FURTHER EVALUATION OF RESPONSE-INDEPENDENT DELIVERY OF PREFERRED STIMULI AND CHILD COMPLIANCE

MATTHEW P. NORMAND AND LAUREN BEAULIEU

FLORIDA INSTITUTE OF TECHNOLOGY

The effect of a fixed-time (FT) schedule involving the delivery of preferred stimuli prior to the issuance of a low-probability instruction was evaluated with 2 young children with autism. The FT schedule was introduced according to a reversal design with 3 target instructions, 1 for the first child and 2 for the second child. Compliance increased for 2 of the 3 cases. A high-probability instruction sequence and guided compliance were implemented for the second instruction targeted for 1 child, with compliance increasing with guided compliance.

Key words: autism, compliance, fixed-time reinforcement schedule, high-probability instruction sequence

A growing body of research indicates that the high-probability (high-*p*) instruction sequence can increase compliance with low-probability (low-*p*) instructions across a variety of populations (e.g., Ardoin, Martens, & Wolfe, 1999; Mace et al., 1988; Wehby & Hollahan, 2000). The typical high-*p* instruction sequence involves two manipulations antecedent to the presentation of a request with which the person is unlikely to comply: (a) the delivery of instructions that readily evoke compliance, and (b) the delivery of reinforcement for compliance with those instructions. It is unclear if both manipulations are necessary to increase compliance with subsequent low-*p* instructions. Zuluaga and Normand (2008) demonstrated that compliance with low-*p* instructions following a high-*p* instructional sequence increased only if compliance with the high-*p* instructions was reinforced. However, Bullock and Normand (2006) reported increases in compliance with two typically developing children by delivering several preferred edible items according to a fixed-time (FT) schedule (i.e., absent any response requirement) just prior to the delivery of a low-*p* instruction.

Clear interpretation of the data reported by Bullock and Normand (2006) is hindered because a single therapist implemented both the high-*p* instruction sequence and the FT schedule according to a multielement design. Thus, increases in compliance under the FT condition could have been due to increased resistance to change because of stimulus–reinforcer contingencies established in the high-*p* condition (e.g., a history of the therapist reinforcing compliance; Nevin, 1996). In addition, the multielement arrangement did not yield clear differentiation among the experimental and control conditions, although the FT sequence alone maintained high levels of compliance with low-*p* instructions even after an extinction condition. The current study addressed the procedural limitations of the Bullock and Normand study by evaluating the time-based delivery of preferred items in a reversal design independent of other interventions and extended this work to young children diagnosed with autism.

METHOD

Participants and Setting

Two children with autism, Charles (3 years 6 months old) and Jared (5 years old),

Lauren Beaulieu is now at the University of Massachusetts, Lowell.

Address correspondence to Matthew Normand, who is now at the Department of Psychology, University of the Pacific, 3601 Pacific Ave., Stockton, California 95211 (e-mail: mnormand@pacific.edu).

doi: 10.1901/jaba.2011.44-665

participated. Both children were receiving early intervention services at the time of the study, and they were selected because their parents reported compliance problems in the home. Neither child's compliance problems had been treated prior to this study. All sessions were conducted in the common living areas of the children's homes.

Response Definition and Measurement

The dependent measure was the percentage of low-*p* instructions with which each participant complied. Low-*p* instructions were nominated via parent report and were defined as instructions issued by the experimenter resulting in compliance on less than 20% of opportunities during baseline. Compliance was defined as the initiation of an instructed response within 10 s of the instruction. For Charles, the target low-*p* instruction was "sit down" when in the presence of a chair and table at which he typically received academic instruction. For Jared, the first low-*p* instruction targeted was "put your socks on" in the presence of his socks. However, his mother also reported problems getting Jared to put away games when it was time to leave the house to run errands. Thus, a second low-*p* instruction ("give me the game" while he was playing with a preferred handheld video game) also was targeted.

Interobserver Agreement

A second observer independently scored the frequency of participant compliance with low-*p* instructions during 75% of sessions for Charles and during 69% ("put your socks on") and 45% ("give me the game") of sessions for Jared. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements for all trials and converting this ratio to a percentage. An agreement was defined as both observers scoring the occurrence or nonoccurrence of compliance with a given instruction. Interobserver agreement was 100% for Charles and 91% ("put your socks on") and 100% ("give me the game") for Jared.

Design and Procedure

The effects of response-independent stimuli on compliance were evaluated using an ABAB (in which A is baseline and B is the FT schedule) reversal design. Each session consisted of 10 trials, with each trial separated by approximately 30 s. A trial consisted of the delivery of a low-*p* instruction and the subsequent opportunity to comply. Because a session was defined as the delivery of 10 instructional trials as opposed to a specific amount of time, session length varied but averaged approximately 15 min. Approximately 10 s prior to each trial, Charles' socks were removed. If Charles put his socks on, they remained on until 10 s before the initiation of the next trial, at which time they were removed by the therapist. Jared was physically guided to stand (for trials targeting the instruction "sit down") approximately 10 s prior to each trial. If he was sitting, he remained seated until 10 s prior to the initiation of the next trial.

Stimulus preference assessment. A multiple-stimulus without replacement (DeLeon & Iwata, 1996) preference assessment was conducted to identify edible items to be used as reinforcers throughout the study. Edible items were used because they could be easily delivered and quickly consumed. Their use also made the removal of a preferred item unnecessary, thereby increasing the efficiency of the procedure and minimizing the likelihood of problem behavior resulting from removal or from the termination of a preferred activity.

Baseline. The experimenter was in the room with the participant and delivered a low-*p* instruction approximately every 30 s. This schedule was arranged to approximate the spacing of low-*p* instructions during the FT condition. If the participant complied with the instruction, a preferred edible item was delivered.

FT schedule. An edible item was delivered every 10 s independent of responding, with 10 s

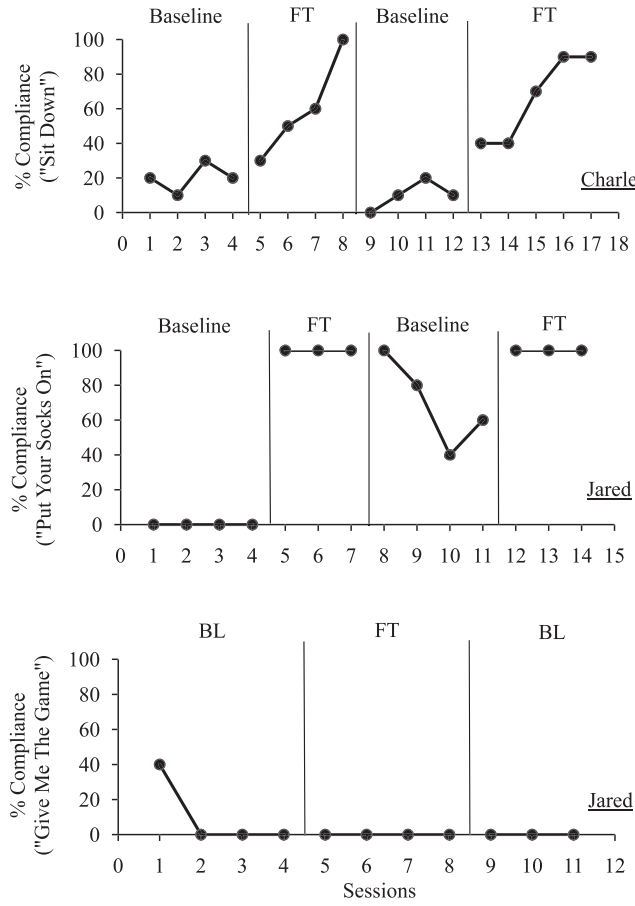

Figure 1. Percentage of compliance with low-*p* instructions across experimental conditions for Charles and Jared.

separating the delivery of the last item and the low-*p* instruction. The experimenter said, ''here you go [name]'' to control for the attention given when issuing instructions in a high-*p* instruction sequence. Three such deliveries occurred prior to the issuance of each of the 10 low-*p* instructions each session, resulting in 30 edible deliveries per session via the FT schedule. A preferred edible item followed each instance of compliance to low-*p* instructions.

RESULTS AND DISCUSSION

Compliance with low-*p* instructions increased following the FT schedule for Charles and increased with one of two instructions targeted for Jared (Figure 1). Charles' compliance increased from a mean of 15% (range, 0% to 30%) during baseline to a mean of 60% (range, 30% to 100%) in the FT conditions. Jared's compliance with the instruction ''put your socks on'' increased from 35% (range, 40% to 100%) during baseline to 100% during the FT conditions. Compliance with the instruction ''give me the game'' was at or near 0% across baseline and FT. Although the FT treatment was unsuccessful for Jared with this instruction, an effective treatment was identified and implemented (data are not reported).

Bullock and Normand (2006) compared the high-*p* instruction sequence and an FT schedule in an alternating treatments fashion using a single therapist across conditions, thereby introducing the possibility that the therapist

functioned as a discriminative stimulus for compliance across all conditions because of a history of reinforcement for compliance in the high-*p* condition, as would be predicted by a behavioral momentum analysis. The current experimental design controlled for this possibility, and compliance still increased with the FT schedule in two of the three cases, thereby supporting the results of Bullock and Normand and extending the findings to young children with autism. However, one limitation of the current arrangement is that a no-consequence baseline for compliance was not evaluated. Although baseline compliance was at or near zero for Jared, Charles was minimally compliant during the fixed-ratio (FR) 1 reinforcement schedule for compliance during baseline. If less compliance were observed in a no-consequence baseline, it might suggest that identifying a functional reinforcer for compliance is a critical variable in the intervention. Failing to identify a functional reinforcer might therefore explain the lack of treatment effects with Jared for the ''give me the game'' instruction.

The mechanisms responsible for this finding remain unclear. There are at least three possible explanations for the obtained results. First, the increases in compliance may be attributable to a behavioral momentum effect (e.g., Nevin, 1996), in that the increased reinforcer rate in the presence of the experimenter resulted in increased compliance as in to previous studies of behavioral momentum in the applied literature (e.g., Mace et al., 1988; McComas, Wacker & Cooper, 1998). However, the increased reinforcement rate was not dependent on compliance with instructions. In fact, this study demonstrates that the addition of response-independent reinforcers to an FR 1 schedule of reinforcement can increase compliance. This result is consistent with basic research findings demonstrating that the delivery of additional response-independent reinforcers can result in increased response persistence (e.g., Nevin, Tota, Torquato, & Shull, 1990). However, the parallel is not perfect, because basic research arrangements typically employ multiple variable-interval schedule arrangements onto which variable-time food deliveries are superimposed.

Second, it is possible that the increased interaction and reinforcement levels associated with the FT schedule might have functioned as an abolishing operation for escape from the demand situation and abated any escape-maintained behavior that competed with compliance (Laraway, Snycerski, Michael, & Poling, 2003). In the present study, specific behavior that interfered with compliance (i.e., noncompliance) was neither measured nor assessed, but this would be a reasonable avenue for future research and would provide data bearing on the abolishing operation hypothesis. In addition, because treatment outcomes of various interventions for compliance are likely to be influenced by the function of noncompliance, future research should incorporate preintervention functional analyses so that the role of behavior function can be investigated.

Third, because the same edible items were used during the FT schedule and following compliance to low-*p* instructions, the antecedent delivery of the items might have made compliance more likely in a manner similar to the ''reinforcer-sampling'' effect reported by Ayllon and Azrin (1968). It is unclear how reinforcer sampling might function in terms of basic behavioral principles. One possibility, as Ayllon and Azrin suggested, is that sampling the reinforcer might interrupt ongoing activities that would otherwise interfere with performance. In the present study, the delivery of preferred items might have reinforced attending to the experimenter, thereby increasing the likelihood of the participants attending to the experimenter when the instructions were delivered.

In the current study, the FT schedule failed to increase compliance with the instruction ''give me the game,'' which involved a situation in which Jared had access to a preferred activity

and was able to maintain access to it if he did not comply with the instruction. It might reasonably be assumed that this constituted a situation in which extinction was not in place for the behavior competing with compliance (i.e., playing with the video game) and that this might account for the ineffectiveness of the FT procedure. The FT schedule might be more effective under conditions in which extinction is implemented for noncompliance, as has been suggested in the case of the high-*p* instruction sequence (Zarcone, Iwata, Hughes, & Vollmer, 1993; Zarcone, Iwata, Mazaleski, & Smith, 1994; cf. McComas et al., 1998). It also is possible, although less clearly so, that the two instructions with which the FT procedure was effective (''sit down'' for Charles and ''put your socks on'' for Jared) did involve an extinction schedule for noncompliance insofar as the participants were not allowed to leave the area in which the instruction was given and there were no other activities in which they could engage. Future research should investigate the role of extinction in the context of the FT procedure, especially given the idiosyncratic nature of the effects observed in this study.

REFERENCES

Ardoin, S. P., Martens, B. K., & Wolfe, L. A. (1999). Using high-probability instruction sequences with fading to increase student compliance during transitions. *Journal of Applied Behavior Analysis*, *31*, 339–351.

Ayllon, T., & Azrin, N. H. (1968). Reinforcer sampling: A technique for increasing the behavior of mental patients. *Journal of Applied Behavior Analysis*, *1*, 13–20.

Bullock, C., & Normand, M. P. (2006). The effects of a high-probability instruction sequence and response-independent reinforcer delivery on child compliance. *Journal of Applied Behavior Analysis*, *39*, 495–499.

DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis*, *29*, 519–532.

Laraway, S., Snycerski, S., Michael, J., & Poling, A. (2003). Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis*, *36*, 407–414.

Mace, F. C., Hock, M. L., Lalli, J. S., West, B. J., Belfiore, P., Pinter, P., et al. (1988). Behavioral momentum in the treatment of noncompliance. *Journal of Applied Behavior Analysis*, *21*, 123–141.

McComas, J. J., Wacker, D. P., & Cooper, L. J. (1998). Increasing compliance with medical procedures: Application of the high-probability request procedure to a toddler. *Journal of Applied Behavior Analysis*, *31*, 287–290.

Nevin, J. A. (1996). The momentum of compliance. *Journal of Applied Behavior Analysis*, *29*, 535–547.

Nevin, J. A., Tota, M. E., Torquato, R. D., & Shull, R. L. (1990). Alternative reinforcement increases resistance to change: Pavlovian or operant contingencies? *Journal of the Experimental Analysis of Behavior*, *53*, 359–379.

Wehby, J. H., & Hollahan, M. S. (2000). Effects of high-probability requests on the latency to initiate academic tasks. *Journal of Applied Behavior Analysis*, *33*, 259–262.

Zarcone, J. R., Iwata, B. A., Hughes, C. E., & Vollmer, T. R. (1993). Momentum versus extinction effects in the treatment of self-injurious escape behavior. *Journal of Applied Behavior Analysis*, *26*, 135–136.

Zarcone, J. R., Iwata, B. A., Mazaleski, J. L., & Smith, R. G. (1994). Momentum and extinction effects on self-injurious escape behavior and noncompliance. *Journal of Applied Behavior Analysis*, *27*, 649–658.

Zuluaga, C. A., & Normand, M. P. (2008). Evaluation of the high-probability instruction sequence with and without programmed reinforcement. *Journal of Applied Behavior Analysis*, *41*, 453–457.

Received April 23, 2010
Final acceptance January 25, 2011
Action Editor, Joel Ringdahl