

Behavioral and Time-Series Approaches

MARK A. MATTAINI, LEONARD A. JASON, AND DAVID S. GLENWICK

Behavioral community psychology attempts to understand and change community problems through the application of behavioral theory and technology (Bogat & Jason, 2000; Fawcett, Mathews, & Fletcher, 1980). Early on, several textbooks describing this field were published (e.g., Glenwick & Jason, 1980; Nietzel, Winett, MacDonald, & Davidson, 1977), as well as a special issue of the *Journal of Community Psychology* (Glenwick & Jason, 1984) and later updates (Glenwick & Jason, 1993). Also, in 1987 a reprint series from the *Journal of Applied Behavior Analysis* (Greene, Winett, Van Houten, Geller, & Iwata, 1987) on behavior analysis in the community was published.

During this early period, behavioral methods had been used in a wide variety of community interventions, such as increasing immunization of preschoolers (Yokley & Glenwick, 1984), providing peer tutoring in elementary schools (Jason, Frasure, & Ferone, 1981), establishing alternative environments for delinquent youth (Fixsen, Wolf, & Phillips, 1973), increasing blood donations (Ferrari, Barone, Jason, & Rose, 1986), reducing speeding and auto accidents (Van Houten et al., 1985), decreasing residential energy consumption (Winett, Leckliter, Chinn, Stahl, & Love, 1985), and encouraging individuals to dispose of their trash properly (Geller, Winett, & Everett, 1982). The power of the behavioral approach is that it translates problems into direct-action schemas where solutions are possible, even if they are of the “small win” category.

In this chapter we review the contemporary behavior analytic paradigm and its potential contributions to community-based research, as well as emerging work in behavioral systems science that expands those possibilities. This is followed

by a review of behavior analytic methodology, with particular focus on the time-series designs characteristic of this approach. The discussion outlines the underlying natural science epistemology that supports those designs. Analysis in this paradigm usually involves the planned manipulation of contextual variables, and observations of the effects of that manipulation on the behaviors of interest under changing conditions over time, rather than the statistical procedures characteristic of social science. We also note, however, that there are situations when statistical procedures specific to time-series data can be useful within this paradigm. The chapter then describes and provides examples of reversal and multiple-baseline designs, two of the most widely applicable options for community-level intervention. Finally we present a detailed case study of an initially modest community intervention in Chicago using a reversal design that ultimately led to citywide policy change.

INTRODUCTION TO THE BEHAVIOR ANALYTIC PARADIGM

Although there are two major behavioral paradigms, behavior analysis and behavior therapy, we will focus on behavior analysis, which we believe has greater relevance to community interventions. The behavior analytic approach stresses the importance of the context of behavior (Skinner, 1971). It is ironic that although behavior analysts continually emphasized the importance of person–environment interactions, the behavioral community approach was never fully embraced by community psychologists (Bogat & Jason, 2000; Jason & Glenwick, 1984). Rappaport (1977), for example, argued that these types of behavioral technologies may not be applicable to applied

settings or problems of concern to community psychology. In addition, community psychologists took issue with the behaviorist belief that there are specific and potentially generalizable solutions to problems, as the former believed that there are no simple solutions to complex social problems (Sarason, 1972), but rather divergent solutions that could not be generalized across communities.

It can be argued, however, that behaviorally oriented interventions can actually be better choices under such circumstances. Interrupted time-series research designs can be employed rigorously in each of several communities, without the need to randomize multiple only somewhat similar communities into contrast groups and apply the identical interventions across all communities in each group. As noted by Biglan, Ary, and Wagenaar (2000, p. 32), such comparison studies are limited by “(a) the high cost of research due to the number of communities needed in such studies, (b) the difficulty in developing generalizable theoretical principles about community change processes through randomized trials, (c) the obscuring of relationships that are unique to a subset of communities, and (d) the problem of diffusion of intervention activities from intervention to control communities.” Behavioral time-series designs do not have these limitations, particularly when implemented with matched communities (Biglan et al., 2000; Coulton, 2005).

Within the contemporary behavior analytic community there is an emphasis on antecedent behavior change procedures as opposed to consequence-only procedures. Changing setting factors (i.e., aspects of the contexts and environments in which behavior occurs) can increase the likelihood of desirable behavior change—an approach often labeled as *ecobehavioral* (a term that came into common use in the 1980s; see Mattaini & Huffman-Gottschling, 2012). Contemporary behaviorists commonly provide participants with skills to act on and mold, rather than be passively shaped by, their environment. The process becomes a bidirectional one between individuals and their ecological contexts (Jason & Glenwick, 2002). Although historically the behavioral approach had been mostly applied at the individual level, higher order change has recently been much more strongly emphasized (e.g., Biglan, 1995; Bogat & Jason, 2000; Guerin, 2005). In addition, even interventions targeted at the individual level can help mobilize community concerns about a problem, increase

attention to the problem, and become the first step toward tackling a larger social problem.

In recent years, a transnational group of behavior analysts has also begun to elaborate *behavioral systems science*, focusing on the interlocking sets of contingencies within and among behavioral systems. Behavioral systems science began with work in organizational behavior management but recently has moved into community, social policy, and social action work (Biglan & Sloane Wilson, 2015; Grant, 2011; Mattaini, 2013; Mattaini & Thyer, 1996; Todorov, 2013). Work focused on the selection of entire sets of interlocking behavioral contingencies and the dynamics of behavioral systems shows promise for understanding the functioning of large systems, moving well beyond a focus on the individual (Glenn, 2010; Houmanfar, Rodrigues, & Ward, 2010), and experimental work in these areas is beginning, particularly in Brazil. Most important contemporary problems are interdisciplinary in nature (National Academies, 2005). Therefore, collaboration with other professions and disciplines, which can produce synergistic effects and more potent intervention, is increasingly common in behavior systems work. Many recent contributions to the behavior analytic journal *Behavior and Social Issues* have thus been interdisciplinary in nature.

Community psychology has stressed the importance of involving the target populations for input concerning such aspects as problem identification, information on the problem, intervention design, and intervention acceptability (Jason & Glenwick, 2012). The result is a collaborative process in which the intervention is culturally relative and thus more sensitive to the local culture and environment. In a canonical article in the *Journal of Applied Behavior Analysis*, Fawcett (1991) drew behavior analysts' attention to these processes. He argued that community research and action required avoiding colonial relationships and establishing collaborative relationships with research participants (including communities), including collaboration in determining research goals and methods, designing and disseminating interventions, communicating research findings, and advocating for community change. As long as the issues of interest are well defined (which can be accomplished in a collaborative way), the behavioral approach can be a tool whereby researchers and citizens jointly plan and implement community interventions as true partners. A setting's ecology can

often be better understood through the collection of ongoing time-series data, providing the community change agent as well as the participants with immediate feedback, a very different approach than the more typical collection of pretest and posttest outcomes.

BEHAVIOR ANALYTIC METHODOLOGY

Behavior analysts control and influence behavior by altering either antecedents (the environment or setting) or the consequences (rewards or punishments) associated with them (Fawcett et al., 1980). When evaluating their interventions, behaviorists collect time-series data that are objective and quantifiable using a variety of experimental designs, including reversal (ABAB) designs; multiple-baseline designs across time, individuals, settings, or situations; changing-criterion designs; and multiple-treatment designs (Kazdin, 2011).

Not surprisingly, the logic of such interrupted time-series experimental designs is distinct from that used in group designs. Behavior analytic research typically is conducted and analyzed using natural science, rather than social science, methods, in part due to differences in underlying philosophies of science. Most natural science research involves the direct manipulation of variables and observation of the effects over time, rather than the use of randomized group designs in which differences are explored using inferential statistics (Johnston & Pennypacker, 1993). These differences may be more important than they appear; Johnston and Pennypacker (1993) asserted the following:

The natural sciences have spawned technologies that have dramatically transformed the human culture, and the pace of technological development only seems to increase. The social sciences have yet to offer a single well-developed technology that has broad impact on daily life. (p. 6)

In the basic time-series model, data are collected until a stable baseline rate for some dimension of behavior (such as rate, intensity, duration, or variability) has been established. Intervention is then introduced while data continue to be collected. If a change that is large, relatively immediate, and socially substantive is apparent, a stable change as a result of intervention is regarded as

present. With multiple replications and increasingly rigorous designs with additional controls, confidence in such change increases. The standard form of analysis in behavioral designs is visual, accepting only clearly evident and reliable changes as depicted graphically (Parsonson & Baer, 1978). Weak or uncertain effects are usually dismissed as not large enough to be useful. When there is significant variability in the data, however, visual analysis can be unreliable (DeProspero & Cohen, 1979; Matyas & Greenwood, 1990).

In most situations where change is not clearly evident from visual analysis, behavior analysts then try to develop a stronger intervention. In some cases, however, there may be benefit in identifying more modest change if the issue is serious and a large population is involved. There is, therefore, a place for statistical methods in time-series research. For example, Kratochwill (1978) provided a series of data analytic methods, including time-series analysis, which emphasized repeated measurement during the baseline and treatment conditions. These techniques alerted investigators to possible internal and external validity threats and led to more sophisticated analyses (Glass, Willson, & Gottman, 1975). Such comparisons take into account differences in levels and slopes. However, because repeated observations from the same unit of interest are not independent from each other, traditional statistical tests that make the assumption of independence of errors are usually not appropriate. When the independence assumption is violated, time-series repeated observations follow an underlying integrated autoregressive moving average (ARIMA) model of order (p, d, q) , where " p ," " d ," and " q " are integers that refer to the complexity of each of three explicitly differentiated types of variance in the time series.

Hoeppner and Proeschold-Bell (2012) described an interesting illustration of the use of this approach, where they found a decreasing trend in hepatitis C knowledge prior to the start of the intervention. After the start of an intervention, the data indicated an increase in patient knowledge, followed by another decrease in knowledge, although at a reduced rate, later in the intervention period. In another example of using these types of time-series analyses, Jason et al. (1999) found that, both within days and between days, perceived energy, physical exertion, and mental exertion were significantly related to fatigue in patients with chronic fatigue

syndrome. Alvarez and Jason (1993) also employed time-series methods to show how significantly more infants were in safe car restraints after the passage of legislation requiring the use of proper restraints and a related educational program.

Todman and Dugard (2001) provided a practical guide to randomization tests in order to make sound causal inferences for single-case data. However, their guide requires that random assignment procedures be built into experimental designs. There are a number of other behavioral strategies for quantitative descriptions of environment–behavior relations, including matching theory (Dallery & Soto, 2013) and dynamic systems models that may be used to describe sequential dependencies in time-series data (Molenaar & Goode, 2013), but they are beyond the scope of this chapter.

BEHAVIORAL RESEARCH DESIGNS

In behavioral designs, data can be collected at the individual, group, community, or societal levels (Mattaini, 2010). We will focus here on two types of designs. The reversal design collects baseline data and then introduces an intervention to try to alter that behavior. Following successful behavior change, the intervention is then withdrawn to assess whether the behavior returns to the baseline condition. There are a number of variations on this design, but all assess combinations of baseline and interventions to see if the intervention is producing a meaningful and clearly evident effect on the participants' behavior. The following example of a reversal design demonstrates how interventions can be maintained over time. Smoking once dominated American culture, but this has changed dramatically over the past few decades. As part of the activism that helped to change smoking norms, in the early 1980s one group developed methods to evaluate the success of creating a nonsmoking section in a student cafeteria before there were laws restricting use (Jason & Liotta, 1982). The investigators first counted the number of smokers in a particular section of the cafeteria once a day. Next, no-smoking signs were posted. The number of smokers in the area did not change, indicating (see Fig. 18.1) that this intervention was not successful. The next intervention involved politely requesting people not to smoke in the nonsmoking area. This request, along with no-smoking signs, was effective in eliminating smoking in this designated area.

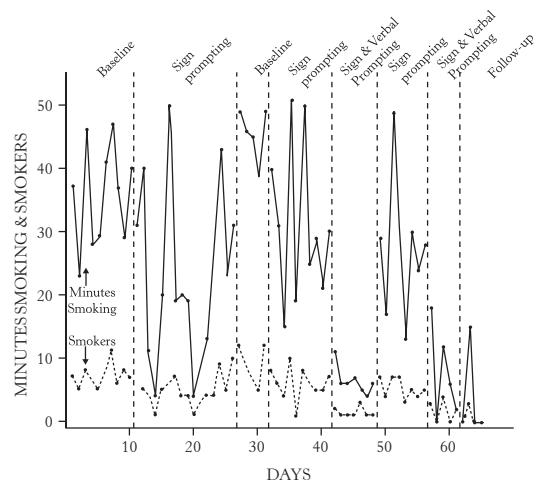


FIGURE 18.1: Smoking as a function of verbal prompting in a university cafeteria

Source: “Reduction of Cigarette Smoking in a University Cafeteria,” by L. A. Jason and R. Liotta, 1982, *Journal of Applied Behavior Analysis*, 15, p. 576. Copyright 1982 by the Society for the Experimental Analysis of Behavior. Reprinted with permission from John Wiley & Sons, Inc.

However, when prompting stopped, the levels of smoking increased; when the researchers then reintroduced verbal prompting, the rates of tobacco use decreased.

At the end of this study, the director of food services assigned an individual responsible for collecting unreturned trays to continue the prompting (a polite request not to smoke). In addition, a permanent no-smoking section was established in the cafeteria. Follow-up data collected 3 months after the end of the formal intervention indicated that both the management and even customers continued the prompting procedures. It is possible that new social norms were established which helped nonsmokers become more fully integrated and comfortable in this new nonsmoking setting. From a transactional point of view, reductions in smoking in an area led management and customers to change their behaviors, which led to less smoking, and perhaps even more attempts at prompting.

In contrast, the multiple-baseline technique is useful when a reversal design would be unethical or when irreversible changes are likely. This design involves charting several behaviors until they stabilize during the baseline phase. There are several variations of multiple-baseline designs, including multiple baseline across systems (persons or communities), multiple baseline across behaviors,

and multiple baseline across settings, as well as some that combine dimensions over time. In a multiple-baseline study across communities, several somewhat similar communities all struggling with the same issue can be selected. Baseline data are collected over a period of time for all. An intervention is then introduced in one community while the others continue to collect baseline data. After a predetermined time interval the intervention is introduced in a second community (the third community would continue to collect baseline data). After a similar interval of time, the intervention is introduced in the third community. If clearly evident change is observed in each community only at

the time that the intervention is introduced there, the probability of genuine change is considered to be high (i.e., the probability of a Type 1 error would be low). If change is not apparent, immediate changes can be made to refine the intervention without wasting additional time or resources. Further replications and applications across other types of communities would gradually strengthen the effectiveness evidence while allowing analysis of community characteristics associated with greater or lesser response to the intervention.

Figure 18.2 shows the use of a multiple-baseline design in an investigation of ways to expand recovery homes (specifically, Oxford Houses) for

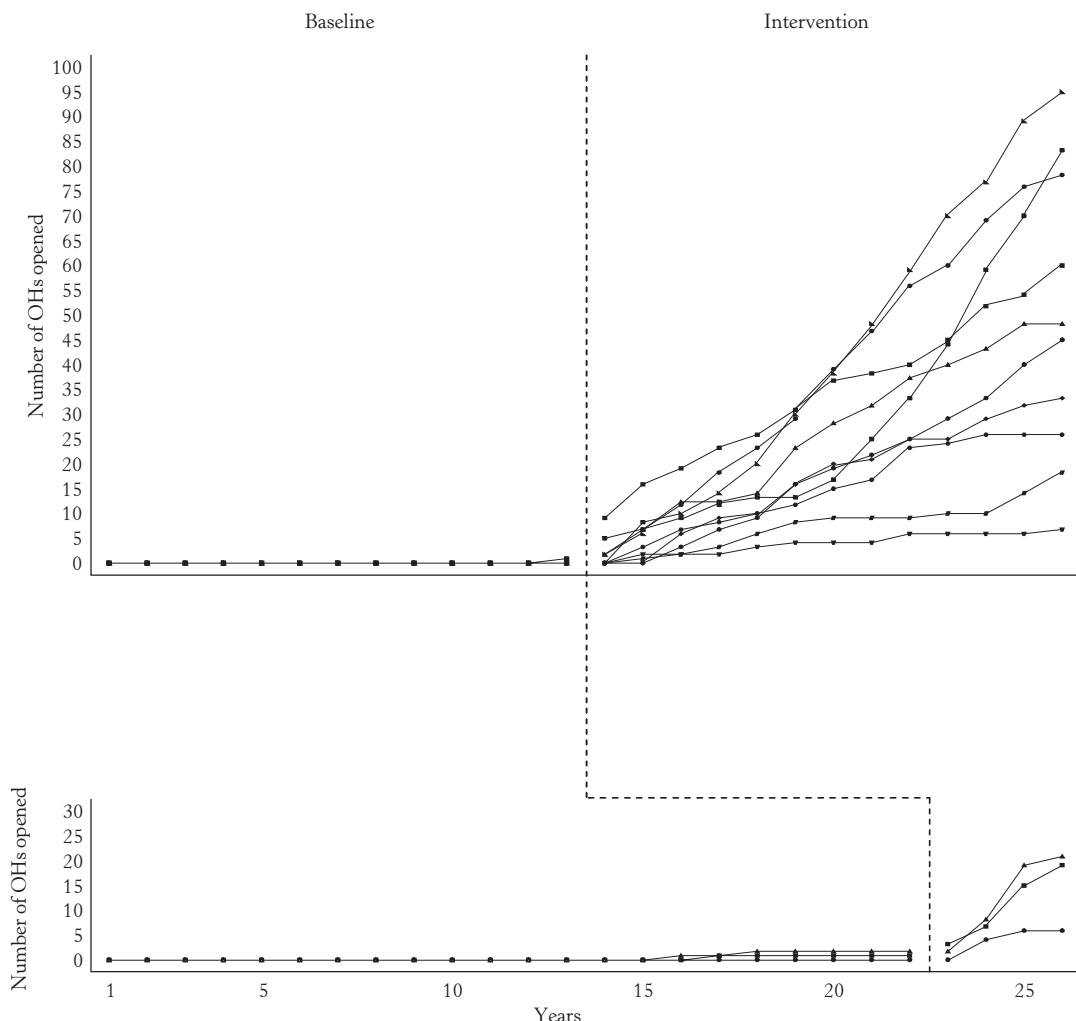


FIGURE 18.2: Recovery homes in two groups of states.

Reprinted from "Increasing the Number of Mutual Help Recovery Homes for Substance Abusers: Effects of Government Policy and Funding Assistance," by L. A. Jason, J. M. Braciszewski, B. D. Olson, and J. R. Ferrari, 2005, *Behavior and Social Issues*, 14, p. 76. Copyright 1982 by the authors.

people with substance abuse problems (Jason, Braciszewski, Olson, & Ferrari, 2005). The intervention involved providing a \$4,000 loan program and a recruiter to open up new houses. Jason et al. utilized a multiple-baseline design to chart the expansion of Oxford Houses in different states. The horizontal axis indicates years, and the vertical axis refers to number of houses. Very few Oxford Houses were established during the years before the start of the intervention. Intervention onset (as indicated by the vertical dotted line at the top of the figure) first occurred in one group of states. A few years later the intervention was introduced in a second group of states (indicated by the vertical dotted line at the bottom of the figure). As states instituted the intervention (but not before), the number of houses expanded considerably, and the impact of the intervention was clearly evident.

CASE STUDY

In the late 1970s, the second author of this chapter (Jason) invited a representative from Chicago alderman Martin Oberman's office to speak to students in a community psychology course. When asked which problem was generating the most community dissatisfaction, the representative answered "uncollected dog feces." Jason and his graduate students decided to collect data on this problem. They selected a long block within the DePaul University area and recorded the following variables for 5 hours daily: the number of dogs, the number of dogs who defecated, and the number of dog defecations picked up by their owners. In addition, all defecations were picked up and weighed each morning. There were six phases in the study, each lasting 7 days (not consecutive days because Saturdays, Sundays, and rainy days were excluded).

Baseline 1: Regular patterns of dog and owner behavior were monitored from the top of a seven-story building.

Signs: During this phase, three black and white .3 m by .2 m signs reading "Protect Children's Health. Pick Up Your Dog's Droppings" were posted on trees and fences on each side of the street. At the end of 7 days, these six signs were removed from the street.

Prompting 1: Instructions and modeling were used in this phase. Every time dog owners

entered the designated area, they were approached by a research assistant, who said: "Excuse me. Can I talk to you? I am a resident of this neighborhood and am very concerned about keeping this area clean. I would appreciate it if you would use this bag to pick up your dog's defecations." The research assistant then demonstrated how to use the bag. The plastic bag was then offered to the dog owner. If, after being given a bag, a dog owner left the designated area and then reentered it, the owner was not given another bag. During this phase, each owner was categorized by the prompter into one of the following five categories: missed (dog owner left the designated area before a bag was offered), pooper scooper visible (prompters were shown a receptacle owned by dog owners who indicated it would be used to pick up droppings), scooper in pocket (owners claimed a receptacle for picking up droppings was in their pocket), bag was accepted, or bag was refused.

Baseline 2: Observers again unobtrusively watched the street from the seven-story building, with no intervention.

Prompting 2: Prompting conditions identical to those described earlier were reintroduced.

Follow-up: Three months after the program ended, all defecations in the target area were counted. Two months later, defecations on seven random, nontarget streets (areas included in the preliminary study) were counted.

During the baseline phase, few dog owners picked up after their dogs, and more than 19 pounds of dog defecations were deposited in the target block. When antilitter signs were posted during the second phase, relatively few changes occurred on the criterion measures. However, during the next phase, when all dog owners were given instructions and a demonstration concerning how to use a plastic bag to pick up dog feces, 82% of the dog owners proceeded to pick up after their dogs (Jason, Zolik, & Matese, 1979). These findings indicate that the prompting intervention, which applied instructions and modeling, effectively motivated dog owners to dispose of their dogs' waste properly (see Fig. 18.3).

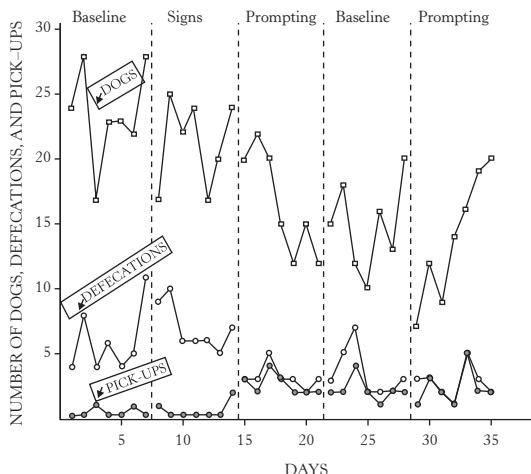


FIGURE 18.3: Dogs, dog feces, and pickups across experimental conditions.

Source: "Prompting Dog Owners to Pick Up Dog Droppings," by L. A. Jason, E. S. Zolik, and F. Matese, 1979, *American Journal of Community Psychology*, 7(3), p. 345. Copyright 1979 by the Society for Community Research and Action. Reprinted with kind permission from Springer Science and Business Media.

Following the study's completion, several community groups contacted Jason and his team for advice in setting up their own dog litter interventions. The team's next study involved a 9-month collaborative relationship between the researchers and a community group in another neighborhood. At a 13-month follow-up, the target block, as well as an area around the target block, had significant reductions in dog litter. The findings suggested that residents who participated in the program continued exerting pressure on dog owners to pick up after their dog even after the formal intervention ended. Thus, teaching skills to indigenous change agents might be an effective way to maintain gains following the termination of a behavioral intervention. In summary, the dog intervention studies documented effective approaches for combating the invertebrate problem of dog waste in urban areas. To effect more substantial, enduring reductions in community dog droppings, working with community residents to implement procedures appears to represent the most promising approach.

This research was used to influence legislation, as the Chicago alderman asked Jason to present his findings at City Hall in order to support a proposed ordinance that would require dog owners to have in their possession a pooper scooper when walking dogs. The ordinance was passed by the City

Council, making Chicago one of the first cities in the country to pass a pooper scooper ordinance.

CONCLUSION

Behavior analytic methods have been used with a wide variety of community issues. Although community researchers often focus much of their effort on self-report measures, behaviorally oriented investigators have pioneered innovative ways to document whether behavioral changes have occurred over time. Such behavioral interventions, just as with other community programs, compete with high-density alternative messages, which might overwhelm and nullify the interventions. That is, there are multiple ecological systems that impact health care systems and other human services, and their messages are often inconsistent. Illustratively, for many years smoking prevention interventions have been implemented in schools, and yet children report that they are almost always sold cigarettes by store vendors (Jason, Ji, Anes, & Birkhead, 1991). By sending youngsters conflicting messages (i.e., vendors selling minors cigarettes when school-based programs indicate that youths should not be smoking), our society diminishes the effectiveness of school-based smoking prevention interventions. Therefore, interventions have also been developed to reduce youth access to retail sources of tobacco (Biglan et al., 1995; Jason, Pokorny, Adams, & Hunt, 2008).

Behavior is influenced by multiple contingencies and setting features. For example, Herrnstein's hyperbola asserts that responding is governed by contingent reinforcement that is evaluated relative to all reinforcement provided by an environment (McDowell, 1982, 1988). Willems (1974) suggested that behaviorists need to examine second- and third-order consequences of interventions in order to better understand systems-like principles that permeate behavior and the environment. Ecobehavioral methods are designed to ensure that natural environmental contingencies can take over to sustain behavioral changes (Mattaini et al., 2012).

Finally, as we develop targeted interventions for particular problems, we need to be reminded that substance abuse, school failure, juvenile delinquency, and other social problems share many developmental roots (Biglan et al., 2015;

Biglan, Brennan, Foster, & Holder, 2004; Jason & Glenwick, 2002), thereby indicating that children and adolescents represent the most fertile population for preventively oriented behavioral interventions. Coordinating such youth-targeted interventions (and uncovering common environmental causes and intervention components) will hopefully increase both the scope and enduring impact of our interventions.

REFERENCES

- Alvarez, J., & Jason, L. A. (1993). The effectiveness of legislation, education, and loaners for child safety in automobiles. *Journal of Community Psychology, 21*, 280–284.
- Biglan, A. (1995). *Changing cultural practices: A contextualist framework for intervention research*. Reno, NV: Context Press.
- Biglan, A., Ary, D., & Wagenaar, A. C. (2000). The value of interrupted time-series experiments for community intervention research. *Prevention Science, 1*, 31–49.
- Biglan, A., Brennan, P. A., Foster, S. L., & Holder, H. D. (2004). *Helping adolescents at risk: Prevention of multiple problem behaviors*. New York, NY: Guilford Press.
- Biglan, A., Henderson, J., Humphrey, D., Yasui, M., Whisman, R., Black, C., & James, L. (1995). Mobilizing positive reinforcement to reduce youth access to tobacco. *Tobacco Control, 4*, 42–48.
- Biglan, A., & Sloane Wilson, D. (2015). *The nurture effect: How the science of human behavior can improve our lives and our world*. Oakland, CA: New Harbinger.
- Bogat, G. A., & Jason, L. A. (2000). Towards an integration of behaviorism and community psychology: Dogs bark at those they do not recognize. In J. Rappaport & E. Seidman (Eds.), *Handbook of community psychology* (pp. 101–114). New York, NY: Plenum.
- Coulton, C. (2005). The place of community in social work practice research: Conceptual and methodological developments. *Social Work Research, 29*, 73–86.
- Dallery, J., & Soto, P. L. (2013). Quantitative description of environment–behavior relations. In G. J. Madden (Ed.), *APA handbook of behavior analysis* (pp. 219–249). Washington, DC: American Psychological Association.
- DeProspero, A., & Cohen S. (1979). Inconsistent visual analyses of intrasubject data. *Journal of Applied Behavior Analysis, 12*, 573–579.
- Fawcett, S. B. (1991). Some values guiding community research and action. *Journal of Applied Behavior Analysis, 24*, 621–636.
- Fawcett, S. B., Mathews, R. M., & Fletcher, R. K. (1980). Some promising dimensions for behavioral community technology. *Journal of Applied Behavior Analysis, 13*, 505–518.
- Ferrari, J. R., Barone, R. C., Jason, L. A., & Rose, T. (1986). The use of incentives to increase blood donations. *Journal of Social Psychology, 125*, 791–793.
- Fixsen, D. L., Wolf, M. M., & Phillips, E. L. (1973). Achievement Place: A teaching-family model of community based group homes for youth in trouble. In L. A. Hamerlynck, L. C. Handy, & E. J. Mash (Eds.), *Behavior change: Methodology, concepts and practice* (pp. 241–268). Champaign, IL: Research Press.
- Geller, E. S., Winett, R. A., & Everett, P. E. (1982). *Preserving the environment: New strategies for behavior change*. New York, NY: Pergamon.
- Glass, G. V., Willson, V. L., & Gottman, J. M. (1975). *Design and analysis of time-series experiments*. Boulder: University of Colorado Press.
- Glenn, S. S. (2010). Metacontingencies, selection, and OBM: Comments on “Emergence and metacontingency.” *Behavior and Social Issues, 19*, 79–85.
- Glenwick, D. S., & Jason, L. A. (Eds.). (1980). *Behavioral community psychology: Progress and prospects*. New York, NY: Praeger.
- Glenwick, D. S., & Jason, L. A. (1984). Behavioral community psychology: An introduction to the special issue. *Journal of Community Psychology, 12*, 103–112.
- Glenwick, D. S., & Jason, L. A. (Eds.). (1993). *Promoting health and mental health in children, youth, and families*. New York, NY: Springer.
- Grant, L. K. (2011). Can we consume our way out of climate change? A call for analysis. *The Behavior Analyst, 34*, 245–266.
- Greene, B. F., Winett, R. A., Van Houten, R., Geller, E. S., & Iwata, B. A. (1987). *Behavior analysis in the community, 1968–1986, from the Journal of Applied Behavior Analysis*. Lawrence, KS: Society for the Experimental Analysis of Behavior.
- Guerin, B. (2005). *Handbook of interventions for changing people and communities*. Reno, NV: Context Press.
- Hoeppner, B., & Proeschold-Bell, R. J. (2012). Time series analysis in community-oriented research. In L. A. Jason & D. S. Glenwick (Eds.), *Methodological approaches to community-based research* (pp. 125–146). Washington, DC: American Psychological Association.
- Houmanfar, R., Rodrigues, N. J., & Ward, T. A. (2010). Emergence and metacontingency: Points of contact and departure. *Behavior and Social Issues, 19*, 78–103.
- Jason, L. A., Braciszewski, J. M., Olson, B. D., & Ferrari, J. R. (2005). Increasing the number of mutual help recovery homes for substance abusers: Effects of government policy and funding assistance. *Behavior and Social Issues, 14*, 71–79.

- Jason, L. A., Frasure, S., & Ferone, L. (1981). Establishing supervising behaviors in eighth graders and peer-tutoring behaviors in first graders. *Child Study Journal*, 11, 201–219.
- Jason, L. A., & Glenwick, D. S. (1984). Behavioral community psychology: A review of recent research and applications. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (Vol. 18, pp. 85–121). New York, NY: Academic Press.
- Jason, L. A., & Glenwick, D. S. (Eds.). (2002). *Innovative strategies for promoting health and mental health across the lifespan*. New York, NY: Springer.
- Jason, L. A., & Glenwick, D. S. (Eds.). (2012). *Methodological approaches to community-based research*. Washington, DC: American Psychological Association.
- Jason, L. A., Ji, P. V., Anes, M. D., & Birkhead, S. H. (1991). Active enforcement of cigarette control laws in the prevention of cigarette sales to minors. *Journal of the American Medical Association*, 266, 3159–3161.
- Jason, L. A., & Liotta, R. (1982). Reducing cigarette smoking in a university cafeteria. *Journal of Applied Behavior Analysis*, 15, 573–577.
- Jason, L. A., Pokorny, S. B., Adams, M., & Hunt, Y. (2008). A randomized trial evaluating tobacco possession-use-purchase laws. *Social Science and Medicine*, 67, 1700–1707.
- Jason, L. A., Tryon, W. W., Taylor, R. R., King, C., Frankenberg, E. L., & Jordan, K. M. (1999). Monitoring and assessing symptoms of chronic fatigue syndrome: Use of time series regression. *Psychological Reports*, 85, 121–130.
- Jason, L. A., Zolik, E. S., & Mateese, F. (1979). Prompting dog owners to pick up dog droppings. *American Journal of Community Psychology*, 7, 339–351.
- Johnston, J. M., & Pennypacker, H. S. (1993). Why behavior analysis is a natural science. In J. M. Johnston & H. S. Pennypacker (Eds.), *Readings for "Strategies and tactics of behavioral research"* (2nd ed., pp. 3–7). Hillsdale, NJ: Erlbaum.
- Kazdin, A. E. (2011). *Single-case research designs*. New York, NY: Oxford University Press.
- Kratochwill, T. R. (1978). *Single subject research: Strategies for evaluating change*. New York, NY: Academic Press.
- Mattaini, M. A. (2010). Single-system studies. In B. Thyer (Ed.), *The handbook of social work research methods* (2nd ed., pp. 241–273). Los Angeles, CA: Sage Publications.
- Mattaini, M. A. (2013). *Strategic nonviolent power: The science of satyagraha*. Edmonton, Canada: Athabasca University Press.
- Mattaini, M. A., & Huffman-Gottschling, K. (2012). Ecosystems theory. In B. A. Thyer, C. N. Dulmus, & K. M. Sowers (Eds.), *Human behavior in the social environment: Theories for social work practice* (pp. 297–325). Hoboken, NJ: Wiley.
- Mattaini, M. A., & Thyer, B. A. (Eds.). (1996). *Finding solutions to social problems: Behavioral strategies for change*. Washington, DC: American Psychological Association.
- Matyas, T. A., & Greenwood, K. M. (1990). Visual analysis of single-case time series: Effects of variability, serial dependence, and magnitude of intervention effects. *Journal of Applied Behavior Analysis*, 23, 341–351.
- McDowell, J. J. (1982). The importance of Herrnstein's mathematical statement of the law of effect for behavior therapy. *American Psychologist*, 37, 771–779.
- McDowell, J. J. (1988). Matching theory in natural human environments. *Behavior Analyst*, 11, 95–109.
- Molenar, P. C. M., & Goode, T. (2013). Methods for sequential behavior analysis relations. In G. J. Madden, V. William, T. D. Hackenberg, G. Hanley, & G. P. Hanley (Eds.), *APA handbook of behavior analysis* (pp. 267–280). Washington, DC: American Psychological Association.
- National Academies. (2005). *Facilitating interdisciplinary research*. Washington, DC: National Academies Press.
- Nietzel, M. T., Winett, R. A., MacDonald, M. L., & Davidson, W. S. (1977). *Behavioral approaches to community psychology*. New York, NY: Pergamon.
- Parsonson, B. S., & Baer, D. M. (1978). The analysis and presentation of graphic data. In T. R. Kratochwill (Ed.), *Single subject research: Strategies for evaluating change* (pp. 101–165). New York, NY: Academic Press.
- Rappaport, J. (1977). *Community psychology: Values, research, and action*. New York, NY: Holt, Rinehart and Winston.
- Sarason, S. B. (1972). *The creation of settings and the future societies*. San Francisco, CA: Jossey-Bass.
- Skinner, B. F. (1971). *Beyond freedom and dignity*. New York, NY: Knopf.
- Todman, J. B., & Dugard, P. (2001). *Single-case and small-n experimental designs: A practical guide to randomization tests*. Mahwah, NJ: Erlbaum.
- Todorov, J. C. (2013). Conservation and transformation of cultural practices through contingencies and metacontingencies. *Behavior and Social Issues*, 22, 64–73.
- Van Houten, R., Rolider, A., Naw, P. A., Friedman, R., Becker, M., Calodovsky, I., & Scherer, M. (1985). Large-scale reductions in speeding and accidents in Canada and Israel: A behavioral ecological perspective. *Journal of Applied Behavior Analysis*, 18, 87–93.

- Willem's, E. P. (1974). Behavioral technology and behavioral ecology. *Journal of Applied Behavior Analysis*, 7, 151–165.
- Winett, R. A., Leckliter, I. N., Chinn, D. E., Stahl, G., & Love, S. Q. (1985). Effects of television modeling on residential energy conservation. *Journal of Applied Behavior Analysis*, 18, 33–44.
- Yokley, J. M., & Glenwick, D. S. (1984). Increasing the immunization of preschool children: An evaluation of applied community interventions. *Journal of Applied Behavior Analysis*, 17, 313–325.