intangible to me, and I suspect implicitly assumed it to be unsuitable for scientific study.

Peering through the eyepiece of my first home made telescope propped in the crotch of an apple tree north of Minneapolis, a four inch diameter double convex lens taped into one end of a cardboard carpet tube, and a simple cheap eyepiece purchased from the back of a comic book for a few dollars, in the opposite end, I began to dawn on me that perhaps there was hope. The moon’s brilliantly snowy white disc wavered at first, then stood still in the visual field as I steadied the cardboard tube. In the night’s refreshing silence I realized there was only the moon and me, no one in the 239 thousand intervening miles interpreting what I was seeing. There was no magic. I made out pale shadows of the mountains, largest craters and brighter polar caps. I had privileged access to a reality that others didn’t seem to understand existed, at least the reality as I was seeing it. It was breathtaking. No silliness, no crazy ideas about men on the moon, just crisp, clear unabashed reality, witnessing with my own eyes, a remarkable object hanging in the inky darkness.

Thinking back to Pierce, it became apparent I was cast in the mold he described, believing that “nature... is a cosmos, so admirable, that to penetrate to its ways seems to them the only thing that makes life worth living.” In hindsight, I realized my substitute for a religious deity was a dispassionate Nature that guarded its secrets tenaciously, but without malice. I eventually concluded that the natural world only shared its enigmas with those sufficiently committed and patient to gradually experimentally seduce them from their hiding places so they became observable. Once discovered, the scientist devised a way to parse them into their natural components, as Plato wrote in Phaedrus, to “cut nature at its joints” to achieve a fuller understanding. After having done so, then reassembling them was the ultimate goal. That was the direction I needed to pursue. I was unable to discuss