

# Behavior Analysis and Intervention for Adults With Autism

Lynn E. McClannahan  
Gregory S. MacDuff  
Patricia J. Krantz

Reprinted from Behavior Modification  
Volume 26 No. 1, January 2002, pp. 9-26  
© 2002 by Sage Publications  
Reprinted by permission of Sage Publications, Inc.

This article describes a behavioral intervention program for adults with autism, suggests that preparation for adulthood should begin in early childhood, asserts that the curriculum should be just as comprehensive and evaluation criteria just as rigorous in programs for adults as in programs for children, and proposes that close examination of adults' repertoires may lead to key modifications of services delivered to children. Along the way, the authors provide some data on the progress of 15 people who are now adults and whom they have known for 15 to 25 years. Finally, the authors argue that, because of the diversity of skills and skill deficits displayed by adults with autism, a program model that prevents "falling through the cracks" must provide an array of options—from training center to supported employment.

## **Behavior Analysis and Intervention for Adults With Autism**

**LYNN E. MCCLANNAHAN**

**GREGORY S. MACDUFF**

**PATRICIA J. KRANTZ**

*Princeton Child Development Institute*

Although most adults with autism remained in institutions during the 1960s and 1970s (Mesibov, 1983), those decades saw the initial development of community-based programs for children with autism, and when these youngsters began to arrive at adulthood, the demand for noninstitutional programs for adults increased sharply. Parents and professionals who had observed young people's progress during childhood and adolescence worked to develop new options for adults, but their efforts were often hampered by a shortage of empirical evidence and an absence of relevant funding mechanisms.

In this climate, in 1987, when the first young person attained age 21 and completed his schooling at the Princeton Child Development Institute (PCDI), we opened the Adult Life-Skills Program. The parameters of the new program were (and are) very similar to those of the preschool and school (McClannahan & Krantz, 1993, 2001). Staff members receive ongoing hands-on training and regular performance

evaluation. Learners' intervention programs are regularly reviewed by both internal and external evaluators to assess (a) completeness of documentation, (b) achievement of favorable behavior change, (c) appropriateness of intervention activities, (d) presence of written consent, and (e) amount of interobserver agreement on behavioral measures. In addition, many different consumer groups are annually invited to evaluate program operation and outcome. But perhaps the most important dimension of accountability is the presence of group contingencies that link the outcomes of all program participants. Thus, staff members are recognized as successful when the data show that they have acquired relevant intervention repertoires and that adults with autism are acquiring new skills; trainers' efforts are rewarded when evaluation data demonstrate that staff members display relevant intervention repertoires and that learners are achieving relevant goals; and the trainers' mentors (who are also the program administrators) are deemed successful when all of these things are true and when consumer satisfaction ratings meet established criteria. These evaluation procedures are identical to those used in the preschool and school and in PCDI's residential programs. We cannot imagine why program standards for adults should be less thoroughgoing than standards for children and youths with autism.

Before the new adult program opened, members of the governing board and program administrators agreed that its mission was to provide science-based intervention to every young person who completed his or her schooling at PCDI and requested adult services; to date, this tenet has been consistently observed, although there are typically significant gaps in funding for adults who need support but have not yet been approved for funding by state agencies. The difficulties in providing seamless transitions from adolescence to adulthood underline the continuing importance of educating funders. Without services, many adults with autism may acquire response patterns detrimental to future employment; furthermore, interruptions in intervention may accelerate residential placement of those who live with their own families. Both of these outcomes are expensive not only in terms of dollars but also in terms of the quality of life of people with autism and their families.

### CHARACTERISTICS OF SERVICE RECEIVERS

During the past decade, outcome data show that 42% to 43% of children who enter PCDI's intensive behavioral intervention program before 60 months of age later make successful transitions to public schools, and 35% of all children, regardless of age at enrollment, make such transitions (Krantz & McClannahan, 1999). But the remainder require ongoing intervention, and with a small number of exceptions (children whose families relocate or select different placements), these learners complete their schooling at the institute and immediately enter PCDI's Adult Life-Skills Program.

Known etiologies and family histories differ for those who depart for public schools and those who remain and receive adult services. Almost half of the learners with autism who participate in the adult program have additional diagnoses (e.g., tuberous sclerosis, fragile X syndrome, Tourette's syndrome, seizure disorders) and/or family histories of schizophrenia, but this is true of less than 10% of students who enter the mainstream. Similarly, about one third of students who do not make transitions to public schools have a sibling with a developmental disability, but less than 10% of children who enter public schools have a brother or sister with a developmental disability.

Each adult enrolled in the program has received a diagnosis of autism from a referring physician or agency beyond PCDI, and all meet the criteria for autism described in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994). The 13 men and 2 women display widely divergent scores on formal assessment instruments; presently, their Age Equivalent Adaptive Behavior composite scores on the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984) range from 2-2 to 9-3, and their Age Equivalent scores on Form III of the Peabody Picture Vocabulary Test of receptive language (Dunn, Dunn, & Dunn, 1997) range from < 1-1 to 14-3. Their dysfunctional repertoires are equally diverse, encompassing self-injury, aggression, and property destruction as well as vocal, verbal, and motor stereotypies. Nine of them live in PCDI's two community-based, family-style group homes, and the remainder live at home or, in one case, in a supervised apartment. All of the group-home residents maintain contact with one or both par-

ents; one visits a parent on major holidays, and the others visit their parents' homes one to three times per month.

We began to design and implement intervention programs and measure the behavior change of these 15 young people when they were 4 to 10 years of age; we have now known them for 15 to 25 years, and presently, they range in age from 21 to 35 years. Their repertoires provide ongoing feedback relevant to the education of children and adolescents with autism. Long-term longitudinal measurement of their skills and skill deficits has produced important modifications of and additions to PCDI's school curriculum.

### PROGRAM STRUCTURE

PCDI's Adult Life-Skills Program is more than a supported employment model—it also provides instruction in an array of home- and community-living skills. Therefore, services are delivered in multiple settings, including community workplaces, learners' own homes, recreation and entertainment facilities, banks and automatic teller machines, restaurants, and shopping malls, as well as at PCDI. Staff members who provide intervention services are identified as "life-skills coaches" because their responsibilities are much broader than job coaching.

Instructional space in the PCDI headquarters building is used to provide paid employment opportunities for a few learners who cannot work out of house because of health or behavior problems; as a practice setting for young workers who are experiencing difficulty in mastering specific aspects of their jobs; and, less often, as a setting in which to help workers acquire skills that are prerequisite to their entry into community employment. Job finding and employment longevity are enhanced by a standing guarantee to employers that daily work assignments not only will be completed but will meet or exceed the employer's standards; if a worker with autism does not achieve the employer's criteria, a life-skills coach will assist with or do the specified job.

Although the Adult Life-Skills Program maintains the same accountability standards for adults as for children, it does so with less

than half the funding (\$26,340 per person in 2000-2001). This is possible only because of favorable intervention effects achieved during childhood. Science-based intervention throughout childhood and adolescence fosters independence so that adults can be productive and successful with a staff-learner ratio (1:2) that is half as rich as the ratio provided to young children. Some additional cost savings are achieved because administrative costs (e.g., secretarial, bookkeeping, and business administration) are distributed across PCDI's early intervention program, preschool and school, residential programs, and the adult program.

Life-skills coaches typically have bachelor's degrees, and sometimes master's degrees, in psychology or education; they are supervised and mentored by a trainer/evaluator and by the program director, both of whose time is shared with the group homes. Life-skills coaches' mean length of stay in the adult program is 16.8 months, but this is an underestimate of total length of stay because they often occupy positions in other branches of PCDI's programs before or after serving in the adult program; their mean length of stay at PCDI is 20.6 months.

Most life-skills coaches have no prior acquaintance with applied behavior analysis, nor do they have any previous experience with serving people with developmental disabilities. Although preservice and in-service workshops are provided, most training is hands on—trainers accompany trainees to job sites, learners' homes, and community settings and model target skills, provide supervised practice opportunities, and deliver immediate positive and corrective feedback (McClannahan & Krantz, 1985). The training protocol (which is also the evaluation protocol) addresses such standard behavior analysis topics as reinforcement procedures, behavior shaping, prompting and fading prompts, and programming skill generalization. Like all other members of PCDI's intervention staff, life-skills coaches have annual performance evaluations, and reappointment for the following program year is contingent on passing the annual evaluation.

The program will be permitted to grow to a census of 25 to 30. Enrollment will then be curtailed to preserve program quality, and a second program, based on the same model, will be developed to serve

young people who are currently enrolled in PCDI's preschool and school.

### CURRICULUM

Curriculum development began in 1975, when individualized programs were written for the children then enrolled in PCDI's preschool and school. As new children arrived, and as other learners reached the teen years and later attained adulthood, programs were gradually added to a continually expanding database that now includes more than 600 programs that address skills in such areas as community participation, keyboard use, language development, money management, recreation and leisure, self-care, social interaction, and time telling, to name but a few.

Preparation for adulthood begins long before learners arrive at age 21. When young children acquire generalized motor imitation skills, learn to accept graduated guidance without exhibiting disruptive behavior, learn to wait for progressively longer periods of time before accessing rewards, learn to request assistance, learn to say "please" and "thank you," or learn to put their hands in their pockets rather than to engage in finger stereotypy, they are displaying repertoires that will be of lasting importance. Similarly, teaching children to follow photographic or written activity schedules provides a framework for helping them (a) achieve increased independence from continuous and immediate supervision, (b) select and sequence their own activities, (c) remain appropriately engaged for longer time intervals, and (d) deliver their own rewards (MacDuff, Krantz, & McClannahan, 1993; McClannahan & Krantz, 1999).

At puberty and throughout adolescence, the data on young people's repertoires are reviewed with an eye toward future employment options, living arrangements, leisure pursuits, and social participation, and these reviews often result in new program emphases and new skill development targets. For example, if a student has acquired some keyboard skills and often selects computer activities from an array of choices, future programs may place greater emphasis on typing speed, text formatting, and data entry. Or, if a young person displays an inter-

est in food preparation and effectively uses photographic or written activity schedules to prepare some foods and to complete selected kitchen tasks (e.g., loading a dishwasher, cleaning counters and sink), programs may expand these repertoires.

If, after years of instruction, a youngster displays only rudimentary reading skills, the emphasis is narrowed to sight-word reading of words that are important to community participation (e.g., "men," "exit," or "stop"). If handwriting skills have not emerged, the new target may be writing one's signature on a document. If basic arithmetic skills have not been acquired, next goals may be more modest, such as appropriate use of a purse or wallet, asking a parent or instructor "Do I have enough money?" before making a purchase, extending a hand to receive change, and saying "thank you" to a cashier.

Whether or not preteens and teenagers pursue academic activities, all continue to receive instruction in several key areas that are common threads in the curriculum from early childhood to adulthood. Self-care is one such area of emphasis. Standards for appropriate bathing, dressing, and grooming change and evolve throughout childhood and adolescence; the bathing routine that was acceptable for a 6-year-old no longer meets parents' expectations when she is 10, and the tooth-brushing skills displayed by a preschooler are unacceptable a few years later. Because the personal appearance of people with developmental disabilities may interact with their opportunities for community participation (McClannahan, McGee, MacDuff, & Krantz, 1990), it is important to program for increases in skills commensurate with increased expectations for teenagers' and adults' personal hygiene and grooming. Many teenagers and adults also benefit from instruction on caring for clothing (e.g., ironing, polishing shoes, hanging slacks and shirts), tying a neck tie, selecting balanced and nutritious meals, and taking medications.

Social competencies are also a programmatic theme that spans childhood and adulthood. Young children learn to say "please" and "thank you," and this repertoire is later expanded to include "excuse me," and "you're welcome," as well as other skills such as covering one's mouth when coughing, using a napkin, using a wastebasket, and restoring the environment (e.g., putting one's belongings away, sliding one's chair under one's desk, or cleaning up if something is



spilled). Helpfulness is also an important target because it may contribute to liking and social acceptance. For example, young people are taught to open doors for others, to turn on lights if first to enter a room and turn them off if last to leave the room, to pick up objects others drop, and to offer to help carry objects such as grocery bags or heavy boxes.

Instruction on generic work skills also begins in early childhood and continues into adulthood. Preschoolers learn to say "help me"; older children and adolescents acquire more sophisticated requests for clarification and assistance, such as "What did you say?" "Where is the . . . ?" "What's that?" (Taylor & Harris, 1995), and "Could you show me how to do it?" As mentioned previously, the duration of work activities is gradually extended to promote the sustained engagement that will be required in most employment settings. Perhaps one of the most difficult-to-teach generic work skills is completing tasks to criterion. For example, the vacuuming is done only when the carpet is clean, wiping the counter is finished when there is no visible dirt on the counter, and the shirt is ironed when there are no more wrinkles.

Following a photographic or written activity schedule is a critical generic work skill (Wacker & Berg, 1983, 1984). Some people become such expert schedule followers that, given schedules, they achieve criterion or near-criterion performances on first attempts at new tasks such as cleaning a refrigerator or creating a menu. Schedules are also conducive to teaching people to make choices; learners select from an (initially small) array of pictorial or textual cues that represent different activities, add the selected activities to their schedules, and then engage in the chosen activities. After a person learns this sequence, it can be used to assess job preference. For example, a young worker with good keyboard skills who also appeared to enjoy strenuous physical activity was given many opportunities to choose either word-processing tasks or manual labor. He consistently chose manual labor, even when those jobs required a much greater time commitment than computer work. He did not have sufficient verbal skills to express his job-interests, but data on his choices of tasks clarified his preferences.

Activity schedules guide workers through lengthy response chains (e.g., assembling paint-mixing equipment, cleaning hotel rooms, or

balancing a checkbook), indicate how much work must be accomplished before reward activities are available, and minimize the need for prompts that may make workers with autism appear less competent. Therefore, when a new position is secured, first steps are to task analyze the job and to create a photographic or written activity schedule that reflects the task analysis.

Persons who cannot tell time are at a distinct disadvantage because they must depend on others to tell them when to begin and end activities. Although time telling may be difficult for some to master, many people can learn to set digital timers for varying lengths of time, engage in specified tasks until the timer signals, and then move on to the next scheduled activities (McClannahan & Krantz, 1999, pp. 69-74). The same instructional procedures are used to teach people to use the key pads on microwave ovens.

In adulthood, the language deficits characteristic of autism continue to be a focus of intervention. Communication skills are typically necessary in order to use an employee cafeteria or fitness center, respond to instructions or receive feedback from a supervisor, or obtain the social attention of a family member or friend. Many of our efforts to foster social interaction skills are based on script-fading procedures (Krantz & McClannahan, 1993, 1998; McClannahan & Krantz, 1999, pp. 91-96; Stevenson, Krantz, & McClannahan, 2000). Audiotaped or written scripts provide learners with appropriate entrees to social interaction; after scripts are mastered, they are faded from end to beginning, one word at a time, until no words remain. Learners with severe language delays may say only previously taught scripts after script fading is completed—an example of the occurrence of target responses in nontraining conditions (Stokes & Baer, 1977). But other students benefit from the language models provided by conversation partners, later recombining scripts or portions of scripts with statements or questions modeled by another person to achieve new, contextual verbal productions.

Whether adults live with their parents or in group homes, home-living skills receive ongoing attention. The curriculum includes programs such as cleaning a bathtub, cleaning a bathroom, making a shopping list, doing grocery shopping, using a gas range, preparing a snack or a meal, doing laundry, making a bed, packing a suitcase,

using the telephone, raking leaves, weeding, and washing windows. In this segment of the curriculum, as in many others, instructional procedures feature photographic or written activity schedules that are taught primarily with a most-to-least prompts hierarchy sequenced as follows: graduated guidance; spatial fading, for example, moving the location of manual prompts from hand to wrist to elbow to shoulder (Cooper, 1987); shadowing; decreasing the proximity of the instructor; and decreasing the frequency of an instructor's reappearance. These prompting procedures are comparatively errorless.

Leisure skills are often selected for instruction because they are consistent with family preferences. If a family values music, a learner may take piano lessons; if the family enjoys games, the student may be taught to play bingo or Uno. Other leisure pursuits represented in the curriculum include playing air hockey, building models, collecting baseball cards, playing pool, doing puzzles, and playing computer and video games. Considerations relevant to maintenance also determine the selection of physical activities. Bowling, golf, tennis, soccer, basketball, Frisbee, walking or jogging, biking, or roller-blading may be taught because they reflect family members' interests. But if no one in an adult's environment appears likely to join him or her in fitness activities, programs are selected, among other reasons, because they do not require others' participation. Examples of such programs include imitating an aerobics videotape, walking or jogging on a safe path or track, and using activity schedules to complete exercise routines that feature calisthenics or free weights.

A large segment of the curriculum addresses community participation. Illustrative programs in this category include using an automatic teller machine, paying bills, planning a day off, using a Laundromat, using public rest rooms, waiting in line, ordering in restaurants, crossing streets, using public transportation, and using vending machines. When possible, these skills are initially taught in the intervention setting, in a person's home, or in a comparatively private setting; this preserves learners' dignity by minimizing the public use of prompts.

After skills are acquired in the training setting, generalization is assessed in the community, and instruction continues in the community until skills are mastered. Often, multiple exemplars are necessary to the achievement of criterion performances. For example, it may be

necessary to practice making purchases in several different convenience stores and some number of grocery stores, drug stores, and bakeries before the relevant responses are consistently displayed in settings that were never used in training.

Although the curriculum includes a large number of programs in many different topic areas, these are used only as boilerplates in developing an intervention plan for a particular adult. Response definitions, measurement procedures, and teaching procedures are individualized to reflect a learner's skills and preferences, living environment, employment setting, and work assignments, as well as family members' and guardians' interests.

### SUPPORTED EMPLOYMENT

A representative definition of supported employment features three characteristics: paid employment, an integrated work setting, and ongoing support (Bellamy, 1988). To date, the beneficiaries of supported employment primarily have been people with mild or moderate disabilities; people with severe or profound disabilities, including autism, have often been placed in day activity centers, prevocational centers, or sheltered workshops that proved to be dead ends—few people have moved from these settings to supported employment (Smith, Belcher, & Juhrs, 1995). It is therefore encouraging to note that of the people currently enrolled in PCDI's adult program, 73% have been in supported employment for 64% to 100% of the months that they received program services.

Of the 15 program participants, all but 1 have had some supported employment experience. Presently, 11 are employed, and 4 receive in-house services because of low-rate but severe aggression, intermittent but severe self-injury, or serious health problems. For all 15 persons, percentage of months employed during their enrollment in the adult program is 59; for the 11 adults who currently hold jobs, that percentage is 84.

The work experience of these adults with autism is quite diverse and includes kitchen utility work, grounds maintenance, hotel housekeeping, data entry, factory product assembly, laundry work, filing

and collating, and merchandise receiving. The 12 people who have been in the program for 1 or more years held 20 jobs between 1987 and 2000. Three people have continued in the first jobs they obtained after enrolling in the Adult Life-Skills Program; they have held their positions for 2.8 to 5.9 years. The most frequent reason for job change was leaving a part-time job to accept full-time employment (4 occurrences). Other reasons were as follows: discharged because of inappropriate interaction with coworkers (3); discharged due to problem behavior in the work setting (2); employment terminated because of low work rate (1); the company closed the work site (1); and job change was initiated by PCDI because of problem behavior in the workplace (1).

Of the 15 people, 4 who are currently full-time employees hold jobs as hotel housekeeper, hotel houseman (who delivers supplies to housekeepers), laundry worker, and data-entry clerk; they earn \$6.00 to \$9.82 per hour. Earnings for 7 adults who are employed part-time range from \$1.78 per hour (a noncompetitive piecework rate) to \$13.51 per hour. Although part-time positions are less likely to provide health insurance and other fringe benefits that might ultimately help workers achieve economic self-sufficiency, the majority of participants in supported employment are in part-time positions (Kregel & Wehman, 1997). Some parents and guardians prefer part-time employment because of concerns about job stress, loss of Social Security benefits, and loss of funding for adult services.

For many workers with autism, pay days are too infrequent to maintain good job performance. Often, reward activities that are available to nondisabled employees (e.g., coffee breaks, meals in the employee cafeteria, use of vending machines, and preferred after-work activities) are scheduled for the purpose of maintaining relevant work repertoires. If more frequent rewards are necessary, tokens may be self-delivered. For example, after completing one or more pages of a photographic activity schedule, a worker may remove a token from the bottom of a page and attach it to a grid that displays the number of tokens earned and the number needed for an exchange. Exchanges often feature items that typical workers might also access on the job—a quick drink from a water bottle or thermos, a small candy or

mint, a brief rest, or a friendly exchange with a coworker or life-skills coach.

Disruptive behavior on the job results in removal and return to program headquarters, where a worker may sample less-preferred work or practice skills such as courteous responding to a supervisor or promptly returning to work when coffee breaks end. When an employee is removed from work by a life-skills coach, another staff member is immediately deployed to the job site to ensure that the assigned work is completed.

Although not all workers have the same instructional programs, data are collected on virtually every person's use of an activity schedule, which is based on a task analysis of work assignments. Number of independently and correctly completed components of this activity schedule is an important measure of job mastery. Another key assessment of work skills is production rate—for example, number of words typed or numbers entered per minute, number of documents collated per minute, or number of envelopes stuffed per minute. These data are particularly useful when compared with normative data on the performances of life-skills coaches and, especially, typical coworkers when they perform identical tasks.

### PROGRAM EVALUATION

Each year, an impartial professional who has expertise in applied behavior analysis and severe developmental disabilities is invited to review the intervention programs provided to adults. During the past year, the external evaluator reviewed 50 programs. This represented 100% of programs delivered to 12 adults (3 young people had just completed their schooling and had only recently begun to participate in the adult program).

Using a protocol developed and validated at PCDI, the reviewer first assessed program documentation. A program is defined as fully documented if it contains, at minimum, (a) a written response definition that provides an objective description of the target behavior, (b) a written description of the data collection procedure, (c) a written

description of the intervention procedure, and (d) a graph or other type of data summary. In addition, the response definition, measurement procedures, and intervention procedures must be consistent with the information shown on the graph. In the review of 1999-2000, the evaluator scored 43 of 50 programs (86%) as completely documented.

Second, the evaluator scores behavior change in one of four categories: behavior change in a desired direction, no behavior change, behavior change in an undesired direction, or cannot ascertain. The evaluator may determine whether any behavior change has occurred since data collection began or, alternatively, may assess behavior change by selecting and comparing various time periods (e.g., this year vs. last year or this quarter vs. last quarter). In the most recent review, the evaluator scored 39 of 50 programs (78%) as producing desired behavior change.

Third, the reviewer scores the appropriateness of programming; that is, on the basis of his or her own professional ethics, knowledge of the literature of the field, and concern for learners, the evaluator decides whether an intervention program should continue or whether it should stop immediately. The protocol notes that a responsible evaluator will score "stop immediately" if he or she believes that the program is not in the best interests of the learner or is in any way harmful to the learner. In the most recent review, 42 of 50 programs (84%) were scored "may continue," and 8 were scored "can't ascertain" because some element was missing from program documentation.

Next, for each program, the evaluator assesses consent by scoring the presence or absence of the signature of a parent or guardian or signature of the service receiver if there is no guardian. The program must remain essentially unchanged since the last consent, and the signature must have been obtained within the 364 days that preceded the review. For 1999-2000, 45 of 50 programs (90%) were scored as having current consent.

Finally, the evaluator notes whether interobserver agreement scores have been obtained at least four times during the last 364 days. During the most-recent review, 42 of 50 programs (84%) were noted to include four or more estimates of the reliability of the data obtained during the prior 12 months.

On each of the five evaluation dimensions, an impartial expert found that 78% to 90% of programs met the defined criteria. Repeated measures over successive years suggest that, given an active and ongoing staff-training program, it is reasonable to expect scores that closely approach or exceed 80% on each measure.

Consumer evaluation is another key evaluation component. Because of service receivers' severe disabilities, most are unable to participate in program evaluation, and parents and guardians are invited to represent their interests. In the last program year, 13 questionnaires were sent on behalf of 12 program participants, and 10 were returned, resulting in a 77% return rate. Questionnaires invite consumers to respond on a 7-point, Likert-type scale on which all scale points are identified and on which 7 represents *completely satisfied* and 1 represents *completely dissatisfied*. Mean ratings of 6 or above are considered criterion scores; mean ratings below 6 represent subcriterion scores that require remedial action. On questions that assessed parents' and guardians' satisfaction with staff cooperation, intervention effectiveness, amount of communication with program staff, and staff pleasantness, mean scores ranged from 6.9 to 7.0, indicating that the people who represent and advocate for adult participants are well satisfied with services received.

In addition, employers are annually invited to evaluate their employees with autism. In 1999-2000, 10 questionnaires were sent and 6 returned, for a less-than-desirable 60% return rate. Nevertheless, of the questionnaires returned, employers assigned mean ratings of 6.4 for their employees' effectiveness, 6.6 for employees' cooperation, and 6.8 for workers' pleasantness. On a separate questionnaire, employers were asked to evaluate the life-skills coaches who assist their employees with autism. On items that assessed the coaches' cooperation with the employer, interaction with the employee, effectiveness, and pleasantness, employers assigned mean ratings of 6.8 to 7.0. Of course, consumers are also invited to provide written comments, and these are often very helpful. Some illustrative comments about employees were, "He understands his assignments and does a good job on all tasks assigned. . . . He asks questions when the instructions he has been given are unclear" and "We need to work on time



sheets (making sure he completes them daily), but other than that, there are no problems."

Because members of the governing board are important consumers, they are invited to participate in the evaluation of all of PCDI's programs. During the past year, 19 questionnaires were sent and 15 were returned by board members, for a 79% return rate. Items relevant to the Adult Life-Skills Program assessed satisfaction with the effectiveness of intervention and with supported employment opportunities. Both of these items received mean ratings of 6.8.

Of course, the proportions of adults with autism who are in full-time and part-time supported employment, length of employment, and levels of remuneration are also important evaluation dimensions, but more data are needed to establish relevant benchmarks. Perhaps one of the most difficult tasks that lies ahead is specification of relevant evaluation criteria for people who do not participate in supported employment and who continue to receive in-house intervention.

### SUMMARY

Key benefits are derived from a continuum of services for toddlers, preschoolers, school-age children, and adults with autism. Intervention on behalf of today's toddlers and preschoolers may enhance outcomes for tomorrow's adults, and data on adults' contemporary repertoires may lead to significant revisions of the curriculum for young children. Policies that specify an age for program exit may cause loss of important data about the long-term effects of services.

Our data and experience also suggest that unidimensional program models (e.g., only supported employment or only day training) may not be in the best interests of adults with autism. Some people, upon completing their schooling, move directly to supported employment and remain in full- or part-time positions with few or no intermissions; others may lose several jobs before retaining one; and still others may need to leave employment because of health or behavior problems. In sheltered workshops or day-training centers, competent young people may never have opportunities to enter the workforce; in programs devoted to supported employment, workers who experience job loss

due to health or behavior problems may be deprived of services. The diversity of skills and skill deficits characteristic of people with autism seems to recommend a multifaceted service model that offers not only skill-development opportunities but also fall-back support that enables people to try again.

## REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Bellamy, G. T. (1988). Supported employment. In G. T. Bellamy, L. E. Rhodes, D. M. Mank, & J. M. Albin (Eds.), *Supported employment: A community implementation guide* (pp. 1-18). Baltimore: Paul H. Brookes.
- Cooper, J. O. (1987). Stimulus control. In J. O. Cooper, T. E. Heron, & W. L. Heward (Eds.), *Applied behavior analysis* (pp. 298-327). Columbus, OH: Merrill.
- Dunn, L. M., Dunn, L. M., & Dunn, D. M. (1997). *Peabody Picture Vocabulary Test—Third edition: Manual for Forms III A and B*. Circle Pines, MN: American Guidance Service.
- Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to initiate to peers: Effects of a script-fading procedure. *Journal of Applied Behavior Analysis*, 26, 121-132.
- Krantz, P. J., & McClannahan, L. E. (1998). Social interaction skills for children with autism: A script-fading procedure for beginning readers. *Journal of Applied Behavior Analysis*, 31, 191-202.
- Krantz, P. J., & McClannahan, L. E. (1999). Strategies for integration: Building repertoires that support transitions to public schools. In P. M. Ghezzi, W. L. Williams, & J. E. Carr (Eds.), *Autism: Behavior-analytic perspectives* (pp. 221-231). Reno, NV: Context Press.
- Kregel, J., & Wehman, P. (1997). Supported employment: A decade of employment outcomes for individuals with significant disabilities. In W. E. Kiernan & R. L. Schalock (Eds.), *Integrated employment: Current status and future directions* (pp. 31-47). Washington, DC: American Association on Mental Retardation.
- MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis*, 26, 89-95.
- McClannahan, L. E., & Krantz, P. J. (1985). Some next steps in rights protection for the developmentally disabled. *School Psychology Review*, 14, 143-149.
- McClannahan, L. E., & Krantz, P. J. (1993). On systems analysis in autism intervention. *Journal of Applied Behavior Analysis*, 26, 589-596.
- McClannahan, L. E., & Krantz, P. J. (1999). *Activity schedules for children with autism: Teaching independent behavior*. Bethesda, MD: Woodbine House.
- McClannahan, L. E., & Krantz, P. J. (2001). Behavior analysis and intervention for preschoolers at the Princeton Child Development Institute. In J. S. Handleman & S. L. Harris (Eds.), *Pre-school education programs for children with autism* (2nd ed.). Austin, TX: Pro-Ed.
- McClannahan, L. E., McGee, G. G., MacDuff, G. S., & Krantz, P. J. (1990). Assessing and improving child care: A personal appearance index for children with autism. *Journal of Applied Behavior Analysis*, 23, 149-210.

- Mesibov, G. B. (1983). Current perspectives and issues in autism and adolescence. In E. Schopler & G. G. Mesibov (Eds.), *Autism in adolescents and adults* (pp. 37-53). New York: Plenum.
- Smith, M. D., Belcher, R. G., & Juhrs, P. D. (1995). *A guide to successful employment for individuals with autism*. Baltimore: Paul H. Brookes.
- Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland Adaptive Behavior Scales, interview edition, survey form manual*. Circle Pines, MN: American Guidance Service.
- Stevenson, C. L., Krantz, P. J., & McClannahan, L. E. (2000). Social interaction skills for children with autism: A script-fading procedure for nonreaders. *Behavioral Interventions*, 15, 1-20.
- Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*, 10, 349-367.
- Taylor, B. A., & Harris, S. L. (1995). Teaching children with autism to seek information: Acquisition of novel information and generalization of responding. *Journal of Applied Behavior Analysis*, 28, 3-14.
- Wacker, D. P., & Berg, W. K. (1983). Effects of picture prompts on the acquisition of complex vocational tasks by mentally retarded adolescents. *Journal of Applied Behavior Analysis*, 16, 417-433.
- Wacker, D. P., & Berg, W. K. (1984). Training adolescents with severe handicaps to set up job tasks independently using picture prompts. *Analysis and Intervention in Developmental Disabilities*, 4, 353-365.

*Lynn E. McClannahan, Ph.D., is the executive director of the Princeton Child Development Institute. Her published research on autism intervention procedures, staff mentoring, and program evaluation has been widely recognized.*

*Gregory S. MacDuff, Ph.D., is the director of Adult and Community-Living Programs at the Princeton Child Development Institute. His publications address incidental teaching, photographic activity schedules, and the design of group-home programs for people with autism.*

*Patricia J. Krantz, Ph.D., executive director of the Princeton Child Development Institute and author of many journal articles and book chapters, has made many international contributions to autism treatment and gave the keynote address at the first conference on autism in Russia.*

