Spring 2018

Improving conversation skills in a child with autism spectrum disorder using textual prompts and front-to-back fading

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Improving Conversation Skills in a Child with Autism Spectrum Disorder Using Textual

Prompts and Front-to-Back Fading

A Senior Thesis Project Presented

to The Faculty of Undergraduate

College of Health and Behavioral Studies

James Madison University

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April 2018

Accepted by the faculty of the Department of Psychology, James Madison University, in partial fulfillment of the requirements for the Honors College.

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PUBLIC PRESENTATION

This work was accepted for presentation, in part, at the Virginia Association for Behavior Analysis conference on April 7, 2018

This work was accepted for presentation in full by the James Madison University Honors Symposium on April 21, 2018.

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Acknowledgements

I would like to acknowledge the numerous people that helped me through this process and made it possible to complete this project. First, I want to thank my advisor and mentor Dr. Trevor Stokes, who has given me endless guidance and support from the start of this process. I am endlessly thankful for the incredible amount of time he took to answer my questions and guide me through this project. Next, I would like to thank Emory Bruno, my primary data collector, who I have been able to rely on every day for encouragement and support. In addition, I would like to thank Alexa Ina, Allison Brandmark, and Melissa Grant for working their schedules around my needs and problem solving with me when I needed it most. Lastly, I want to extend my thanks to the other staff at the Inter-Professional Autism Clinic for allowing me to conduct my research and being supportive throughout.

Abstract

A central characteristic of Autism Spectrum Disorder (ASD) are deficits in social communication, which often results in delays in speech and impairments in communication skills. The present study's goal was to improve the quality of conversation skills in a seven-year-old diagnosed with Autism Spectrum Disorder. A multiple baseline across behaviors probe design was used to teach the child appropriate responses in three conversation scripts about topics of interest of the child. The scripts were presented to the child using visual text prompts that were faded out using a front-to-back fading procedure. When the child met criteria for reinforcement, it was provided in the form of access to the preferred activity that was the topic of the conversation script. The interventions for the scripts were presented sequentially, with a new script being introduced once the previous one had been mastered. The results showed that the textual and the front-to-back fading procedure are effective for increasing the frequency of responding with appropriate content in a conversation, which in turn improves the quality of conversation skills.

Improving Conversation Skills in a Child with Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder whose symptoms typically emerge in early childhood and affects approximately 1 in 68 children (CDC, 2016). The main characteristics of ASD are deficits in social communication and restricted, repetitive patterns of behavior, interests, or activities (Weiss, Baker, & Butter, 2016). Individuals with ASD also may experience delays in developmental milestones and impairments in intellectual and adaptive skills. The impairments in social communication skills often results in individuals with ASD having limited or below typical communication skills. Individuals may start talking later than what is developmentally typical, or not speak vocally at all. The deficits in communication also can result in individuals with ASD having difficulty initiating and maintaining conversations, which require an individual to respond to questions and comments (Conallen & Reed, 2017). These deficits also can lead to individuals with ASD to attempt to avoid social interactions, which can further hinder their ability to develop conversational skills. The impairments in social and communication skills and that some individuals with ASD may avoid social interactions mean that interventions that address improving communication skills are needed.

An obstacle in teaching individuals with ASD to successfully engage in conversations with others is that individuals with ASD often struggle with reading other people's body language and having difficulty interpreting and using that information to make decisions about how to interact with another person. Peters and Thompson (2015) used Behavior Skills Training (BST) to teach children with ASD responses to reengage an uninterested conversational partner. Behavior skills training involves a teacher or clinician providing verbal instructions about the skill, the teacher or clinician then models the skill, often in the form of role playing, then the

teacher or clinician has the individuals who are participating in the skills training rehearse using the skill, and then the teacher or clinician gives feedback (Peters & Thompson, 2015). The results of their study supported the use of BST in teaching individuals with ASD to discriminate whether a conversational partner was interested or uninterested, and that behavior skills training was effective at teaching individuals how to regain the interest of a partner through asking a question or changing the topic (Peters & Thompson, 2015). Although there is evidence that suggests that BST does work for teaching adolescents and adults conversational skills, the practice of giving verbal instructions about a skill may not be appropriate for younger children. However, using the procedures of behavior skills training, such as the practice of repeated rehearsals and giving feedback through positive reinforcement and corrections, is appropriate for young children who have emerging communication skills (Radley, Hanglein, & Arak, 2016).

As stated previously, one of the characteristics of ASD is deficits in social communication. This can manifest as individuals with ASD experiencing trouble identifying emotions in themselves and in others, which can lead to individuals having difficulty engaging in conversations about emotions. Conallen and Reed (2017) examined the use of conversation cards to prompt children with ASD to engage in conversations about their feelings about events. The researchers used conversation cards placed between activities on a visual schedule to prompt the children to have a conversation with a partner about their feelings about the previous activity. The researchers of this study found that the prompt cards were effective at prompting children with ASD to engage in conversations about private events, and that children with ASD could be taught to use grammatically correct sentences in the conversations (Conallen & Reed, 2017). This study lends support not only to the use of prompt cards to help signal individuals to engage

in a conversation, but that children with ASD can also be taught to engage in conversations about non-concrete or open-ended topics, such as emotions.

Behavior skills training (BST) is a common procedure used to teach adults with ASD to engage in conversations with peers. Hood, Luczynski, and Mitteer (2017) used BST and textual prompts to teach conversational and greeting skills to adults with ASD. In this study, BST followed typical procedures by using an instructional period where trainers explained the skill and the reasoning for the skills. Textual prompts then were used after participants gave incorrect responses in order to provide a correction. Researchers were successful in teaching conversational skills using this combination of BST and textual prompts (Hood et al., 2017). This study used adults as its participants, which means the individuals are more likely to have higher processing skills needed to benefit from the instructional period. Adults are also more likely to have more experience in social situations and may have more communication skills going into the study compared to children under the age of ten. Those experiences and previous skills allow for researchers to start training at a level that may not be appropriate for a younger participant. Children with low skills may need researchers to use textual prompts as a part of the training, fading them out during the intervention, instead of only presenting them as corrections.

Sarokoff, Taylor, and Poulson (2001) conducted a study on the use of script fading to teach children with ASD to engage in conversational exchanges. Script fading is a procedure in which a text, such as a sentence, is presented in full to an individual, and as the individual learns the text, the visual of the script is slowly taken away by removing words from the sentence. In this study, the researchers taught the participants scripts about their interests, such as video games. They presented the scripts to the participants, and throughout the study faded the scripts back-to-front. An example of back-to-front fading is fading the sentence "The sky is blue" to

"The sky." Their results showed that the intervention was successful in teaching the children to engage in a conversation. This research supports using scripts about an individual's interest to teach conversational skills, and outlines a script fading procedure appropriate for children. Though this study used a back-to-front fading method, based on the child in this study, a front to back fading procedure may be more effective. A front-to-back script fade example is fading the sentence "The sky is blue" to "Is blue." Previous studies that used back-to-front fading procedures used participants that are older than the one in this study. Other studies typically only taught one script, as opposed to multiple; when teaching multiple scripts with similar beginning cues, using a front-the-back script may be more appropriate because it allows the young participant to have a clear prompt.

In a previous study conducted by Eliana Segal (2016), a social skills training procedure using behavior therapy techniques was used to teach a child diagnosed with Autism Spectrum Disorder to appropriately initiate and engage in reciprocity in a social interaction. Training sessions were implemented following baseline which consisted of verbally prompting the child to initiate a greeting using the prompt "say hi," to engage in a reciprocal conversation using the verbal prompt "say good, how are you?" following the conversation partner's greeting and question "how are you?". Positive social consequences were used as reinforcers. The results showed that following training, the child developed the skills of initiating social interaction, and that the skills generalized across settings and individuals (Segal, 2016). This study offered support of using social skills training sessions and positive attention as consequences for teaching conversation skills to children with ASD.

Generalization, as described by Stokes and Baer (1977), is the "occurrence of relevant behavior under different, non- training conditions (i.e., across subjects, settings, people,

behaviors, and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions" (p. 350). While not all interventions or treatments aim for generalization to occur, it is a goal for most, especially interventions targeting social and communication behaviors. It important for individuals to be able use communication skills with a variety of people and in differing settings. A simple and common method of testing for generalization is the "train and hope" method. In train and hope, researchers or practitioners do not actively program for generalization during the intervention. Instead, following the intervention or treatment, simply whether generalization occurred across settings and/or people is documented (Stokes & Baer, 1977). The train and hope method can be useful when evaluating whether and to what extent a specific intervention produces or promotes generalization without being directed pursued. This information can then inform how to improve the intervention, or what program of generalization should be used.

The purpose of the present study is to improve the quality of social interactions and communication skills for children with Autism Spectrum Disorder by building from previous behavioral research that supports using repeated rehearsals, textual prompts, and preferred activities as reinforcers to improve communication skills in individuals with ASD. The goal of this study is to increase the percent of responding with appropriate content during a conversation in a child diagnosed with ASD. Research has suggested that for many individuals with ASD, social interactions are non-preferred activities (McConnell, 2002). In order to effectively teach communication and social skills to children with ASD, it may also be important to construct interventions around preferred activities to motivate the child to learn and practice the skill. Teaching scripts where the topic of the conversation is preferred activities may motivate the child to learn the skills of having sustained conversations. Learning how to have sustained

conversations about topics of interests and experiencing the positive reinforcement of talking about preferred activities may increase the child's motivation to continue to grow his or her communication skills and independently seek out social interactions with others.

Methods

Participants

The participant of this study was a 7-year-old boy diagnosed with Autism Spectrum Disorder (ASD) who receives treatment sessions weekly from an autism clinic, the Inter-Professional Autism Clinic (IPAC). The child receives services including speech therapy, occupational therapy, and applied behavior analysis therapy at IPAC. An intelligence assessment the Comprehensive Test of Nonverbal Intelligence 2nd edition, was conducted within the past year of this research study and estimated the child's IQ to be 86. The child in this study also has communication skills below average for his age. His mean length of utterance, which is the average number of words he used each time he speaks, is approximately 4. Previous interventions have focused on teaching the child to initiate greetings. He spontaneously initiates greetings with others, particularly adults. The child experiences some interfering behaviors, such as eloping from areas and activities, aggression towards others, and destructive behaviors such as throwing items. The function of his interfering behaviors has been assessed through observations, and the function maintaining many of his interfering behaviors is seeking attention from others. He currently uses many inappropriate ways to gain attention from others, including pinching, spitting, and running away from designated staff and areas. For him to more appropriately gain attention from others, he needs to be taught behaviors that can evoke positive reactions from others. His attention seeking behaviors make him a good fit for an intervention that is centered around learning how to have positive interactions with others, such as learning

conversational skills. Informed consent was collected from the mother and ascent from the child prior to the start of the study.

The experimenter was an undergraduate student in Psychology at James Madison University who, under the supervision of a licensed behavior analyst with more than 40 years of experience, introduced the conversation scripts and conducted the research sessions. This clinician has two years of experience working with children in the IPAC setting, and more than four years of experience working with children diagnosed with Autism Spectrum Disorder.

Procedures

Setting. The study was conducted at the Inter-Professional Autism Clinic (IPAC) on James Madison University's campus at the Occupational Therapy Clinical Education Services. IPAC provides applied behavior analysis, occupational therapy, and speech therapy services from a licensed behavior analyst, a licensed occupational therapist, and a licensed speech-language pathologist. The clinic is split into multiple areas, including a sensorimotor gym, an open room, a board games and reading nook, a craft center, a separate room used for private sessions such as meetings with parents and academic skills sessions, a kitchen, and offices. The sensorimotor gym is equipped with a ball pit, a trampoline, gymnastic mats, and other occupational therapy resources. The open room is used for indoor activities such as circle time, an obstacle course, and riding bikes around on a track. The games and reading nook has a cabinet with various board games for a wide range of age levels and a couch. The craft center is separated using tall dividers, has a small table and art supplies in cabinets. In the separate room, there is a table with chairs, a computer, and academic supplies. The kitchen is separated from the rest of the clinic by a door, and contains counters, a stove, microwave, sink, table, and chairs. The conversation sessions took place in the craft center.

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Behaviors. Consistent with the child's diagnosis of Autism Spectrum Disorder, the development of his social and communication skills is delayed. The child is verbal; however, his communication skills are below typical for his age. He uses three to four-word phrases to communicate his needs, can answer concrete questions, and has emergent spontaneous functional speech. He also has difficulty answering questions that do not have clear, specific answers, and struggles with using correct gender pronouns.

The target behavior was the responding to questions with appropriate content. Responding with appropriate content was recorded when the child responded vocally with content relevant to the question and conversation using a sentence of at least three words within 5 seconds after the question is asked.

Observation Procedures. Behaviors were recorded using response per opportunity to measure the percentage of the conversation that the child was responding to with appropriate responses. Three observers were used in this study, all were senior psychology majors attending James Madison University. They were trained prior to the start of the study through verbal instructions from the researcher and practice observations. The observers marked whether the child gave an appropriate response using a plus sign if the child did respond appropriately and a minus sign if the child did not respond appropriately. The observers also recorded what prompt level the child needed to respond with appropriate content by circling the abbreviation of the prompt next to the plus or minus. Variations from the answers in the script were coded as correct if they were appropriate to the question, contained at least 3 words, and had correct sentence structure. The researcher provided the observers with a copy of the questions in the script along with accepted variations of answers. Observers started coding after the clinician initiated a conversation with the client and asked the first question. Coding ended after the clinician ended

the conversation with the closing statement. The number of instances of the child responding

with appropriate content to the questions was divided by the total number questions and then

multiplied by 100 determine the percent of the conversation that the child was responding

appropriately.

Interobserver agreement (IOA) was assessed by having two observers take data

simultaneously and independently in at least 30% of data collection in each phase. Interobserver

agreement was calculated by the number of agreements divided by the sum of the agreements

and disagreements. That was then multiplied by 100 to determine the percent agreement between

the two observers.

Experimental Design. A single subject, multiple baseline probe across behaviors design

was used to examine the effectiveness of using scripts to improve the child's communication

skills through increasing the frequency of responding to conversational questions with

appropriate content. Single subject designs are important in the field of behavior analytic

research because they allow a researcher to more systematically examine the effectiveness of an

intervention, and they can have high internal validity (Lieberman, Yoder, Reichow, & Wolery,

2010). Multiple baseline probe designs are useful when continuous baseline measures are

impractical or aversive, when an assumption of stability can be made, and when exploring

whether training certain behaviors can affect untrained members of the same behavior class

(Horner & Baer, 1978). Each script had a baseline condition, and an intervention condition

consisting of a full prompt phase, a partial prompt 1 phase, a partial prompt 2 phase and an

independent mastery phase. Baseline data for each script was collected prior to the introduction

of the intervention. Baseline data for the second and third script was probed throughout the

baseline and intervention phases of the first script, and baseline data for the third script continued

to be probed throughout the intervention phases of the second script to demonstrate instructional control.

The scripts were each about topics of interest to the participants: the game Angry Birds, music, and craft time. Each script consisted of 5 questions and answers. The first script was as follows: (1) Clinician: "What game do you play on the IPad?" Participant: "I play angry birds" (2) C: "What Angry Birds game do you play?" P: "I play Seasons" (3) C: "What bird do you like?" P: "I like Terence" (4) C: "What does Terence look like? P: "He is big and red" (5) C: "What power does Terence have?" P: "Terence is super strong". There were a total of 34 trials during Script 1.

The second script was: (1) Clinician: "What do you listen to?" Participant: "I listen to music" (2) C: "What do you do when you listen to music?" P: "I watch the videos" (3) C: "Who do you listen music with?" P: "I listen with (name of peer)" (4) C: "What song do you like?" P: "I like the animal song" (5) C: "What does the snake in the animal song video do?" P: "He shakes his tail". For Script 2, 30 trials were conducted.

The third script: (1) Clinician: "Where do you go after skills?" Participant: "I go to craft" (2) C: "Who do you sit with in craft?" P: "I sit with (name of peer)" (3) C: "What do you do in craft?" P: "I color pictures" (4) C: "What color do you like?" P: "I like brown" (5) C: "What do you do at the end of craft?" P: "I clean it up". In Script 3, 26 trials were conducted.

Experimental Conditions

Baseline

During the first baseline condition, the sessions were conducted once a week during clinic time, for approximately 15 minutes. The clinician took the child into a separate room, and asked him to have a seat in the chair across from the clinician. Once at the table, the clinician

waited until the child was seated or standing quietly and attending to clinician. The clinician then

initiated the conversation with a greeting, and waited 5 seconds for the child to respond.

Following the greeting, the clinician asked the child the questions, in order, from the first script.

The child was not provided with the script and was not prompted to answer the questions. The

clinician waited 5 seconds after each question was asked to give the child time to respond; if the

child answered correctly or incorrectly, the clinician responded with a neutral "okay", if the child

did not respond the clinic moved on to the next question at the end of the five seconds. At the

end of the conversation, the clinician waited 5 seconds and then re-initiated the conversation.

The clinician repeated the baseline conversation procedures for approximately 15 minutes.

Baseline data were collected prior to the introduction of the first scripts intervention, and the

second and third script's baseline data continued to be probed during the intervention. Having a

baseline for each of the scripts allowed the clinician to observe the child's conversation skills

prior to the skill being taught, which allowed the clinician to observe changes in the child's

conversation behaviors.

Intervention

During the intervention condition, the same clinician that conducted the baseline

conversation sessions conducted the intervention conversation sessions. The intervention

condition took place in the same room as the baseline condition. The session took place once a

week within the normal clinic time, for 15 minutes. There were three intervention conditions,

one for each script that was introduced. Each intervention was separated into four phases: a full

prompt phase, a combined partial text and verbal prompt, a partial verbal prompt phase, and an

independent mastery phase. The phases followed a most to least prompting approach. Most to

least prompting involves beginning a training session with providing the highest levels of

prompts, such as physical guidance or full verbal prompts, and then systematically fading the prompts to a less intrusive level to promote independence. Most to least prompting has been found to be preferable because it can lead to fewer errors in a training session, and fewer errors can reduce the occurrences of problem behavior during a session (Libby, Weiss, Bancroft, & Ahearn, 2008). At the beginning of the session, the child was taken into the separate room and asked to sit at the table. The clinician sat across from the child, facing him. Once the child was sitting or standing, and attending to the clinician, the clinician initiated the conversation with a greeting, and then asked the first question. The clinician asked each question and waited 5 seconds for the child to answer before prompting the correct answer.

Full Prompt Phase. The first phase of the first script intervention condition was a full prompting phase. During this phase, the script was presented to the participant for the entire conversation so that he could read straight from it. The script was put onto a power-point, where each slide had the question being asked and the answer to that question. As the clinician moved through the conversation, the clinician also moved through the slides. The child was prompted to answer each question by the clinician pointing to each word of the answer, verbally prompting each word as well if necessary. Following a correct response, the clinician provided social praise and positive touch and enthusiastically reflected the response back to the child. Reflecting the correct response served to emphasize the correct answer. An incorrect response was corrected using a full verbal prompt while pointing to each word of the script. At the end of the conversation, if the child responded with appropriate content for four out of the five questions (80%) he gained reinforcement in the form of access to the preferred activity that the conversation was about (ex. playing angry birds), for 30 seconds. After the 30 seconds are over, the preferred activity was removed, and the clinician initiated the conversation again. If the child

did not meet the criteria to receive reinforcement, the clinician waited 5 seconds and then started the conversation again. This was repeated until the 15-minute session was over. The child moved to the second phase after he had reached at least 80% correct responses across at least 3 consecutive units of conversation.

Partial Prompt Phase. The second phase of the first script intervention condition was the partial prompting 1 phase. As with the full prompt phase, the clinician went with the child into a separate room and initiated the conversation. During this phase, the script was available to the child, but the script was partially faded using a front-to-back procedure, where the answer to the question was faded 50% to only include the end of the sentence, which had the key information needed to signal the correct response. For example, the prompt for the response "I play Angry Birds" was faded to "____ _____ Angry Birds". The clinician asked the question and only gestured to the script and gave a partial verbal prompt when necessary. The response was coded as correct if the child independently read from the script or if the participant only needed a partial verbal prompt. Reflecting the correct response served to emphasize the correct answer. If the child did not respond after 5 seconds or responded incorrectly and was not able to be corrected with a partial verbal prompt, the clinician gave a correction using a full prompt procedure, pointing to each word while saying each word of the answer. If the child answered four out of five (80%) of the questions with appropriate content using only the partial prompts, he gained access to the preferred activity that the conversation was about for 30 seconds. If the child did not meet the criteria to receive reinforcement, the clinician waited 5 seconds and then started the conversation again. This was repeated until the 15-minute session was over. The child moved to the next phase after reaching 80% correct responses across 3 consecutive conversation trials.

The third phase of the first script intervention was the partial prompt 2 phase. The clinician went with the child into a separate room and initiated the conversation. In this condition, the clinician removed the textual script prompt, and only provided a partial verbal prompt when necessary. The textual script was faded out prior to the partial verbal prompt to more gradually fade the supports and to begin moving to a more natural condition. The child received reinforcement if he answered four out of five of the questions (80%) with appropriate content either independently or with a partial verbal prompt. As with the previous phases, if the child did not meet the criteria to receive reinforcement, the clinician waited 5 seconds and then started the conversation again. The script was repeated for the duration of the 15-minute session. Once the participant reach at least 80% mastery across 3 consecutive trials, he moved on to the next phase of the intervention.

Independent Mastery Phase. The fourth phase of the first script intervention condition was the independent mastery phase. The same procedures were followed from the previous phases; however, the script was not provided to the child. The child was expected to answer the questions without needing a reference. After each question, the clinician waited 5 seconds for the child to respond. If he did not respond with appropriate content the clinician placed the script in front of him and gestured to the answer. If the child still did not answer with appropriate content, the clinician gave a full prompt correction, pointing to each word while saying each word of the answer. If the child answered four out of the five (80%) questions appropriately he gained access to the preferred activity that the conversation was about for 30 seconds. If the child did not meet the criteria to receive reinforcement, the clinician waited 5 seconds and then started the conversation again. This was repeated until the 15-minute session was over.

These same phase procedures were used for each of the three scripts. The child moved on to the second script, after he had independently reached 80% correct across 3 consecutive conversations for Script 1. Due to time constraints, the intervention for the third script was started while the second script was in the PP 2 phase.

Generalization. Generalization was tested for in scripts 1 and 2 using the "train and hope" method by having two different clinicians run the scripts with the client. Both generalization probers were first year graduate students in the ABA concentration of the Masters in Psychological Sciences program at James Madison University, and both had at least one-year previous experience working at IPAC. Prior to the beginning of the intervention phase for each script, a baseline measure was taken for scripts 1 and 2 with two clinicians who were not involved with the training or data collection. The two generalization probers went through the script one time following baseline procedures. Following the client reaching mastery criteria for in the independent mastery phase of Script 1 and 2, a post mastery measure was preformed using the procedures used during the independent mastery phase of the intervention. The purpose of the baseline and post mastery test measures was to examine the percent of responses with appropriate content within a conversation across different clinicians before and after intervention, and to compare those results to responding with the researcher during the baseline and intervention conditions.

Results

The goal of the present study was to improve the quality of social interactions and communication skills for children with Autism Spectrum Disorder by teaching three conversation scripts to a child with content related to topics of interest of the child using a multiple baseline across subject's probe design. Baseline data were taken for each script prior to

the introduction of the intervention. Data were collected on each conversation trial and was represented by a percent of responses with appropriate content in each trial. Data that were collected were put into line graphs to visually analyze the data over the course of the study. The researcher graphed the data after each session to visually analyze the graphs to make decisions about the following session. When visually analyzing graphs, researchers examine changes in the trend, level, variability and/or stability of data, and look for patterns within and between conditions (Parsonson, 2003).

Figure 1 shows the baseline and intervention conditions of all three scripts using percent of responses with appropriate content. Baseline data on the percentage of the conversation trial that the child was responding with appropriate content were taken for each script, and the mean percentage of appropriate responding during baseline for all three scripts was 0%. For Script 1, following baseline the full prompting condition was implemented, responding appropriately increase dramatically, with data presenting high and stable levels of responding with appropriate content within the conversation script throughout the condition (M = 100%). Data remained at a high, stable level for both the partial prompting 1 and 2 conditions, with mean percent at 97% and 100%. During the independent mastery condition, responding was more variable as compared to other conditions, though remained at or above the criteria for reinforcement in most of trials (M = 86%).

In Script 2, the mean percent of responding with appropriate content was 0% during baseline. The levels of responding appropriately in the full prompting phase again increased substantially from baseline, and remained at a high, stable level (M = 100%). Responding during the partial prompt 1 phase of Script 2 was slightly more variable compared to the full prompt phase, with a small dip in accuracy on the second trial (M = 97%). Responding returned to a

high, stable level in the partial prompt 2 phase (M = 100%). In the independent mastery phase, responding with appropriate content remained high and stable (M = 100%).

The mean percent of responding during baseline in Script 3 was 0%. As with Scripts 1 and 2, percent of responses with appropriate content immediately and dramatically increased following implementation of the full prompt phase of the intervention and remained high (M = 100%). Responding with appropriate content remained at a high rate during the partial prompt 1 phase, with a mean of 100%. In the partial prompt 2 phase, the mean percent of responses with appropriate content was 100%. In the last phase, independent mastery, the percent of responses with appropriate content remained at a high, stable level (M = 95%).

Figure 2 presents data collected during the generalization training and hope testing. A baseline measure of percent of responses with appropriate responses was take prior to the implementation of the intervention, and two post mastery measures were taken for Scripts 1 and 2 with two probers. Generalization was not tested for Script 3 due to time constraints of the study. The mean percent of appropriate responses in the Script 1 baseline was 0% for prober 1 and prober 2. Similarly, the mean percent of responses with appropriate content in the Script 2 baseline for prober 1 and 2 was 0%. In Script 1, performance with prober 1 showed an increase from baseline to the first post mastery test, and a continued increase in the second post mastery test, with a mean increase from the baseline to an average of 60%. Initially, there was not an increase in performance with prober 2 in the first script from the baseline to the first post mastery test, but a sharp increase in performance to 80% was observed in the post mastery test and an average increase between the baseline and post mastery test of 40%.

During baseline for Script 2, generalization was assessed with prober 1 and 2 with a mean percent of appropriate responses at 0%. Following intervention and the participant reaching

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mastery level in the independent mastery phase of Script 2, generalization was tested for again. For prober 1, the percent of appropriate responses increased in the first post mastery test and continued to increase in the second post mastery test, with an average percent of responding with appropriate content of 100%. With prober 2, there was an observed increase in the first post mastery test, and a further increase in the second. The mean increase from baseline to the post mastery tests was 90%.

Interobserver agreement (IOA) data were taken during the present study for each script in each condition, with high levels of agreement throughout the research. In Script 1, IOA was collected in all baseline trials with an average agreement of 100%. IOA was taken in 48% of trials during the full prompt phase (M = 100%), in 48% of partial prompt 1 trials (M = 100%), in 71% of partial prompt 2 trials (M = 100%), and in 88% of trials within the independent mastery phase (M = 100%). For Script 2, IOA was taken during 88% of baseline, 100% of the full prompt phase, 63% of partial prompt 1, 100% of partial prompt 2, and 100% of the independent mastery phase, with an mean agreement of 100% for each phase. In Script 3, IOA was taken in 100% of all phases, and there was a mean agreement of 100% in each phase.

Discussion

Individuals diagnosed with Autism Spectrum Disorder often experience deficits in social communication skills, which can result in individuals becoming socially isolated. It is important for children with ASD to develop their communication skills so that they not only are able to have their needs met, but so they can also develop positive, reciprocal relationships with others. The present study evaluated the effects of using textual prompts and front to back fading to improve the quality of conversations in a child diagnosed with ASD. The participant was taught three different scripts that were about topics of interest to the child. A most to least prompt

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fading procedure was used to fade the textual and verbal prompts to reduce errors during the sessions and so that the participant was able to contact reinforcers early on. The textual prompts were also reduced 50% from front to back to provide gradual progression to independence. Overall, the textual prompts and fading procedures were found to be effective in teaching the three scripts. The participant met mastery criteria at independence in all three scripts.

A multiple baseline probe across behaviors design was used in this study to demonstrate control. Baseline data were collected on each script prior to implementing the intervention; baseline data for Script 2 was probed during the intervention of Script 1, and Script 3 baseline data was probed during the intervention phases of Scripts 1 and 2. Multiple baseline across behaviors designs can show whether changes in data can be attributed to changes in interventions or condition by intervening on the first behavior while keeping other behaviors in baseline. After intervening on the first behavior, if there are little to no observed changes in the other baselines, then changes observed following the intervention on the first behavior can be attributed to the intervention and not outside variables (Cooper, Heron, & Heward, 2007). A probe design was used in addition to the multiple baseline design because the researcher was concerned about the aversive effects of conducting numerous baseline sessions in Scripts 2 and 3. Probing the scripts allowed for the researcher to examine the control of the conditions without conducting an excessive number of trials for the scripts. The low, stable level of responding during the baselines for Scripts 2 and 3 allow changes in the data following beginning the intervention to be attributed to the intervention itself.

Generalization was tested for in Scripts 1 and 2 with two probers. Script 3 was not assessed due to time constraints of the study. Baseline performance of responding with appropriate content for both Script 1 and 2 was low, at 0%. When generalization was probed for

Script 1 following the participant reaching independence with the training clinician, an increase in responding was observed. However, responding did not meet the high of levels as it did with the training clinician, and only met the mastery criteria of 80% with one of the probers on one trial. This data suggests that with no direct programming for generalization, this intervention can promote some generalization across people. Based on these findings, when this intervention is conducted in the future, it is suggested that generalization is programmed for using sufficient exemplars and less discriminable antecedents. Stokes and Osnes (1989) defined a stimulus exemplar as "a training condition related to the circumstances of training, such as the person who is conducting the therapy sessions or the room in which the therapy occurs" (p. 725). Using sufficient exemplars would include having multiple clinicians conducted the training sessions with the participant. This would help to promote generalization of the skill with different people. Stokes and Osnes (1989) also suggest making antecedents less discriminable, which helps to broaden the stimulus control through variations in the training conditions. Making antecedents less discriminable will help to generalize the skills to different people, including those who do not directly train the skill. Conversations do not naturally stay the same between people or circumstances, so it is important to train communication skills in a way that allows for variability.

A limitation of this study in regards to generalization was that generalization was only tested for with adults who the participant had already had previous contact with; it was not tested for with peers. The data on generalization with other adults suggested that the conversation scripts partially generalized to other adults. Since generalization was not tested for with same ages peers, researchers cannot make the claim that teaching conversation scripts will generalize to the ability to engage in the conversation scripts with peers. While it is important for children

with ASD to be able to communicate with adults, it is equally important for them to do so with peers. The ability to engage in social communication with peers allows the formation of friendships, and potentially further develop of socially appropriate skills and behaviors. The results from this study indicate that teaching conversation scripts using textual prompts is effective, however more research is needed to determine the generalizability to other individuals, and the overall effects conversation scripts have on the development of non-scripted conversations.

Through anecdotal data obtained throughout the course of the study during the participant's time during IPAC and the training sessions, the researcher observed an increase in social communication with both other clinicians in the therapy clinic and with the other client who attends the clinic with the participant. The participant frequently initiated conversations with appropriate greetings and asked questions to others, such as "do you want to go Hardees?" The participant was more conversational throughout the day, often commenting on the activities he participated in. Observations implied that the participant was attempting to engage in conversations with others. The participant frequently initiated conversations with appropriate greetings and asked questions to others.

In addition to the anecdotal data on communication skills, the researcher also observed a decrease in problem behavior within the sessions over the course of the study. When the study began, the child frequently engaged in problem behavior during the sessions, including out of seat behavior, inappropriate behavior, and noncompliance. As the study progressed, there was an observed decrease in these behaviors, and by the end of the study the child was not engaging in any problem behavior during the training sessions. These observations suggest that both learning improved communication skills, and experiencing reinforcing social attention associated with

engaging in conversation with others may decrease problem behaviors. In the future, data should be collected on frequency of problem behaviors over the course of the research.

This research was conducted in an applied setting, and there were several limitations associated with conducting applied research. First, sessions were conducted once a week for about 15 minutes distributed across a 3 hour clinic session within a university clinic. The Inter-Professional Autism Clinic only operated once a week and operated on James Madison University's schedule. This meant that the researcher only had access to the participant once a week and had to work within the participant's typical clinic time and was unable to make up sessions that were missed due to the participants absence. Following the university's schedule also resulted in occasional large gaps of time between sessions, such as when the university closed for winter break. Due to these gaps between some sessions, the researcher made decisions to stay in conditions for extended periods of time, even when the participant met mastery criteria. These decisions were made as to not move to a new condition right before or after a break. Had this study taken place within a clinic that operated year-round and multiple days a week, the researcher could potentially have moved through the study at a quicker pace.

A second limitation of this study associated with applied research was the impact of variations in the participants perceived mood and well-being. When the participant came to clinic while he was sick or recovering from an illness, drops in his performance were observed. This can be seen in trials 30 and 31 of Script 1. On days when the child came in sick, instances of problem behaviors during clinic time were observed, and during the research sessions, the participant was observed as attending to the clinician and materials less compared to days in which it was reported that the participant was in good health. These variations in the participants behavior from session to session impacted the participants performance and slowed reaching the

mastery criteria. It is difficult to control for these variations in applied settings, thus more

research is needed to determine how to best control for these variations when teaching social

communication skills.

A third limitation of this study was the generalizability of these findings to other

individuals with ASD. Since this research only contained one participant, it is unknown if this

intervention would be as effective with other children on the spectrum. The procedures of this

intervention were designed for a child whose behaviors were motivated by access to attention. A

major goal of this intervention was to teach appropriate communication skills to a child to help

him gain access to positive social attention. While reinforces were used to increase the child's

target behavior, the positive social attention acted as another reinforcer. More research is needed

to determine if this intervention would be as effective with children whose behaviors are related

to other functions, such as escape from demands and access to tangibles.

Using script training procedures may be an effective way to teach communication skills

to children with ASD, specifically how to engage in conversations about topics of interest.

Teaching scripts can be a good starting point when the end goal is to teach an individual with

ASD to engage in appropriate conversations about open ended subjects with others.

Conversation scripts provide examples of the structure of conversations and allow an individual

to practice communication skills in a way that offers reinforcement in the form of specific

reinforcers and social attention. The results of this study demonstrated that training sessions do

not need to be long, or frequent, to adequately teach the scripts, therefore, could be implemented

in other clinic and classroom settings. Practitioners should create scripts that are age appropriate,

within the student's ability level, and that have topics that are of interest to the child. Ensuring

the scripts are age appropriate and within the individuals ability level assists with the further

development of social skills and may increase the generalizability to same age peers. Creating scripts centered around preferred topics may also increase the rate at which the participant learns the script and may increase the likelihood that the student uses the script in other settings.

This research demonstrates that using textual prompts presented visually and a front to back fading procedures is effective in teaching conversation scripts to a child with ASD. These findings lay the foundation for future research on teaching social communication skills to individuals diagnosed with ASD. Future research should explore using conversation scripts to teach reciprocal conversations, including teaching individuals to ask questions and to comment on a conversation partners answers. Asking questions in a conversation demonstrates interest in what the communication partner is saying and helps to move a conversation forward. Research should also explore how to program for generalization so that the conversation skills generalizes across settings and people. Communication skills are more effective when they can be used in differing circumstances and still meet the needs and wants of the speaker.

In conclusion, this research demonstrated the effectiveness of using textual prompts and a front-to-back fading procedure to teach three conversation scripts to a child diagnosed with Autism Spectrum Disorder. The training procedures resulted in the participant meeting mastery criteria for independence in all three scripts.

Appendix

Date _____   Phase _____ Observer # _____ Client #_____   P   S

Trial 1

Clinician Q 1	Child Response 1	Clinician Q 2	Child Response 2	Clinician Q 3	Child response 3	Clinician Q 4	Child Response 4	Clinician Q 5	Child Response 5
	FP PP I		FP PP I		FP PP I		FP PP I		FP PP I

Trial 2

Clinician Q 1	Child Response 1	Clinician Q 2	Child Response 2	Clinician Q 3	Child response 3	Clinician Q 4	Child Response 4	Clinician Q 5	Child Response 5
	FP PP I		FP PP I		FP PP I		FP PP I		FP PP I

Trial 3

Clinician Q 1	Child Response 1	Clinician Q 2	Child Response 2	Clinician Q 3	Child response 3	Clinician Q 4	Child Response 4	Clinician Q 5	Child Response 5
	FP PP I		FP PP I		FP PP I		FP PP I		FP PP I

Trial 4

Clinician Q 1	Child Response 1	Clinician Q 2	Child Response 2	Clinician Q 3	Child response 3	Clinician Q 4	Child Response 4	Clinician Q 5	Child Response 5
	FP PP I		FP PP I		FP PP I		FP PP I		FP PP I

Trial 5

Clinician Q 1	Child Response 1	Clinician Q 2	Child Response 2	Clinician Q 3	Child response 3	Clinician Q 4	Child Response 4	Clinician Q 5	Child Response 5
	FP PP I		FP PP I		FP PP I		FP PP I		FP PP I

Appropriate response: responding vocally with content relevant to the question and conversation using a sentence of at least 3 words within 5 seconds after the question is asked.

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Figures

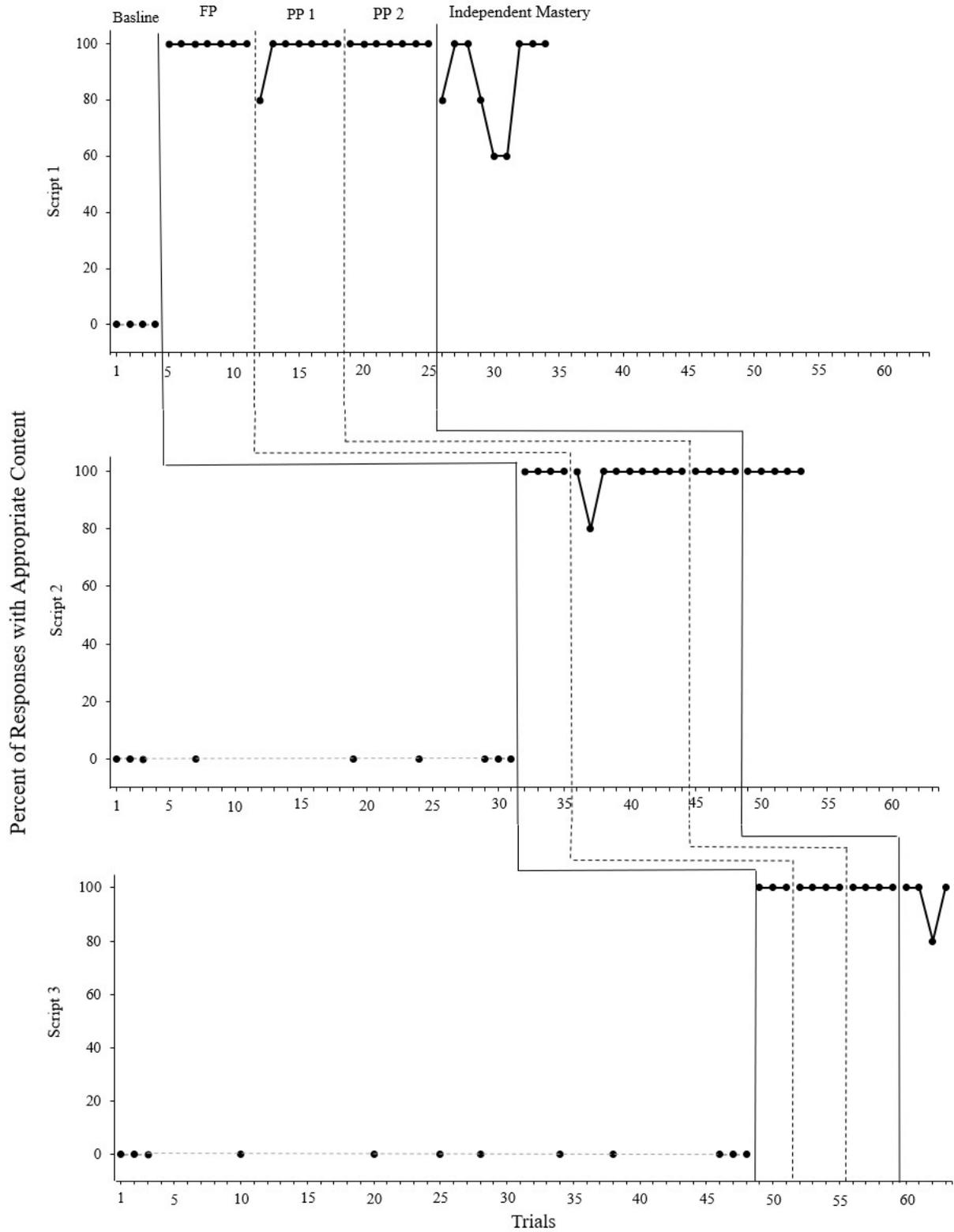**Figure 1.** Percent of responses with appropriate content within a conversation trial
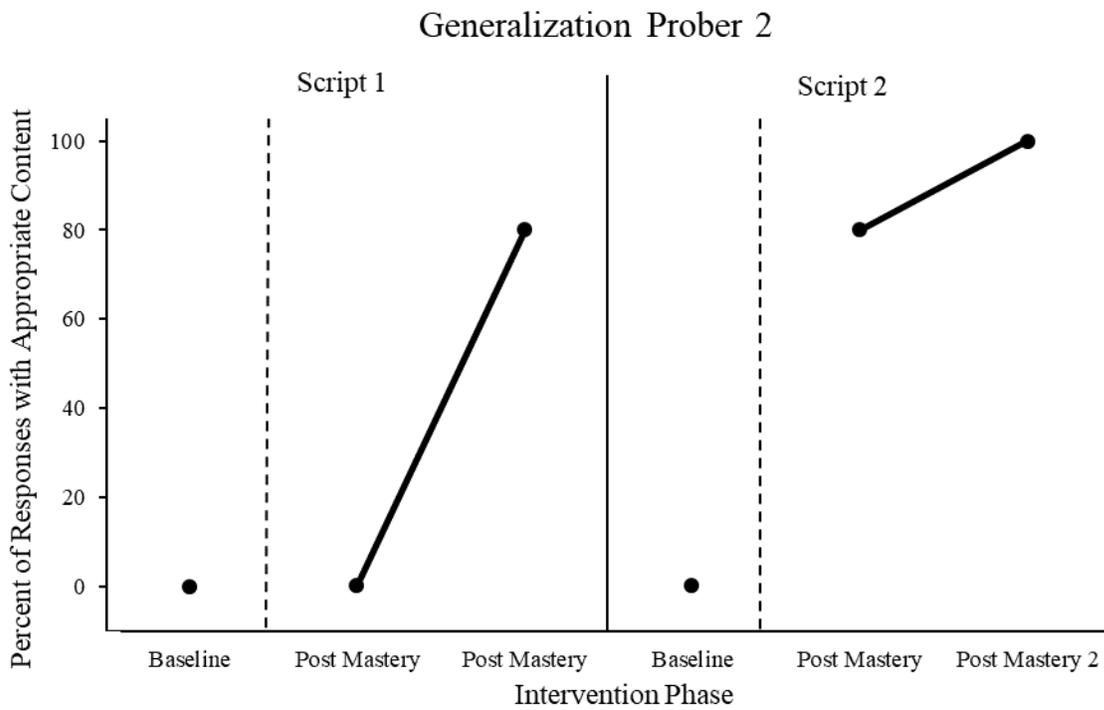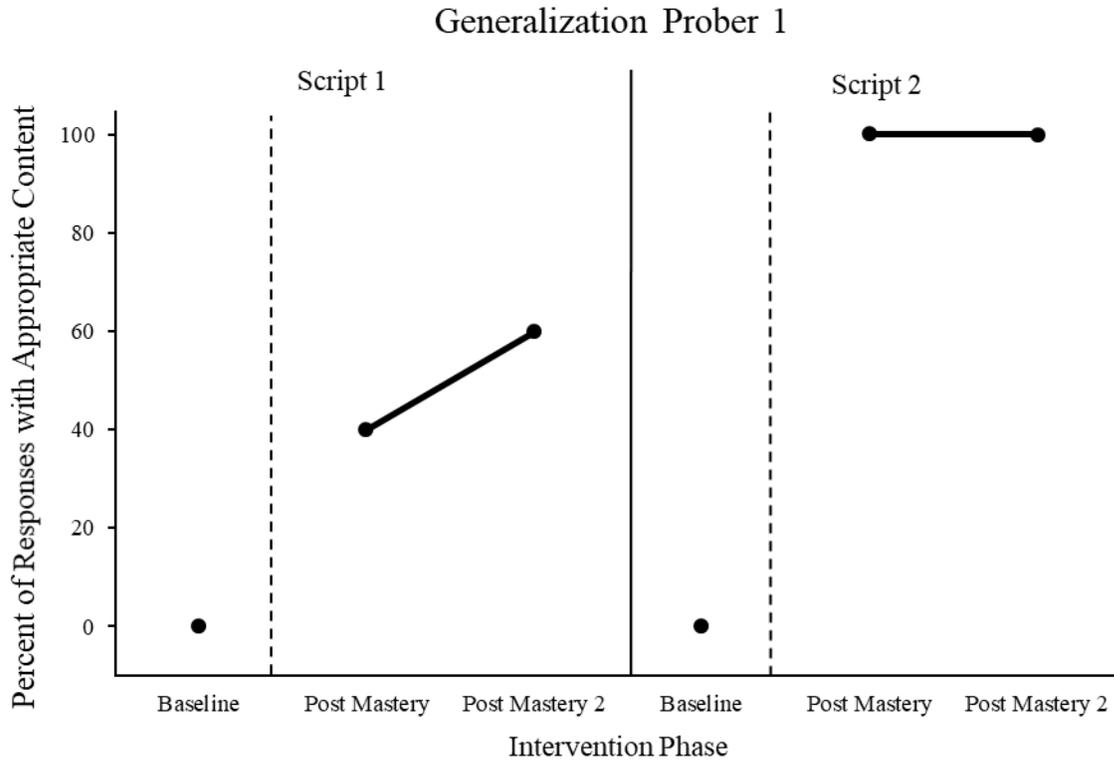
Figure 2. Percent of responses with appropriate content within a conversation trial with a generalization prober before and after intervention