

*A DESCRIPTIVE ASSESSMENT OF INSTRUCTION-BASED
INTERACTIONS IN THE PRESCHOOL CLASSROOM*

VIRGINIA W. NDORO

BEHAVIOR AND SOCIAL INTERVENTION CENTER

AND

GREGORY P. HANLEY, JEFFREY H. TIGER, AND NICOLE A. HEAL

UNIVERSITY OF KANSAS

The current study describes preschool teacher–child interactions during several commonly scheduled classroom activities in which teachers deliver instructions. An observation system was developed that incorporated measurement of evidence-based compliance strategies and included the types of instructions delivered (e.g., integral or deficient directives, embedded directives, “do” or “don’t” commands), the children’s behavior with respect to the instructions (e.g., compliance, noncompliance, active avoidance, problem behavior), and the differential responses of the teacher to the child’s behavior following an instruction (e.g., appropriate or inappropriate provision of attention and escape). After 4 classroom teachers were observed at least five times in each of five target activities, simple and conditional probabilities were calculated. Results indicated that (a) the frequency of instruction and probability of compliance varied as a function of activity type, (b) “do” commands and directive prompts were delivered almost to the exclusion of “don’t” commands and nondirective prompts, (c) the likelihood of compliance was highest following an embedded or an integral directive prompt, and (d) although putative social reinforcers were more likely to follow noncompliance than compliance and were highly likely following problem behavior, compliance occurred over twice as much as noncompliance, and problem behavior during instructions was very low. Implications for using descriptive assessments for understanding and improving teacher–child interactions in the preschool classroom are discussed.

DESCRIPTORS: descriptive assessment, instructions, compliance, preschool children, teachers

Research has shown that descriptive assessment can be an effective means for quantitatively describing important interactions between people, which in turn, can be used to infer variables that influence behavior (Atwater & Morris, 1988; Bijou, Peterson, & Ault, 1968; Lerman & Iwata, 1993; Thompson & Iwata, 2001; Vollmer, Borrero, Wright, Van Camp, & Lalli, 2001). Once relations between an individual’s behavior and the social environment are specified, analyses can be designed to directly test putative relations, and interventions can

then be developed to minimize problem behaviors, strengthen desirable behaviors, and improve the overall effectiveness of adult–child interactions (Iwata, Pace, Dorsey, et al., 1994; Lalli, Browder, Mace, & Brown, 1993). To that end, several recent descriptive studies sought to identify antecedent and consequent events associated with severe problem behaviors such as self-injury, aggression, and disruption that are often exhibited by children and adults with developmental disabilities (Thompson & Iwata; Vollmer et al.).

Although descriptive assessments are often conducted to infer variables for problem behavior or to individualize subsequent functional analyses of problem behavior, descriptive assessments also may be conducted simply to better understand how antecedent and consequences interact with important behaviors in

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Requests for reprints should be addressed to Gregory P. Hanley, Applied Behavioral Science Department, 1000 Sunnyside Avenue, University of Kansas, Lawrence, Kansas 66045 (e-mail: ghanley@ku.edu).

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the natural environment. To this end, several descriptive assessments have been conducted in classrooms to identify important relations between teacher and child behavior (Atwater & Morris, 1988; Fagot, 1973; Lytton & Zwirner, 1975; McKerchar & Thompson, 2004; Strain, Lambert, Kerr, Stagg, & Lenkner, 1983). For example, McKerchar and Thompson described the prevalence of social consequences following preschoolers' problem behavior. They found that attention was provided following problem behavior at least some of the time for all of the children who displayed such behavior. More relevant to instructional situations, McKerchar and Thompson found that escape from instructional tasks was provided following problem behavior to 33% of children who participated in the study, yet there did not appear to be a contingency between problem behavior and escape in the context of an instruction for these children. That is, escape was slightly less likely to occur following problem behavior than at other times.

Atwater and Morris (1988) also conducted descriptive assessments in preschool classrooms, but their analysis was restricted to instructional situations. These authors measured teacher behavior in the form of an instruction (suggestion, imperative, question, or declarative) and the type of verbal feedback (approval or disapproval), the context in which an instruction was delivered (small or large group, transitions), and children's behavior (compliance, off task, and disruptions). Their results suggested that the form of the instruction did not influence the probability of compliance as much as the interaction context in which the instruction was delivered (e.g., children were more likely to comply with an instruction if they were engaged in an activity than if they were off task or disruptive).

The aims of the present study were somewhat similar to those of Atwater and Morris (1988) in that we also sought to measure and describe aspects of teachers' instructions and their

relation to child compliance and problem behavior. However, the variables that we were interested in measuring were primarily influenced by developments in effective prompting and differential reinforcement strategies derived from the empirical literature on the treatment of noncompliance and escape-maintained problem behavior. From this literature, we identified the following strategies that appeared to be relevant to the treatment of compliance in classrooms: integral directive prompting (often referred to as three-step prompting; Horner & Keilitz, 1975; Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990), embedding prompts in preferred activities (Carr, Newsom, & Binkoff, 1980; Piazza, Contrucci, Hanley, & Fisher, 1997), framing instructions as "do" commands as opposed to "don't" commands (Adelinis & Hagopian, 1999; Fisher, Adelinis, Thompson, Worsdell, & Zarccone, 1998; Neef, Shafer, Egel, Cataldo, & Parrish, 1983), eliminating escape from instructions by continuing prompting until the task is completed (also known as escape extinction; Iwata, Pace, Cowdery, & Miltenberger, 1994; Iwata *et al.*, 1990; Zarccone *et al.*, 1993), and providing social positive and negative reinforcers for compliance (Lalli *et al.*, 1999; Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Piazza, Fisher, *et al.*, 1997).

Although the effects of these strategies have been experimentally demonstrated with children and adults who display various topographies of problem behavior and noncompliance, it is unclear whether the relations between child behavior (compliance and problem behavior) and the experimentally demonstrated strategies would hold under nonexperimental conditions, and whether these strategies could be implemented by early childhood teachers, especially those working with typically and atypically developing children in the preschool classroom. Their adoption seems important as a preventive strategy aimed at preempting the development of early patterns of noncompliance and escape-related aberrant behavior. Therefore, this study

offers a method of descriptive assessment of instruction-based interactions in the preschool classroom. More specifically, we measured aspects of teacher-mediated instructions and consequences—those that have repeatedly been shown to alter the likelihood of compliance and escape-maintained problem behavior with individuals who display noncompliance and severe problem behavior—in a university-affiliated preschool classroom.

METHOD

Participants and Setting

Naturalistic observations were conducted two to four times a day in an inclusive, full-day preschool classroom serving 15 children. Trained graduate students intermittently observed 4 undergraduate teachers who were enrolled in an early childhood teacher-training program. These teachers attended a half-day orientation session prior to interacting with the children in the classroom; this session included a lecture on the importance of integral directive prompting, embedding instructions, “do” versus “don’t” instructions, escape extinction, and differential reinforcement of compliance. A trained graduate student provided feedback on the correct implementation of these skills during a 2-week period prior to the onset of data collection while the teachers interacted with the children in the classroom and following their respective shifts. At least 2 of the 14 teachers were present during each descriptive observation session.

Fifteen children between 30 and 48 months of age participated. Twelve of the children were typically developing, and English was a second language for 3 of them. Two children had been diagnosed with nonspecified developmental delay and were receiving intermittent support services from the local school district, and 1 child had been diagnosed with autism and was receiving one-on-one support throughout the school day. All children had some receptive language skills (e.g., they could follow simple

instructions); however, 6 of the children had limited expressive language skills (e.g., they communicated with gestures and single-word utterances).

Observations were conducted in three locations—in the main classroom (36 m by 20 m), on the playground (85 m by 110 m), and in an indoor activity room (23 m by 30 m)—during five typically scheduled activities (free choice, circle time, meals, outdoor, and centers). Free choice was a 45-min period in which children independently selected from one of nine simultaneously available activities (dramatic play, blocks, art, games, computer, etc.). Circle time was a 15-min teacher-led activity during which children sat in a half-circle facing the lead teacher. The lead teacher engaged the children in songs, finger plays, conversations, or had them participate in a science, craft, or cooking activity. Family-style dining was arranged during meals. Small groups of children sat with a teacher at a small table, children passed and served food and beverages, and the teacher modeled appropriate mealtime behavior (e.g., washing hands prior to eating, appropriate use of silverware, chewing with mouth closed). Outdoor time was a 45-min period during which various physical activities including balancing, tumbling, running, skipping, climbing, and bike riding were encouraged. During centers, children rotated every 8 min between different teacher-structured activities that included manipulative/table-top skills (emphasis was on fine motor skills such as block building), art skills (exploration and creativity activities such as cutting, drawing, pasting, clay forming), concept skills (matching, pointing to, or naming colors, shapes, alphabet, identifying body parts), and small-movement skills (cutting, tracing, and writing were taught and practiced).

Response Measurement and Interobserver Agreement

Observations were conducted during 15-min periods. A data sheet partitioned into 1-min

intervals was used to record the occurrence of teacher and child interactions. A discontinuous observation procedure was used in which the first instructional episode initiated by the target teacher in each 1-min interval was recorded. The observer circled specified behavior codes in three categories of events arranged sequentially. In essence, a close-ended antecedent-behavior-consequence observation system was used to describe instruction-based interactions. Teacher instructions were coded first and included codes for “do” and “don’t” commands, integral directives, deficient directives, and embedded directives. The second category was child behavior and included compliance to the vocal prompt, compliance to the model prompt, noncompliance, active avoidance, and problem behavior. The consequent event category was located third, consisted of the teacher’s responses to child behavior, and included appropriate attention, inappropriate attention, appropriate escape, and inappropriate escape. Each teacher was individually observed at least five times in each of the five activities. A total of 114 15-min observations were conducted for a total of 28.5 hr of teacher–child observation.

The first instruction delivered by the target teacher in each 1-min interval initiated the data-collection sequence. Data collection continued with regards to that particular instructional sequence until either the instruction was completed or the teacher allowed the child to escape the instruction. This usually occurred within the same interval, but not always. In the latter case, observers were instructed to record a new instructional sequence at the start of the subsequent interval. We first recorded whether the initial instruction specified some action (e.g., “Hand me the book”), which were scored as “do” commands, or whether the instruction specified a behavior to be terminated or not emitted (e.g., “Don’t throw the book”), which were scored as “don’t” commands. These were mutually exclusive categories. As the instruction unfolded, a determination of the type of

directive was made. An integral directive was scored if a fixed hierarchy of vocal, model, and physical prompts were issued, with 3 to 5 s between prompts to allow compliance, and if the initial (vocal) prompt specified the action to be completed or terminated. A deficient directive was scored if the teacher did not include a fixed hierarchy of vocal, model, and physical prompts (e.g., subsequent prompts were not delivered following 3 s of noncompliance), if an action (or termination of an action) was not specified, or if the prompt was phrased as a question (e.g., “Can you come here?” or “Would you sit down?”). An embedded directive was scored if an instruction was delivered without a direct statement of a specific goal, was embedded in a play activity, and, if completed, accomplished a teacher’s goal (e.g., “Let’s hop like bunnies to the bathroom”). These three categories of instructions (integral, deficient, or embedded) were also mutually exclusive categories (i.e., one, and only one, was scored for each instructional trial).

Children’s behaviors were scored following the onset of an instruction, and were operationally defined as follows. Compliance vocal was scored on the completion of an instructed response within 5 s of the teacher’s initial vocal prompt, and compliance model was scored on completion of an instructed response within 5 s of the teacher’s model prompt. Noncompliance was scored if the instructed response was not completed within 5 s of the teacher’s second prompt. Active avoidance was scored if the child ran away, crawled under the table, or fell to the floor following an instruction from the teacher. The problem behavior category was scored if the child exhibited any of the following behaviors after an instruction had been delivered: self-injurious behavior (banging or hitting head, biting self), aggression (hitting, kicking, scratching, pinching, biting others), disruption (knocking down materials, pushing away chairs or tables), and inappropriate vocalizations (screaming, swearing). The com-

pliance measures (compliance vocal, compliance model, and noncompliance) were mutually exclusive categories. By contrast, the active avoidance and problem behavior could be scored at any time during the instructional episode and in addition to our compliance measures.

The final set of behaviors recorded were the teachers' responses to child behavior (which followed the teacher's instruction). Either appropriate attention or inappropriate attention was recorded for each instructional episode. Appropriate attention was scored if any form of attention was provided following compliance *or* if all forms of attention were withheld following noncompliance, active avoidance, and problem behavior (additional prompting, i.e., a model or physical prompt, was not scored as attention). Inappropriate attention was scored if any form of attention was provided following noncompliance, active avoidance, or problem behavior *or* if all forms of attention were withheld following compliance. Appropriate escape was scored if instructions were terminated or continued following compliance or were withheld following noncompliance, whereas inappropriate escape was scored only if an instruction was terminated following noncompliance. The category of appropriate escape included more teacher responses than inappropriate escape because it was determined that both terminating or continuing instructions following compliance were appropriate teacher responses, considering the routine nature of both singular instructions and instructional sequences often provided in the classroom.

Several graduate students in a child psychology program were trained on the observational code until they each attained 80% agreement scores for each of the 14 behaviors (teacher and child) for three consecutive sessions. Interobserver agreement was then assessed by having two observers collect data simultaneously but independently during 20% of the sessions across teachers and activities. An agreement

Table 1
Interobserver Agreement Percentages across Teachers' and Children's Behavior

Behavior	<i>M</i>	Range
Teachers' instructions		
"Do" instructions	93	80-100
"Don't" instructions	100	100
Integral directives	88	60-100
Deficient directives	87	60-100
Embedded directives	99	93-100
Children's responses		
Compliance to the verbal prompt	87	67-100
Compliance to the model prompt	98	80-100
Noncompliance	88	67-100
Active avoidance	99	93-100
Problem behavior	100	100
Consequences provided by teacher		
Appropriate attention	84	60-100
Inappropriate attention	80	60-100
Appropriate escape	100	100
Inappropriate escape	92	80-100

was defined as both observers recording the occurrence of the same events within the same 1-min interval. These scores were summed across intervals, divided by the total number of agreements plus disagreements, and multiplied by 100%. Mean interobserver agreement across behaviors is reported in Table 1.

RESULTS

The descriptive assessment involved 114 15-min observations (28.5 hr of observation). Instructional instances were captured in 947 (55%) of the 1,710 1-min time samples. The mean number and range of instructions and the overall percentage of compliance with instructions in each of the five activity areas are reported in Table 2. There was a small difference in the mean number of instructions delivered across activities with the teacher-led activities (centers and circle) associated with a greater number of instructions (9.3 and 8.8, respectively) than the more child-directed activities (outdoor and free choice; 8 and 7.2, respectively). The percentage of compliance with instructions was similar for centers (68%), meal (66%), and free choice (65%), but higher levels of compliance were observed

Table 2

Mean Number (and Range) of Instructions and the Overall Percentage of Compliance to Instructions (per 15-min Observation) during Various Preschool Activities

Activity	Mean and range for the number of instructions delivered	Percentage of compliance
Centers	9 (4–15)	68
Circle	9 (4–14)	84
Meal	8 (3–11)	66
Outdoor	8 (4–11)	59
Free choice	7 (1–13)	65

during circle (84%) and lower levels of compliance were observed during the outdoor activity (59%).

The overall number of instances (in parentheses) and simple probabilities (vertical bars) of teachers' instruction types, child behaviors, and teacher responses given an instructional instance are depicted in Figure 1. The top panel shows that "do" instructions were observed during 99% of all instructional instances, whereas "don't" instructions were rarely observed (seven instances). The majority of directive prompts (60%) were deficient (i.e., insufficient or extended delay between prompts, lack of follow-through with a model or physical prompt), and only five directives were embedded into a play-based activity.

Although problem behavior and active avoidance were rarely observed during instructional episodes in this classroom (total of 15 episodes; see middle panel of Figure 1), noncompliance to instructions was observed on 301 occasions (i.e., 32% of instructions did not result in compliance). When compliance was observed, it was usually following the initial vocal prompt.

The bottom panel of Figure 1 shows that attention was provided following problem behavior, active avoidance, or noncompliance or was withheld following compliance during the majority of instructional episodes ("inappropriate attention," 64%). Conversely, attention was provided following compliance and was withheld following problem behavior, active avoidance, or noncompliance during 36% of the instructional episodes. By contrast,

the inappropriate provision of escape (i.e., escape provided following problem behavior, active avoidance, or noncompliance) was observed on fewer occasions (20%) than the appropriate management of escape (i.e., escape withheld following problem behavior, active avoidance, or noncompliance or provided following compliance, 80%).

Figure 1 shows the simple probabilities of the various teacher prompts, child behaviors, and teacher consequences during the instructional episodes, and Table 3 shows the conditional probabilities of various child behaviors (e.g., compliance, problem behavior) given the various types of teacher instructions. Similarly, Table 4 shows the conditional probability of various teacher-delivered consequences (e.g., attention, escape) given the various types of child behaviors (e.g., noncompliance, active avoidance). The data in Table 4 were extracted by comparing the specific child behaviors and the types of consequences that were scored. For instance, if the only child behavior recorded was noncompliance and inappropriate attention was recorded, then we counted that trial as one in which attention was provided for noncompliance with an instruction.

As can be seen in Table 3, "do" directives resulted in somewhat higher levels of compliance than "don't" directives (68% and 57%, respectively). However, because "don't" directives were observed only seven times, the stability of the percentage of compliance associated with "don't" directives remains in question. Similarly, embedded directives were delivered only five times, so it remains unclear whether the high levels of compliance (100%) associated with this type of instruction would continue if more embedded directives were delivered.

By far, the majority of instructions delivered were either integral directive prompts ($n = 373$) or deficient directive prompts ($n = 569$), so the percentages of compliance associated with these two types of instruction are probably quite

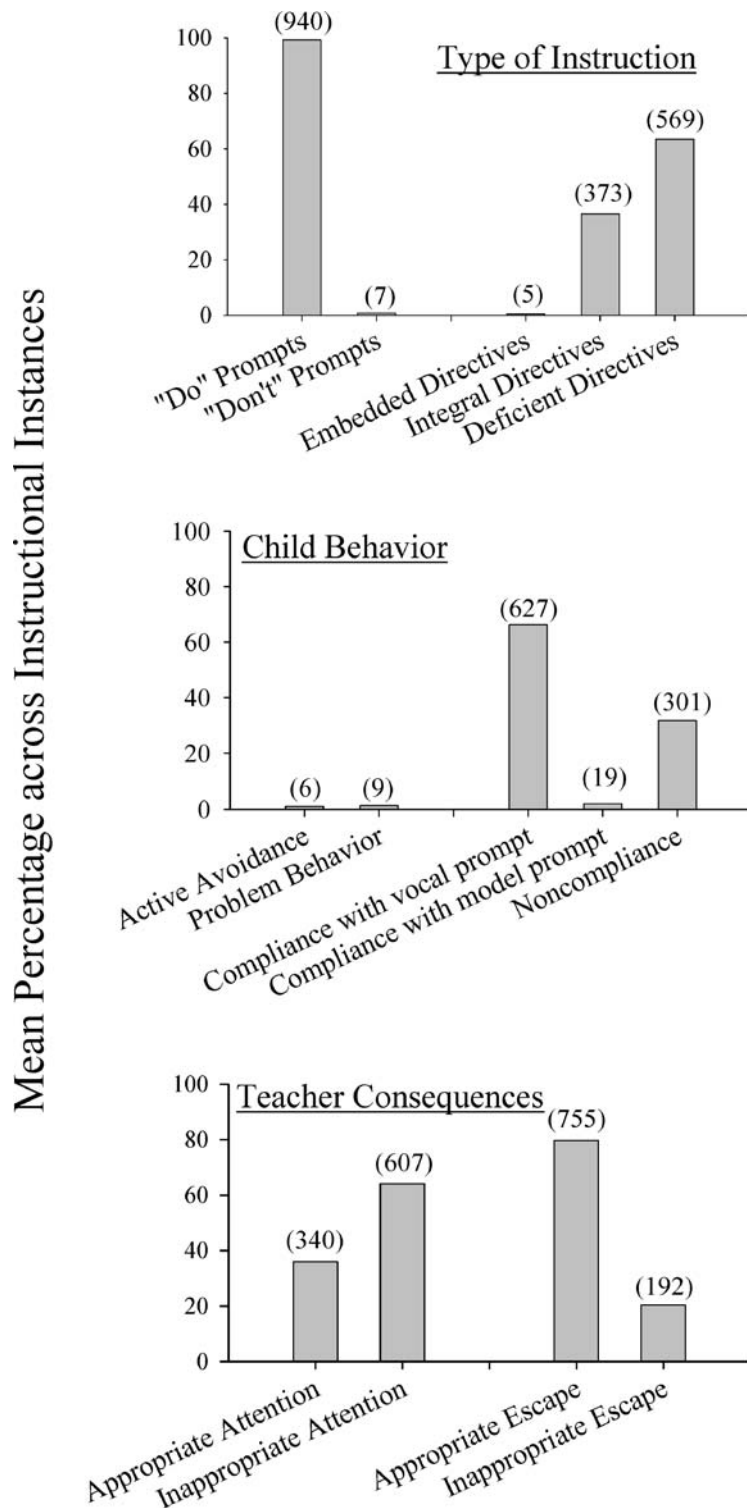


Figure 1. The percentage and number of instruction types (top), child behaviors (middle), and teacher-delivered consequences (bottom) observed across all instructional instances.

Table 3

The Conditional Probabilities of Children's Responses to Different Types of Teacher Instructions (the Numbers in Parentheses Depict the Overall Number of Instances Recorded)

Conditional probability of:	Given a directive "do" (940)	Given a directive "don't" (7)	Given an integral directive (373)	Given a deficient directive (569)	Given an embedded directive (5)
Compliance (646)	68% (642)	57% (4)	87% (323)	56% (318)	100% (5)
Noncompliance (301)	32% (298)	43% (3)	13% (50)	44% (251)	0% (0)
Problem behavior or active avoidance (15)	1% (12)	43% (3)	1% (3)	2% (12)	0% (0)

stable. Compliance was much higher when integral directive prompts were delivered (87%) than when deficient directives were given (56%).

Although problem behavior was quite low at 15 episodes, at least one interesting association was evident (see the bottom row of Table 3). That is, problem behavior was considerably more probable following a "don't" directive (43% of "don't" directives were followed by problem behavior) relative to the other types of instructions (less than 2% of each of the other types of instructions were followed by problem behavior). The probability of this high percentage for "don't" directives occurring by chance is quite low ($Z = 8.7$; $p < .001$). It also may be worth noting that 12 "do" directives were associated with problem behavior, and of these, nine (80%) were deficient directives and three (20%) were integral directives. However, this difference was not statistically significant (due at least in part to the low levels of problem behavior and the relatively high levels of deficient prompts).

As can be seen in Table 4, attention was provided following only 35% of the instances of compliance (i.e., appropriate attention), where-

as some form of attention (other than that provided by additional appropriate prompting) was provided following 61% of the instances of noncompliance (i.e., inappropriate attention). In addition, escape was provided more often following noncompliance (65%) than it was withheld (35%). In essence, putative social positive and negative reinforcement in the form of attention and escape favored noncompliance over compliance. A similar relation is evident for problem behavior, in that attention was much more likely to be provided following problem behavior (87%) than withheld following problem behavior (13%). By contrast, there was an equal probability that problem behavior would result in the provision or prevention of escape.

DISCUSSION

The methods of descriptive observation outlined above allowed us to identify the naturally occurring probability of both antecedent and consequent events that have been experimentally verified as having an impact on children's behavior during instruction. Although the generality of these findings is limited by the

Table 4

The Conditional Probabilities of Teacher-Delivered Social Consequences for Children's Behavior

Conditional probability of:	Given compliance with an instruction	Given noncompliance with an instruction	Given problem behavior or active avoidance
Attention	35%	61%	87%
No attention	65%	39%	13%
Escape		65%	50%
No escape		35%	50%

uniqueness of the setting (university-based preschool), teachers (young adults seeking bachelors degrees in early childhood education), and their training (each had some behavior-analytic course work and attended an orientation about the importance of effective prompting and differential reinforcement), the descriptive observations did yield some interesting patterns.

The initial questions addressed in the analysis were whether different activities were associated with more or fewer instructions or greater or lesser probabilities of compliance. Although the mean number of instructions was higher in teacher-led activities (centers and circle) than in child-initiated activities (outdoor and free choice), the difference between the amount of instructions delivered across teacher- and child-initiated activities was small (an average of 2.1 instructions per 15-min period). This finding was somewhat surprising given prior descriptions in the literature regarding differences between teacher-led and child-initiated activities (Delprato, 2001; Losardo & Bricker, 1994; Wolery & Sainato, 1996).

Teacher-led activities often involve assessment and instruction with respect to a wide variety of curriculum-based developmentally appropriate skills (e.g., matching, pointing, and naming colors, numbers, shapes), which incorporate materials that are of general interest to young children (Essa, 2003). Social skills such as waiting for one's turn, listening to others, and attending to a speaker may also be assessed and taught in these group activities. By contrast, child-initiated activities (free choice, free play, guided discovery) involve the simultaneous availability of several activities and materials from which the child can choose. Children have opportunities to develop and practice skills such as painting, drawing, manipulating toys, block building, and playing games at their own pace. Social skills relevant to peer relations also may be developed during these times (Allen & Schwartz, 2001; Bredekamp & Copple, 1997; Goetz & Allen, 1983).

Instead of high levels of teacher instruction and direction, free-choice periods are typically described as teachers initially setting the occasion for learning by attractively displaying materials and then commenting on children's use of language and play with respect to the materials.

The current results suggest that child-initiated activities may involve more direct prompting from teachers than previously thought (at least that was the case in this setting). It is also possible that the current participants (i.e., student teachers) had not received sufficient training or practice in organizing and conducting child-initiated activities. Future research should be directed toward determining whether the current findings were specific to these 4 student teachers or whether teachers, in general, provide too many prompts during activities that are supposed to promote child initiations and choices. At a minimum, these results suggest that the current teachers should receive direct teacher training in interactions relevant to child-initiated activities (e.g., commenting or engaging a child in joint attention to an activity, rather than providing direct instructions). Additional research is needed to determine whether most teachers require more direct training in organizing and conducting child-initiated activities than is currently provided in typical teacher-training programs.

It was notable that circle was associated with the highest percentage of child compliance (84%) and outdoor time was associated with the least (58%), whereas the level of compliance in the other three areas (centers, meals, and free choice) did not differ much (all percentages in the mid 60s). Atwater and Morris (1988) found that compliance was more likely when an instruction was delivered to a child engaged in a task rather than if the child was being disruptive or off task. The present results also suggest that the activity context may be associated with varying probabilities of compliance.

Although the results of the present study and those of Atwater and Morris (1988) were

consistent with respect to the influence of context, the results of the two studies differed regarding the influence of instruction form. Atwater and Morris found that the form of the instruction was not related to the probability of child compliance. By contrast, in the current study, embedded and integral directives were associated with high levels of compliance (100% and 87%, respectively), and “don’t” prompts and deficient directives were associated with lower levels of compliance (57% and 56%, respectively). The two studies may have produced discrepant results because different instructional forms were measured in each. Atwater and Morris distinguished forms based on their syntactic structure (e.g., direct imperatives, “let’s” imperatives, questions, and declaratives), whereas the different forms measured in the present study were based on existing empirical evidence of a relation between compliance probabilities and particular instruction forms (e.g., “do” vs. “don’t,” integral vs. deficient).

Several studies have shown that compliance and problem behavior often covary in an inverse relation, and that targeting one can produce concomitant but opposite changes in the other (Iwata *et al.*, 1990; Lalli *et al.*, 1999; Parrish *et al.*, 1986; Piazza, Fisher, *et al.*, 1997). In light of these previous studies, it is not surprising that levels of compliance were relatively high (68%) and levels of problem behavior were quite low (2%). However, it is surprising that the levels of compliance were so much higher than problem behavior, given that the teacher-delivered consequences seemed to favor the opposite (higher levels of problem behavior and lower levels of compliance; see the bottom panel of Figure 1 and Table 4). Inappropriate attention (i.e., delivery of attention for noncompliance or problem behavior and the nondelivery of attention following compliance) was more prominent than appropriate attention (i.e., delivery of attention for compliance and the nondelivery of attention for noncompliance and

problem behavior), and escape was more probable for noncompliance (relative to compliance), yet levels of compliance were far higher than levels of noncompliance and problem behavior in the classroom.

The reason for these somewhat counterintuitive findings is not entirely clear, but there are several possible explanations that could be the focus of future research. First, it is possible that the form of the instructions exerted antecedent control sufficient to yield higher levels of compliance despite contingencies that generally supported noncompliance. Second, it is possible that the consequences delivered by the teachers had effects different from those suggested by previous research (Lalli *et al.*, 1993, 1999; Parrish *et al.*, 1986; Piazza, Fisher, *et al.*, 1997). For example, it is possible that different forms of attention were delivered for compliance (e.g., praise) than for problem behavior (e.g., reprimands), and that these qualitative parameters of reinforcement may have overridden the relative rates of reinforcement delivered for compliance and problem behavior (e.g., Neef & Lutz, 2001). A related possibility is that the activities were usually preferred by the children, in which case termination of the activity contingent on problem behavior may have functioned as punishment (i.e., time-out from positive reinforcement) rather than escape from nonpreferred activities. Nevertheless, further increases in compliance (from compliance with two of every three instructions observed in the current study) may be gained by training teachers to more carefully allocate potential social reinforcers exclusively for desirable behaviors (e.g., compliance, on task, etc.) in addition to delivering instructions in an optimal format (e.g., issuing “do” as opposed to “don’t” instructions, and delivering integral directives).

Several limitations of the current investigation are worth noting. First, the data are aggregated across several preschool teachers as they interacted with multiple children. Therefore, the relations that are implied by these data

may not be indicative of actual relations between a particular teacher's behavior and a particular child's behavior. Second, some of the measured teacher and child behaviors were observed infrequently (embedded directives and "don't" prompts, problem behavior) relative to other behaviors; therefore, conclusions regarding relations involving these behaviors should be regarded as tentative at best. Third, considering that the group of teachers in the current study received training in evidence-based compliance procedures, these results may not be representative of other preschool classrooms (i.e., different proportions of instruction types, child behaviors, and teacher responses are likely to be observed in other preschool settings). An interesting direction for future research would be to use this measurement system across a variety of preschool classrooms to determine the prevalence of the instructional strategies and differential reinforcement procedures suggested by research in the areas of problem behavior and compliance. Fourth, although interesting relations between teacher and child behavior are suggested by the present data, all results are correlational and would benefit from further experimental analysis of the suggested relations in preschool classrooms. To that end, these data, and the system used to collect them, may be helpful in establishing baselines of preschool teacher and child performance from which to evaluate the effects of several variables that have been linked to high levels of compliance or in directly evaluating the effectiveness of various teacher-training strategies (e.g., workshops, feedback, public posting of performance data).

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