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Theoretical considerations suggest that problem behavior should increase when a child's competency does not match the curricular demands of the environment (i.e., when there is poor environmental fit). In the present study, environmental fit was examined for six children with autism spectrum disorders. Results indicated that the children exhibited high rates of problem behavior associated with poor motor or academic competency. Curricular modifications resulted in (a) a decrease in the level of problem behavior, (b) an increase in the percentage of task steps completed correctly, and (c) improved affect. Adults who worked with the children reported ease of intervention techniques. The concept of environmental fit and its usefulness in guiding both assessment of and intervention for problem behavior are discussed.

Keywords: *environmental fit; problem behavior; autism; curricular modification; school based intervention*

There has been an increase in the number of children with autism spectrum disorders (ASD) served in general education classrooms, a fact that presents new challenges for parents and teachers (Harrower & Dunlap, 2001; Myles & Simpson, 2003). Successful education requires that parents and teachers work together to address the serious problem behaviors that children with ASD often display in response to curriculum challenges that make demands on their academic and motor skills.

In what follows, two methods used in the field for assessing and treating problem behavior will be described: functional assessment and context-based assessment. Then, the importance of examining a larger context for problem behavior will be discussed, focusing on the interaction of person variables with environment variables. This approach, labeled the transactional approach, will be posed as a derivation of context-based assessment and will be used to explore the interaction between student competency and curricular demands. In doing so, the concept of poor environmental fit—that is, when curricular demands exceed a child's competency—will be introduced, and its potential impact on problem behavior in children diagnosed with an ASD will be explored. Recognizing poor environmental fit provides the opportunity to intervene on the level of the person (e.g., competency) and/or on the level of the environment (e.g., task demands). The concept of good environmental fit will be discussed within the framework of ecologically valid treatments, emphasizing the importance of natural treatment agents in natural contexts.

Problem Behavior and Functional Assessment

Skinner's (1938) examination of operant conditioning enhanced the understanding and treatment of problem behavior by focusing on the role of the environment and

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the functional "cause and effect" relationships that exist between environment and behavior. Subsequently, the field of applied behavior analysis emerged as a set of strategies that employed operant conditioning principles in clinically relevant contexts (Baer, Wolf, & Risley, 1968). Through an assessment strategy known as functional assessment, the antecedents and consequences that reliably influence problem behavior can be identified (Durand & Crimmins, 1988; O'Neill et al., 1997). Altering these variables and creating new antecedent conditions that evoke socially appropriate behavior often result in reductions in problem behavior in people with developmental disabilities (Smith & Iwata, 1997).

Further, by assessing the function of problem behavior (i.e., the consequences that maintain it) and using these assessment results to design interventions, researchers have been able to build effective interventions. The results of several meta-analyses of the effectiveness of interventions based on functional assessment demonstrate significant reductions in problem behavior (i.e., 90% or more reduction from baseline levels) in 50% or more of the cases examined (Carr et al., 1999; Didden, Duker, & Korzilius, 1997; Scotti, Evans, Meyer, & Walker, 1991). Importantly, these results indicate that interventions based on functional assessment are approximately twice as likely to succeed as those interventions that are not based on functional assessment.

An important emerging issue in the field concerns the ecological validity of the interventions used, because few of the studies reviewed in the meta-analyses were conducted in typical settings (e.g., neighborhood schools) with typical interventionists (e.g., teachers). Similarly, in an examination of 111 studies on problem behavior in school-aged children with developmental disabilities, it was noted that fewer than 25% of the studies employed educators and family members as intervention agents (Snell, Voorhees, & Chen, 2005). Thus, while interventions based on functional assessment reduce problem behavior, the extent to which they do so in typical settings with typical intervention agents remains an important research question.

Problem Behavior and Context-Based Assessment

In recent years, there has been an increasing focus in behavior analysis on examining the context (i.e., systems, setting events, trigger stimuli) in which problem behavior occurs (Carr, Ladd, & Schulte, 2008; McAtee, Carr, & Schulte, 2004). A focus on context provides new opportunities to advance the assessment and treatment of problem behavior (Luiselli & Cameron, 1998; McGill, 1999; Smith & Iwata, 1997). For example, in one study examining the results of 536 functional analyses, it was determined that 34.2% of the analyses demonstrated that the function of problem behavior was to escape from or avoid aversive situations (Hanley, Iwata, & McCord, 2003). When the context for escape behavior was examined, Hanley et al. (2003) noted that idiosyncratic antecedent events such as task difficulty, lack of choice among tasks, social variables, and curricular factors frequently served to signal the reinforcing value of escape. In other words, negative contexts often evoked negative behavior. There is a pressing need to examine what makes so many contexts aversive (an assessment issue) for children with ASD and how these antecedent events can be changed (an intervention issue).

Positive behavior support emerged in an attempt to both recognize and address broad social, emotional, educational, and ecological contexts for problem behavior and to intervene in these contexts to reduce problem behavior and to promote skill development and improved quality of life (Carr et al., 1999). There is a growing literature documenting the effectiveness of interventions that take into account aversive antecedent events, such as systems (e.g., school climate, school policy), setting events (e.g., mood, illness), and trigger stimuli (e.g., academic demands). Researchers have examined the effective modification of school systems through the creation of schoolwide reinforcement of appropriate behavior (Crone & Horner, 2003). Setting events for problem behavior also have been effectively taken into account through the insertion of countermanding setting events, with neutralizing routines introduced to reduce the aversiveness of academic demands (Horner, Day, & Day, 1997), preferred activities introduced to induce positive mood (Carr, McLaughlin, Giacobbe-Grieco, & Smith, 2003), and curricular modifications put in place for students to gain success in the school day during periods of illness (Carr & Blakeley-Smith, 2006). A number of interventionists also have focused on modifying trigger stimuli by reducing task length or content (Dunlap, Foster-Johnson, Clarke, Kern, & Childs, 1995; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Kern, Childs, Dunlap, Clarke, & Falk, 1994; Weeks & Gaylord-Ross, 1981), matching task demands to student ability (Center, Deitz, & Kaufman, 1982), increasing task difficulty for "too easy" tasks (Umbreit, Lane, & Dejud, 2004), varying tasks (Winterling, Dunlap, & O'Neill, 1987), altering the instructional presentation of the task through behavior momentum (Mace et al., 1988), and providing choices (Bambara, Ager, & Koger, 1994). The success of these

studies justifies researchers' efforts that seek to highlight the broad array of contextual variables that may be responsible for maintaining problem behavior and may guide intervention selection that promotes skill acquisition and problem behavior reduction (Kern & Dunlap, 1998).

Present Investigation

One strategy for examining a larger context for problem behavior is to examine person-environment transactions. The transactional approach (Lazarus & Folkman, 1984) emerged within the field of stress and coping as a means of recognizing the important role played by the interaction of person variables and environmental variables. In applying the transactional approach to school settings, the context for problem behavior may not lie solely in the person (i.e., student's low competency) or in the environment (i.e., challenging curricular demands) but within the interaction between the two. It is hypothesized that if there is a mismatch between a student's competency in a given context and the presented curricular demands, there may be an increased probability of problem behavior. The mismatch, or poor environmental fit, could generate ongoing failure creating an environment that becomes progressively more aversive, thereby facilitating the development of problem behavior.

In the present investigation, the relationship between competency level and curricular demands will be explored for two domains that commonly affect a child's performance in school-related work: motor and academic. In addition, the effect of poor environmental fit (i.e., presenting a child with demands that exceed his/her competency level) on problem behavior will be examined. Tasks selected within these domains (i.e., handwriting and essay writing) are tasks that are commonly reported to be areas of difficulty for children with ASD (Myles & Adreon, 2001; Myles et al., 2003). By evaluating a child's overall competency level through standardized testing and identifying the specific curricular demands (i.e., task steps) that a child is unable to complete for tasks within the domain, assessment information can be generated to systematically modify the environment (e.g., academic task) so that the student's competency level is a better fit to the curricular demands of that environment. The redesigned environment may produce higher levels of success for a given skill level, which may contribute to a reduction in subsequent problem behavior. An additional goal of the present study is to create an intervention that has ecological validity. Thus, it is important not only to reduce problem behavior, but to do so in typical settings with typical intervention agents.

Method

Participants and Setting

Occupational therapists and school psychologists in four Long Island public schools selected six children for inclusion in this study: three participants had difficulties in the motor domain and three in the academic domain. The three children selected for each domain (a) met criteria for an ASD, as specified in the *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (American Psychiatric Association, 2000); (b) demonstrated consistent weaknesses either in fine motor (i.e., graphomotor) skills, as indicated by their performance on the *Beery-Buktenica Test of Visual-Motor Integration* (VMI; Beery, 1989), or demonstrated consistent weaknesses in academic skills (i.e., essay writing), as indicated by their performance on *Test of Written Language–Third Edition* (TOWL-3; Hammill & Larsen, 1996); and (c) exhibited serious problem behavior, as indicated by ratings on a 7-point Likert scale of problem behavior described in Stage 5 of this study. All participants were selected from general education classrooms.

Participant characteristics are noted in Table 1. The table shows that participants ranged in age from 4 years 8 months to 13 years 4 months, had diagnoses of an ASD (provided by independent professionals), ranged in Full Scale IQ from 76 to 125, evidenced poor motor or academic standardized scores (i.e., one standard deviation or more below the mean), and had elevated problem behavior. Sessions were conducted in naturalistic settings (i.e., school or home) chosen by the participants' parents. Depending on the selected setting, teachers or parents served as intervention agents.

Procedure

The study was conducted in five stages, described as follows.

Stage 1: Identify Relevant Context (Motor or Academic Task)

The purpose of this stage was to identify a difficult motor task for Participants 1 to 3 and a difficult academic task for Participants 4 to 6 based on consultation with the occupational therapist/school psychologist, teacher, and parent. School personnel and parents first listed difficult tasks within the specified domain, rank

Table 1
Participant Characteristics

Domain of Competency	Name	Age[a]	Diagnosis	Full Scale IQ	Standardized Score for Domain of Competency	Total Problem Behavior[h]
Motor	Hailey	5, 6	Autistic disorder	103[b]	83[f]	6.0
	Julie	5, 7	Autistic disorder	76[c]	77[f]	7.0
	Matthew	4, 8	Asperger syndrome	118[c]	72[f]	4.7
Academic	Amy	13, 4	Autistic disorder	104[d]	80[g]	3.0
	David	9, 4	Asperger syndrome	125[e]	84[g]	5.0
	Aaron	11, 5	Autistic disorder	89 [d]	74[g]	5.6

Note: Normative data indicate that the mean score for measures a–g below is 100 with a standard deviation of 15.
[a]Years, months.
[b]*Stanford-Binet Intelligence Scale* (4th ed.).
[c]*Wechsler Preschool and Primary Scale of Intelligence–Revised*.
[d]*Wechsler Intelligence Scale for Children* (4th ed.).
[e]*Woodcock-Johnson Psychoeducational Battery* (3rd ed.), General Intellectual Ability.
[f]*The Beery-Buktenica Test of Visual-Motor Integration*.
[g]*Test of Written Language* (3rd ed.).
[h]Problem behavior ratings are obtained from a three-item 7-point Likert-type scale completed by the teacher regarding the severity, the degree of danger posed to self or others, and the disruptiveness of problem behavior to the setting. Each item was rated on a 7-point scale, where 7 = *severe*, 4 = *moderate*, and 1 = *mild*. Scores were averaged across items to create a Total Problem Behavior score.

ordered the tasks according to level of difficulty, and selected, by consensus, the most appropriate task (from the top three tasks that had been ranked as most difficult) and setting (i.e., home or school) for the assessment and environmental modification (intervention) to take place. All tasks chosen were those that the child experienced in his/her typical daily routine.

Participants 1 to 3: Motor. The motor tasks selected for the first three participants involved handwriting. The occupational therapists for all three children indicated that their grasps were poor (quadrupod or palmar) and that they had difficulty forming letters with the correct size, shape, and height; writing within the indicated spaces; and providing appropriate spacing between letters. In addition, Matthew did not write with a top to bottom progression or with correct letter directionality. Handwriting tasks were selected based on their difficulty for the children, their pervasiveness in the curriculum, and the negative impact that the problem behavior evoked by these tasks had on each child's academic and social inclusion. The task selected for Hailey and Matthew involved writing their first names, and the task selected for Julie involved writing the lowercase alphabet. The settings selected for Hailey and Julie were their kindergarten classrooms, and the setting selected for Matthew was his home.

Participants 4 to 6: Academic. The academic task selected for the three participants was essay writing based on parents' and teachers' concerns regarding the negative impact of the children's task-related problem behavior on their school inclusion, the increasing priority of written assignments as students get older, and the shared goal of increasing their children's independent completion of these assignments. For all three participants, it was decided that the child would complete an outline and essay each week at home that would be turned in for grading at school (as was the case for all the other students in class). Amy's essay consisted of five paragraphs in which she was to describe, analyze, and interpret a painting for her art class. David's essay consisted of two paragraphs on social studies and science topics (e.g., "Describe Marie Curie and her discoveries"). Aaron's essay consisted of five paragraphs based on a short fifth-grade science book series (e.g., floods, volcanoes).

Stage 2: Conduct Task Analysis

The purpose of this stage was to conduct a task analysis for the selected motor and academic tasks. The task analysis involved evaluating performance on the individual steps of the behavioral sequence that comprised the task (Cooper, Heron, & Heward, 1987) in order to identify the specific steps that needed to be targeted for environmental modification. The task analyses for the motor participants consisted of one step for each letter of the task; task analyses for the academic participants consisted of one step for each part of the outline, for the title of the essay, and for each sentence of the essay. The intervention agent completed a step for the child if the step was not completed correctly by the child or was performed out of sequence or if the time period allotted for the step to be completed (60 s) was exceeded. Task analyses were conducted twice for each participant, using the multiple opportunity method (Snell &

Smith, 2006), to assess stability of responding and to compute an average percentage of steps completed correctly.

Stage 3: Baseline

The purpose of this stage was to test the hypotheses that presenting a child with a task in which curricular demands exceeded the child's competency level (poor environmental fit) would result in (a) a short latency to problem behavior, (b) a large number of sessions terminated due to problem behavior, (c) a high rate of minor problem behavior in unterminated sessions, (d) a low percentage of task steps completed correctly, and (e) negative affect.

Tasks were completed following a modified version of the single opportunity method (Snell & Smith, 2006). In contrast to the method used for the task analysis (Stage 2), the intervention agent did not complete steps for the child. Rather, the intervention agent continued to provide a verbal prompt for the task step (i.e., the verbal instruction indicating what was required: "write the letter *b*") every 60 s until the child correctly completed the task step or engaged in problem behavior meriting termination of the session or 5 min had elapsed since the initial verbal prompt for that step was provided. If the child skipped a step or performed the step incorrectly, the intervention agent provided the verbal prompt "try again" and repeated the verbal instruction until the criteria just described had been met.

Different criteria for session termination due to problem behavior were based upon the designation of major or minor problem behavior used by Carr and Carlson (1993) and defined in Table 2. The major/minor criteria were established based on pilot observations that suggested that certain problem behaviors were less tolerated than others by teachers or parents. A single instance of major problem behavior or three instances of minor problem behavior resulted in session termination since, under these conditions, teachers and parents typically removed the child temporarily from the task or setting. The use of these termination criteria further ensured the safety of both the child and the intervention agent since the session was not allowed to continue in the face of serious problem behavior.

Stage 4: Intervention

The purpose of this stage was to test the hypothesis that modifying the task so that it no longer exceeded the child's competency level (good environmental fit) would result in (a) an increased latency to problem behavior, (b) a reduced number of sessions terminated due to problem behavior, (c) a low rate of minor problem behavior in unterminated sessions, (d) an increase in the percentage of task steps completed correctly, and (e) improved affect. The curricular demands were modified according to the results of each participant's task analysis. By identifying those steps in the task analyses conducted in Stage 2 that the child either did not attempt or did not correctly complete, specific problematic steps were targeted to facilitate the child's successful completion of the task (see Tables 3 and 4).

Table 2
Behavioral Definitions for Problem Behavior

Major problem behavior	Aggression (i.e., hitting, punching, kicking, biting, grabbing, pushing, or attempting these behaviors but missing because the target successfully avoided the attack), self-injury (i.e., head banging, hitting self in head), tantrum behavior (i.e., dropping to the floor, more than 5 s of screaming), and/or property destruction (i.e., hitting, throwing, or attempting to destroy an object).
Minor problem behavior	Screaming less than 5 s in duration, a verbal insult or curse word, and/or 2–5 s of stomping feet on the floor accompanied by loud vocalizations.

The tasks were then completed following the modified version of the single opportunity method (Snell & Smith, 2006) described in Stage 3. In the motor domain, all task steps (i.e., letters) that were not completed correctly in the task analyses in Stage 2 were provided in a "dotted out" format for the child to trace. In the academic domain, stimulus prompts were provided for the task steps that the children did not correctly complete on their outlines and in their essays.

In addition, two consecutive task analyses (as described in Stage 2) were conducted after every six intervention sessions in the motor domain to reevaluate the child's performance on the task so that further modifications could be made based on the child's increasing task proficiency. Given that each preintervention task analysis in the academic domain took approximately 70 min to complete, it was decided that only one task analysis would be conducted after every six intervention sessions in the academic domain. The stimulus prompts used in intervention for task steps were faded once the child was able to correctly complete those steps in the task analysis sessions. Verbal prompts were not provided if the child independently moved to attempt the next task step within 10 s of the completion of the previous task step.

Stage 5: Ancillary Posttest Measures

The purpose of this stage was to obtain social validity data. The social validity measure of the dependent variable

Table 3
Motor Domain: Task Analysis Results and Corresponding Strategy Used

Participant	Task	Percentage of Task Steps Attempted	Percentage of Task Steps Completed Correctly	Problematic Task Step	Example of Intervention Strategy
Hailey	Writing her name	100%	66%	e, y	"Dotted out" problematic letters
Julie	Writing the alphabet	82.7% (range = 20–25)	69.2% (range = 18–19)	d, e, g, j, k, q, s, z	"Dotted out" problematic letters
Matthew	Writing his name	100%	42.8% (range = 18–20)	a, h, e, w	"Dotted out" problematic letters and starting points of the letters were provided

was completed by the intervention agents after the final session of Stage 3 (baseline) and then, again, at the end of Stage 4 (intervention) to assess perceptions of changes in the dependent variable (problem behavior). Intervention agents were asked to use a 7-point Likert scale to rate the current severity of problem behavior, the degree of danger posed to self or others, and the disruptiveness of the behavior to activities being carried out in the setting. The social validity measure for the independent variable and for the impact of the independent variable on the dependent variable was completed by the intervention agents after Stage 4. Specifically, intervention agents were asked to use a 7-point Likert scale to assess the ease of strategy use, helpfulness of strategies, and their perceptions regarding the impact of the strategies on successful task completion and problem behavior.

Data Collection

All data were collected, live, on data sheets by trained doctoral students in clinical psychology who were blind to the purpose of the present study. Stopwatches were used to record time-based data. During Stage 1, data were collected on attempts, correct completion, and cue level of the verbal instruction. During baseline, data were collected on the above plus latency and affect. Affect ratings were completed by data collectors after each task step by using 6-point Likert-type scales similar to those employed by Carr et al. (2003). Data collectors were directed to score 0 or 1 depending on extent of negative facial expression (e.g., frowning; pouting; appearing irritable, angry, or frustrated; does not seem to be enjoying things), score 2 or 3 depending on duration of occasional negative or positive facial expression (e.g., does not appear to be decidedly happy or unhappy; may smile or frown occasionally, but overall, seems rather neutral), and score 4 or 5 depending on extent of positive facial expression (e.g., smiles, laughs appropriately, seems to be enjoying things). These ratings were completed to determine whether the intervention resulted in a change in the child's affect. During intervention, data were collected on all five variables. Percentage of task steps completed was calculated based on data collected on correct completion of task steps.

Experimental Design and Behavioral Definitions

A multiple baseline across participants design (Baer et al., 1968) was used to examine treatment effects of good environmental fit (i.e., when task demands were modified to meet the child's competency level; Stages 3 and 4). Two primary dependent variables were tracked through the multiple baseline design: percentage of task steps completed correctly and latency to session termination. A third key variable, affect, was tracked across baseline and intervention sessions; however, these data are summarized through mean scores and not on the graphs.

Decisions regarding phase changes in the multiple baseline were determined as follows. After baseline stability in percentage of task steps completed and latency to session termination was achieved, the intervention agent for the first participant of each domain received training on the appropriate task modification and prompt delivery. The intervention agent for the second participant did not receive training on task modification until a stable trend was observed in the first participant's performance (i.e., at least two sessions in which 100% of the task was completed without the need to terminate due to problem behavior). In addition, baseline data for latency to session termination for the next participant needed to be stable. These condition changes were determined through visual inspection of the data.

Table 4
Academic Domain: Task Analysis Results and Corresponding Strategies Used

Participant	Task	Percentage of Task Steps Attempted	Percentage of Task Steps Completed Correctly	Problematic Task Step	Example of Intervention Strategy
Amy	Outline for essay	100%	42.3% (range = 10–11)	Topic for each paragraph	Provide a topic descriptor (e.g., paragraph 2, "describe the elements of art in this painting")
				Opening sentence for each paragraph	Provide a sentence descriptor and sentence starter (e.g., "Opening sentence of 1st paragraph: 'The title of this painting ___.'")
				Transition/concluding sentence for each paragraph	Provide a sentence descriptor and sentence starter (e.g., "topic sentence: 'In this essay, I will ___.'")
	5 paragraph art essay, 4 sentences in each paragraph	100%	90.4% (range = 18–20)	2nd sentence of 2nd and 3rd paragraph	Provide additional information on outline that could be selected to write about (e.g., 2nd sentence, 2nd paragraph: "elements of art: line, shape, form, and color")
David	Outline for essay	84.6% (range = 10–11)	61.5%	Topic for 2nd paragraph	Underline and place arrow to second part of original essay question (e.g., Describe Marie Curie and *her discoveries*)
				4th and 5th sentence of 1st paragraph and 1st and 5th sentence of 2nd paragraph	Provide choices of sentence starters (e.g., for 5th sentence of 1st paragraph, "next")
	2 paragraph social studies/science essay, 5 sentences in each paragraph	81.8% (range = 8–9)	81.8% (range = 8–9)	5th sentence of 1st and 2nd paragraph	Provide a more complete sentence starter in outline (e.g., "Next, I'll tell you about ___.")
Aaron	Outline for essay	80.7% (range = 20–22)	53.8%	Title	Underline and place arrow to main idea of original essay question (e.g., Describe the life cycle of the *Monarch butterfly*)
				Topic for each of 5 paragraphs	Provide a topic descriptor (e.g., "___ stage of life cycle")
				1st, 2nd, 3rd, and 4th sentence of 1st paragraph	Provide sentence starter (e.g., "In this essay, I will ____.")
	5 paragraph science essay, 4 sentences in each paragraph	100%	85.7% (range = 17–18)	1st sentence of 1st, 2nd, 3rd, 4th, and 5th paragraph	Provide choices of sentence starters (e.g., *first*, *second*, and *third*; *first*, *next*, *now*, *finally*) and verbs (e.g., *talk about*, *describe*, *explain*, *discuss*) in outline

Training the Intervention Agents

All intervention agents (one-to-one aides for Hailey and Julie, mothers for all other participants) were trained by the first and third authors prior to Stage 3 (baseline) on prompting techniques through verbal explanation, modeling, and feedback until performance-to-criteria standards were met. The performance-to-criteria standards were defined as following the task analysis prompting strategies described in Stage 2 and 3 correctly (i.e., correct prompting sequence, correct completion of task item in Stage 2 if the child did not complete it, and appropriate response to problem behavior as verified by investigators on a yes/no checklist for each task item)

for 100% of the tasks across three consecutive sessions. Following Stage 3, the same procedures were applied to train the intervention agents on the specified environmental modification techniques (listed in Table 3 and 4), prompting sequence, and response to problem behavior. Once these criteria were met, verbal feedback from the investigator was faded (typically between 1 and 4 sessions). These procedures were completed again after every sixth intervention session given that intervention strategies were revised at this time (e.g., faded or modified) based on results from ongoing task analyses.

Interobserver Agreement

A binary reliability index (i.e., perfect agreement or no agreement) was used to assess agreement on attempts, correct completion, cue level of the verbal instruction, and latency. An agreement was scored only when both observers agreed that the same task step had been attempted and completed correctly or required the same level of verbal instruction, if the difference between observers for latency to problem behavior or successful task completion was 5 s or less, if the same number of major and minor problem behaviors occurred on the same task step, or if affect ratings fell within one point of each other. During Stage 2, two observers independently and concurrently completed interobserver reliability checks for 2 out of the 2 preintervention task analysis sessions for each of the six participants. The mean percentage agreement for the six participants for attempts, correct completion, and cue level of the verbal instruction was 97.2% (range = 81.8%–100%), 96.3% (range = 75%–100%), and 94.2% (range = 95.7%–100%), respectively. During Stage 3, interobserver reliability checks were completed for 39 out of 40 baseline sessions (i.e., 97.5%) across the six participants. Mean percentage agreement for attempts, correct completion, cue level of the verbal instruction, latency, problem behavior, and affect for the six participants was 99.8% (range = 90.9%–100%), 99.1% (range = 83.3%–100%), 97.8% (range = 66.6%–100%), 100%, 100%, and 100%, respectively. During Stage 4, interobserver reliability checks were completed for 66 out of 156 intervention sessions (i.e., 42.3%) across the six participants. Mean percentage agreement for attempts, correct completion, cue level of the verbal instruction, latency, problem behavior, and affect for the six participants was 99.5% (range = 80%–100%), 97.9% (range = 50%–100%), 95.4% (range = 45.5%–100%), 100%, 99.9% (range = 96.3%–100%), and 99.5% (range = 85.7%–100%), respectively.

Results

Percentage of Task Steps Completed Correctly

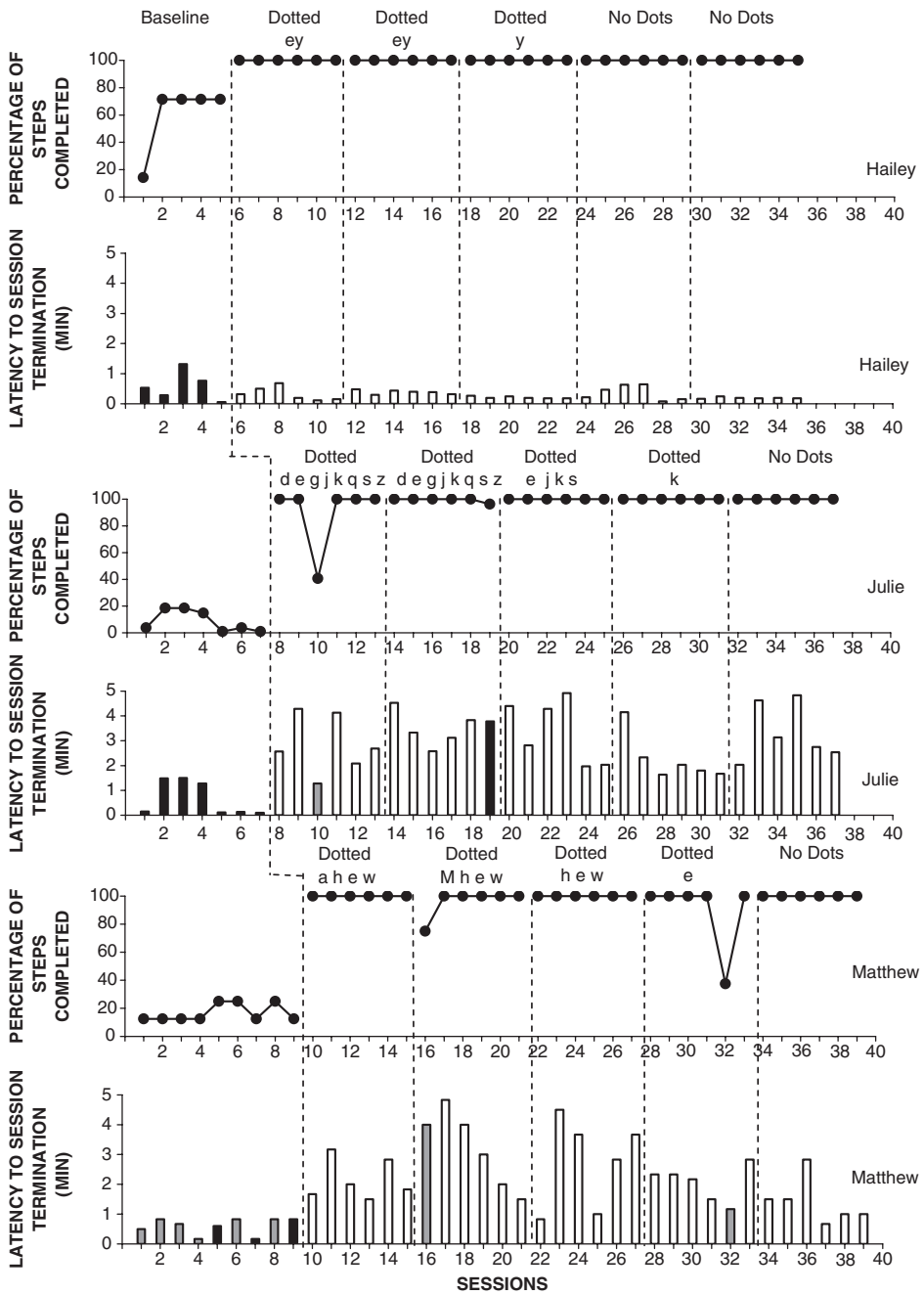
As shown in Figure 1 (motor domain) and Figure 2 (academic domain), all participants showed an increase from baseline to intervention in the percentage of task steps they completed correctly and independently. In addition, by the final stage of intervention, all participants completed their tasks without the use of the environmental modification techniques (i.e., modification techniques were faded out based on results of the ongoing task analysis and as indicated by the phrase “no dots” in Figure 1 and “no prompts” in Figure 2). Thus, by the end of intervention, the participants’ competency met the curricular demands of the environment without the need for continued environmental modification techniques.

Participants 1 to 3: Motor. As shown in Figure 1, Hailey’s mean percentage of task steps completed correctly increased from 71.4% during baseline to 100% during intervention. Even more dramatic increases from baseline to intervention were seen for Julie (8.8%–97.9%) and Matthew (16.3%–96.7%). Just as the participants’ correct completion of task steps increased from baseline to intervention, so too did their independent completion of these steps. In baseline, Hailey was completing only 51.4% of the task steps without verbal prompts from the intervention agent; however, by intervention, she was completing 98.2% of the task steps independently. Julie’s and Matthew’s independent completion of task steps increased from 2.5% and 0%, respectively, during baseline to 80.4% and 66.3%, respectively, during intervention.

Participants 4 to 6: Academic. As shown in Figure 2, the participants also demonstrated dramatic increases in the academic domain from baseline to intervention, respectively, in the mean percentage of task steps completed correctly: Amy (9.8%–100%), David (5.5%–91.5%), and Aaron (0.2%–98%). The participants’ mean independent completion of task steps increased from near-zero rates of independent task completion in baseline (i.e., Amy, 2.2%; David, 1.4%; and Aaron, 0%) to approximately two-thirds independent task completion during intervention (i.e., Amy, 76.1%; David, 62.5%; and Aaron, 63.0%).

It should be noted that Amy’s outline was faded faster than those of the other two participants. During the task analysis following Session 16, she told the investigators that she did not want or need the outline or additional materials to write the essay. She was then given the

Figure 1
Percentage of Task Steps Completed Correctly and Latency to Session Termination for Motor Tasks During the Baseline and Intervention Stages of the Study



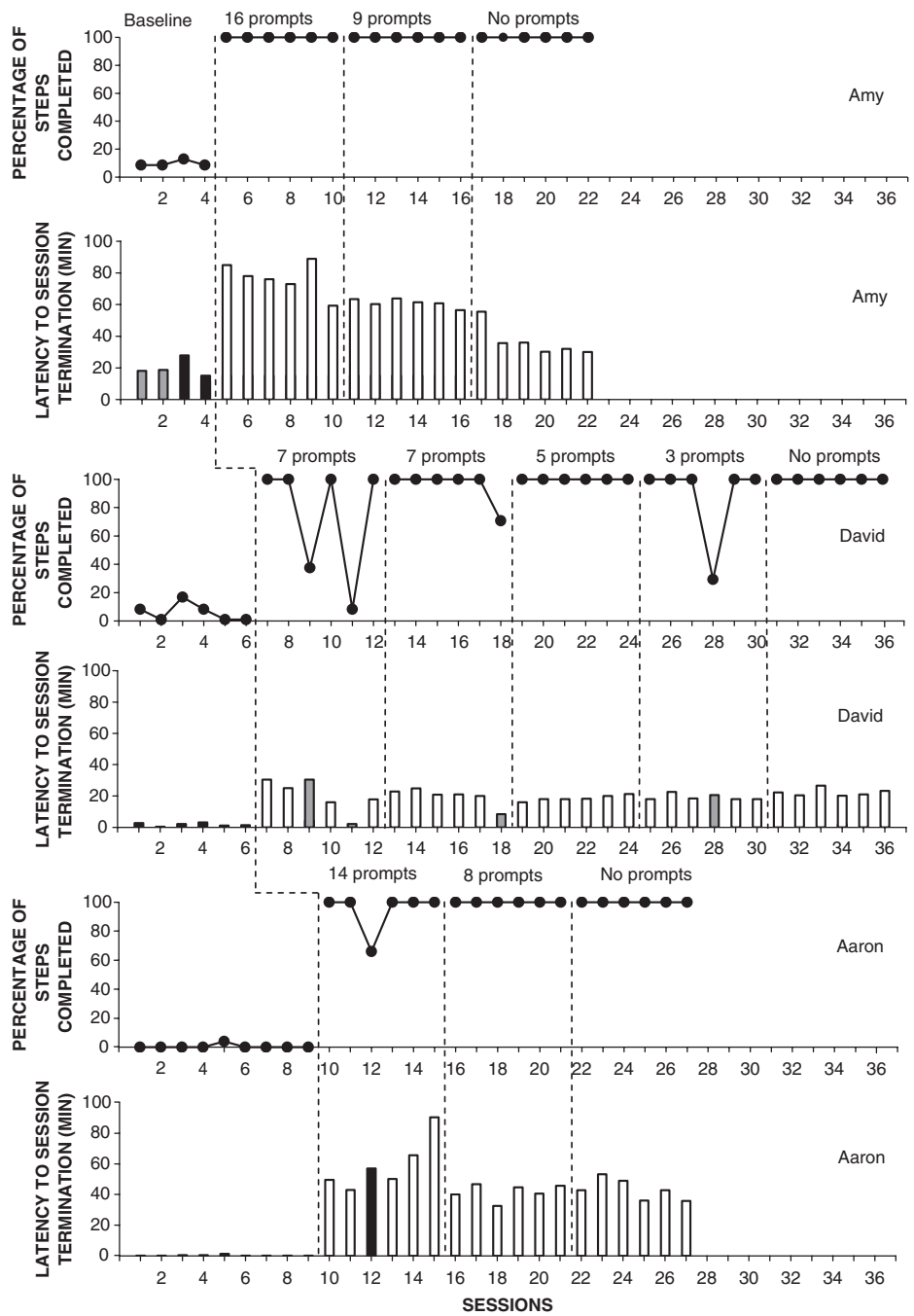
Note: ■ = Session terminated due to major problem behavior; ■ = Session terminated due to minor problem behavior; □ = Task successfully completed without the need to terminate due to problem behavior.

opportunity to complete the essay without creating the outline, which she did successfully (i.e., 100% of the task steps for the essay were completed correctly). Therefore, Amy's final six intervention sessions were composed only of the essay.

Latency to Session Termination and Problem Behavior

Figures 1 and 2 also present data on latency to session termination due to either problem behavior or successful

Figure 2
Percentage of Task Steps Completed Correctly and Latency to Session Termination for Academic Tasks During the Baseline and Intervention Stages of the Study



Note: ■ = Session terminated due to major problem behavior; ■ = Session terminated due to minor problem behavior; □ = Task successfully completed without the need to terminate due to problem behavior.

completion of all task steps without problem behavior. As indicated in Figures 1 and 2, all baseline sessions were terminated due to either major (black bars) or minor (gray bars) problem behavior. As such, all baseline sessions represent a short latency to problem behavior. During intervention, latency data refer to either the latency to problem behavior (black or gray bars) or the latency to successful completion of all task steps without the need to terminate due to criterion levels of either major or minor problem behaviors (open bars). As

indicated by the open bars, almost all sessions during intervention were completed successfully without the need to terminate due to problem behavior.

Participants 1 to 3: Motor. The mean latency to session termination increased from baseline to intervention for Julie (41 s to 3 min) and Matthew (36 s to 2 min 16 s). In other words, Julie and Matthew were able to tolerate the task for longer periods during intervention than they did during baseline, and they did so while successfully completing the task. Interestingly, Hailey took less time to successfully complete the task during intervention than she did to escape the task due to problem behavior during baseline (18 s in intervention as compared with 37 s in baseline). In addition, even for those intervention sessions that had to be terminated due to problem behavior (Julie, Sessions 10 and 19; Matthew, Sessions 16 and 32), the mean latency to session termination was greater during intervention than it was during baseline. In other words, when the participants engaged in problem behavior (during intervention) that merited session termination, they were able to tolerate the task for longer during intervention before engaging in problem behavior than they did during baseline (Julie, 2 min 32 s during intervention vs. 18 s during baseline; Matthew, 2 min 35 s during intervention vs. 36 s during baseline) and complete a higher mean number of task steps in intervention than they did in baseline (Julie, 68.5% during intervention vs. 8.8% during baseline; Matthew, 56.3% during intervention vs. 16.3% during baseline).

Participants 4 to 6: Academic. The mean latency to session termination increased from baseline to intervention for Amy (19 min to 58 min 10 s), David (1 min 51 s to 19 min 10 s), and Aaron (21 s to 48 min 10 s). That is, participants tolerated the task for significantly more time during intervention than they did during baseline and successfully completed more of the task. In addition, even for those intervention sessions that were terminated due to problem behavior (Sessions 9, 11, 18, and 28 for David; Session 12 for Aaron), the mean latency to session termination was greater during intervention than it was during baseline. In other words, when the participants engaged in problem behavior meriting session termination during intervention, they were able to tolerate the task for longer (David, 4 min 55 s during intervention vs. 1 min 51 s during baseline; Aaron, 57 min during intervention vs. 21 s during baseline) and to complete more task steps than they did during baseline (David, 68.5% during intervention vs. 5.5% during baseline; Aaron, 66% during intervention vs. 0% during baseline).

Affect

The data indicated a positive change in affect from baseline to intervention for all participants, despite the fact that affect was not specifically targeted. It should be noted that results did not demonstrate that participants were "happy" when completing their work but, rather, suggested that working at one's level of competence resulted in a shift from negative to more neutral affect.

Participants 1 to 3: Motor. Hailey's, Julie's, and Matthew's mean affect scores indicated slightly negative affect during baseline (1.7, 1.1, and 1.5, respectively) and neutral affect during intervention (3.0, 2.9, and 2.8, respectively).

Participants 4 to 6: Academic. Amy's affect remained neutral during baseline and intervention (2.4–2.8). However, David's and Aaron's mean affect scores increased from negative affect during baseline (.96 and .83, respectively) to neutral affect during intervention (3.1 and 2.9, respectively).

Ancillary Posttest Measures

Participants 1 to 3: Motor. The mean severity scores for the motor task participants decreased from baseline to intervention for problem behavior (i.e., from 6.3, indicating severe problem behavior, to 2, indicating mild problem behavior), for danger of the child to himself or herself or others (i.e., from 5, indicating moderate severity, to 1.3, indicating mild severity), and for the disruptiveness of the child to the setting (i.e., 6.3, indicating severe disruption, to 2, indicating mild disruption). The mean score for ease of intervention strategy use and helpfulness of strategies was 7, indicating that the intervention agents believed the strategies to be easy to use and helpful. Similarly, they provided the highest possible ratings (7, indicating high impact) for the impact of the strategies in aiding the child to successfully complete the task and to reduce problem behavior. It also should be noted that at the end of the study, anecdotal reports from the teachers of the children in the motor task domain indicated an increase in academic task completion and/or improvement in quality of classroom life. To illustrate, Hailey's teacher reported that Hailey was completing significantly more work in the classroom, Julie's teacher reported that she moved Julie back to a table with her peers as the teacher no longer felt Julie was a danger to those peers, and Matthew's teacher reported that he was now writing his name on classroom assignments, despite the fact that the home-based intervention did not address this task in the school setting.

Participants 4 to 6: Academic. The mean severity scores for the academic task participants decreased from baseline to intervention for problem behavior (i.e., 5.3, indicating moderate problem behavior, to 2.3, indicating mild problem behavior), for danger of the child to himself or herself or others (i.e., 2.6, indicating mild severity, to 1.6, indicating very mild severity), and for disruptiveness of the child to the setting (i.e., 5.7, indicating severe level of disruption, to 2, indicating mild disruption). Parents provided the highest possible ratings (i.e., 7) for the ease of strategy use and helpfulness of the strategies. The mean score for the impact of the strategies in aiding the child to successfully complete the task was 6.3 (indicating that the strategies were very useful) and the mean score for the impact of the strategies in reducing the child's problem behavior was 6.6 (indicating high impact of the strategies in reducing problem behavior).

In addition, teachers of the children in the academic domain reported an improvement in the children's essay writing at school, even though these skills were taught at home. While at times the participants' use of standard transition sentences appeared formulaic, teachers reported that the intervention strategy provided an organization and consistency in writing that the students did not previously have. This outcome is evidenced by the fact that the grades of the participants' assignments increased over the course of intervention. Classroom teachers graded all assignments in baseline and intervention. In baseline, given that all sessions were terminated due to problem behavior, all assignments were graded as "incomplete." However, grades during intervention averaged an A– for Amy, a B– for David (including 4 incompletes), and a B– for Aaron (including 1 incomplete). A high point for Amy's family occurred when she received a 30/30 on her final exam (an art essay that was written independently in class). Amy completed the essay with her classmates within the time period allotted (45 min) without the use of an outline.

Discussion

The two studies in the present investigation provide a framework in which to examine how poor environmental fit may have affected problem behavior in six children diagnosed with an ASD. In both the motor and the academic domains, poor environmental fit was associated with a low percentage of task steps completed correctly, high levels of problem behavior, and negative affect. However, when interventions were developed that improved environmental fit (i.e., specific task steps were modified), then task completion increased dramatically, problem behavior decreased to near-zero levels, and affect improved. It should be noted, however, that the concept of poor environmental fit is just one explanation for the problem behavior that emerged for participants when the performance demands of their environment exceeded their competency level. Results of the present investigation do not conclusively determine the function of problem behavior. While it is possible that problem behavior was escape motivated, results do not preclude the possibility that problem behavior may have been attention motivated. However, irrespective of the function of problem behavior, results indicate that enhanced environmental fit (i.e., modifying curricular demands to the child's competency level) was associated with reduced problem behavior.

The Role of Assessment

The present study involved the use of a sequenced strategy to identify areas of difficulty for the participants. The results of standardized assessments relevant to the participants' skills in specified domains were examined. Then the classroom teacher and parents listed tasks in the specified problematic domain that were difficult for the participant. The parents and teachers also identified which of the tasks were most relevant for assessment and intervention. This was followed by task analyses to assess the participants' performance on the identified problematic task. The use of a combination of standardized assessment and task analysis distinguishes the present study from much previous research (Carr et al., 1999), as a systematic effort was undertaken to link specific performance difficulties on a task to global deficiency in a generic domain (e.g., motor, academic) and then further assess the particularities of that deficiency via task analysis.

A focus on the concept of environmental fit may lead to a better understanding of the importance of matching activities with an individual's current skill level. Results from the present study suggest that a child can be successful when placed in the right (modified) environment. Challenging activities or demands need not be avoided by individuals with skill deficits; rather, accommodations can be put in place to facilitate success and independence within the activity or demand situation. As demonstrated in the present study, ongoing assessment is critical to successfully developing environmental modifications that are responsive to the individual's competency level.

The Role of Intervention

An environmental fit model highlights intervention opportunities that exist not only at the level of the

individual (skill building) but also at the level of the environment (curricular modification). Through detailed task analyses, it becomes possible to identify the specific components of a task that are most problematic for a given individual. This information, in turn, can be used to redesign the task so that it is a better fit to the individual's competency in a given domain. In addition, with these environmental modifications in place, it is actually possible to increase an individual's competency within that task. An environmental fit model suggests that even though an individual may have deficient skills in a given domain of functioning, whatever skills he/she does have may prove adequate provided that the environment is redesigned so that the skills are now a good fit for the newly modified environment.

Results from the present study provide further support for the viability of antecedent based approaches such as curricular modification (Dunlap et al., 1991) in reducing problem behavior and increasing task completion. It is possible that environmental redesign reduced task aversiveness, which undermined the need for escape-motivated problem behavior. Difficult task steps may no longer have served as discriminative stimuli for problem behavior; rather, specific curricular modifications may have served as discriminative stimuli for successful completion of work that, in turn, may have contributed to increased motivation to engage in the task and more positive behavior overall. Alternatively, problem behavior may have initially served an escape function but may later have acquired an attention function. Accessing negative attention from peers is unfortunately a common maintaining variable for problem behavior occurring in naturalistic settings (e.g., it is difficult to control the reactions often inadvertently provided to a student by classmates). It is possible that environmental redesign increased the participants' success with tasks and led to attention acquired for successful task completion rather than problem behavior.

To illustrate both possibilities, during baseline, anecdotal observations indicated that Julie (a participant in the motor task domain) would frequently scream, "No ABCs!," when her teacher announced that it was time for the class to practice writing the alphabet. This type of reaction to curricular demands was clearly disruptive to the functioning of the class and may have resulted in inadvertent attention from classmates (e.g., stares, backing away). In contrast, during intervention, Julie would frequently say, "Watch me!" and show her classmates her successfully completed ABCs. Julie's apparent pride in task completion demonstrates the important role that environmental modification can have in increasing a child's competence in a given task, altering a child's interactions with her classmates, and affording the child the opportunity to derive positive attention for task completion. Given the critical link demonstrated between early school failure and rejection by peers, teachers, and parents (Patterson, Reid, & Dishion, 1992), these results are particularly intriguing.

While the process of assessing and determining the appropriate level of educational materials to provide to a child can be daunting for teachers, the procedures outlined in the present study suggest one set of strategies for producing rapid, positive change. Good environmental fit can result in an immediate reduction in problem behavior and an increase in independent task completion. In addition, through continuous monitoring of the child's progress, one can build interventions that bring about an increase in skills. The implication is that given the right environment, all students can be successful.

Limitations and Next Steps

In sum, the present study suggests that by examining a child's competency as well as the curricular demands of the environment through both standardized assessments and more focused, ongoing task analyses, a comprehensive assessment can be generated that leads to greater opportunities for and more effective means of curricular modification. While the function of problem behavior was not established, the curricular modifications provided served to impact task completion, problem behavior, and affect. It will be important, though, that efforts continue to focus not only on assessing the wider context for problem behavior but also on assessing the specific function of problem behavior so that interventions may be further refined.

In addition, it is critical that social validity continue to be prioritized. These results are particularly important given that the study was conducted in natural venues (e.g., classrooms and homes) by natural intervention agents (e.g., teachers and parents) within natural routines (e.g., school activities, homework), all features of progressive best practice (Carr et al., 1999). The degree to which the intervention agents adhered to the procedures was not assessed. Next steps will involve more heightened scrutiny regarding the fidelity of the interventions provided by natural intervention agents and the possible effect of fluctuating maintaining variables within these natural contexts.

The positive outcomes achieved in the motor and academic domains justify the plausible extension of the procedures identified to other domains involving language, social, and cognitive functioning as well as extension to other venues such as the community and workplace.

A multidimensional approach built on an environmental fit model has, arguably, potential for enhancing quality of life for people with serious disabilities.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.

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

Bambara, L. M., Ager, C., & Koger, F. (1994). The effects of choice and task preference on the work performance of adults with severe disabilities. *Journal of Applied Behavior Analysis*, *27*, 555–556.

Beery, K. E. (1989). *Developmental test of visual-motor integration: Administration, scoring and teaching manual*. Cleveland, OH: Modern Curriculum Press.

Carr, E. G., & Blakeley-Smith, A. (2006). Classroom intervention for illness-related problem behavior in children with developmental disabilities. *Behavior Modification*, *30*, 901–924.

Carr, E. G., & Carlson, J. I. (1993). Reduction of severe behavior problems in the community using a multicomponent treatment approach. *Journal of Applied Behavior Analysis*, *26*, 157–172.

Carr, E. G., Horner, R. H., Turnbull, A. P., Marquis, J., Magito-McLaughlin, D., McAtee, M. L., et al. (1999). *Positive behavior support for people with developmental disabilities: A research synthesis.* Washington, DC: American Association on Mental Retardation.

Carr, E. G., Ladd, M. V., & Schulte, C. (2008). Validation of the contextual assessment inventory (CAI) for problem behavior. *Journal of Positive Behavior Interventions*, *10*, 91–104.

Carr, E. G., McLaughlin, D. M., Giacobbe-Grieco, T., & Smith, C. E. (2003). Using mood ratings and mood induction in assessment and intervention for severe problem behavior. *American Journal on Mental Retardation*, *108*, 32–55.

Center, D. B., Deitz, S. M., & Kaufman, M. E. (1982). Student ability, task difficulty, and inappropriate classroom behavior: A study of children with behavior disorders. *Behavior Modification*, *6*, 355–374.

Cooper, J. O., Heron, T. E., & Heward, W. L. (1987). *Applied behavior analysis.* Columbus, OH: Merrill.

Crone, D. A., & Horner, R. H. (2003). *Building positive behavior support systems in schools.* New York: Guilford.

Didden, R., Duker, P. C., & Korzilius, H. (1997). Meta-analytic study on treatment effectiveness for problem behaviors with individuals who have mental retardation. *American Journal on Mental Retardation*, *101*, 387–399.

Dunlap, G., Foster-Johnson, L., Clarke, S., Kern, L., & Childs, K. E. (1995). Modifying activities to produce functional outcomes: Effects on the disruptive behaviors of students with disabilities. *Journal of the Association for Persons with Severe Handicaps*, *20*, 248–258.

Dunlap, G., Kern-Dunlap, L., Clarke, S., & Robbins, F. R. (1991). Functional assessment, curricular revision, and severe behavior problems. *Journal of Applied Behavior Analysis*, *24*, 387–397.

Durand, V. M., & Crimmins, D. B. (1988). Identifying the variables maintaining self-injurious behavior. *Journal of Autism and Developmental Disorders*, *18*, 99–117.

Hammill, D. D., & Larsen, S. C. (1996). *Manual for the Test of Written Language* (3rd ed.). Austin, TX: Pro-Ed.

Hanley, G. P., Iwata, B. A., & McCord, B. E. (2003). Functional analysis of problem behavior: A review. *Journal of Applied Behavior Analysis*, *36*, 147–185.

Harrower, J. K., & Dunlap, G. (2001). Including children with autism in general education classrooms: A review of effective strategies. *Behavior Modification*, *25*, 762–784.

Horner, R. H., Day, H. M., & Day, J. R. (1997). Using neutralizing routines to reduce problem behaviors. *Journal of Applied Behavior Analysis*, *30*, 601–614.

Kern, L., Childs, K. E., Dunlap, G., Clarke, S., & Falk, G. D. (1994). Using assessment-based curricular intervention to improve the classroom behavior of a student with emotional and behavioral challenges. *Journal of Applied Behavior Analysis*, *27*, 7–19.

Kern, L., & Dunlap, G. (1998). Curricular modifications to promote desirable classroom behavior. In J. K. Luiselli & M. J. Cameron (Eds.), *Antecedent control: Innovative approaches to behavioral support* (pp. 289–307). Baltimore: Paul H. Brookes.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.

Luiselli, J. K., & Cameron, M. J. (Eds.). (1998). *Antecedent control: Innovative approaches to behavioral support*. Baltimore: Paul H. Brookes.

Mace, F. C., Hock, M. L., Lalli, J. S., West, B. J., Belfiore, P., Rinter, E., & Brown, D. K. (1988). Behavioral momentum in the treatment of noncompliance. *Journal of Applied Behavior Analysis*, *2*, 123–141.

McAtee, M., Carr, E. G., & Schulte, C. (2004). A Contextual Assessment Inventory for problem behavior: Initial development. *Journal of Positive Behavior Interventions*, *6*, 148–165.

McGill, P. (1999). Establishing operations: Implications for the assessment, treatment, and prevention of problem behavior. *Journal of Applied Behavior Analysis*, *32*, 393–418.

Myles, B. S., & Adreon, D. (2001). *Asperger syndrome and adolescence: Practical solutions for school success.* Shawnee Mission, KS: Autism Asperger Publishing.

Myles, B. S., Huggins, A., Rome-Lake, M., Hagiwara, T., Barnhill, G., & Griswold, C. (2003). Written language profile of children and youth with Asperger syndrome: From research to practice. *Education and Training in Developmental Disabilities*, *38*, 362–369.

Myles, B. S., & Simpson, R. L. (2003). *Asperger syndrome: A guide for educators and parents* (2nd ed.). Austin, TX: Pro-Ed.

O'Neill, R. E., Horner, R. H., Albin, R. W., Sprague, J. R., Storey, K., & Newton, J. S. (1997). *Functional assessment and program development for problem behavior: A practical handbook*. Pacific Grove, CA: Brooks/Cole Thomson Learning.

Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *Antisocial boys.* Eugene, OR: Castalia.

Scotti, J. R., Evans, I. M., Meyer, L. H., & Walker, P. (1991). A meta-analysis of intervention research with problem behavior: Treatment validity and standards of practice. *American Journal on Mental Retardation*, *96*, 233–256.

Skinner, B. F. (1938). *The behavior of organisms*. New York: Appleton-Century-Crofts.

Smith, R. G., & Iwata, B. A. (1997). Antecedent influences on behavior disorders. *Journal of Applied Behavior Analysis*, *30*, 343–375.

Snell, M. E., & Smith, D. D. (2006). Developing an IEP: Selecting and assessing skills. In M. E. Snell (Ed.), *Systematic instruction of the moderately and severely handicapped* (pp. 76–112). Upper Saddle River, NJ: Pearson/Merrill/Prentice Hall.

Snell, M. E., Voorhees, M. D., & Chen, L. (2005). Team involvement in assessment-based interventions with problem behavior: 1997–2002. *Journal of Positive Behavior Interventions*, *7*, 140–152.

Umbreit, J., Lane, K. L., & Dejud, C. (2004). Improving classroom behavior by modifying task difficulty: Effects of increasing the difficulty of too-easy tasks. *Journal of Positive Behavior Interventions*, *6*, 13–20.

Weeks, M., & Gaylord-Ross, R. (1981). Task difficulty and aberrant behavior in severely handicapped students. *Journal of Applied Behavior Analysis*, *14*, 449–463.

Winterling, V., Dunlap, G., & O'Neill, R. E. (1987). The influence of task variation on the aberrant behaviors of autistic children. *Education and Treatment of Children*, *10*, 105–119.

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In Memoriam: Edward G. Carr

Dr. Edward G. Carr, our mentor at the State University of New York at Stony Brook, was tragically killed on June 20, 2009. Ted assumed many professional roles in his life—researcher, author, editor, teacher—and will be remembered for many things. Some will remember Ted for his groundbreaking work, his prolific career, and his selfless devotion to the field of disabilities. Others will remember him for his unassuming brilliance, his ability to captivate audiences, both small and large, and his ability to mold ideas and bring them to life in the humble surroundings of his Stony Brook office, where two pictures sat nested above his desk: one, a small preschool drawing by his son Aaron (now twenty) that read, "Dad, you are a monkey," and the other, a black-and-white photograph of young Ted and several forefathers of behavioral interventions, including Ivar Lovaas and B.F. Skinner.

Ted's passion for working on behalf of disenfranchised populations is renowned; he viewed people with disabilities as the most extreme of these populations. He devoted his life to shifting a western world view focused on intelligence and productivity to create communities that would support "lives worth living" for all people. He saw ability in disability; to him, problem behavior was a form of communication rather than behavior that warranted punishment and segregation. He worked tirelessly to advance federal policy regarding functional assessment and inclusion, with the ultimate goal of placing all children on the "same bus" in their home communities. His compassion and understanding resulted in priceless local support for families struggling mightily with the day-to-day obstacles of caring for those with disabilities.

Ted's work is extraordinary in a field endowed with many talented visionaries, and we are honored and humbled to have worked closely with him. To us and to all who have been touched by his vision, Ted will forever remain a giant among giants.

Ted's work will live on through all those who have learned from him.

—Audrey Blakeley-Smith
Sanja Cale
Jamie Owen-DeSchryver