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INCREASING PLAY-BASED COMMENTING IN CHILDREN WITH AUTISM SPECTRUM DISORDER USING A NOVEL SCRIPT-FRAME PROCEDURE

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Children with developmental disabilities may engage in less frequent and more repetitious language than peers with typical development. Scripts have been used to increase communication by teaching one or more specific statements and then fading the scripts. In the current study, preschoolers with developmental disabilities experienced a novel script-frame protocol and learned to make play-related comments about toys. After the script-frame protocol, commenting occurred in the absence of scripts, with untrained play activities, and included untrained comments.
Key words: script frames, script fading, social commenting, generalization, play, autism

Many intellectual disabilities (ID) are characterized, in part, by deficits in communication (e.g., autism spectrum disorder; American Psychiatric Association, 2013). Thus, common goals of intervention include increasing the frequency and variation of communication. Scripts and script-fading procedures have been used to teach individuals with ID to make comments (e.g., Krantz & McClannahan, 1993; MacDuff et al., 1993); the approach has several strengths. First, scripts may be used to evoke a variety of comments. Second, individuals can initiate commenting without receiving instructional cues from another person. Finally, unscripted statements may emerge (e.g., Krantz & McClannahan, 1993, 1998).

Despite these strengths, complete fading of scripts has been elusive, often requiring that a specific item or cue remain for commenting to occur (e.g., activity schedules, Krantz & McClannahan, 1998; a portion of the script, Krantz & McClannahan, 1993). If all cues associated with training can be faded while individuals continue to initiate, then initiations may be more likely to occur in a greater variety of relevant situations (i.e., with only natural sources of stimulus control). Therefore, an important extension of the script-fading research would be to identify methods that will result in complete fading of script-related cues. The primary purpose of the current study was to examine the extent to which a novel script-frame procedure could be used to increase play-related commenting in preschoolers with developmental disabilities (script frames involve an incomplete scripted comment that must be completed by the speaker using situation-specific information) and result in complete fading of scripts. In addition, we investigated the extent to which commenting

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occurred with untrained play activities and untrained comments.

METHOD

Participants

Three preschoolers in a public school classroom for children with autism spectrum disorder (ASD) participated. They were identified for inclusion because they did not make comments to others during play activities or commenting was limited to a few overused phrases, and their commenting had not improved with previous interventions based on applied behavior analysis.

Trevor was a 5-year-old boy who showed characteristics consistent with ASD but did not have a formal diagnosis. Maria was a 4-year-old girl with ASD. Evan was a 4-year-old boy with ASD. All three participants responded appropriately to adult- or peer-initiated interactions and had mastered many nonvocal play behaviors, but did not comment appropriately when playing. All participants had previous experience with script-fading procedures in nonplay situations (e.g., greetings).

Setting

All sessions took place in the participants' typical educational environment. Baseline and intervention sessions took place in the classroom at one of two horseshoe-shaped tables that were commonly used for play and other activities. One participant at a time was present during sessions, which occurred once or twice daily and lasted up to 10 min.

Materials

Script-frame pretraining included familiar items that participants could tact and would not be used during experimental sessions. Script-frame intervention sessions and commenting probe sessions included a variety of toy sets. Each toy set included a variety of different components that could be commented on, such as a jungle scene with multiple animals and moving parts. Script frames were typed on paper using 19-point Arial font, cut into pieces (1.3 cm by 6.5 cm), and laminated for increased durability. Clear tape was used to secure the scripts to the toys.

Response Measurement and Reliability

During script-frame pretraining sessions, data were collected on the prompt necessary to evoke a comment. Hand-over-hand prompts were recorded if the experimenter physically guided the participant's hand to point to a script. A prompt at the wrist was recorded if the experimenter physically guided the participant to point to a script by contacting the forearm or wrist. A prompt at the elbow was recorded if the experimenter made physical contact with the participant at or above the elbow.

After each intervention or commenting probe session, each participant's comments were transcribed from audio-video recordings of the sessions and scored using the following categories. A *comment* was defined as a vocal response that included at least one word, separated from previous words by either at least 3 s or a clear change in topic. A *repeated comment* was scored if a participant made a one- or more than one-word comment that was identical to a previous comment within the session except for changes in verb tense or prepositions. A *sound effect* was scored if a participant made sounds apparently related to the play activity that did not include words. An *echoic comment* was scored if, within 3 s of the experimenter's comment, the participant made an identical comment, even if it included only part of the experimenter's comment. Although this definition may have resulted in some appropriate comments being scored as echoic responses, it was designed to provide a conservative measure of unique commenting within sessions. An *unintelligible comment* was scored if, after several attempts by at least two researchers, the vocalization could not be deciphered. A *unique comment* was defined as any one- or more than one-word comment that had

not been previously stated in a given session. Thus, repeated and echoic comments were not unique. Percentage of unique comments was calculated by dividing the number of unique comments by the total number of comments (repeated comments, echoic comments, and novel comments) and converting the quotient to a percentage.

Reliability was assessed by having at least two researchers simultaneously listen to recordings of all sessions while they independently transcribed comments. Disagreements rarely occurred but were resolved through additional listening until an agreement was reached.

Procedure

Vocabulary pretraining. For each participant, one set of toys was designated the training set. Participants needed to correctly label aspects of the toys (e.g., large spider web in a jungle toy). Participants' vocabulary for training toy sets were assessed by asking, "What is it?" while pointing to an aspect of the toy. If the participant responded correctly, the play session continued. If the participant responded incorrectly, the experimenter modeled the correct response. Vocabulary pretraining ended when participants labeled at least 20 different aspects of the toy set with 100% accuracy across two consecutive sessions.

Script-frame pretraining. The researchers taught three script frames that included an incomplete phrase that could be completed when the script frame was attached to a toy; the script frames were "I found the —," "Look at this —,"and "I'm playing with the —" (the actual script frames included a blank space instead of the blank line). The script frames were identified through observations of playtime comments made by 3- to 5-year-old children with typical development. Pretraining sessions included five trials with each of the three script frames interspersed (i.e., 15 trials). The script frames were randomly attached to familiar items, and modeling and imitation were used to teach each participant to state the script and fill in the blank with the relevant item. Script-frame pretraining continued until participants responded 100% correctly, defined as independently stating the script frame and labeling the associated item across two consecutive sessions.

Baseline. The training toy was used during all baseline sessions, and no script frames were present during baseline. In baseline, the participant was brought to the table and told, "Let's play [toy name]." The experimenter then played with the toys and responded to any participant play comment within 3 s by making a reciprocal comment. If no comments were made, the experimenter made a play comment approximately once every 30 s. No specific praise or additional reinforcers were delivered for commenting. Sessions lasted 5 min.

Script-frame intervention. The training toy set was placed on a table with five examples of each of the three script frames attached to 15 known aspects of the toy. The locations and arrangements of the script frames varied from session to session. The experimenter gave the same initial instruction given in baseline and again responded to participant comments (scripted or unscripted) by making a related comment within 3 s. If the participant did not make a scripted or unscripted comment during the 30-s period, the experimenter used least-to-most physical prompting for the participant to point to a script frame. All participants reliably responded to the physical prompt by saying the indicated script frame. Sessions ended after all 15 script-frame comments were made.

Commenting probes. Commenting probe sessions were conducted every one to three intervention sessions and included a toy set (either the training set or a novel set) without scripts. For Trevor, experimenters also observed commenting during a group art activity in which no scripts or specific consequences were programmed for commenting.

Script-frame fading. If participants did not comment with additional play sets during the

commenting probe sessions after intervention with the training play set (Evan and Maria), script-frame fading began in training sessions when the participant independently read at least 14 of 15 script frames per session for two consecutive sessions. Fading occurred by cutting off a portion of the script frame, starting at the end of the script frame. For Evan, script frames were faded using five steps (i.e., 100% script, then 75%, 50%, 25%, and 13%). For Maria, one additional fading step was added after the 13% script and included a piece of clear tape but no script frame attached to the tape.

Design

A multiple probe design across participants was used to evaluate the effects of the intervention on commenting in the absence of scripts. Baseline for Trevor, Maria, and Evan was conducted across 1, 4, and 15 days, respectively. Because all participants had a history of little or no appropriate commenting during play activities, probes were used rather than increase the number of baseline sessions and sacrifice participation in regularly scheduled school activities.

RESULTS AND DISCUSSION

Participants mastered script frames in pretraining in two to seven sessions and vocabulary in five to 14 sessions. In baseline, Trevor made no comments (Figure 1, top), and his rate of unique commenting increased during generalization sessions to a mean of 4.7 unique comments per minute across toy sets. In commenting probe sessions, he commented without systematic fading of script frames, and 76% of his comments were unique (percentage of unique comments is not shown). Trevor also commented independently during a small-group activity, which had reportedly not occurred previously. In baseline, Maria's unique commenting was stable at approximately 0.9 comments per minute (Figure 1, middle) and increased to a mean of 1.7 comments per minute during commenting probe sessions. In baseline, 25% of her comments were unique, which increased to 48% during commenting probe sessions. Evan engaged in a mean of 0.3 novel comments per minute in baseline (Figure 1, bottom), which increased to a mean of 0.9 novel comments per minute during commenting probe sessions. In baseline, 37% of Evan's comments were unique, which increased to 72% during commenting probe sessions.

The current study extended script-frame procedures by including a novel script-frame procedure to evoke varied comments during play situations. Each script frame was taught across a variety of stimulus conditions both within and across sessions in order to include sufficient stimulus examples (Cooper, Heron, & Heward, 2007; Stokes & Baer, 1977), which may have contributed to stimulus generalization. The presence of three script frames used with 20 aspects of toys may have taught sufficient response examples, leading to response generalization (see Cooper et al., 2007). By associating the script frames with 20 aspects of the toys, the participants could experience 60 different play-related comments. In essence, the participants appeared to learn that it was possible to say a variety of things about many aspects of a toy, increasing the likelihood of making untrained comments about various aspects of the toys.

The current study has several limitations. First, baselines on commenting were not collected on any untrained toy sets, so it is unclear if participants would have commented with the toy sets. Without these data, it is not possible to conclude that increased commenting was due to generalization or other variables. Second, although similar effects were seen with all three participants, it is unclear if similar results could be expected with other individuals with different skill profiles or different histories with scripts and script fading. Third, the current analysis did not include a component analysis, so it is unclear if all components of the script-frame procedures were

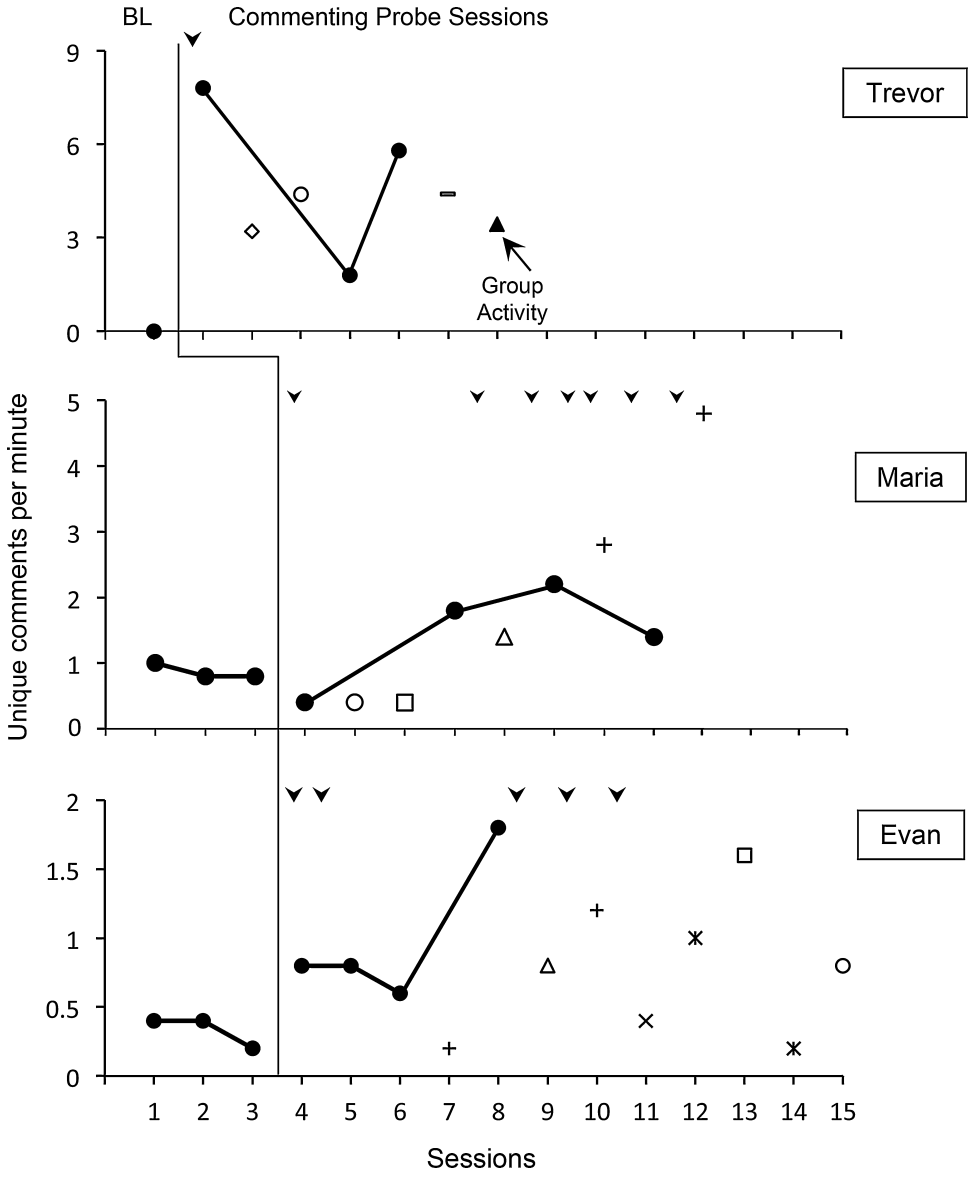

Figure 1. Rate of unique commenting for Trevor, Maria, and Evan during baseline and commenting probe sessions. Filled circles represent unique commenting performance in sessions with the training toy set (no scripts present). All other symbols indicate performance in sessions with untrained toy sets (the specific list of toys is available from the first author). Arrows along the top of each graph indicate when script-frame steps were initiated, starting at 100%, and for Maria and Evan, when script frames were faded to the next level.

necessary (e.g., script-frame arrangement or session-to-session variation in location of script frames). Finally, the intervention procedures included not delivering reciprocal comments for echoic comments, repeated comments, or sound effects, making it unclear to what extent extinction of these responses influenced the results.

The participants' teacher noted informally that all three participants made more comments

following the study. Future researchers should examine the extent to which script frames enhance script-fading outcomes and with whom the procedures are effective. Future researchers should include additional baseline probes to identify baseline levels of commenting across multiple activities before training and assessing generalization.

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