ON SYSTEMS ANALYSIS IN AUTISM INTERVENTION PROGRAMS

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Although intervention technology has grown substantially during the past quarter century, the design of intervention systems has not grown apace. This paper examines organizational arrangements that enhance and diminish treatment effectiveness and argues that defining, measuring, and manipulating systemic antecedent and consequent variables are as important as assessment and intervention on an individual client's behalf.

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"But clearly, behaviorists . . . know that credit or blame rests with the system." (Holland, 1978, p. 170)

The past 25 years have brought remarkable advances in autism treatment. Appropriate research designs and strong demonstrations of experimental control added many powerful intervention procedures, too numerous to cite here. But if one visits a handful of service programs for children, youths, or adults with autism, more often than not one notes that clients' progress is less than illustrious, and well-documented procedures have not been adopted.

In some arenas (e.g., control of illegal substances, political campaigns, agendas to reduce homelessness), behavior analysis is not widely recognized as a relevant technology. But in intervention for people with developmental disabilities, our science has enjoyed a special respect. What, then, prevents treatment agencies from implementing research-based procedures and achieving noteworthy outcomes for the recipients?

More than a decade ago, Kazdin (1982) noted that organizational and administrative structures often dictate the extent to which implementation is feasible. And more recently, Baer, Wolf, and Risley (1987, p. 325) concluded that "effectiveness for the future will probably be built primarily on system-wide interventions." In human service programs for people with autism and other develop-

mental disabilities, research on specific intervention procedures greatly outweighs research on organizational arrangements, although the latter may determine whether our technology is ever put into practice. Today, few practitioners design interventions for people with autism that fail to acknowledge antecedent and consequent variables, but few practitioners design human service *systems* that give serious consideration to the same variables.

This paper describes a journey. In 1975, upon our arrival at the Princeton Child Development Institute (then a young and floundering agency), we set about designing an intervention program; today, this work is still very much in progress. For 18 years, we have navigated the reefs and shoals of systems design, and have heard and been tempted by Sirens' songs. The critical parameters of the Institute's program have been replicated across many generations of staff members (of whom we are very proud) and across many new programs. Some attempted replications failed, but the failures, although painful, were at least instructive, and uniformly reminded us of the importance of our science.

In reviewing 18 busy, exciting, and challenging years, we are persuaded that gains in our system's effectiveness have been directly and incontrovertibly tied to the growth of applied behavior analysis. Its evolution, even during the past decade, has radically changed target responses, intervention procedures, and organizational arrangements. The remainder of this article explores systemic problems and proposes systemic solutions that have been tested at the Princeton Child Development Institute. The individual and organizational behavior changes that we

programmed in our setting—and that we recommend—are based not only on our own data but also on data gathered by mentors and colleagues who collectively represent our field, a field that has served people with autism very well indeed.

SOME REFLECTIONS ON ORGANIZATIONAL STRUCTURE AND FUNCTION

The raison d'être of applied behavior analysis programs is to produce socially important behavior change (Baer, Wolf, & Risley, 1968); in our view, agencies that do not achieve this outcome should close their doors no later than tomorrow. Acceptance of this mandate to be effective prompts close examination of organizational charts. The majority of positions must be held by employees who help clients to master functional skills and learn to control maladaptive behavior. A lesser number of positions must be occupied by people who help the helpers, that is, employees who ensure that the latter have the skills that are necessary for the production of significant client behavior change. And a very much smaller proportion of boxes on the organizational chart should be assigned to people who are responsible for creating, maintaining, and allocating the resources that ensure that the other jobs are accomplished.

In practice, however, many organizational charts do not reflect this analysis. Some are top-heavy—a large proportion of positions is assigned to resource management (commonly referred to as "administration"). Others include many "specialist" jobs, but the persons who occupy these positions are accountable for neither client progress nor staff members' intervention skills. That organizational structure and function can be derived from basic principles of our science is widely acknowledged; the failure appears to be in application.

A Rose by Any Other Name . . .

We have known for some time that verbal and textual stimuli mediate other responses (cf. Skinner, 1957), but we have been slow to apply this prin-

ciple to the design of service delivery systems. For example, the names of positions are likely to evoke certain behaviors and not others. A dictionary definition of an aide is an assistant to a superior; a "direct-care worker" is a worker who takes care of others. Compare these job titles with alternatives such as "instructor" or "therapist." One may hypothesize that (at least under certain organizational contingencies) supervisors and co-workers will interact differently with "therapists" than with "aides," that "instructors" will discharge their job responsibilities differently than "direct-care workers," do and that "trainers" may respond differently than "supervisors" do in interactions with the employees for whom they are responsible. Of course, titular changes are irrelevant in the absence of organization-wide contingencies that support job names and the fulfillment of job responsibilities. What technology ensures that the titles "teacher" and "trainer" are functional titles? The answer, of course, lies in the elementary behavior-analytic procedures of direct observation and measurement, and in organizational contingencies that dictate action based on performance data—in this case, either further training or personnel replacement.

Group Contingencies

Group contingencies exist when the behavior of one or more group members determines the consequences for at least one other group member (Speltz, Shimamura, & McReynolds, 1982). In human service systems, an obvious application of group contingencies is the delivery of rewards to intervention agents when clients for whom they are responsible display favorable behavior change. For example, when John learns to tie his shoes, both John and his teacher receive special rewards and recognition. It appears to be less obvious (or at least, it is less often observed in practice) that when John's teacher masters specified intervention skills, both she and her trainer should receive professional rewards. And it is still less evident (and rarely mentioned) that administrators' professional rewards should be contingent upon the measurable successes of trainers, trainees, and clients.

Yoking the reinforcement contingencies of *all*

of the participants in a human service organization is a systems design that supports clients' progress. Unfortunately, such group contingencies can be vitiated by tenure systems, unions, and ambiguous lines of authority and responsibility. And even if these difficulties are resolved, still other pitfalls must be circumvented.

What kinds of rewards? Food, bar chits, lottery tickets, and even bonuses are questionable rewards for professional performances. The fact that such rewards may be accepted does not verify that they are functional reinforcers. For example, in the case of public posting of performance data, it is often unclear whether changes in staff members' behavior should be ascribed to reinforcement or to avoidance of punishment. Because the events that follow specified behaviors may also serve as antecedents that cue future performances, "professional" rewards (e.g., praise from a mentor, an invitation to discuss a successful intervention procedure at a staff meeting, expanded authority and job responsibilities, or an invitation to participate in a new research project) deserve more attention than they currently receive. If the goal is to build a professional intervention team, there is a simple test of the appropriateness of proposed rewards for staff members: Will program managers accept the same rewards, delivered in the same manner?

Training expertise. For more than a decade, our data have repeatedly documented that didactic procedures alone do not enable instructors and therapists to exhibit intervention skills at or near criterion levels. It is ongoing, hands-on training (modeling, supervised practice, and immediate verbal feedback) that enables staff members to perform target skills. Thus, in an environment driven by group contingencies, it is imperative that trainers master the skills they are mandated to teach. In a recent review of staff-training methods, Reid and Green (1990) noted that a disadvantage of modeling is that trainers may not be able to demonstrate specific intervention skills. But it is difficult to identify a more effective alternate training strategy. It can be very discomforting to a trainee who is attempting to help a child learn to manage a severe behavior problem if the trainer has no experience

about how to accomplish this goal (McClannahan & Krantz, 1985).

Of course, responsibility for trainers' expertise rests with administration. Unqualified administrators may appoint successive layers of supervisors and staff trainers to "stand in" for them; in this event, the success of the program rests on the mysterious arts of recruitment and selection. The alternative is for some applied behavior analysts to become program administrators and to become involved in training. Who else will train the trainers?

Feedback reciprocity. The literature of applied behavior analysis contains numerous examples of the efficacy of verbal performance feedback in changing staff members' behavior (Harchik, Sherman, Sheldon, & Strouse, 1992; Reid & Green, 1990; Reid & Whitman, 1983). However, a review of staff-training research reveals that feedback is often described as unidirectional—it originates with supervisors and is given to trainees. And in practice, supervisors may receive training in giving feedback but not in receiving it, and the persons supervised may receive no feedback training at all. This unilateral feedback model strongly conveys the message that staff members are passive receivers of communications rather than active intervention agents. An alternative paradigm, well articulated in the Teaching-Family Model (Phillips, Phillips, Fixsen, & Wolf, 1972), teaches both trainers and trainees to give and receive positive and corrective feedback.

It is not necessary to look very far afield to see the potential advantages of bilateral feedback. Lovaas (1977), in discussing shaping, noted that "If E is too liberal in his reinforcement, the child's responses remain undifferentiated and obscure. On the other hand, if E is too strict, the child's behavior will extinguish. Part of E's job is to keep the child behaviorally receptive" (p. 28). Substituting the words "trainer" and "trainee" for "E" and "child," we note a rationale for training the trainers to deliver performance feedback. But it is equally important that trainers learn to *receive* feedback, and that trainees acquire the full complement of feedback skills. Because many intervention repertoires are not readily acquired, trainers and trainees are called

upon to make significant joint investments of time and effort. If praise is clumsy or stereotyped or if correction is too frequent or punitive, fragile new skills may extinguish or the trainee may attempt to escape the training situation. Similarly, in the absence of recognition or acknowledgment of training endeavors, information about trainee preferences, and feedback about training activities that are viewed as unpleasant, the trainer may avoid training assignments. Thus, the quality and quantity of performance feedback to and from trainers and trainees are likely to affect every other component of a human service system. But what about other interaction partners?

A common goal of staff-training programs is to alter the frequency and types of feedback that occur in therapist–client interactions: We want teachers of children with autism to engage in verbal behavior that is behavior specific, contingent, and delivered with appropriate voice volume; we want praise and correction to be well differentiated, and we want more of the former than the latter; and we want communications to be respectful of others' rights. A less common goal is to influence the frequency and types of feedback that characterize exchanges between trainers and their mentors. And a still-less-common objective (perish the thought!) is to specify and program interaction patterns among administrators and everybody else.

Much has been written about institutional subcultures (Becker, 1964; Clinard, 1968; Goffman, 1961), and there is interdisciplinary agreement that the behavior patterns of prison guards, hospital attendants, and nursing-home aides are learned. In the absence of a specified curriculum, however, participants in human service organizations may learn to complain about administration, gossip about co-workers, and make inappropriate responses about clients ("he's having a bad day," "she can't learn this"). Such performances often have far-reaching effects; they diminish the credibility of program personnel, the community's acceptance of new programs, and new staff members' responsiveness to training efforts.

But applied behavior analysts need not permit organizational subcultures to develop adventitious-

ly. There is an existing technology for teaching staff members to use multilateral feedback as a vehicle for solving problems, obtaining help, garnering professional rewards for professional accomplishments, and replacing dysfunctional responses with adaptive behavior. Failure to manipulate these variables may abbreviate program effectiveness and program longevity. And it goes without saying that a multilateral feedback system must apply to *all* members of the organization, including secretaries, bookkeepers, and administrators.

Consumer Evaluation

Staff members as consumers. In programs for people with developmental disabilities, one typically identifies clients, parents or guardians, neighbors of group homes, community members, and funding agency representatives as potential consumers of program services. But staff members are also consumers: They are consumers of clients', co-workers', trainers', and administrators' behavior.

In programs that are data driven, members of the intervention staff have a great deal of objective information about clients' performances, their own performances, and their trainers' performances; if they have also received some training about how to deliver feedback, their consumer evaluation activities are especially valuable. Data gathered over many years indicate that intervention agents' satisfaction ratings are often highly correlated with observational measures of clients' progress and staff members' acquisition of clinical skills.

Teachers, therapists, instructors, and job coaches represent the "front line"; in the presence of an active training program that shapes the organizational subculture and teaches feedback skills, their consumer evaluations (i.e., their ratings and especially their written comments) often highlight needed changes in client programming, staff-training agendas, and administrative policies. Administrative decision making in the absence of such information is risky at best. Further, administrative responsiveness to such consumer input is another means of affirming that staff members are not passive clock-punchers, but are active professionals whose suggestions are expected and valued.

Consumer evaluation as a prompt system. If consumer evaluation is not a one-time event but an ongoing process (Finney, 1991; Schwartz & Baer, 1991; Wolf, 1978), then solicitation of consumers' likes and dislikes often prompts certain practitioner behavior, such as reviewing data about consumers' satisfaction (or lack of it), disseminating the data, discussing the data, and changing selected program components. Of course, program managers could conceal unfavorable data, but if consumer evaluations are conducted regularly, others may note their absence or alteration and deliver social punishers. Thus, a firmly established consumer evaluation system, especially one that is accompanied by specified procedures for disseminating and acting on the data, represents a relatively dependable set of prompts for making program improvements in an orderly and continuing fashion, rather than in response to crises. And repeated measures of consumers' satisfaction make it possible to examine trends in those data that may be correlated with changes in programs or personnel.

Evaluation of Staff Performance

In many organizations, "evaluation" is not a popular word. Public school officials and human service managers sometimes assert that performance evaluation cannot be initiated because of union opposition or staff members' countercontrol, and employees may view evaluations as punitive and unfair. But assessment of staff members' skills is necessary to the critical demonstration that staff training results in staff performances that affect client outcomes.

Research has seldom addressed staff acceptance of program procedures (Reid & Green, 1990), but experience suggests that the acceptability of evaluation may be determined largely by active teaching that shapes an institution's subculture, and by management of group contingencies. With regard to the latter, evaluations may be perceived as "fair" if (a) everyone in the organization (not only intervention agents but also secretaries, business managers, trainers, evaluators, and administrators) is evaluated; (b) performance evaluations typically produce many more rewards than punishers; (c)

evaluations result in new training plans that enable people to teach, learn, and evaluate additional skills; and (d) each evaluation protocol is a training protocol (it should come as no surprise that the evaluation of skills never taught is regarded as unfair). Regularly scheduled evaluations of intervention agents permit even more performance evaluations if the system is designed in such a way that data on clinicians' skills comprise an evaluation of their trainers, and assessment of trainers' and clinicians' repertoires constitutes one type of evaluation of the trainers' trainers.

Like consumer evaluation, staff performance evaluation can serve as an effective prompt system for agency personnel. Impending evaluations prompt clinicians to practice target skills and prompt trainers to teach the competencies that will be measured; favorable assessments of a staff member's skills prompt praise and appreciation; evaluators' awareness of staff members' roles as consumers of program services prompts timely verbal and written feedback; and managers' recognition of group contingencies prompts tracking all of the above.

In such a system, the training/evaluation protocol can be used to evoke specific repertoires from persons in a variety of positions. It is not unusual for staff-training programs to target skill areas such as verbal instruction, ignoring, manual guidance, behavior-specific praise, and backward chaining; it is less usual to train and evaluate skills in teaching social competencies (e.g., teaching clients to say "please," "thank you," and "excuse me"; use tissues; introduce themselves; give complements; offer to assist others). But clients who have acquired social competencies are more likely to enjoy social acceptance, and staff members who have taught these proficiencies are more likely to be satisfied consumers of clients' performances.

Specific additions to a training/evaluation protocol can be used to address particular program deficiencies. Do clients appear dirty and unkempt? Expanding the protocol to include a section on personal appearance can alter the behavior of clients, intervention agents, trainers, evaluators, and perhaps ultimately, the behavior of community members and visitors to the program (Mc-

Clannahan, McGee, MacDuff, & Krantz, 1990). When interacting with clients, do staff members appear to be bored, annoyed, or enervated? Then a section of the protocol on relationship building may identify and assess whether clinicians model and teach contextual smiling, age-appropriate physical contact, joking, and statements of positive affect. Of course, such behavior-change strategies may not be viable unless relevant group contingencies and a receptive organizational subculture have already been programmed.

Evaluation of Treatment Outcomes

If preschool children with autism receive timely and comprehensive behavioral treatment, a very significant proportion of them can remain with their own families and succeed in public school classrooms (Fenske, Zalenski, Krantz, & McClannahan, 1985; Lovaas, 1987; McClannahan & Krantz, 1994). Data on the proportion of clients who achieve such outcomes represent a definitive measure of program effectiveness. But regardless of the expert nature of intervention, some people with severe disabilities do not exit the program, and advance only slowly. For them, assessment of treatment outcomes must focus on acceleration or deceleration of specific responses.

For many years, there has been broad recognition that "measurement of skill acquisition, rate of inappropriate behavior, and other direct measures of behavioral change are . . . the ultimate validation of the value of a treatment program" (Favell, Favell, Riddle, & Risley, 1984, p. 33), and most agencies collect data on client performance. Such data may be used in constructing individualized education and habilitation programs, in progress reports, and in licensing reviews, but they are not used frequently enough as part of a program-wide evaluation system.

Several years ago, we developed a protocol that enabled impartial evaluators (professionals selected because of their expertise in applied behavior analysis and developmental disabilities) to review individualized programs and to obtain respectable levels of interobserver agreement on whether each program produced behavior change in a desired direction, no behavior change, or change in an undesired direction (McClannahan & Krantz, 1979). The data that result from such a review can flag needed revisions in specific programs for specific clients, and can also be summarized in a variety of ways that permit more global estimates of program effectiveness (e.g., the proportion of programs in a school or group home that achieve favorable behavior change, or the proportion of skill-acquisition programs that achieve positive behavior change). Used as repeated measures across years of program operation, such data set benchmarks for treatment effectiveness and offer a way to examine the fidelity of replication programs.

Assuming a reliable strategy for measuring change in particular behaviors of particular clients and assuming a well-designed system of group contingencies, evaluation of treatment outcome can become a key component of performance evaluation. First, trainers teach intervention agents to examine the data they collect and graph and to request assistance when they note unfavorable trends. Trainers also regularly monitor the data on client performance and seek assistance from their mentors when they are unsuccessful in remediating undesired treatment outcomes. Thus, trainers and trainees jointly prepare for an evaluation of clients' progress, and the data generated by an in-house evaluator not only represent feedback for trainee, trainer, and trainer's mentor, but also prompt revisions in client programming prior to the arrival of outside evaluators (whose data constitute feedback for everyone and summarize the agency's effectiveness).

SYSTEMS BUILDING

We began by suggesting that not all organizational structures are equal. We now turn to a specific hypothesis—that highly departmentalized organizations are less likely to achieve desired outcomes. Organizations with separate training and evaluation departments offer an illustration. While trainers are busy training, people in the evaluation department (who may have no stake in training success or failure) develop instruments that do or do not assess the skills being trained. After eval-

uations, trainers may readily dismiss data on trainees' skills on the basis that the assessment device is inappropriate. These not uncommon events seem to occur, at least in part, because departmentalization creates different contingencies for trainers than for evaluators. But there are alternative arrangements that foster cooperation rather than interdepartmental competition; suppose, for example, that trainers are also evaluators, albeit evaluators who are exempt from evaluating the people they train. This organizational structure generates rather uniform contingencies for trainers/evaluators, who are responsible for the reliability and validity of the evaluation instrument as well as for evaluation outcomes.

Problems of departmentalization may also be observed in organizations that include "specialist" departments (e.g., departments of speech therapy, occupational therapy, recreational therapy). If a speech therapist sees many clients with severe developmental disabilities for brief sessions once a day or several times a week, it is not likely that clients' acquisition will be rapid; if the specialist has no responsibility for staff training and supervision, one may question whether clients' new vocal responses will be maintained. These difficulties *might* be resolved by appointing specialists as staff trainers, but this rarely happens because (a) agency policies or organizational charts prohibit such appointments; (b) specialists' definitions of their professional responsibilities do not include staff training; or (c) not originally hired as trainers, the specialists may lack prerequisite skills that would enable them to acquire training competence. If one were to construct a new system, it might be populated with "generalists" (i.e., behavior analysts) who could teach staff members to teach speech not only in speech sessions but also during lunch, personal hygiene tasks, and academic and leisure activities. Demand for trainers of this type has long outstripped supply, and practitioners in our field have tried repeatedly (and relatively unsuccessfully) to lay responsibility for meeting the demand at academia's doorstep. Given the continuing problem of supply, practitioners are challenged to get better and more efficient at "growing their own."

Even if, by virtue of administrative control, perseverance, and good behavior analyses, we surmount the problems posed by certain organizational structures, we are still faced with the problem of how to arrange antecedent and consequent variables in a manner that links all of the positions in a human service system. Fortunately, our science provides a great deal of the technology necessary to this task—technology that is pertinent to direct observation, reliable measurement, design of prompt systems, and contingency management. The linkages among clients, intervention agents, trainers/evaluators, and administrators are, of course, data links. And the strength of the linkages is directly, immediately, and incontrovertibly determined by the reliability and validity of data on trainer/evaluator behavior, intervention agents' performance, treatment outcome, and consumers' satisfaction. But exchange of data among system components is merely an exercise in the absence of relevant contingencies. Some of those tie client performance to clinicians' rewards, so that staff members receive special acknowledgment when clients make measurable behavioral gains; others couple trainer/evaluators' rewards with intervention agents' and clients' acquisition of relevant skills; and ultimately, administrators' reinforcement contingencies are yoked with all of the above, so that administrative success is defined by client progress, clinicians' skill acquisition, trainer/evaluators' favorable performance, and the satisfaction of consumers.

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