A comparison of consequences for correct responses during discrete-trial instruction

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ABSTRACT

We used an adapted-alternating treatments design to compare the effects of four types of consequences for correct responses on skill acquisition during discrete-trial instruction for four children diagnosed with autism spectrum disorder. Contingent on correct responses, the therapist provided either praise, tangible items, tokens, or no differential consequence. Three of four participants acquired target skills in the fewest number of sessions when correct responses resulted in immediate access to tangible items or tokens exchangeable for tangible items at the end of the session. One participant did not acquire target skills in any condition. We assessed participants' preferences for different consequences using a concurrent-chains assessment. Three of the four participants demonstrated a preference for conditions associated with immediate or delayed tangible items, and one participant demonstrated a preference for descriptive praise.

Findings in the current study generally suggest that immediate or delayed tangible items should be used as consequences for correct responses during discrete-trial instruction.

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Discrete-trial instruction (DTI) is one of the most commonly used teaching methods for children with autism spectrum disorder (ASD) during early intensive behavioral intervention (EIBI). Researchers have demonstrated that varying how one or more components of DTI are implemented can influence the effectiveness or efficiency of the procedure (e.g., Carroll, Kodak, & Fisher, 2013). For example, a number of previous studies have shown that skill acquisition can be influenced by the therapist's response following incorrect responses by the learner, including withholding prompts (Holcombe, Wolery, & Snyder, 1994), using different prompting strategies (Grow et al., 2009), and using different error-correction procedures (Carroll, Joachim, St. Peter, & Robinson, 2015; McGhan & Lerman, 2013).

Previous research also has shown that varying the consequences for correct responses may influence skill acquisition during DTI (e.g., Karsten & Carr, 2009). A variety of consequences for correct responses have been used in research and in clinical practice. Consequences for correct responses may include contingent praise statements (e.g., "Great job!"), social interaction (e.g., tickling), brief access to a preferred item, or delivery of a token later exchangeable for access to a preferred item. It is typically recommended that, during the initial acquisition of a new skill, the therapist deliver a tangible item paired with praise immediately following a child's correct response (e.g., DeLeon, Graff, Frank-Crawford, Rooker, & Bullock, 2014; Lovaas, 2003). Then, as the child starts to acquire the skill, tangible consequences for correct responses should be gradually removed and replaced by praise alone as a way of programming for response maintenance.

In practice, teachers may provide praise alone more frequently than they deliver tangible items for correct responses during DTI (e.g., Carroll et al., 2013; Kodak, Cariveau, LeBlanc, Mahon, & Carroll, In press). Delivering praise alone may

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function as a reinforcer during DTI for some children diagnosed with ASD (Greer, Singer-Dudek, Longano, & Zrinzo, 2008; Paden & Kodak, 2015). For example, Paden and Kodak compared the efficiency of DTI for four children with ASD when a correct response was followed by the delivery of a small-magnitude reinforcer (i.e., one-eighth of an edible item), a large-magnitude reinforcer (i.e., two to three edible items), or praise (i.e., no edible item). The participants mastered target skills in all conditions, and for the majority of participants learning was most efficient in either the small-magnitude reinforcer or praise condition. These results suggest that praise functioned as a reinforcer for the participants. However, participants in their study had an extensive history of DTI (i.e., 5–18 months) prior to the start of the study, and consistent pairings of praise and tangible items may have established praise as a conditioned reinforcer.

Although praise functioned as a conditioned reinforcer in the Paden and Kodak (2015) study, praise may not immediately function as a reinforcer for all individuals due to different histories of reinforcement (e.g., Dozier, Iwata, Thomason-Sassi, Worsdell, & Wilson, 2012). Several studies demonstrated that praise may be established as a conditioned reinforcer for some individuals for whom praise does not function as a reinforcer, but not for others (Dozier et al., 2012; Greer et al., 2008). Thus, at present, it is not clear the conditions under which praise will and will not function as a reinforcer during DTI.

At least two studies have directly compared the effects of social consequences (other than praise) and tangible consequences for correct responses during DTI on skill acquisition (Kang et al., 2013; Leaf et al., 2014). Leaf et al. compared acquisition of target skills for three children with ASD when correct responses resulted in either a choice of a toy, food, or social reinforcers, or feedback alone (i.e., the therapist said, "yes" following a correct response). The authors assessed mastery of a set of targets during probe sessions during which no programmed consequences were provided for correct responses. Participants showed mastery during probe sessions for the targets in all four conditions; however, it took fewer training sessions for participants to master the targets when correct responses resulted in a choice between three food items. In comparison, it took all three participants the most training sessions to master targets when correct responses resulted in a choice between three social activities. Although participants reached mastery for the targets in the food condition more quickly during probe sessions, correct responding during training sessions tended to be undifferentiated during two or more conditions for each participant. Leaf et al. also assessed participants' preferences for the different types of reinforcers, and all three participants showed a preference for the food condition relative to the other three conditions. These results suggest that providing food contingent on correct responses may increase the efficiency of DTI and may be more preferred than providing leisure items and social consequences.

In comparison, Kang et al. (2013) found no difference in correct responding for three children with ASD when a teacher provided either a preferred tangible item or a preferred social activity (e.g., tickling) contingent on correct responses during DTI. However, all three participants engaged in higher levels of stereotypic behavior during sessions in which teachers provided tangibles for correct responses. These results suggest that both tangible and social consequences may facilitate skill acquisition; however, tangible items may increase stereotypy relative to social activities.

In addition to providing brief access to a tangible item or social activity immediately following a correct response during DTI, a therapist may deliver a token that can be exchanged for extended access to a preferred tangible item or activity after the session (e.g., Adcock & Cuvo, 2009; Tarbox, Ghezzi, & Wilson, 2006). In applied settings, there may be a number of potential advantages to providing reinforcement at the end of the session rather than within the session. For example, reinforcement at the end of a session may be less likely to disrupt on-going instruction in a classroom. Additionally, it may be more practical for a teacher, who is responsible for providing instruction to multiple children simultaneously, to deliver a token following every correct response and extended access to a tangible item at the end of the session. Finally, tangible items may be more preferred if they are delivered for a longer duration at the end of the session versus short durations within the session (e.g., playing a video game for 5 min at the end of the session versus 30 s following each correct response; DeLeon, Chase et al., 2014).

In a recent study, DeLeon, Chase et al. (2014) compared the influence of accumulated and distributed access to reinforcers on responding for four individuals with intellectual disabilities. During the distributed reinforcement condition, participants earned 30-s access to a preferred activity immediately after the participants completed a task. During the accumulated reinforcement conditions, participants earned a token after completing a task, and at the end of the session they could exchange those tokens for extended access to an activity. The results showed that response rates were higher during the accumulated reinforcement condition relative to the distributed reinforcement condition. The authors then assessed participants' preferences for accumulated and distributed reinforcement using a concurrent-chains assessment (Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997). All four participants preferred accumulated reinforcement when activity reinforcers were available, and three of the four participants' preferred accumulated reinforcement when edible reinforcers were available. Overall, the results of this study suggest that accumulated reinforcement may be more efficient and preferred when compared to distributed reinforcement. Nevertheless, DeLeon, Chase et al. included tasks that participants could complete with minimal prompts. These authors did not compare the effectiveness or efficiency of accumulated and distributed reinforcement during the acquisition of new skills. Thus, it is unclear whether similar effects on responding would be observed during the acquisition of new skills. It is possible that providing access to tangible items following every correct response may be more effective during skill acquisition than providing delayed access to tangibles at the end of the session.

The purpose of the current study was to replicate and extend previous research examining the effects of different consequences for correct responses on the effectiveness and efficiency of DTI. Specifically, we compared skill acquisition for four children with ASD when correct responses resulted in (a) access to a preferred tangible item, (b) a token exchanged