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STIMULUS CHARACTERISTICS WITHIN DIRECTIVES: EFFECTS ON ACCURACY OF TASK COMPLETION

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Three experiments were conducted in an outpatient setting with young children who had been referred for treatment of noncompliant behavior and who had coexisting receptive language or receptive vocabulary difficulties. Experiment 1 studied differential responding of the participants to a brief hierarchical directive analysis (least-to-most complex stimulus prompts) to identify directives that functioned as discriminative stimuli for accurate responding. Experiment 1 identified distinct patterns of accurate responding relative to manipulation of directive stimulus characteristics. Experiment 2 demonstrated that directives identified as effective or ineffective in obtaining stimulus control of accurate responding during Experiment 1 continued to control accurate responding across play activities and academic tasks. Experiment 3 probed effects of the interaction between the type of directive (effective vs. ineffective) and the reinforcement contingency (differential reinforcement for attempts vs. differential reinforcement for accurate responses) on accurate task completion and disruptive behavior. Results suggested that behavioral escalation from inaccurate responding to disruptive behavior occurred only when ineffective directives were combined with differential reinforcement for accurate task completion. The overall results are discussed in terms of developing a methodology for identifying stimulus characteristics of directives that affect accurate responding.

DESCRIPTORS: antecedent experimental analyses, instructional hierarchy, stimulus control, discriminative stimuli, differential reinforcement

A discriminated operant consists of a stimulus that sets the occasion for a response to be reinforced (Catania, 1998). With humans, an important form of discriminated operant is the accuracy of responding to gestured and spoken requests. Therefore, the directive itself must function as a discriminative stimulus (S^D), and the individual's history of reinforcement for following directives must be sufficient for the behavior to be emitted. Thus, accurate responding can be conceptualized as involving both a skill (discrimination) component and a reinforcement component. Although both components can affect responding, the reinforcement component has been studied more fre-

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quently in the behavioral literature because of the historical emphasis on consequence variables rather than on antecedent variables related to predicting and controlling human behavior (Halle & Spradlin, 1993; Iwata et al., 1994; Smith & Iwata, 1997; Wacker, Berg, Asmus, Harding, & Cooper, 1997). The general purpose of this study was to assess one antecedent variable in directives and its effect on accuracy of responding by young children. This study is based on the literature evaluating stimuli that precede or accompany a behavior and may result in discriminative control over responding.

Halle and Holt (1991) developed one of the first experimental methodologies for identifying specific antecedent stimuli that had acquired stimulus control of responding. Four participants with moderate mental retardation were taught to request an item using a mand while four stimulus parameters were held constant: item, setting, requester, and receiver. Following training on the use of the mand, probe trials were conducted with only one stimulus condition remaining the same as in the training sessions while values of the other three parameters were changed. Idiosyncratic response patterns occurred, with each student responding to different discriminative stimulus conditions. These results showed that even under highly controlled conditions, the specific stimuli that functioned as S^Ds varied across children.

Cooper, Wacker, Sasso, Reimers, and Donn (1990) demonstrated that brief antecedent analysis procedures can identify broad classes of antecedent variables that influence child behavior. They showed that child behavior in an outpatient clinic was responsive to antecedent variables such as level of demands. Other researchers have replicated these findings across multiple topographies of behavior and participant characteristics using brief antecedent analyses (Arndorfer, Miltenberger, Woster, Rortvedt, & Gaffaney, 1994; Taylor & Romanczyk, 1994). Harding, Wacker, Cooper, Millard, and Jensen-Kovalan (1994) extended these findings by using brief analyses in an outpatient setting to evaluate the effects of a prescribed hierarchy of antecedent and consequence variables on disruptive behavior during demand situations. Seven children (age range, 4 to 6 years), with intellectual functioning within the mild range of mental retardation or above, participated in brief analyses that consisted of a series of rapidly changing assessment conditions. For 3 of 6 participants who displayed decreased disruptive behavior and increased appropriate behavior, this improvement occurred when caregivers provided specific directives rather than general directives. Given that the only change across these conditions was in directive specificity, it seems probable that disruptive behavior was due to the way the directives were presented. One possible reason for this finding may have been the children's inability to discriminate the requirements of the task (lack of discriminative control within the directives), although this hypothesis was not directly tested.

The issue of lack of discriminative control within directives is closely related to the concept of an instructional hierarchy described by Haring, Lovitt, Eaton, and Hansen (1978). The concept of an instructional hierarchy can be used as a conceptual framework for selecting instructional strategies that are matched to the individual's current skill level or behavioral repertoire. Each stage of the instructional hierarchy is matched with procedures that help guide mastery of educational material at different complexity levels. Daly and Martens (1994), for example, used an instructional hierarchy to compare the effects of three instructional strategies on participants' oral reading performance. Results indicated that instructional strategies were more effective if they incorporated components that were matched to

the student's current skill level as specified by the instructional hierarchy. The development and refinement of this type of hierarchical methodology may help researchers to study more precisely the effects of antecedent variables on discriminated operants such as correct and compliant behavior.

Very few studies have investigated stimulus characteristics that affect correct responses produced by young children who engage in noncompliant behavior. The purpose of Experiment 1 was to study accuracy of task completion by young children when the directive complexity varied, while the same target behavior and consequences were maintained across conditions. Specifically, Experiment 1 studied differential responding of 22 young children to a brief hierarchical directive analysis (least-to-most complex directives) to identify variables that influenced correct responding to gestured and spoken requests under analogue conditions. This methodology provided an analysis of each child's repertoire with regard to discriminating requests. Our hypothesis was that accurate responding would vary according to the antecedent stimuli provided and that the antecedent stimuli constituted a hierarchy in terms of difficulty.

In Experiment 2, we evaluated whether the class of directives that were identified to exert discriminative control of accurate responding during the analogue task in Experiment 1 continued to control accurate responding across several play activities and academic tasks for 6 participants. That is, we examined whether directives functioned as discriminative stimuli for accurate responding across a larger range of tasks.

Finally, in Experiment 3, we conducted a case study that examined the interaction between the type of directive (effective vs. ineffective) and the differential reinforcement contingency (for attempts vs. for accuracy) on both accuracy of responding and disruptive behavior during demand situations. The purpose of Experiment 3 was to test the hypothesis that behavioral escalation from inaccurate responding to disruptive behavior occurred during situations in which ineffective directives were presented to the participant and inaccurate responding resulted in extinction.

EXPERIMENT 1

Method

Participants

Twenty-two children between the ages of 3 and 8 years, who were regularly scheduled patients in a behavioral pediatrics outpatient clinic and who met the following criteria, participated in the investigation: (a) They had been referred for "disruptive type" behaviors (American Psychiatric Association, 1994); (b) their estimated intellectual functioning was within the borderline range or above; (c) the primary referral issue, as reported by the parents, was noncompliance with directives in the home or school setting; and (d) the parents indicated that the child experienced overall difficulty following caregiver directions. Twenty-one of the children received a speech and language evaluation and a hearing screen during their outpatient evaluation, and a local area education agency had assessed 1 participant's speech and language abilities within 6 months of the study. See Table 1 for participant scores on measures of receptive language and receptive vocabulary skills. Sixteen (standardized scores were available for 15 of these participants) of the 22 participants had a receptive language or receptive vocabulary deficit defined as one standard deviation below age-equivalent normative data. Three of the participants performed in the borderline to low average range on a standardized measure of receptive language or vocabulary. Receptive language and vocabulary standard scores were unknown for 4 participants.

Table 1
Receptive Language and Receptive Vocabulary Standardized Assessment Results

Participant	Age (year-month)	Diagnoses	Receptive language and receptive vocabulary assessment	
Aaron	7-2	Delayed receptive vocabulary Borderline receptive language Borderline intellectual ability Disruptive behavior disorder	PPVT-Form L TOLD	P = 6 SS = 77
Brad	4-0	Disruptive behavior disorder	—	
Colton	5-2	Delayed receptive vocabulary Disruptive behavior disorder	PPVT-Form L	P = 5
Morgan	4-0	Low average receptive language Disruptive behavior disorder	PPVT-Form L PLS	P = 25 P = 24
Zach	3-11	Low average receptive language Disruptive behavior disorder	PPVT-Form L PLS-3	P = 34 P = 37
Cody	4-0	Delayed expressive and receptive language	PPVT-Form L PLS	P = 3 P = below 1
David	5-2	Mixed expression and receptive language disorder	—	
Matt	5-7	Delayed receptive vocabulary Attention deficit hyperactivity disorder Overanxious disorder	PPVT-Form L PLS	P = 5 P = 23
Garrett	4-9	Low average receptive vocabulary Oppositional defiant disorder	PPVT-Form L PLS-3	P = 39 P = 73
Eric	5-5	Delayed receptive language and vocabulary Disruptive behavior disorder	PPVT-Form 1 PLS-3	P = 2 P = 2
Lee	5-7	Delayed receptive vocabulary Borderline receptive language Lack of normal physiological growth Disruptive behavior disorder	PPVT-Form L TOLD	P = 10 SS = 78
Erin	5-8	Low average receptive language Disruptive behavior disorder	PPVT-Form L PLS-3	P = 21 P = 23
Nick	7-2	Delayed receptive vocabulary Borderline receptive language Disruptive behavior disorder	PPVT-Form L TOLD	P = 5 SS = 74
Jason	8-9	Delayed receptive vocabulary Disruptive behavior disorder	PPVT-Form L TOLD	P = 5 SS = 99
Chris	7-0	Delayed receptive language and vocabulary Mild delays in cognitive development Disruptive behavior disorder	PPVT-Form L TOLD	P = 1 SS = 63
Tyler	4-7	Delayed receptive language Disruptive behavior disorder	PPVT-Form L PLS-3	P = 53 P = 6
Monty	6-6	Delayed receptive vocabulary Disruptive behavior disorder Reading disability Articulation errors	PPVT-Form L TOLD	P = 1 SS = 85
Roman	4-10	Delayed receptive language and vocabulary Disruptive behavior disorder	PPVT-Form L PLS-3	P = 2 P = 16
Kris	6-6	Below average receptive language Learning disability (higher nonverbal and lower verbal cognitive abilities profile)	—	
Rich	7-5	Disruptive behavior disorder	—	
Brandon	8-8	Attention deficit hyperactivity disorder Disruptive behavior disorder	—	

Table 1
(*Continued*)

Participant	Age (year-month)	Diagnoses	Receptive language and receptive vocabulary assessment	
Tabitha	8-3	Expressive and receptive language delays Overanxious disorder Reading disorder	PPVT-Form L TOLD	P = below 1 SS = 77

Note. P = percentile rank; SS = standard score, mean of 100 and standard deviation of 15; dashes indicate that the information was not available. PLS-3 = Preschool Language Scale (3rd ed.) (receptive language results); TOLD = Test of Language Development (receptive language results); PPVT-Form L = Peabody Picture Vocabulary Test.

Setting

Outpatient clinic staff included two psychologists, a staff pediatrician, a pediatric resident, a pediatric nurse practitioner, and a speech-language pathologist. In addition to the staff psychologists, a psychology clinic team was also present, which included two pediatric psychology interns and one graduate student in school psychology or special education.

Behavioral observations were conducted via video monitoring. A videocamera and microphone were mounted on a wall in the observation room, and observers collected child behavior and procedural integrity data from a 53-cm color monitor. The current investigation was incorporated into the standard evaluation conducted by the psychology team, which typically lasted 90 min. All procedures were conducted in the regular assessment rooms located in the outpatient clinic.

Materials

The following materials were used during Experiment 1: three triangles, three squares, and three circles, all made of plastic and approximately 3 cm in height and length, and one yellow plastic bucket (approximately 25 cm in height and 15 cm in diameter). The colors of the geometric shapes were red, yellow, and blue. Two plastic dinosaurs (green and red), one black cow, one red wood rectangle (all approximately 10 cm in length and 5 cm in height), one green crayon, one right triangle constructed of soft foam material (approximately 5 cm in length and 3 cm in height), one large yellow plastic square (approximately 10 cm square), and one small yellow wood square (approximately 2 cm square) were also used during this experiment.

Dependent Variable

The dependent variable was the number of directives completed accurately. Between 12 and 17 items (depending on the assessment condition) were placed on the floor with a bucket in front of the child. Accurate responding was defined as placing three items specified by the experimenter into the bucket. Each trial constituted one attempt to place the designated items into the bucket. The trial was scored as accurate (correct) if the child picked up the items in the order specified in the directive and placed them in the bucket. A session consisted of five trials that were each preceded by the same type of directive (i.e., five different directives that were all the same complexity level). Accuracy of responding for a session was computed by dividing the number of correct trials by the total number of trials (five). The criterion level of accuracy for each session was 80% (i.e., four of five trials completed accurately).

Independent Variables

The independent variable was the type of directive presented to the child. Each session varied the type of directive provided by the

therapist. The type of directive increased in difficulty across sessions with regard to the receptive language skills that were required to discriminate the task requirements. The directive conditions were based on the receptive language requirements of the token test (Boller & Vignolo, 1966). Although the target response was the same across directives (i.e., to pick up three items and place them in a bucket), the mode (visual vs. verbal), sequence (one step vs. three steps in a specified order), discrimination of group membership (e.g., discriminating farm animals from dinosaurs, discriminating squares from circles), and discrimination of conjunctions (pick up a blue square *and* a red triangle, *or* pick up a yellow triangle and put it in the bucket) varied by condition. The token test was used as the basis for defining this hierarchy of directives because of previous studies that evaluated the difficulty of these components (see Lezak, 1995).

Data Collection and Observation System

One therapist, trained in the use of the data-collection procedures, used an event-recording procedure to gather information on the therapist's and the child's behavior. Separate recording forms were used for each condition.

As the therapist delivered each directive, the observer scored whether the directive was delivered correctly (therapist integrity measure). To be correct, both the type of directive and items to be placed in the bucket were delivered as intended. The child's response was then recorded as accurate or inaccurate and was the only dependent variable that was recorded during Experiment 1. An accurate response was scored if the child picked up the correct items in the correct order and placed them in the bucket (any deviation was scored as incorrect).

Interobserver Agreement

A second observer simultaneously but independently collected interobserver agreement data on the participant's and the therapist's behavior for 93% (range, 40% to 100%) of the sessions across all children. An agreement occurred when both observers recorded that the same behavior occurred on the same trial. Agreement was computed using an exact point-by-point system, dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Agreement for child behavior ranged from 92% to 100% (M = 99%). Procedural integrity data for the accuracy of the directive delivered indicated that 100% of the directives were delivered as dictated by the directive condition. Agreement for the therapist's behavior (administration of correct directive) ranged from 80% to 100% across sessions (M = 99%).

Design and Analysis

The study used a brief multielement design with the order of conditions arranged hierarchically, as described previously, but was also dependent on the child's performance (Cooper et al., 1990; Harding et al., 1994). As the child passed each condition (at least 80% accuracy), the next condition was presented until the child failed to reach the pass criterion. Experimental control was then assessed by one of three mini-reversal designs in which the first unsuccessful condition (B) was followed by repeating the last previous successful condition (A). The three versions of the mini-reversal designs used for this study were (a) ABA (n = 8), (b) ABAB (n = 5), and (c) ABABA (n = 9).

Procedure

The therapist first screened the child's knowledge of specific geometric shapes and colors by holding one object at a time in front of the child and asking, "What color is this?" or "What shape is this?" Each child demonstrated the ability to verbally state the colors and shapes used during the experiment.

Escape extinction was implemented for active resistance to completing the task. The direction was repeated or the trial continued until a response occurred. Escape extinction was used for 3 children. Finally, praise (described below) was provided after each trial for all participants who attempted to complete the task. Praise was provided noncontingently with regard to accuracy of task completion.

Directive assessment. The objects were placed approximately 33 cm in front of the child on the floor in four straight vertical rows (approximately 6 cm between rows). Three of the lines consisted of one red, one blue, and one yellow item for each geometric shape. The fourth line consisted of three plastic animals (a stegosaurus, a tyrannosaurus rex, and a dairy cow).

Prior to beginning the first directive condition, the child was provided with one practice trial to ensure that the child could discriminate the general requirements of picking up three designated items and placing them in a bucket. After the child accurately completed the sample directive, praise was delivered and the assessment began. Prior to the beginning of each directive session, the child was provided with one reminder to pay close attention to each directive. Each session consisted of five directives (trials) that involved variations of the same type. Each directive was administered once. If the child asked the therapist to repeat the directive, the therapist replied, "I'm sorry, but I can only give the direction once. Do the best you can and we will try another one." The therapist provided praise contingent on the participant attempting to complete the request (e.g., picking up three items and placing them in the bucket), but praise was provided noncontingently without regard to accuracy of task completion.

Mild inappropriate child behavior (e.g., playing with assessment materials instead of attempting to complete the task accurately) was ignored and the child was redirected to the task ("Okay, I can see you are ready to listen to directions again; good job"). Disruptive behavior (e.g., moving away from the assessment procedures, verbally refusing to attempt to complete the task) rarely occurred during the assessment.

The assessment always began with the one-step modeled directive condition. This condition consisted of the therapist pointing to the items to be picked up and then to the bucket. The therapist instructed the child, "Watch me, I am going to show you what I want you to pick up. When I am done pointing to the objects, you pick them up and put them in the bucket." The therapist pointed to one item at a time (touching each of the three items for approximately 1 s), made a sweeping gesture to indicate that all of the items should be picked up, and then pointed to the bucket. This was repeated five times with different items on each trial. For every trial, only one shape (circle, square, triangle, or animal) was selected.

The next condition used one-step verbal directives. This condition consisted of one verbal prompt to the child regarding the items to pick up and place in the bucket (e.g., "Pick up the squares and put them in the bucket"). The therapist instructed the child, "Now I am going to tell you what I want you to pick up and put in the bucket. I will not point to the items anymore, so listen carefully. I can only give the direction once."

Three-step verbal directives consisted of a verbal prompt regarding the items to pick up and place in the bucket. The child was told to listen carefully and to pick up the items in the same order as specified in the directive. The verbal prompt contained three sequential steps, such as, "Pick up the red square, then the blue square, and then the yellow square, and put them in the bucket." Thus, the child needed to pick up each item of a designated shape and color indicated in

Table 2
Summary of Directive Assessment Results

Participant	One-step model	One-step verbal	Three-step verbal	Three-step verbal increased group discrimination	Three-step verbal with conjunctions	Replicated (reversal achieved)
Aaron	+ (100)	− (60)		—	—	+
Brad	+ (100)	− (20)	—	—	—	+
Colton	+ (100)	− (20)	—	—	—	+
Morgan	+ (100)	− (0)	—	—	—	+
Zach	+ (90)	− (20)	—	—	—	+
Cody	+ (90)	− (0)	—	—	—	+
David	+ (100)	+ (100)	− (20)	—	—	+
Matt	+ (100)	+ (90)	− (40)	—	—	+
Garrett	+ (100)	+ (100)	− (0)	—	—	+
Eric	+ (100)	+ (93)	− (10)	—	—	+
Lee	+ (100)	+ (100)	− (30)	—	—	+
Erin	+ (100)	+ (100)	− (20)	—	—	+
Nick	+ (100)	+ (100)	− (20)	—	—	+
Jason	+ (100)	+ (100)	− (60)	—	—	+
Chris	+ (100)	+ (100)	− (20)	—	—	+
Tyler	+ (80)	+ (100)	− (30)	—	—	+
Monty	+ (100)	+ (100)	− (0)	—	—	+
Roman	+ (100)	+ (100)	− (20)	—	—	+
Kris	+ (100)	+ (100)	− (10)	—	—	+
Rich	+ (100)	+ (100)	− (0)	—	—	+
Brandon	+ (100)	+ (100)	+ (87)	− (40)	—	+
Tabitha	+ (100)	+ (100)	+ (100)	+ (80)	− (0)	+

Note. + = passed condition with at least 80% accurate task completion; − = failed condition (less than 80% accurate completion); dashes indicate that condition was not conducted. Percentage values in parentheses represent mean accurate task completion for all sessions conducted in each condition.

the directive. Following this condition, the therapist placed the additional items required for the next condition (e.g., small wood square, large wood rectangle, large plastic square, and one crayon) in a row directly to the right of the preexisting four rows of items (i.e., geometric shapes and animals).

Three-step verbal directives with increased group discrimination consisted of a verbal directive with three sequential steps, and the directives required the child to make an additional discrimination between group memberships (e.g., "Pick up the blue square, then the red square, and then the *heaviest object* and put them in the bucket"). The previous conditions required group discrimination between familiar stimuli (e.g., colors and shapes), and this condition required the child to also discriminate between group membership. Three-step verbal directives with conjunctions consisted of a verbal prompt with three sequential steps and required the child to discriminate between the conjunctions *or* and *and* (e.g., "pick up the red square *or* pick up the blue circle *and* the yellow triangle and put them in the bucket").

Results and Discussion

The performance of each child is summarized in Table 2. For each child, a successful condition was defined when the child performed the task with at least 80% accuracy (at least four of five correct responses). In every case, a mini-reversal (i.e., replication) was conducted in which a successful condition was repeated twice with an unsuc-

cessful condition inserted between the two successful conditions.

As shown in Table 2, 6 children (Aaron, Brad, Colton, Morgan, Zach, and Cody) failed to reach the pass criterion when instructed with one-step verbal directives after accurately responding to one-step modeled directives. Thus, modeled (visual) but not verbal one-step directives functioned to set the occasion for accurate responding. Mean accuracy was 98% (range, 80% to 100%) when they were given one-step modeled directives compared to 23% (range, 0% to 60%) when they were given one-step verbal directives. The top panel of Figure 1 presents the data of 1 participant (Brad) who exhibited the pattern of responding that indicated one-step modeled directives were necessary to guide accurate responding.

Fourteen children (David, Matt, Garrett, Eric, Lee, Erin, Nick, Jason, Chris, Tyler, Monty, Roman, Kris, and Rich) failed to reach the pass criterion when instructed with three-step verbal directives after accurately responding to one-step verbal and modeled directives. The mean accuracy was 99% (range, 80% to 100%) when they were given one-step verbal directives compared to 16% (range, 0% to 60%) when they were given three-step verbal directives. For an example of these results, see the second panel of Figure 1 for the results of Eric's assessment.

One child (Brandon) failed the three-step verbal directives with increased group discrimination requirements after accurately responding to three-step verbal directives (see third panel of Figure 1). One-step modeled and one-step verbal directives resulted in 100% accurate responding, and three-step verbal directives resulted in 100% and 80% accuracy, respectively, across sessions. In contrast, three-step verbal directives with increased group discrimination requirements resulted in 60% and 20% accurate responding across two sessions. The final child (Tabitha) failed the three-step verbal directives with conjunctions condition (see bottom panel of Figure 1). Both the one-step conditions and the three-step condition resulted in 100% accurate responding. Three-step verbal directives with increased group discrimination requirements resulted in 80% accurate responding, but three-step verbal directives with conjunctions resulted in 0% accuracy.

For all 22 children, no inconsistencies occurred within the hierarchical arrangement of conditions (see Table 2). Mild disruptive behavior (e.g., briefly refusing to attempt task completion) occurred for only 3 participants (Matt, Nick, and Kris).

In Experiment 1, brief antecedent analyses of directives were conducted in an outpatient clinic to study the accuracy of task completion by young children to directives that varied in complexity but maintained the same target behavior and the same reinforcement contingency for attempting to complete the task. For all 22 children in Experiment 1, distinct patterns of accurate task completion occurred relative to manipulation of the independent variable. Overall, the results of Experiment 1 suggested that the directive assessment represented a hierarchical arrangement of least-to-most complex directives that appeared to be useful for identifying broad classes of effective directives that resulted in discriminative control over accurate responding.

EXPERIMENT 2

The purpose of Experiment 2 was to evaluate whether the directives that were identified as effective in exerting discriminative control over accurate responding in Experiment 1 would continue to result in the same pattern of responding when common play and academic stimuli were used as tasks. In addition, we evaluated whether different patterns of behavior occurred for play and academic tasks or if accurate task completion

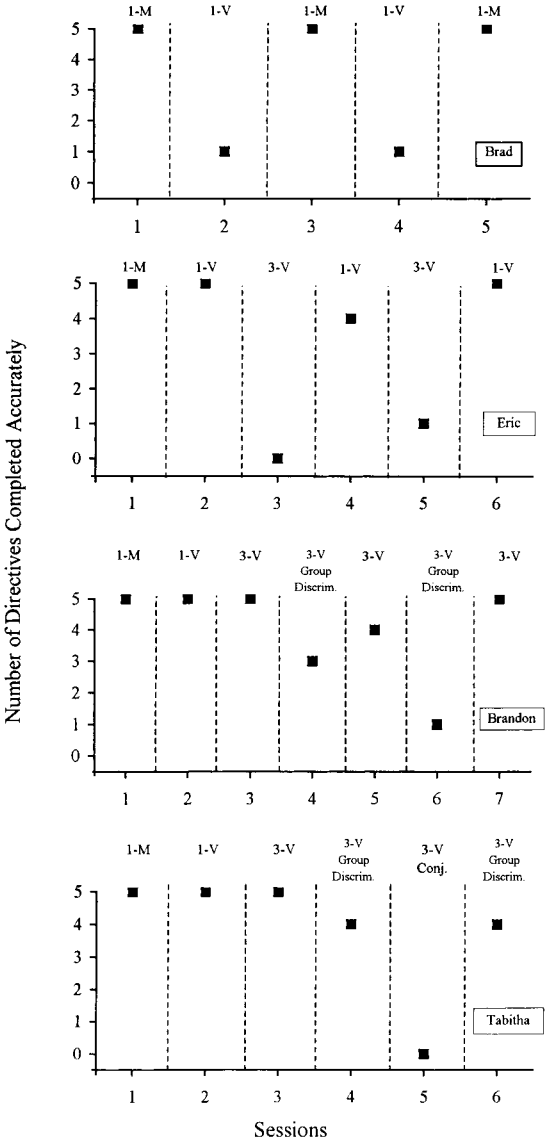

Figure 1. Data points represent the number of directives completed accurately during the hierarchical directive assessment. The top panel shows data for 1 participant (Brad) who displayed a pattern of responding indicating that one-step modeled directives were the most complex directives that resulted in stimulus control of accurate responding. The second panel shows data for 1 participant (Eric) who displayed a pattern of responding indicating that one-step verbal directives were the most complex directives that resulted in stimulus control of accurate responding. The third panel shows data for the participant (Brandon) who displayed a pattern of responding indicating that three-step verbal directives were the most complex directives that resulted in stimulus control of accurate responding. The bottom panel shows data for the participant (Tabitha) who displayed a pattern of responding indicating that three-step verbal directives with increased group discrimination requirements were the most complex directives that resulted in stimulus control of accurate responding.

was related to the directives provided across these categories of tasks.

Effective directives were defined as resulting in 80% or greater accuracy of task completion, and ineffective directives were defined as resulting in less than 80% accuracy during Experiment 1. Experiment 2 systematically evaluated the child's accuracy of task

completion with effective and ineffective directives across three play activities (i.e., two puzzles and a pegboard) and three academic tasks (i.e., letter identification and tracing, number identification, and picture identification). These tasks were selected because they represented common tasks at home and school and represented a preliminary attempt to assess the effects of degree of preference (play activities may be more preferred than academic tasks) and difficulty of task (academic tasks were presumed to be more difficult than the play activities) on accuracy of performance.

Method

Participants

Six of the 22 children from Experiment 1 participated in Experiment 2. Participants were selected for participation in Experiment 2 directly after completing the directive assessment as scheduled clinic time permitted. One-step modeled directives were effective in guiding accurate responding for 2 of the participants, and one-step verbal directives were effective for 4 of the participants. This matched the overall results of Experiment 1, which suggested that the majority of participants needed one-step verbal or three-step verbal directives to guide accurate responding. Therefore, the participants selected for Experiment 2 were representative of the participants in Experiment 1. No other selection criteria were used. Three of the children (Matt, Garrett, and David) received both the play and the academic tasks, and the remaining 3 children (Cody, Zach, and Eric) received only the play activities. The decision regarding who received the academic tasks was based on the child's recognition of numbers, letters, and pictures on worksheets as assessed via a brief screening prior to Experiment 2.

Tasks

Play activities. Play activities consisted of one transportation puzzle, one soft puzzle, and five solid-colored wood pegs with one rubber pegboard. The transportation puzzle was designed and produced by Discovery Toys, and consisted of small plastic pieces (approximately 6 cm in length) of a train, a car, an airplane, a space rocket, a hot air balloon, and a truck. The soft puzzle was also designed and produced by Discovery Toys, and its pieces were made of soft foam. The small (3 cm in length) foam puzzle pieces consisted of common items such as a key, moon, star, umbrella, grapes, and train. The rubber pegboard was 18 by 18 cm, and the five pegs were each 5 cm in length and were blue, green, yellow, orange, and red.

Academic tasks. Academic tasks were chosen from commercially available writing and math tasks available for use during assessments in the Behavioral Pediatrics Clinic. The academic tasks consisted of tracing letters from a work sheet that contained the entire alphabet presented in uppercase letters, number identification from a number line consisting of the numbers zero to nine, and picture identification of various fruits (e.g., apple, banana, orange) and childhood toys (e.g., bicycle, jacks, dolls, dump trucks). All of the academic items were approximately 3 cm in length and height.

Dependent Variable

The dependent variable was the number of directives completed accurately for effective and ineffective directives as identified by the assessment conducted in Experiment 1. Five to eight items (depending on the condition) were placed immediately in front of the child, who was sitting in a chair at a desk. Accurate responding for the play activities was defined as picking up specified items and placing them in the correct spot (e.g., in the pegboard, in the puzzle outline). Accurate responding for the academic tasks was defined as tracing (letter task) or circling (number and picture identification task) the

specified items in the correct order with a pencil.

Each trial consisted of one attempt to place the designated items in their correct place (pegboard or puzzle outline for play activities) or to circle or trace the designated items for the academic tasks. A session contained five trials that were preceded by the same type of directive (i.e., effective or ineffective stimulus prompt). Each trial was scored as correct if the child picked up or circled or traced the items in the order specified in the directive. Accuracy of responding for each session was computed by dividing the number of correct trials by the total number of trials for each play or academic task.

Independent Variable

The independent variable was the type of directive presented to the child. Based on the findings from Experiment 1, the directives presented during Experiment 2 were either effective or ineffective stimulus prompts. Ineffective stimulus prompts were defined as the first directive condition presented during the hierarchical assessment that the child failed (less than 80% accuracy; see Table 2). Effective stimulus prompts were defined as the most advanced directives presented in Experiment 1 that the child passed at 80% or higher accuracy.

Interobserver Agreement

An event-recording system was used to record each child's behavior. A second observer (a member of the psychology team), trained prior to the investigation, simultaneously but independently collected interobserver agreement data on an average of 93% (range, 50% to 100%) of sessions across children. Agreement checks were conducted for all children. Agreement for child behavior ranged from 93% to 100% (M = 97%). Procedural integrity data indicated that 100% of the directives were delivered correctly, and interobserver agreement was 100% for therapist behavior (i.e., specific directive administered).

Design and Analysis

The design was a multielement design contrasting two treatment conditions (effective and ineffective directives) to determine whether the effective directives resulted in increased accuracy of responding compared to the ineffective directives across at least three tasks for each child. The type of directive presented (effective or ineffective stimulus prompt) was counterbalanced. When both play and academic tasks were assessed, separate multielement designs were used with each category of tasks.

Procedure

After the effective and ineffective stimulus prompts were identified in Experiment 1, the therapist gave the child a short break (e.g., 15 min to 1 hr) with access to preferred activities in the examination room or a lunch break with his family. Prior to beginning Experiment 2, each child was screened to determine his ability to identify the names of colors (i.e., peg colors), objects, pictures, letters, and numbers used in the experiment. The screening consisted of holding individual items in front of the child and saying, "What do you call this?" or "Point to the letter." All children were able to identify the play items, but 3 of the 6 children were not able to identify the academic stimuli accurately; therefore, these children received only the play activities.

Each of the play activities or academic tasks (five trials with each academic or play task) was presented twice, once with effective directives and once with ineffective directives, for a total of 60 discrete trials: 30 trials with ineffective stimulus prompts and 30 with effective stimulus prompts for the children who received both the play and academic tasks. For the participants who re-

ceived only the play activities, 30 trials were presented (15 with effective directives and 15 with ineffective directives).

Each child was told that he was going to listen to several directions and that he would be allowed time afterwards to play with preferred activities. For example, for one-step model directives with puzzles, the child was told, "Now I am going to point to the piece you need to pick up; pick up only the item that I point to." As in Experiment 1, the child was given praise and positive attention for attempting to comply with each directive. The praise and positive attention (encouraging comments, hand claps) were presented noncontingently regarding the child's accuracy of completing the directive. Mild inappropriate behavior was briefly ignored (e.g., 5 s), and the child was redirected to the task. None of the 6 children displayed disruptive behavior. When a child completed the five trials for effective or ineffective directives for a given task, he was given access to preferred activities for approximately 5 min.

Results and Discussion

Play Activities

For 2 of the 6 children (Cody and Zach), the effective directive condition was one-step modeled directives and the ineffective directive condition was one-step verbal directives. For the remaining children (David, Matt, Garrett, and Eric), the effective directive condition was one-step verbal directives and the ineffective directive condition was three-step verbal directives.

All 6 children responded to the effective directive condition with increased accuracy relative to their performance when ineffective directives were presented (see Figure 2 for the participants who received only play activities and Figure 3 for the participants who received both play and academic tasks). These results occurred even though the same tasks, setting, and therapist were used across all sessions. As a group, mean accuracy was 96% (range, 90% to 100%) with effective directives, but accuracy decreased to 33% (range, 0% to 100%) with ineffective directives.

Results for Cody are shown in the top panel of Figure 2. When Cody was given a one-step directive with a visual model, his accuracy for the play activities was 100%, 100%, 80%, and 80% (M = 90%). However, when he was given one-step verbal directives, his accuracy was 20%, 60%, 100%, and 20% (M = 50%). Cody's performance was more variable during the ineffective directive condition than during the effective directive condition across the play activities. Additional effective and ineffective directive sessions were conducted because of an upward trend in accuracy during the first three ineffective directive sessions. These additional sessions used the colored pegs as the play activity that had previously resulted in 100% accuracy during the effective directive condition and 20% accuracy during the ineffective directive condition. The play activity that Cody completed with 100% accuracy when both effective and ineffective directives were used was the puzzle that consisted of various transportation objects. This finding suggests that there may be idiosyncratic features associated with various play activities, such as familiarity or preference, that affect some children's need for a specific type of directive to guide accurate responding.

Results for Zach are shown in the middle panel of Figure 2. When Zach was given a one-step modeled directive, his accuracy across the play activities was 100%, 100%, and 80% (M = 93%). However, when he was given one-step verbal directives, his accuracy was 0% for the same three play activities. Similar results occurred for Eric, as shown in the bottom panel of Figure 2. When Eric was given effective directives (one-step verbal directives), his accuracy

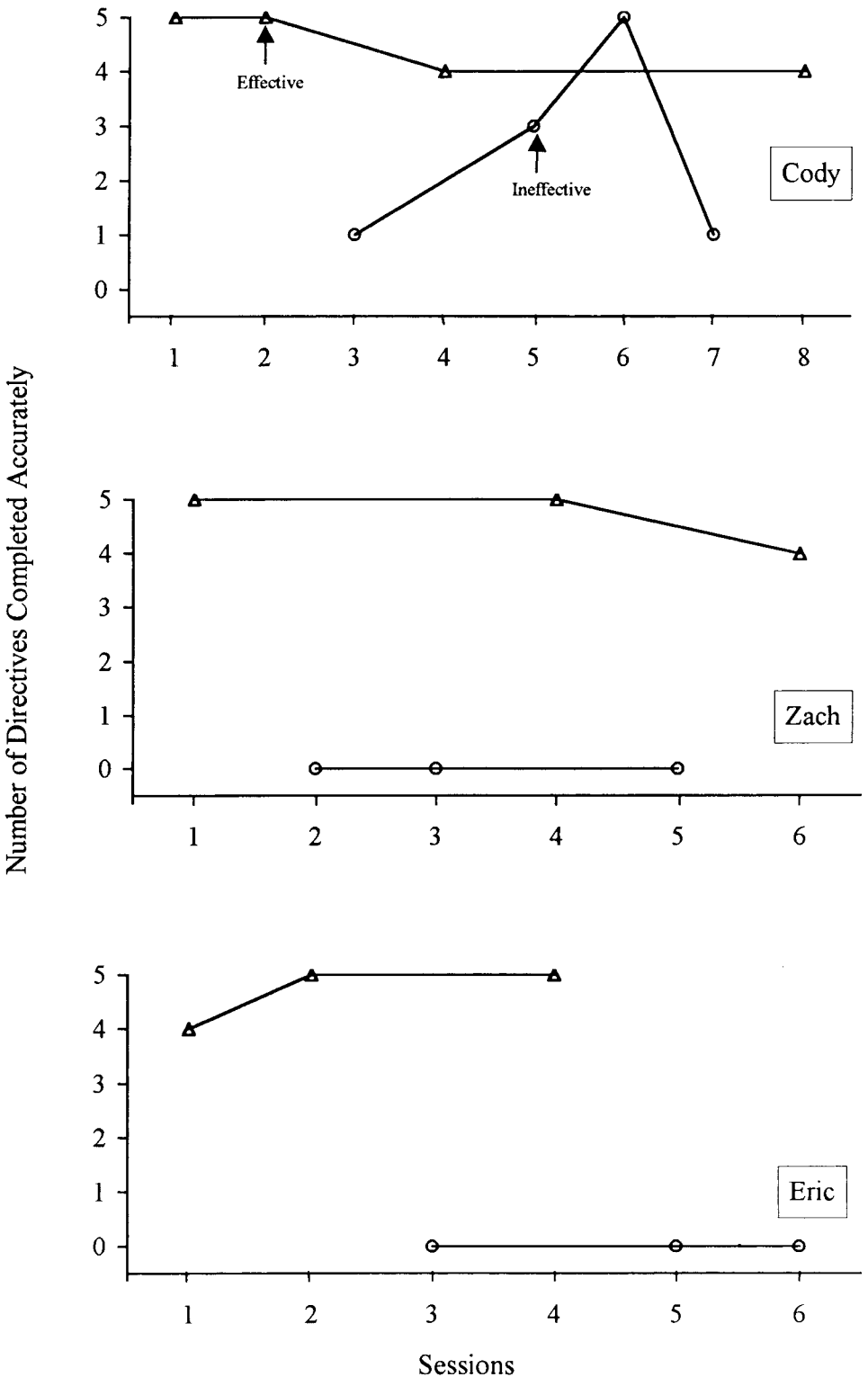

Figure 2. Number of directives completed accurately during the hierarchical directive assessment and play probes for Cody (top panel), Zach (middle panel), and Eric (bottom panel).

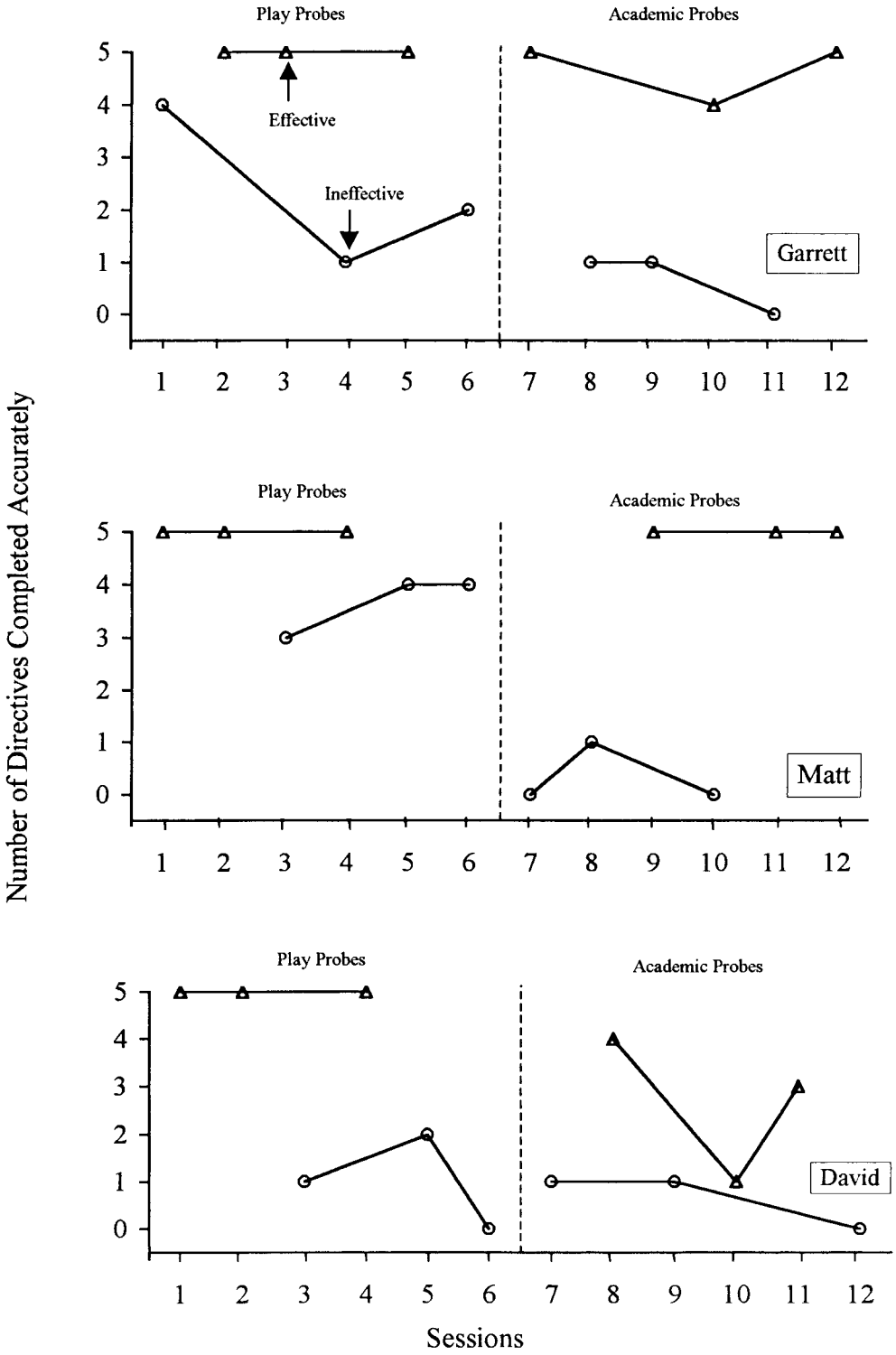

Figure 3. Number of directives completed accurately during the hierarchical directive assessment and the play and academic probes for Garrett (top panel), Matt (middle panel), and David (bottom panel).

across play activities was 80%, 100%, and 100% (M = 93%). However, when he was provided with three-step verbal directives, his accuracy decreased to 0% for all three play activities.

Play Activities and Academic Tasks

The remaining 3 participants in Experiment 2 received both play and academic tasks under both effective and ineffective directive conditions. For all 3 children, the effective directive condition was one-step verbal directives and the ineffective directive condition was three-step verbal directives.

As a group, accuracy on the academic tasks ranged from 20% to 100% (M = 82%) for the effective directives and 0% to 20% (M = 11%) for the ineffective directives. Results for Garrett are shown in the top panel of Figure 3. When Garrett was given one-step verbal directives, his accuracy across the three play activities was 100%. However, when he was provided with three-step verbal directives, his accuracy decreased to 80%, 20%, and 40% (M = 47%) for the same three play activities. When Garrett was given effective directives for the three academic tasks, his accuracy was 100%, 80%, and 100% (M = 93%). When he was given ineffective directives for the same three academic tasks, his accuracy decreased to 20%, 20%, and 0% (M = 13%). Overall results indicate that the effective directive condition resulted in increased accurate performance compared to the ineffective directive condition, but as in Cody's case, accuracy during the ineffective directive condition for play activities was more variable.

Results for Matt are shown in the middle panel of Figure 3. When Matt was given one-step verbal directives for the play activities, his accuracy was always 100%. In contrast, when he was given three-step verbal directives for the same three play activities, his accuracy decreased to 60%, 80%, and 80% (M = 73%). When Matt was given effective directives for the three academic tasks, his accuracy was again 100% for all three tasks. When he was given ineffective directives for the same three tasks, his accuracy decreased to 0%, 20%, and 0% (M = 7%). Overall, Matt's pattern of performance across play and academic tasks was similar to the pattern observed for Garrett. Specifically, accuracy decreased more for academic tasks relative to play activities during the ineffective directive condition.

Results for David are shown in the bottom panel of Figure 3. When David was given one-step verbal directives for play activities, his accuracy was 100% for all three play activities. However, when he was given three-step verbal directives, his accuracy decreased to 20%, 40%, and 0% (M = 20%) for the same three play activities. When David was given effective directives for the three academic tasks, his accuracy was 80%, 20%, and 60% (M = 53%). When he was given ineffective directives for the same three academic tasks, his accuracy decreased to 20%, 20%, and 0% (M = 13%). This pattern of performance was unique in that lower levels of accuracy occurred on the academic tasks under the effective directive condition than was expected. However, his performance continued to vary predictably across the effective and ineffective directive conditions.

In Experiment 2, the results were used to determine whether the directives identified as effective and ineffective with an analogue task (i.e., picking up items and placing them in a bucket) continued to function similarly with more common play and academic tasks. The results for all children in Experiment 2 corresponded with those predicted in Experiment 1. Thus, the directive assessment provided guidance on the type of directive that would be effective across a relatively wide range of tasks. All of the children performed better on tasks during the effective directive condition than on the same

task during the ineffective directive condition. For only two tasks with 1 participant (David) did 80% or higher accurate responses fail to occur when effective directives were provided. In contrast, accurate behavior failed to occur across all academic tasks and across 15 of 19 play activity sessions when ineffective directives were given. One needed extension of this research is to classify the relevant dimensions of various tasks (e.g., level of demand) that may alter the effectiveness of specific directives. Although Cooper et al. (1990, 1992) and Harding et al. (1994) have also shown differential responding to changes in antecedent variables, the interaction of the dimensions of the task and the effectiveness of specific directives has not been studied.

A surprising finding was the absence (or very low levels) of disruptive behavior during Experiments 1 and 2. This was surprising because all of the children had been referred for severe noncompliance and disruptive behavior at home or school. Given the high levels of compliant and appropriate behavior obtained during Experiments 1 and 2, we next assessed the interaction of the type of directive (effective vs. ineffective) with the schedule of reinforcement (differential reinforcement [DRA] for attempts vs. DRA for accurate responses only) on accurate task completion and occurrences of disruptive behavior. Given that a DRA schedule was used for attempts to complete the task during Experiments 1 and 2, it seemed plausible that at least some of the participants failed to discriminate when they did and did not accurately comply with the directive. We hypothesized that disruptive behavior might continue to be eliminated or reduced with the DRA schedule for attempts, because the child's behavior would continue to be reinforced regardless of accuracy (e.g., praise for attempting to comply and a break from that specific task). In contrast, it seemed possible that disruptive behavior would occur when ineffective directives were paired with praise and a brief break delivered on a DRA schedule for accurate task completion because this would comprise an extinction condition. If DRA for accuracy is paired with ineffective directives, the functional consequence is extinction, and increases in disruptive behavior should occur. We tested this supposition with 1 participant in Experiment 3 to show how this type of analysis might be used to study disruptive noncompliant behavior in young children.

EXPERIMENT 3

Method

Participant, Tasks, and Setting

Karli had not participated in Experiments 1 or 2, but she met the criteria to be enrolled in this research project as described in the Procedure section of Experiment 1. Experiment 3 evaluated Karli's disruptive behavior and accuracy of task completion with effective and ineffective directives during DRA for attempts and DRA for accurate responses in the same setting and with the same play activities and academic tasks used in Experiment 2.

Dependent and Independent Variables

The dependent variables were (a) the child's accuracy of responding (as described in Experiments 1 and 2) and (b) disruptive behavior, defined as moving away from task materials and pushing the materials away.

The independent variables were (a) the type of directive (those identified as effective or ineffective via the hierarchical directive assessment described in Experiment 1) and (b) the type of differential reinforcement schedule (DRA for attempts vs. DRA for accuracy). The definitions for ineffective and effective directives were the same as in Experiments 1 and 2. The same event-recording system that was used in Experiment 2 was used for Experiment 3 to record accuracy of

task completion. A 10-s partial-interval recording system was used to record disruptive behavior.

Interobserver Agreement

A second observer simultaneously but independently collected interobserver agreement data for accuracy of task completion (55% of sessions), accuracy of directives presented to the participant, and disruptive behavior (81% of sessions). Agreement for accuracy of task completion averaged 97%, with a range of 90% to 100%, and agreement for procedural integrity (correct administration of directives) was 100%. Interval-by-interval agreement for disruptive behavior averaged 94%, with a range of 67% to 100%.

Design and Analysis

The design was a multielement design. We first completed the hierarchical analysis (Experiment 1) within a brief multielement design to identify effective and ineffective directives. We then compared effective and ineffective directives within a mulitelement design under the two distinct reinforcement schedules: DRA for attempts and DRA for accuracy.

Procedure

Prior to Experiment 3, Karli completed the hierarchical directive assessment as described in Experiment 1. Results indicated that one-step verbal directives were effective for guiding accurate responding (80% accurate responding) and three-step verbal directives were ineffective for guiding accurate responding (0% accurate responding). For Experiment 3, the directives continued to be alternated between effective and ineffective, but the DRA schedule also varied across sessions.

Differential reinforcement for attempts. During both the effective and the ineffective DRA-for-attempts conditions, Karli was given praise and a brief break (10 to 15 s) from the demand for attempting to complete the task regardless of accuracy.

Differential reinforcement for accuracy. During both the effective and the ineffective DRA-for-accuracy conditions, Karli was given praise and a break from the demand only if the demand was completed accurately. Karli was informed when she had completed the demand incorrectly, and she was instructed to listen carefully to the directive and try again. If Karli's response was inaccurate, the same trial was repeated until she completed it accurately or until five trials of the same demand had been presented.

Results and Discussion

Results for Karli are presented in Figure 4. When effective and ineffective directives were presented to Karli with the DRA-for-attempts schedule, the same pattern occurred as had been observed in the hierarchical directive assessment described in Experiment 1 with 22 participants. That is, as long as Karli was provided with praise and brief breaks for attempting to complete the demand, she did not exhibit disruptive behavior when she was given either effective or ineffective directives. As predicted, Karli's accuracy of responding was high during the effective DRA-for-attempts condition (M = 95%) and low during the ineffective DRA-for-attempts condition (M = 10%).

When effective and ineffective directives were presented to Karli during the DRA-for-accuracy conditions, a substantial difference in disruptive behavior was observed depending on the type of directive used to present the demand. During the ineffective DRA-for-accuracy condition, Karli exhibited decreased accurate responding (M = 7%) and increased disruptive behavior (M = 66%; range, 0% to 80%) when praise and brief breaks were provided only for accurate responding. However, during the effective DRA-for-accuracy condition, accuracy of re-

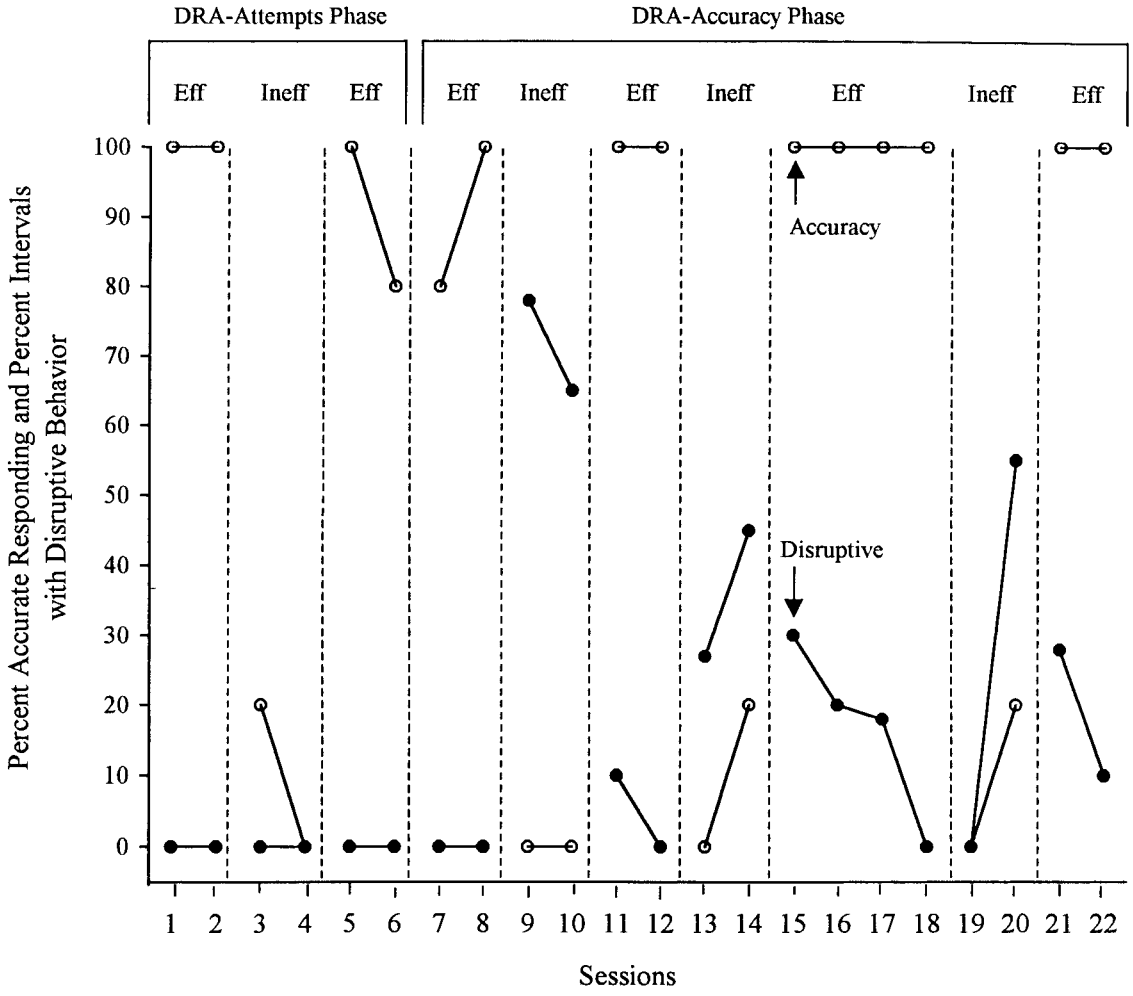

Figure 4. Percentage of directives completed accurately and percentage of 10-s intervals with disruptive behavior when effective or ineffective directives were presented to Karli under DRA for attempts and DRA for accurate task completion.

sponding was high (M = 97%) and disruptive behavior was reduced (M = 22%). Examination of the trends during the DRA-for-accuracy phases revealed that when the contingency was changed such that correct responses but not attempts produced praise and a break from the task, the results were consistent for the first eight sessions but became more variable for the remaining sessions. A limitation of Experiment 3 is that when response variability occurred, the phases were not extended due to clinic time constraints; therefore, steady-state responding was not established. Very quick changes in accurate responding occurred with changes in the type of directives, but disruptive behavior may have been the result of an interaction between ineffective directives and a contingent schedule of reinforcement for accuracy of task completion. One alternative explanation that cannot be ruled out is that the increase in disruptive behavior may have been solely due to the reduction in reinforcement density that occurred during these phases. That is, when Karli received praise and a break for correct responses only, it was

correlated with a large reduction in reinforcement.

Previous studies have shown that inappropriate behavior displayed by young children with behavior problems often covaries with the amount of compliant behavior displayed by these children. For example, Parrish, Cataldo, Kolko, Neef, and Egel (1986) demonstrated that compliant and inappropriate behavior were inversely related for several preschool-aged children with mild to moderate mental retardation. Their results indicated that, as various behavior management strategies were implemented to increase compliance with care-provider requests, inappropriate behaviors (e.g., destruction of materials, crying) also decreased even though no specific changes in consequences occurred for inappropriate behavior. Relative to the current investigation, one hypothesis is that ineffective directives set the occasion for increased disruptive behavior because inaccurate responding may have historically resulted in redirection (extinction) or punishment. The results of Experiment 3 provide preliminary support for this hypothesis by demonstrating that disruptive behavior increased by changing the reinforcement contingency from DRA for attempts to DRA for accuracy. When Karli received praise and was allowed a break from demands for attempting to complete the demand, low levels of disruptive behavior occurred regardless of the type of directive presented. However, when she received ineffective directives and inaccurate responding was placed on extinction, disruptive behavior increased. Accuracy of responding was controlled by the type of directive and not by the schedule of reinforcement.

GENERAL DISCUSSION

Results of Experiment 1 indicated that the hierarchical directive assessment was an efficient and effective method for identifying stimulus characteristics of the directives that affected correct responding while the response requirements of the directives and reinforcement for responses were held relatively constant. This method permitted the identification of directives that resulted in discriminative control of accurate responding along a specifically defined continuum of discriminated operants for young children. Results of Experiment 2 indicated that the directives identified as either effective or ineffective continued to control accurate responding across a range of common play and academic tasks as predicted by the results of Experiment 1. Results of Experiment 3 indicated that disruptive behavior remained low as long as the DRA-for-attempts schedule was presented. When the contingencies were switched to a DRA-for-accuracy schedule, disruptive behavior increased quickly and substantially when ineffective directives were presented, but not when effective directives were provided.

Experiment 3 demonstrated with 1 participant that ineffective directives were associated with inaccurate responding, and when inaccurate responding resulted in extinction, disruptive behavior occurred. The results of Experiment 3 establish effective directives plus DRA for attempts as a control or default condition in that it resulted in the highest level of accurate responding and lowest level of disruptive behavior. This type of analysis permits a relatively direct assessment of the interaction between skill deficits and accuracy of responding and demonstrates that certain antecedent conditions presented under varying consequence conditions alter behavior in a systematic way. If caregivers provide directives that do not result in stimulus control of accurate responding, then it would be expected that a child would eventually display disruptive behavior to escape the task (i.e., negative reinforcement) if reinforcement is provided only for accurate responding. However, if caregivers alter the

antecedent to increase accuracy, then it may be possible to avoid some occurrences of disruptive behavior. Alternatively, if ineffective directives must be used (i.e., when the type of directives that are effective are unknown), then reinforcement for attempts should be incorporated into training to decrease the probability of escalation of disruptive behavior.

The relation between the way a directive is presented and the discrimination skills of the child may be especially important when working with young children with language difficulties who display noncompliant behavior. Recent studies (Dunlap et al., 1994; Vaughn & Horner, 1997) have shown that both compliant and academic behavior are responsive to specific antecedent variables (e.g., instructional strategies). Given that children with behavior problems often experience coexisting learning or language disabilities (Benasich, Curtis, & Tallal, 1993; Glassberg, Hooper, & Mattison, 1999; Piancentini, 1987), it is plausible that at least some behavior problems, especially in young children, may be due to difficulties in stimulus control.

The results of the current investigation provide an example of one problem with a structural definition of noncompliance. Specifically, the term *noncompliance* describes the absence of desired responding, but it does not offer information about why (under what conditions) noncompliance occurs or how to best promote compliance. For example, noncompliance may be the result of either skill or reinforcement variables, but researchers have not developed methods for determining which of these classes of variables is most important to target during initial treatment attempts. Instead, caregivers often attempt to differentiate skill deficits from a lack of motivation to comply by the level or severity of noncompliant behavior (e.g., passive or active off-task behavior). For example, when a caregiver directs a child to complete a task and the child appears to be confused, the caregiver may assume that noncompliance is due to a lack of "understanding" how to complete the task (e.g., the child may have a receptive language deficit). However, if the child screams or becomes aggressive, the care provider may assume that the child lacks sufficient motivation to complete the task. Although these assumptions are often reasonable, the functional basis for noncompliance in both examples may be the same (i.e., both may be due to a skill deficit or to lack of motivation).

Structural versus functional definitions of the absence of behavior, such as noncompliance, pose a problem when working with young children. When a child displays noncompliant behavior, how can caregivers differentiate between (in this case) skill deficits and a lack of motivation to comply with the demand? One approach is to develop an assessment methodology that differentiates skill deficits from motivation concerns. The approach taken in the current study was an attempt to provide effective directives to young children that guided accurate responding on analogue tasks, and then to assess their effectiveness on more common tasks. For young children with documented skill deficits, an effective strategy may be to identify antecedent instructional conditions that set the occasion for accurate responding and then focus on reinforcement aspects as needed. For many young children who do not have long histories of obtaining reinforcement via avoidance responding, this approach to behavior management (antecedent manipulation) may be sufficient to increase compliance and avoid behavior maintained by negative reinforcement.

One way to understand the relation between skill deficits and behavior problems is to conceptualize them as coexisting along separate but related continua. With learning problems, the continuum ranges from complete understanding (the child discriminates

all task requirements) to a complete lack of understanding (the child does not discriminate any of the task requirements). With regard to behavior problems, the continuum ranges from mild problem behavior (e.g., inaccurate responding) to severe aberrant behavior (e.g., aggression, property destruction). Whereas these continua are separate dimensions of behavior, it is possible that an individual's learning difficulties may affect the range of situations that produce behavior problems during demand situations. For example, if a child's ability to understand verbal language is limited, this skill deficit may result in a very restricted range of directives that effectively guide accurate responding. It is possible that this limited range of effective directives increases the probability that the child will display problem behavior due to a history of extinction or punishment for inaccurate responding. On the other hand, effective directives may reduce the relative aversiveness of a task (e.g., change the establishing operation) by lowering the demand via increasing the probability of accurate responding. If this conceptualization proves to be useful, then the use of antecedent interventions (e.g., effective directives) may become the treatment of choice because these interventions may prevent the occurrence of problem behavior for some children.

An interesting finding of Experiment 2 was that the accuracy of performance for 2 of the 3 children (Matt and Garrett) who received both play and academic tasks was lower during the ineffective directive condition for the academic tasks compared to their performance for the play activities. One hypothesis regarding why this discrepancy occurred is that there may be a relation between the difficulty level or preference for the task itself and the need for specific types of prompts. Tasks such as academic tasks that may require more effort, or possibly are less preferred, may increase the need for effective prompts to guide accurate performance. Accurate performance on tasks that may be more preferred, such as following directives for play activities, may not be as dependent on the directives provided by caregivers. If the naturally occurring S^Ds that are routinely available within the tasks are sufficient to guide accurate responding, there would be no need to use an added or modified prompt to improve behavior. This finding is similar to the results of McComas, Wacker, and Cooper (1996) with performance on reading comprehension tests and instructional strategies for 2 adolescents with mild disabilities. McComas et al. evaluated the effects of adding antecedent instructional strategies (e.g., paraphrasing, study guides) on tests of reading comprehension, and the results indicated that differential effects occurred only for the more difficult, instructional tasks. There was no need for these strategies on independent tasks. The findings of the current investigation and the results of McComas et al. indicate that the need for specific types of external cues provided by caregivers may be highly contextual with regard to the type of task presented. Therefore, it may not only be the difficulty level of the task but also an interaction of various contextual variables. Future research should focus on contextual variables or demand characteristics that affect the degree of stimulus control for directives that have been identified as effective or ineffective for guiding accurate responding during analogue tasks.

The primary limitation of this investigation was the relatively narrow range of directives assessed during Experiment 1. This was a preliminary study that focused on identifying broad classes of effective and ineffective directives, and the conditions in Experiment 1 were based on the receptive language requirements of the token test (Boller & Vignolo, 1966). Future studies that evaluate hierarchies of directives should attempt to identify additional components within di-

rectives that may provide a greater range of accurate responding such as two-step or multichoice directives and matching-to-sample tasks.

Relative to the social validity of the results, effective directives were not evaluated in the context of a long-term behavior management or instructional program. Therefore, improvement in overall compliance or learning across caregivers (e.g., teachers and parents) and settings (e.g., home and school) was not measured. The results of the present investigation suggest that such an evaluation is warranted, but conclusions about the effects documented in this investigation should be made with caution. Finally, the results of Experiment 3 need to be replicated with additional participants to confirm that the interaction of directives and schedules of reinforcement is not a function of idiosyncratic variables.

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STUDY QUESTIONS

1. What were the purposes of the three experiments?

2. What were the dependent variables in each of the experiments?

3. How were directives varied across conditions in Experiment 1?

4. Briefly summarize the results shown in Table 2 and their general implications.

5. What antecedent manipulations were conducted in Experiment 2 and what results were obtained?

6. What types of experimental designs were used in Experiment 3 to compare the effects of (a) effective versus ineffective prompts and (b) reinforcement for accuracy versus attempts?

7. What are the implications of the findings of this study for the selection of instructional procedures?

8. What difficulty is encountered when one attempts to conduct functional analyses of behavioral deficits?

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