The Expanding Role of Behavior Analysis and Support

Current Status and Future Directions

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Although many of the pioneers of behavior analysis thought on a large scale and encouraged others to do so, most behavior analytic projects have remained small scale. The intent of this article is to urge the application of behavior analytic principles on a large scale. This article begins with a brief history of applied behavior analysis. It then describes some early behavior analysts who thought big and describes several examples of large-scale behavioral projects. It then shows how behavior analysis fits well with the public health model and describes how behavior analytic principles can be implemented broadly to combat public health problems. The article ends with some practical advice for behavior analysts on how to think big and speculates on the future of behavior analysis.

Keywords: *thinking big; history; pitfalls*

The field of applied behavior analysis grew out of basic behavior analysis laboratories in which learning theory was explored primarily with rats and pigeons, although many other species were also studied. The purpose of this discussion is to take the reader from those basic roots through a brief history of applied behavior analysis (ABA). In doing so, we highlight the accomplishments of ABA, cite exhorta-

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tions of some pioneers to think big, describe some big ideas and outcomes, and focus on the methodological strengths of ABA and how well it fits the public health model. By thinking big, we mean the application of behavior analysis at macropopulation levels in settings such as social services, schools, and the workplace. Additionally, we suggest some of the pitfalls of ABA, how to avoid them, and in doing so, expand the applications of ABA. Finally, we predict where the future could lead by big thinking about ABA.

HISTORICAL ACCOMPLISHMENTS OF ABA

The roots of ABA lie at the University of Washington in the early 1960s. It was there that Harris, Johnston, Kelley, and Wolf (1964) demonstrated the effects of social reinforcement by preschool teachers on the behavior of a withdrawn child. Also, Wolf, Risley, and Mees (1964) described their seminal work with Dickey, a 3½-year-old child with autism who had serious behavioral excesses and deficits, all of which were complicated by the fact that he had cataracts that needed to be removed and he would have to wear glasses after his surgery. Wolf et al. (1964) accomplished remarkable behavior changes with Dickey and paved the way for all the advances we appreciate today in behavioral technology that have provided children with autism opportunities to learn that were unavailable prior to 1964.

Earlier, work was being reported from psychiatric institutions with adults who had schizophrenia. Ayllon and Michael (1959) described the use of psychiatric nurses who were taught simple reinforcement strategies to improve the behavior of institutionalized patients in Canada. Later, similar work was systematically replicated in California (Atthowe & Krasner, 1968) and Illinois (Schaefer & Martin, 1966). Such behavioral psychosocial programs have become common in schizophrenia, and behavior analysis has become the mode intervention in developmental disabilities and autism. Many applications have also occurred in education, health, and even in community issues such as seat belt usage and litter control.

The *Journal of Applied Behavior Analysis* appeared in 1968 and became the primary outlet for work covering these new applications.

Subsequently, *Behavior Modification* appeared, and then specialty journals with a behavioral bent appeared in education (*Education and Treatment of Children*), children (*Child and Family Behavior Therapy*), developmental disabilities (*Behavioral Interventions* and *Journal of Positive Behavior Interventions*). A host of other journals have published many or even in some cases, a majority of articles reflecting an applied behavioral focus. Most of the published work in ABA, in part because of the very nature of the field, has been published using single-case research designs with $n = 1$ or multiple baselines with a few subjects, or small grouped data within single-case designs. These designs have high internal validity and limited external validity. In addition to good internal validity, the single-case approach has allowed applied researchers to learn more about individuals who participate, that is to say, to learn more about what works in an intervention and how to tinker, tweak, and fix an errant intervention than what is learned or not learned about participants in group designs. However, this advantage, we suggest, has also served in part to be a disadvantage.

THINKING AND BEING BIGGER

It might be concluded that ABA has always been and continues to be small in focus in terms of the applied research or the theoretical underpinnings. That has not, however, been the case. Skinner published his Utopian novel, *Walden Two*, in 1948. In it, he describes a society, a community, of 1,000 people whose lives are arranged by behavioral principles. Several components of *Walden Two* (the name of the community and the book) are worth noting. Given that it was written in the late 1940s, it is remarkable that the community described by Skinner was completely egalitarian. Although he evaded race (it is not clear if there was racial and ethnic diversity in this hypothetical community) and homosexuality, there is complete egalitarianism between the sexes. Furthermore, in a time in U.S. history when large economic and geographic (suburban) expansion was about to begin, Skinner was recognizing the value of small self-sufficient, environmentally sensitive communities.

Also, the applications of behavior analysis have historically focused primarily on the consequence side of Skinner's three-term contingency (antecedents, behaviors, and consequences); however, the primary principles that guide *Walden Two* are almost exclusively based on what Skinner called a prosthetic environment, one in which stimuli and events are arranged to maximize productive, effective behavior. For example, the food service is designed to reduce waste, be ecologically sound, and yet create a pleasant, relaxing atmosphere for the residents of Walden Two. Thus, through fiction, in *Walden Two*, Skinner described an entire community based on behavioral principles.

In 1976, the American Psychological Association bestowed on Nate Azrin its Award for Distinguished Contributions for Applications in Psychology. This was based on his productivity and creativity in developing the token economy, programs for training individuals with developmental disabilities, toilet-training programs, behavioral marital adjustment training, a program to overcome stuttering, treatment for tics, a community-based intervention for alcohol abuse, and a group approach for job finding. In his acceptance address, Azrin (1977) suggested that work in psychology in general and behavior analysis (what he referred to as learning therapies) be learning based but outcome oriented. In doing so he argued that too much of psychology was focused on methodology at the expense of outcome. Implicit in these remarks was that much research was (and is) conducted for the convenience of the researcher rather than aiming at big and broad clinical (applied) outcomes. Among the negative sequelae of such a methodological approach, Azrin asserted that researchers would fail to generalize beyond their narrow niches and would be unlikely to venture into new topical arenas. In making his remarks, Azrin did not suggest abandoning rigorous behavioral methodologies. In fact, he noted that pursuing methodological rigor was one of his two guiding tenets. However, the other guiding tenet for Azrin has been developing effective large-scale, widely used interventions.

Also addressed by Azrin was the notion that effectiveness comes mostly from multicomponent interventions and that seldom is there or should there be the luxury of conducting a component analysis to determine which parts of such packages may be more important than

others. Again, that is not to dismiss the possible relevance of component analyses, which would include cost measures, but to suggest that they be conducted only after intervention packages have shown clear effectiveness.

Other aspects of good applied research suggested by Azrin were durability as a measure of effectiveness, the ability and opportunity to make individual variations in an intervention program, and social validity. Finally, Azrin cautioned about being overly wed to any set of principles and to get beyond $n = 1$ work into large-scale replications. Thus, Azrin provided by word and deed an example of thinking big in behavior analysis.

Another big thinker in behavior analysis has been Todd Risley. In addition to his early pioneering work in autism, Risley has expanded his repertoire to include landmark analyses of children's academic and social skills as a function of parent-child interactions. In fact, his book with Betty Hart, *Meaningful Differences* (Hart & Risley, 1995), received a nomination for a Pulitzer prize. Other applications by Risley have included examinations of living environments such as nursing homes and infant and toddler care and even included a stint as director of Alaska's Department of Mental Health and Developmental Disabilities. Thus, Risley's career has also been one of thinking outside of the box and applying the principles and designs of ABA to novel areas and having large-scale impact.

BIG BEHAVIORAL PROJECTS

The first large-scale behavioral project with several replications was Achievement Place (Phillips, 1968), a community-based, teaching family model aimed at youth involved in the early stages of criminal activity and preventing further activity in such. Achievement Place truly represents a model of careful self-scrutiny and fine-tuning that subsequently allowed for systematic replications and expansion.

Montrose Wolf and colleagues (1976) established Achievement Place in 1967 in Lawrence, Kansas. It was a community-based home environment administered by rigorously trained teaching parents. The first home could accommodate up to eight boys who were court-

ordered for intervention. Consistent with ABA principles, two hallmarks of Achievement Place were the extensive training the house parents received and the use of a sophisticated token economy to manage the boys' behavior. Teaching parents were taught to consistently identify and respond to boys' positive and negative behaviors. Boys were awarded points for various activities including cleaning one's room, maintaining a neat personal appearance, and doing dishes. Likewise, points could be lost for disobedience, aggressive behaviors, and tardiness, along with other unwanted behaviors.

Wolf and colleagues (1976) conducted a series of experiments using single-subject research designs to refine the strategies used to modify boys' behaviors in the Achievement Place house. For example, studies were conducted to evaluate different reinforcement systems for various behaviors including cleaning one's room, using appropriate language, saving money, and studying (Wolf et al., 1976). Similarly, experiments were conducted to examine the effect of self-government systems and elected manager systems on boys' behavior. These experiments allowed the Achievement Place program to be modified and fine-tuned for maximum effect.

In addition to evaluation of its key components, Achievement Place has also been evaluated for its impact on boys' behavior outside of the home. Methodological constraints (i.e., small sample size and lack of randomization) limit the conclusions that can be drawn from the outcome data, but boys treated in the Achievement Place program had reduced police and court contact, reduced institutionalization, and improved school attendance as compared to boys treated in institutions.

The Achievement Place model has been replicated nationwide. The replication of the model has been facilitated by the development of an extensive year-long training curriculum for teaching parents (Braukmann & Blase, 1979) that includes two 1-week workshops, periodic consultations by phone and in-home, and formal evaluations. Regional training sites were established for training teaching parents, and in 1975 a national organization, the Teaching-Family Association (www.teaching-family.org), was formed to ensure the quality of the trainings by the regional training sites. By 1982, almost 800 couples

had been trained to work in 303 Teaching-Family group homes located in 32 different states (Fixsen, Blase, Timbers, & Wolf, 2001). Kirigin, Braukmann, Atwater, and Wolf (1982) compared 12 replications of the Achievement Place group homes to 9 comparison group homes, and found favorable effects of the Achievement Place homes during the intervention period on alleged criminal offenses, percentage of youth involved in those offenses, and consumer satisfaction (differences were not significant at posttreatment).

Child maltreatment has been another topic area with a large-scale effort. Project 12-Ways (Lutzker, 1982), an ecobehavioral approach to prevention and intervention, was begun in July, 1979 and has been operating continuously since in rural southern Illinois. The model originally offered 12 services (hence, the name) to 27 counties. Subsequently, some of the services have been changed and modified, and the project now serves 10 to 15 counties. The original 12 services were (a) parent-child training, (b) stress reduction, (c) self-control training for parents, (d) basic skills training for children, (e) activities planning, (f) reciprocity (relationship) counseling, (g) alcohol abuse referral, (h) job finding, (i) money management, (j) health and safety training, (k) multiple setting behavior management, and (l) prevention. These services were offered based on the ecobehavioral concepts that to tackle a pervasive problem such as child maltreatment, multifaceted assessments, and skills training would need to be offered. Over the years, the effectiveness of this program has been shown through multiple evaluation methods including single-case experiments with one family (Campbell, O'Brien, Bickett, & Lutzker, 1983), single-case experiments with multiple families (Tertinger, Greene, & Lutzker, 1984), and outcome evaluations using recidivism as the dependent measure (Lutzker & Rice, 1987). These studies suggest that families are at lowered risk of recidivistic child maltreatment if they are exposed to the Project 12-Ways model than if they are offered other services in the region. It has also been suggested that Project 12-Ways is referred more difficult families than have comprised the comparison groups (Wesch & Lutzker, 1991).

Project SafeCare (Lutzker, Bigelow, Doctor, & Kessler, 1998) was a systematic replication of Project 12-Ways. Whereas Project 12-

Ways is mostly rural, Project SafeCare was conducted in the urban San Fernando Valley of Los Angeles, California, with mostly Latino parents. Three of the most commonly used protocols from Project 12-Ways were modified and became the services offered by Project SafeCare: (a) bonding (teaching planned activities training to parents), (b) home safety, and (c) child health care skills. These services were delivered in five sessions each, making the entire intervention 15 sessions, a more succinct approach than Project 12-Ways. As with Project 12-Ways, single-case data with individual and multiple families validated the effectiveness of the protocols in producing important changes in parent-child interactions, in reductions in home safety hazards accessible to children (Mandel, Bigelow, & Lutzker, 1998), and in the parents' abilities to identify, report, or self-treat the illnesses of their children (Bigelow & Lutzker, 2000). In a quasi-experimental design, 41 families who completed Project SafeCare services were compared with 41 matched families in the same service area who received other family preservation services. The measure of interest was survival. That is, after 3 years, what percentage of the families avoided repeated reports of child maltreatment? The survival data showed that 54% of the comparison group survived as compared to 85% of the Project SafeCare sample, a difference significant at the $> .001$ level (Gershater-Molko, Lutzker, & Wesch, 2002).

These ecobehavioral models aimed at prevention and intervention in child maltreatment are examples of applied work at a big and dirty level. By *big*, we mean that they serve numerous participants during a protracted period and that they involve training and supervising numerous staff over the years. Through replication and outcome evaluations, they have shown efficacy and effectiveness. By *dirty*, we mean that they are among the most difficult kinds of applications to carry out. In the case of prevention and intervention in child maltreatment, we are dealing with a clientele known to be resistant to services, often in denial that they require services, and mostly living in abject circumstances. All of theses services have historically been provided in home and in-situ. Thus, there are logistics and safety issues for staff, problems of appointment keeping, and a multitude of other social and ecological factors that make such work considerably chal-

lenging. These difficulties notwithstanding, like the Achievement Place model, the ecobehavioral model for prevention and intervention in child maltreatment has been conducted with a continuous eye on remaining dynamic and self-evaluative. Thus, there has been ongoing attempts to improve staff training, identify staff performance criteria, improve and master the fidelity of protocol deliveries for staff and performance criteria for the participants, revalidate protocols, and look for the most effective and efficient empirically based systems for delivery and behavior change.

A third example of large-scale implementation of programs based on behavior modification principles is the work of the May Institute. The May Institute is a private, nonprofit organization that Dr. Jacques May and his wife Marie Ann founded in 1955 as a school to care for children with autism. The May Institute has grown and expanded their repertoire of services over the years and now consists of a network of more than 170 programs serving more than 18,000 individuals and families per year. The May Institute is affiliated with more than 40 universities, hospitals, and human service agencies. May Institute programs serve individuals and families with a range of needs including developmental disabilities, brain injury, and mental and physical health needs. The May Institute's Positive Schools Program provides on-site consultation and training for schools in effective instruction and behavior management practice to promote students' achievement. The Positive Schools Program teaches behavior management practices to teachers and parents, along with schoolwide plans to support the program. The Positive Schools Program has been implemented in public and charter schools in several locations around the country; initial results show that students in the Positive Schools Program report increased engagement and fewer off-task behaviors and discipline problems after the program was implemented (Putnam, Handler, & Luiselli, 2003). Finally, the May Institute's Center for Applied Research conducts research activities within the May Institute's spectrum of behavioral services. The Center has published more than 200 articles since 1978.

A final example of a big behavioral project is the Fast Track Project, a multisite project aimed at testing the efficacy of an intervention

targeted toward children at high risk for developing conduct disorder. It is based on a developmental model that posits that antisocial behavior is multiply-determined in that child, parent, and environmental factors can contribute to a child's antisocial behavior. Accordingly, the intervention includes components for the child, parent, and the family-school relationship. The child component focuses on social skills training and academic tutoring, and the parenting component focuses on child behavior management strategies, including use of praise and timeout and promoting a positive parent-school relationship, including regular communication with the child about school and positive communication and relationships with the child's teachers. In addition, Fast Track provides a teacher-led classroom intervention that the entire class receives, focusing on social understanding and self-control. Thus, Fast Track integrates universal services (all children) and selective services (at-risk children) into a single model involving the child, parents, and school.

The Fast Track Program was initiated in 1992 in four culturally diverse communities. The project enrolled families whose 1st graders were deemed to be the riskiest 10% of their cohort based on parent and teacher reports. Families were enrolled in the intervention when the target child entered 1st grade, and the intervention will continue through the 10th grade (the universal interventions end after 5th grade), with intensive interventions during the transition from to elementary school and middle school. Families will be followed until the child completes 10th grade.

Data from the first year of the Fast Track Project (Conduct Problems Prevention Research Group, 1999) indicate that children who received the intervention, as compared to control children, had better social skills, more positive peer relations, better reading skills, and better social and emotional coping skills. There was also partial evidence that intervention children displayed fewer conduct problems. Parents who received the intervention also benefited more than parents assigned to the control group in that they demonstrated more positive involvement in their children's schools, more effective discipline techniques, and more positive relations with their children.

BEHAVIOR ANALYSIS METHODOLOGY

As noted, single-case research design has been a hallmark of ABA. We have already cited its advantages. Those advantages noted, ABA has shied from and occasionally eschewed group designs. Doing so has probably inhibited ABA's impact in the broader professional community. The large projects described above have made efforts at broader outcome analyses. For example, surely the mode for ABA and behavior modification services today is the autism community. Yet the only truly comprehensive large outcome study was conducted by Lovaas (1987) and it, in fact, has been controversial. More large outcome studies in autism are necessary. Unfortunately, the paucity of large outcome studies in ABA has limited its acceptance in the broader professional community.

The public health model and ABA represent a nearly perfect fit for one another. As can be seen in Figure 1, the first step in the model is to define the problem, that is, in behavior analysis terms, to operationalize the problem. The second step is to identify risk and protective factors. This is not unlike behavioral, functional, and ecobehavioral assessments. The third step is to evaluate and intervene, the same process as in ABA, although the evaluation methods sometimes differ. Finally, the fourth step in the public health model is the dissemination and implementation of effective programs. This is akin in behavior analysis to generalization. We know that our aim is to produce generalization of effects across behaviors, settings, and time. Additionally, we should strive to disseminate effective programs broadly, as has generally been the case with some of the programs described earlier; however, ABA has not done an especially good job in widespread dissemination of programs that we know to be effective.

There are several examples of how the public health model has successfully moved from surveillance to risk factor research to intervention development to dissemination. One example comes from tobacco use. Today, smoking is the leading preventable cause of death and disability in the United States. As smoking became more popular during the 20th century, a corresponding increase in cases of lung cancer was

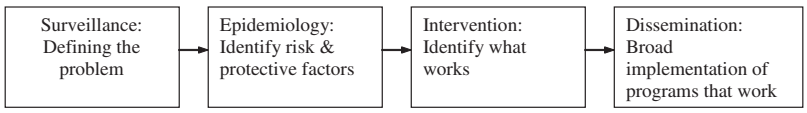

Figure 1. The public health model.

noted. Smoking was recognized as a problem in the 1940s and 1950s when epidemiologic studies linked cigarette smoking to lung cancer (Wynder & Graham, 1950). In 1964, the advisory committee to the U.S. Surgeon General concluded that cigarette smoking is a cause of lung cancer in men. This led to substantial public health efforts to take steps to reduce the prevalence of smoking. These efforts included education programs, public health campaigns, and policy changes (e.g., warning label requirements on cigarettes). These prevention efforts have resulted in a corresponding shift in smoking prevalence. Annual per capita cigarette consumption increased from 54 cigarettes in 1900 to 4,345 cigarettes in 1963, and then decreased to 2,261 cigarettes in 1998 (Giovini et al., 1994; U.S. Department of Agriculture, 1999).

A more recent example of the successful implementation of a public health model comes from HIV prevention activities. The HIV epidemic was recognized as a problem in the 1980s. Epidemiologic studies showed that the disease occurred primarily in gay men, which led to studies to determine behavioral risk factors for HIV. Next, specific interventions were created and tested to change the attitudes and behaviors of gay men (Kelly, St. Lawrence, Betts, & Brasfield, Hood, 1990; Kelly et al., 1991). Broad prevention efforts were then targeted at the gay community, and this resulted in behavior change and a corresponding drop in the incidence of HIV infection among gay men (Center for Disease Control and Prevention, 2001).

The public health model has fostered wide-scale behavior change. ABA offers well-honed behavior change strategies that have shown high internal validity. Combining the public health approach with ABA would likely produce even more effective behavior change in large populations.

BEHAVIOR ANALYSIS PITFALLS

Avoid heroes. This is difficult to advise because heroes inspire us and have helped us move our profession and careers. Nonetheless, we should be wed to methodologies, science, exploration, be willing to change, be open to new methods and ideas, and be constantly inquisitive. Hero worship tends to inhibit some of these important behaviors. Our heroes are often right, but they are also often wrong. If we cling to their dogmas, we may inhibit our willingness to explore, to be inquisitive, or may be blinded to new ideas or mistakes in older theories. Most importantly, we must be open to data that may suggest holes in previous research or theories of our heroes. It would seem that the greatest respect we could show to current and late pioneers is to place the data, the science, over adherence to incomplete or unevaluated theories of some of our pioneers and innovators.

Avoid jargon. In our professional publications and to audiences who understand jargon, it may be appropriate to use; however, there are many groups who have no clue to what we may be referring. This includes other professionals who are not behavior analysts. Thus, the use of jargon can only serve to confuse or alienate others. We would particularly caution against the language of Skinner's (1957) *Verbal Behavior.* Imagine how the server behind one's favorite fast food counter would respond to someone who said, "I am manding you to get me a cheeseburger," or "I am tacting that I am hungry!" One could possibly get arrested for saying something about autoclitics! Any similar use of terms such as *conditioned reinforcers*, discriminative stimuli (also known as *SD*s), *chaining*, and so forth should be avoided. Our job in behavior analysis is to disseminate that from our technology that is clearly effective, to assimilate into other professions and into the community, rather to isolate ourselves as elitists with a peculiar language. Judy Favell (Morris et al., 2001) has suggested that "we have to reach out with a language and approach that the world understands" (p. 143).

Grow up (be literature savvy). In the published literature and in reviewing for journals, too often have we seen cursory literature reviews, or those that only focus on recent articles, thus avoiding, or

perhaps being unaware of, seminal work in a given area. For example, those who think of functional analysis as if it is a new concept seem to ignore the work of Kanfer and Saslow (1969), who described a model for ecological assessment.

Although in the history of science, behavior analysis is still relatively young, it does now have a literature that is over 40 years old. There are many empirical and applied gems in the early literature that should be consulted when planning or conducting research and service and writing a manuscript. Articles such as Baer, Wolf, and Risley (1968), "Some Current Dimensions of Applied Behavior Analysis" and Stokes and Baer (1977), "An Implicit Technology of Generalization" should be regularly consulted, as they are as germane today as the days they were written.

Grow up (be discipline tolerant). Behavior modification and ABA has very much to offer in many domains; however, the field has had a tendency to isolate itself and be intolerant of other disciplines. For example, developmental psychology has much to offer for any behaviorist who works with typically developing children or children with developmental disabilities. Research in social psychology and anthropology also offers much for the applied researcher in learning about the behavior of groups and other cultures. Biobehavioral research will continue to lead us to more important information on how some of our behavior is driven by biological factors. This information will never diminish the need for the applications of behavior modification. Also, an understanding of psychopharmacology becomes increasing useful as that science continues to advance. ABA is compatible with other broad population-level perspectives, particularly in violence prevention. For example, at the Center for Disease Control and Prevention (CDC), we are exploring crime prevention through environmental design. Potentially, there are procedural and methodological uses of ABA in such an approach.

Get your hands dirty. Behavior modification and ABA continues to have unlimited potential applications. There is nary an area of application that could fail to benefit from these strategies. Currently and understandably, the field is largely dominated by autism and other

developmental disabilities. Many advances have also occurred in education, youth violence prevention, and child maltreatment, to name just a few. However, it has been rare that large-scale applications have been attempted. Work in areas such as youth violence, child maltreatment, and any other large-scale interventions requires flexibility with research designs, struggles with obtaining reliability data, and difficulty, if not often impossibility, with creating controlled environments that might be possible in other settings. For example, much clinic-based work in parent training offers a training room free of distractions for the parent and child. In-home work in child maltreatment, on the other hand, requires that the applied researcher adapt to the usually chaotic home environment found in families at risk or indicated for child maltreatment. In these homes, it is not uncommon to find the television on at all times. Thus, rather than asking the parent to turn off the television, they are requested to turn it down. To turn off the television would be an aggravation for the parent and would create an analogue rather than natural environment for training. It is also common that people come and go in the house during in-home parent training. Again, this represents the natural environment and an inconvenience for the trainer. Nonetheless, given that it is the natural environment, it can be expected that training might be more effective than expecting generalization from an environment that has become artificial.

Thus, working in new environments and tackling large projects requires considerably more flexibility by the applied researcher than work in more closed easier environments. But, getting ones hands dirty allows for advances that are not possible by staying conservative in technique and setting and thus in broad application of our effective technology.

THE CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

The CDC is the nation's public health agency and is charged with conducting prevention activities on a range of public health issues. The CDC's charge is to put basic science regarding public health into action. The CDC was recently reorganized into four coordinating centers focused on infections disease; health promotion; public health

information and services; and environmental health, occupational health, and injury prevention. Each coordinating center contains centers and divisions that focus on particular health problems or issues (e.g., HIV and AIDS, cancer, violence). In line with the public health model, the CDC conducts surveillance, risk factor research, research to develop and test prevention programs, and disseminates information and programs. Within the National Center for Injury Prevention and Control is the Division of Violence Prevention (DVP), which focuses on preventing injuries from violence including intimate partner violence, sexual violence, youth violence, child maltreatment, and suicide. DVP is organized according to the public health model with three branches. The Etiology and Surveillance Branch conducts surveillance activities and risk factor research around violence; the Program Development and Evaluation Branch develops and tests interventions to prevent violence; the Program Dissemination and Implementation Branch focuses on implementation and dissemination of successful programs. The work of the DVP is conducted by behavioral, social, and medical scientists representing a variety of disciplines and research strategies. The amalgam has produced dynamic research and services to states in the efforts to prevent violence. ABA principles play a role in many of the intervention projects conducted by DVP.

FUTURE EFFORTS

Applications of behavior analysis have had no boundaries when creative researchers and service providers have looked to new horizons. In addition to developmental disabilities and education, behavior analysis has been applied to consumer and safety issues, child maltreatment, mental health, traumatic brain injury, rehabilitation, medicine, and several other venues. But, the applications have often been modest. Recently, two behaviorally oriented psychologists were appointed as assistant secretary of education and assistant secretary of health and human services. At the CDC, behavioral psychology is having an influence in violence prevention. Part of the recommendation for thinking big includes the suggestion that behavior analysts

should have ambitions for high and important roles in government. Again, our focus on performance criteria, the ability to collect valid measures of performance, and the ability to conduct programmatic fidelity analyses creates another natural fit between our skills and the needs of government.

One area that behavior analysts must explore is formal cost analyses in the form of cost-benefit analyses and cost-effectiveness studies. Unfortunately, proper and formal efforts of this kind have eluded most human service programs. Yet times will always demand increased accountability. Cost analyses represent the literal putting one's money where one's mouth is.

Technology and behavior therapy have come together in virtual reality treatments for anxiety-related disorders. For example, virtual reality treatments have been successfully used to treat fear of flying, fear of public speaking, and post-traumatic stress disorder symptoms for Vietnam veterans (Anderson, Rothbaum, & Hodges, 2003; Rothbaum, Hodges, Anderson, Price, & Smith, 2002). Similarly, the future will see more of the natural fit between behavior analysis and technology. The best training strategies in behavior analysis have always included breaking learning tasks into small, easy to learn components and providing immediate feedback for performance. Computer-assisted technology and interactive programs will burgeon in behavior analysis because of this natural fit.

The future holds no boundaries for ABA if it can grow with other technologies and if its researchers and practitioners are willing to be true scientists by accepting the findings and practices of other relevant disciplines and display a willingness to think big, be big, and get dirty.

REFERENCES

Anderson, P., Rothbaum, B. O., & Hodges, L. F. (2003). Virtual reality in the treatment of social anxiety: Two case reports. *Cognitive and Behavioral Practice, 10,* 240-247.

Atthowe, J., & Krasner, L. (1968). Preliminary report on the application of contingent reinforcement procedures (token economy) on a "chronic" psychiatric ward. *Journal of Abnormal Psychology,* 73, 37-43.

Ayllon, T., & Michael, J. (1959). The psychiatric nurse as a behavioral engineer. *Journal of the Experimental Analysis of Behavior, 2*, 323-334.

Azrin, N. H. (1977). A strategy for applied research: Learning based but outcome oriented. *American Psychologist*, *32*, 140-149.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, *1*, 91-97.

Bigelow, K. M., & Lutzker, J. R. (2000). Training parents reported for or at risk for child abuse and neglect to identify and treat their children's illnesses. *Journal of Family Violence*, *15*, 311-330.

Braukmann, C. J., & Blase, K. (Eds.). (1979). *Teaching-parent training manuals* (Vols. 1-2). Lawrence, KS: University of Kansas Printing Service.

Campbell, R. V., O'Brien, S., Bickett, A., & Lutzker, J. R. (1983). In-home parent-training, treatment of migraine headaches, and marital counseling as an ecobehavioral approach to prevent child abuse. *Journal of Behavior Therapy and Experimental Psychiatry*, *14*, 147-154.

Centers for Disease Control and Prevention (2001). *HIV prevalence trends in selected populations in the United States: Results from National Serosurveillance, 1993-1997.* 1-51.

Conduct Problems Prevention Research Group. (1999). Initial impact of the fast track prevention trial for conduct problems: II. Classroom effects. *Journal of Consulting and Clinical Psychology*, *67*, 648-657.

Fixsen, D. L., Blase, K. A., Timbers, G. D., & Wolf, M. M. (2001). In search of program implementation: 792 replications of the teaching-family model. In G. A. Bernfeld, D. P. Farrington, & A. W. Lescheid (Eds.). *Offender rehabilitation in practice: Implementing and evaluating effective programs*, (pp. 149-166). New York: John Wiley & Sons.

Gershater-Molko, R. M., Lutzker, J. R., & Wesch, D. (2002). Using recidivism data to evaluate Project SafeCare: Teaching bonding, safety, and health care skills to parents. *Child Maltreatment*, *7*, 277-285.

Giovini, G. A., Schooley, M. W., Zhu, B., Chrison, J. H., Tomar, S. L., Peddicord, J. P., et al. (1994). Surveillance for selected tobacco-use behaviors—United States, 1900-1994. In *CDC Surveillance Summaries, November 18, 1994. Morbidity and Mortality Weekly Reports*, *43*, 1-43.

Harris, F. R., Johnston, M. K., Kelley, C. S., & Wolf, M. M. (1964), Effects of positive social reinforcement on regressed crawling of a nursery school child. *Journal of Educational Psychology*, *55*, 35-41.

Hart, B., & Risley, T. (1995). *Meaningful differences in the everyday experiences of young American children.* Baltimore: Paul H. Brookes.

Kanfer, F. H., & Saslow, G. (1969). Behavioral Diagnosis. In C. M. Franks (Ed.), *Behavior therapy: Appraisal and status.* New York: McGraw-Hill.

Kelly, J. A., St. Lawrence, J. S., Betts, R., Brasfield, T. L., & Hood, H. V. (1990). A skills-training group intervention model to assist persons in reducing risk behaviors for HIV infection. *AIDS Education & Prevention*, *2*, 24-35.

Kelly, J. A., St. Lawrence, J. S., Diaz, Y. E., Stevenson, L. Y., Hauth, A. C., Brasfield, T. L., et al. (1991). HIV risk behavior reduction following intervention with key opinion leaders of population: An experimental analysis. *American Journal of Public Health*, *81*, 168-171.

Kirigin, K. A., Braukmann, C. J., Atwater, J. D., & Wolf, M. M. (1982). An evaluation of teaching-family (Achievement Place) group homes for juvenile offenders. *Journal of Applied Behavior Analysis*, *15*, 1-16.

Lovaas, O. I. (1987). Behavioral treatment and normal education and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, *35*, 3-9.

Lutzker, J. R., Bigelow, K. M., Doctor, R. M., & Kessler, M. L. (1998). Safety, health care, and bonding within an ecobehavioral approach to treating and preventing child abuse and neglect. *Journal of Family Violence*, *13*, 163-185.

Lutzker, J. R., Frame, R. E., & Rice, J. M. (1982). Project 12-Ways: An ecobehavioral approach to the treatment and prevention of child abuse and neglect. *Journal of Applied Behavior Analysis*, *5*, 141-155.

Lutzker, J. R., & Rice, J. M. (1987). Using recidivism data to evaluate Project 12-Ways: An ecobehavioral approach to the treatment and prevention of child abuse and neglect. *Journal of Family Violence*, *2*, 283-290.

Mandel, U., Bigelow, K. M., & Lutzker, J. R. (1998). Using video to reduce home safety hazards with parents reported for child abuse or neglect. *Journal of Family Violence*, *13*, 147-162.

Morris, E. K., Baer, D. M., Favell, J. E., Glenn, S. S., Hineline, P. N., Malott, M. E., et al. (2001). Some reflections on 25 years of the Association for Behavior Analysis: Past, present, future. *The Behavior Analyst*, *24*, 125-146.

Phillips, E. L. (1968). Achievement place: Token reinforcement procedures in a home-style rehabilitation setting for per-delinquent boys. *Journal of Applied Behavior Analysis*, *1*, 213-223.

Putnam, R. F., Handler, M. W., & Luiselli, J. K. (2003). Positive schools: A behavioral consultation, intervention, and prevention approach to student discipline. *Psychiatric Services, 54,* 1039.

Rothbaum, B. O., Hodges, L., Anderson, P. L., Price, L. & Smith, S. (2002). 12-Month follow-up of virtual reality exposure therapy for the fear of flying. *Journal of Consulting and Clinical Psychology*, *70*, 428-432.

Schaefer, H. H., & Martin, P. L. (1966). Behavioral therapy for "apathy" of hospital schizophrenics. *Psychological Reports*, *19*, 1147-1158.

Skinner, B. F. (1948). *Walden Two*. New York: MacMillan.

Skinner, B. F. (1957). *Verbal Behavior.* New York: Appleton Century Crofts, Inc.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*, *10*, 349-367.

Tertinger, D. A., Greene, B. F. & Lutzker, J. R. (1984). Home safety: Development and validation of one component of an ecobehavioral treatment program for abused and neglected children. *Journal of Applied Behavior Analysis*, *17*, 159-174.

U. S. Department of Agriculture, Economic Research Service. (1999). Tobacco situation & outlook. *TBS-241.* Washington, DC: U.S. Department of Agriculture.

Wesch, D., & Lutzker, J. R. (1991). A comprehensive 5-year evaluation of Project 12-Ways: An ecobehavioral program for treating and preventing child abuse and neglect. *Journal of Family Violence*, *6*, 17-35

Wolf, M. M., Phillips, E. L., Fixsen, D. L., Braukmann, C. J., Kirigin, K. A., Willner, A. G., et al. (1976). Achievement Place: The teaching-family model. *Child Care Quarterly*, *5*, 92-103.

Wolf, M. M., Risley, T., & Mees, H. (1964). Application of operant conditioning procedures to the behavior problems of an autistic child. *Behavioral Research Therapy*, *1*, 305-312.

Wynder, E. L., & Graham, E. (1950). Tobacco smoking as a possible etiologic factor in bronchiogenic carcinoma: A study of 684 proven cases. *Journal of the American Medical Association*, *143*, 329-336.

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