

An Evaluation of Instructive Feedback to Teach Play Behavior to a Child with Autism Spectrum Disorder

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Abstract Instructive feedback is used to expose learners to secondary targets during skill acquisition programs (Reichow & Wolery, in *Journal of Applied Behavior Analysis*, 44, 327–340, 2011; Werts, Wolery, Gast, & Holcombe, in *Journal of Behavioral Education*, 5, 55–75, 1995). Although unrelated feedback may have clinical utility in practice, very little research has evaluated unrelated instructive feedback, particularly for promoting play behavior (Colozzi, Ward, & Crotty, in *Education and Training in Developmental Disabilities*, 43, 226–248, 2008). The purpose of the study was to determine if play emerged after embedding instructive feedback during the consequence portion of discrete trial training to teach tacts. An adapted alternating treatments design was used to compare tact training with and without instructive feedback for play behaviors. Instructive feedback resulted in the emergence of play behaviors during tabletop instruction and a play area of a classroom. We

discuss the results in terms of clinical practice and future research.

Keywords Autism · Instructive feedback · Play behaviors · Tact training

Instructive feedback is a strategy used to expose learners to secondary training targets during skill acquisition programs (Reichow & Wolery, 2011; Werts, Wolery, Gast, & Holcombe, 1995; Wolery, Doyle, Ault, Gast, Meyer, & Stinson, 1991). For example, an instructor teaches a child to tact the name of several animals. During the reinforcement interval, the instructor tacts features of the animals in the presence of the child and moves onto the next trial (i.e., instructive feedback for a related secondary target). After teaching sessions, the modeled skills are probed under extinction. Learners with autism spectrum disorder (ASD) have acquired secondary targets without explicit training by using instructive feedback (e.g., Loughrey, Betz, Majdalany, & Nicholson, 2014; Vladescu & Kodak, 2013).

Much of the research has focused on teaching secondary targets that are expansions of the trained targets (Nottingham, Vladescu, & Kodak, 2015). That is, the trained and secondary targets are similar or related skills. For example, an instructor teaches a child to tact the name of the animal (i.e., trained target) and tacts the feature of the animal during the reinforcement interval (i.e., secondary target). Another type of instructive feedback is unrelated feedback in which the trained and secondary targets come from different skill areas. For example, an instructor teaches a child to tact the name of foods (i.e., trained targets) and models a play behavior during the reinforcement interval (i.e., secondary target). Although unrelated feedback may have clinical utility in practice because instructors can embed a variety of skills into instruction, with a few

The data were collected while the authors were employees of the University of Nebraska Medical Center’s Munroe-Meyer Institute.

Implications for Practice • Shows a systematic evaluation of the effectiveness of a procedure for increasing play behaviors

- Demonstrates how to implement instructive feedback for increasing play behaviors during tact training
- Describes how instructors can increase play behaviors without explicit training
- Highlights the clinical usefulness of instructive feedback during early intervention programming

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exceptions (e.g., Colozzi, Ward, & Crotty, 2008), very little research has evaluated unrelated instructive feedback, particularly for promoting play behavior.

Instructors use behavioral interventions such as video modeling to teach play behaviors to children with ASD. However, the results of video modeling to teach play behaviors may be inconsistent or require extensive training (Dupere, Macdonald, & Ahearn, 2013). Instructors may use instructive feedback to complement and bolster the effectiveness of programs to teach play behaviors. The purpose of this study was to determine if play behaviors emerged as a result of embedding instructive feedback during the consequence portion of discrete trial training to teach tacts of features of animals, objects, and foods.

Method

Sarah was a 7-year-old child diagnosed with ASD and stereotypic movement disorder, Not Otherwise Specified by a licensed psychologist. Sarah had deficits in play and social skills compared to her same-aged, typically developing peers. The experimenter conducted two types of sessions in a partitioned area for one-to-one teaching in Sarah's early intervention clinic: tact training with instructive feedback and probes of play behaviors at the table. The experimenter conducted generalization probes in the play area of her clinic in the presence of her peers. The experimenter conducted three to five sessions a day approximately 3 to 5 days per week.

Measurement and Interobserver Agreement

During tact training sessions, the experimenter scored an independent correct tact when Sarah vocally named the feature of the animal, object, or food within 5 s of the presentation of the picture card. During tact training sessions, a correct prompted tact was scored when Sarah echoed the experimenter's vocal model of the tact within 5 s of the echoic prompt. During play skills probes, play behavior was scored when Sarah engaged in vocal and motor responses with toys that corresponded to the toy play modeled by the experimenter during instructive feedback. The percentage of responses was calculated by dividing the number of responses by the number of trials for tacts and plays skills, respectively. During the generalization probes, the experimenters collected data on the frequency of correct toy play included in the instructive feedback and unrelated to instructive feedback. The frequency of toy play was converted to a rate by dividing the frequency by the duration of the generalization probe (i.e., 5 min).

A second, independent observer recorded tacts and play behavior. An agreement was defined as both observers recording an independent or prompted correct tact or play behavior. A disagreement was defined as any differences in the responses recorded by the data collectors. Point-by-point agreement was

calculated by dividing the number of agreements by the total number of trials (i.e., 16) and multiplying by 100. Interobserver agreement was calculated for 38% of sessions and the mean agreement was 100% for tacts and play behavior.

Experimental Design

An adapted alternating treatments design was used to compare the tact training with and without instructive feedback conditions (Sindelar, Rosenberg, & Wilson, 1985). The experimenter selected tacts and play behavior for inclusion in each condition based on pre-test probes in which the experimenter presented materials, waited up to 5 s for a response, and did not provide prompts or consequences for correct or incorrect responses. Only tacts and play behaviors to which Sarah did not engage in correct responses during pre-test probes of these stimuli were included as targets in the training sets. The experimenter attempted to equate the tacts and play behaviors in the training sets to control for differences in response effort as a confounding variable. For example, the experimenter assigned tacts with overlapping sounds to different conditions (e.g., husks and tusks). In addition, training sets included tacts with a similar number of syllables. The experimenter assigned play behaviors with a similar number of vocal and motor responses across conditions.

General Procedure

The experimenter assigned a set of 12 tacts (e.g., features of common animals, foods, and objects) and three play behaviors consisting of a vocalization and two or more motor responses with toys to the tact training with and without instructive feedback conditions. The experimenter presented tacts once per session for 12 trials. In both conditions, the experimenter started the trial by presenting a picture card in front of the learner. The experimenter used a constant prompt delay with an echoic prompt to teach tacts. The experimenter used a 0-s prompt delay during the first two sessions. That is, the experimenter presented the picture card and immediately provided an echoic prompt. The experimenter inserted a 5-s delay between the presentation of the picture card and the echoic prompt starting with session three. The reinforcement interval was 20 to 30 s. Sarah received a small piece of a highly preferred edible for each independent or prompted correct response. The mastery criterion for tact training was one session with 100% independent correct responses.

Experimental Conditions

Tact Training without Instructive Feedback The experimenter did not model play behaviors during the reinforcement interval during the tact training without feedback condition. During the reinforcement interval, experimenter delivered the

specified reinforcer for correct and prompted tacts, collected data, and prepared the materials for the next trial.

Tact Training with Instructive Feedback Sessions were similar to tact training without instructive feedback with one exception. Immediately following the delivery of a reinforcer for a correct tact, the experimenter presented the secondary target by modeling a play behavior (e.g., placed a play pizza on a tray, put the tray in the oven, and said, “I am hungry.”). The experimenter did not deliver consequences for echoing the vocal component of the secondary target, and the participant did not have access to the toys. The experimenter presented secondary targets in a pseudo-randomized manner so that each play behavior was presented with each tact during training.

Play Probes

The experimenter conducted two types of probes of play skills assigned to the tact training with and without instructive feedback conditions to measure the acquisition of play behavior: probes at the table with the experimenter and generalization probes in a play area with the experimenter in the presence of peers.

Probes at the Table The experimenter presented the toys associated with the play behaviors assigned to each condition. The experimenter presented the toys in a semi-random order and allowed a 15-s opportunity to respond. Each probe consisted of six trials (i.e., two probes for each play behavior). The experimenter did not provide prompts or consequences for play behaviors (i.e., extinction). The experimenter reinforced appropriate work-related behavior (e.g., attending, sitting down at the table) approximately every other trial.

Probes in the Play Area The second type of probe measured if play behavior during probes at the table generalized to the playroom with peers present. Generalization probes were 5 min. The experimenter conducted generalization probe for play behavior if the participant engaged in appropriate toy play during 66 to 100% of trials during the probe at the table. The experimenter baited a carpet in the play area with the three sets of toys from the tact training with and without instructive feedback condition and three novel toys. The experimenter, Sarah, and some of her same-aged peers were present during the generalization probes. If Sarah engaged in correct toy play, the experimenter provided attention for approximately 10 s in the form of modeling new, related play behaviors on a continuous schedule. For example, if Sarah put the pizza on a tray, put the tray in the oven, and said, “I am hungry,” the experimenter provided attention by saying, “I’m hungry, too! Can I have some pizza when it’s ready?” If the participant engaged in play behavior during the generalization probes that matched the play models presented as secondary targets, the

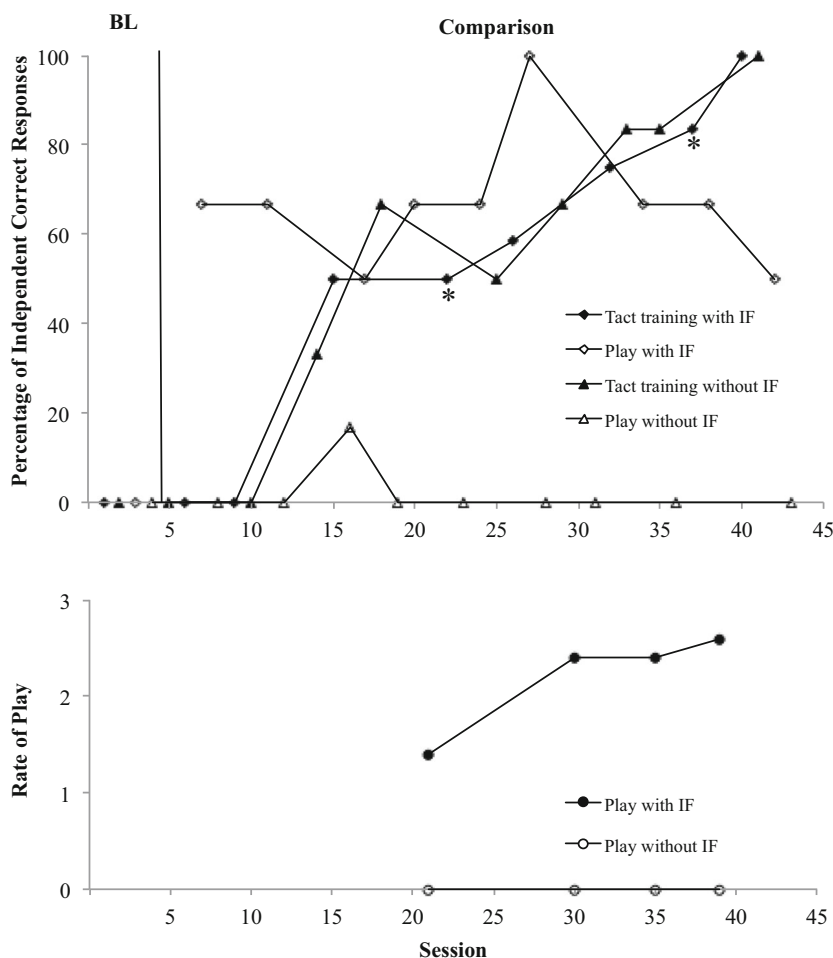
experimenter consider the play behaviors mastered and modeled new play behaviors as secondary targets in the subsequent tact training sessions.

Results and Discussion

The top panel of Fig. 1 shows the results of the comparative evaluation during tact training and probes of play behaviors at the table. Sarah acquired the tact relations in the tact training with instructive feedback condition in fewer sessions than the tact training without instructive feedback suggesting that instructive feedback does not impede the acquisition of the trained targets. Three sets of three play behaviors emerged during probes at the table after a history of instructive feedback during the consequence portion of the tact training trials. Sarah rarely engaged in toy play and often engaged in repetitive behavior with the toys assigned to the tact training condition without instructive feedback during probes at the table (e.g., smelling the toys). The bottom panel of Fig. 1 depicts the results of the generalization probes of the play behaviors. Sarah engaged in high rates of play behavior with the toys assigned to the tact training with instructive feedback condition, and she never engaged in play behavior with the toys assigned to the tact training without instructive feedback condition. Thus, the play behaviors presented during instructive feedback generalized to a play area of the participant’s early intervention clinic suggesting that instructive feedback promoted adaptive behavior in a meaningful setting. Overall, the results show that instructive feedback was an efficient method for evoking play behavior in a teaching and play context.

The results of the current study add to the growing body of research on the usefulness of instructive feedback for teaching learners with ASD. The present study is the first to demonstrate the effectiveness of instructive feedback for increasing play behavior as a secondary target during tact instruction. The current study is one of few demonstrations that have incorporated unrelated secondary targets (Reichow & Wolery, 2011; Nottingham et al., 2015). That is, the secondary target came from an unrelated skill set to the primary target (i.e., tacts). Sarah acquired nine play behaviors before meeting the mastery criterion during the tact training with instructive feedback condition. Sarah’s rapid acquisition of secondary targets during the tact training with instructive feedback condition allowed for the inclusion of new play behaviors as secondary targets during the continued training of primary targets. To our knowledge, only one other study has evaluated whether children with ASD acquire multiple sets of secondary targets during training of a single set of primary targets (i.e., Haq, Zemantic, Kodak, LeBlanc, & Ruppert, 2016). The findings of the current study suggest that including secondary targets during early intervention programming can lead to the emergence of multiple sets of secondary targets, which

Fig. 1 The *top* panel depicts independent correct tacts and play during tact training with and without instructive feedback. The *asterisks* indicate when the experimenter added new play behaviors to the tact training with instructive feedback condition. The *bottom* panel shows the rate of play during the generalization probes in the play area



further enhances the efficiency of instruction. Finally, the current study assessed the generalization of play behaviors to a play area in the participant’s early intervention clinic. Few studies on instructive feedback evaluated generalization of secondary targets following emergence during probes. Nevertheless, generalization is a fundamental dimension of behavior analytic instruction (Baer, Wolf, & Risley, 1968) and should be a critical goal of intervention (Stokes & Baer, 1977). Thus, instructive feedback may be an effective strategy to promote both acquisition and generalization of play behavior for children with ASD.

One limitation of the study was that the play behaviors assigned to the tact training without instructive feedback condition were not included in the generalization probes. However, given that play behavior rarely occurred with toys during probes at the table, it is unlikely that Sarah would have engaged in play with control toys during the generalization probes. Another limitation of the study is that the experimenter used a continuous schedule of reinforcement during the generalization probes such that only the first instance of each toy play behavior can be considered generalization. Nevertheless, play behavior directed toward another person in a home or educational

setting is likely to result in social interaction with peers or adults. Sarah’s high level of play behavior during generalization probes suggests that play is likely to produce reinforcing interactions with her peers and caregivers during playtime.

Despite the limitations, the history of instructive feedback produced multi-component play behaviors that generalized to a novel setting. From an educational standpoint, instructive feedback may be appealing in classrooms and clinics because additional instructional time is unnecessary to promote rapid behavior change. Instructive feedback may be used to increase the effectiveness of comprehensive play skills training. Future research might explore the possibility of teaching peers how to deliver instructive feedback during classroom activities.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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