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SOCIAL COMMUNICATION FOR STUDENTS WITH AUTISM: EFFECTS OF MULTIPLE
SCRIPTS ON CONVERSATIONAL EXCHANGES WITHIN SOCIAL DIALOGUE

by

Angela M. Christensen

A thesis submitted in partial fulfillment of
the requirements for the degree

of

MASTER OF SCIENCE

in

Special Education

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2014

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ABSTRACT

Social Communication for Students with Autism: Effects of Multiple
Scripts on Conversational Exchanges within Social Dialogue

by

Angela M. Christensen, Master of Science

Utah State University, 2014

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Department: Special Education and Rehabilitation

Students with autism spectrum disorder (ASD) often experience difficulty in initiating and maintaining social dialogue in multiple settings. This study examined the effects of training multiple social scripts, used in sequence, on the number of conversational exchanges within a social dialogue in four male participants with ASD. A multiple baseline design was used across participants to determine if there was an increase in the number of conversational exchanges within a social dialogue after training. In training sessions, participants learned the scripted conversations and used them to engage in social dialogue. During training sessions, scripts were completely faded for three of four participants. However, none of the participants demonstrated an increase in the number of conversational exchanges during the generalization condition in naturalistic settings. This failure to increase in the number of conversational exchanges in generalization settings could possibly be attributed to one or more of the

following: a lack of a discriminative stimulus to cue the use of the script, too many words in the scripts, lack of training on more simple scripts first, and a lack of adequate time to facilitate generalization.

(45 pages)

PUBLIC ABSTRACT

Social Communication for Students with Autism: Effects of Multiple
Scripts on Conversational Exchanges within Social Dialogue

by

Angela M. Christensen

Students with autism spectrum disorder (ASD) often experience difficulty in both communication and social skills. These difficulties make it challenging for students with ASD to participate in basic social exchanges within many different situations and environments. This study examined how training four adolescent male students with ASD on social scripts would affect their ability to participate in brief social conversations during their work training. The study involved training sessions where the students memorized up to 9 scripted statements and practiced using them in typical back-and-forth social conversations. It also involved generalization sessions where the students were observed to see if they would use the scripts they learned or other statements to participate in conversations. During the study, 3 of the 4 students were able to memorize full scripts. The students, however, were not observed using any scripts independently. This lack of responding on their own may be attributed to a few factors. These include: not training a clear or natural cue to begin the scripts, overwhelming the students with too many words within the scripts, and limited time to run the study and provide additional training to the students. This study can offer valuable insight into factors that must be in place in order to effectively teach social scripts and help individuals with ASD overcome deficits in social and communication skills.

CONTENTS

	Page
ABSTRACT	iii
PUBLIC ABSTRACT	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
INTRODUCTION	1
METHOD	10
Participants	10
Setting and Materials	11
Pre-Experimental Generalization Probes	13
Pre-Training Follow Scripts	13
Informed Consent	14
Dependent Variables and Response Measurement	14
Interobserver Agreement (IOA)	17
Treatment Integrity	18
Experimental Design	19
Procedures	20
Independent Variable	20
Generalization	24
RESULTS	25
DISCUSSION	29
REFERENCES	34
APPENDIX	35

LIST OF TABLES

Table		Page
1	Social Scripts Used in the Study	36
2	Percentage of Training Sessions Conducted in Classroom and Work Settings.....	36
3	Interobserver Agreement Within and Across Participants.....	37

LIST OF FIGURES

Figure		Page
1	Data on number of contextually appropriate statements made independently	27

INTRODUCTION

From the earliest records identifying individuals with ASD, it was noted that these individuals struggled with social interactions; even to the point of being described as “being in a world of their own” and “indifferent to the people around them.” This was pointed out in the landmark study conducted by Dr. Leo Kanner in 1943. In the document “The Definition and Prevalence of Autism: A Review” by Lorna Wing (1993), she cites five different criteria used to diagnose ASD. All five of the criteria included some sort of description of impairments in social interactions. When it comes to typical daily social interactions, these deficits can keep adolescents with ASD socially isolated in school and vocational settings where social conversations that build relationships are imperative. Without acquiring some of these basic skills of social interaction, these individuals will struggle to work with coworkers, customers, or supervisors. Those that work with them might feel ignored or disrespected which can create a hostile work environment. Also, their personal and family relationships may suffer or never develop at all. This might lead to social isolation which can lead to difficulties in meeting their wants or needs and may lead to depression or other problems. Overall, without these basic social communication skills, they may have difficulty taking part in a world that functions, in large part, in the realm of human relationships. One strategy that has been shown to be effective in the research literature for increasing both social and communication skills is social scripting (Krantz & McClannahan, 1993).

Social scripts are verbal statements in written or audio format that students learn and then repeat in natural contexts (Krantz & McClannahan, 1993). Once scripts are learned, they are faded one word at a time. This is most often done starting from the last word and ending with the first word. For example, if the script asked “How was your weekend?” then the word “weekend” would first be removed, followed by the word “your,” then “was,” and finally “How.” It is intended that the student would fill in the blanks from memory as each word is removed, until finally, the whole phrase would become part of the students conversational repertoire. Multiple scripts are generally taught to students with two or more scripts serving the same functional purpose (e.g., more than just one common greeting or compliment). Additionally, multiple scripts would include using more than one script within the same interaction. For example, it could include a common social greeting followed by a common response to a reciprocated greeting (“Hello how are you?” “I’m well thank you.”).

Social scripting has proven to be effective in teaching students with autism spectrum disorder (ASD) to participate in social interactions and dialogue (Krantz & McClannahan, 1993; McClannahan & Krantz, 2006). Studies conducted with social scripts have addressed using scripts in initiating dialogue with peers (Krantz & McClannahan, 1993), vocalizing during play (Reagon & Higbee, 2009), initiating conversation statements about surrounding stimuli (Sarokoff, Taylor, & Poulson, 2001), and conversing with adults (Krantz & McClannahan, 1998). In each study, social scripts increased functional skills that students with ASD can use in natural settings as they interact with others.

Social scripts are a relatively new intervention with the first studies on this intervention being published in the early 1990s. Social scripts or the script fading technique were first studied by Krantz and McClannahan in 1993 where they used this procedure to teach four children with ASD to initiate verbal interactions with their peers about past, present, and future activities. Krantz and McClannahan noted that because children with ASD responded so favorably to visual schedules and visual supports in instruction, they reasonably could benefit from a verbal script or dialogue that was written down and then faded slowly. This would help the students to be independent as the prompt would be coming from the script and not an adult, thus allowing the student to participate in the social interactions without the immediate presence of an adult.

This study involved four participants who attended the day school program at Princeton Child Development Institute. These participants were between the ages of 9 and 12 and all had a history of socially inappropriate behaviors such as tantrums, self-injurious head hitting, inappropriate laughing and crying, social isolation, aggression, self-injury, echolalic speech, and stereotypical behaviors. All of the participants had learned to follow written schedules. The setting was a school and research center for ASD, and the study was conducted in a typical classroom type environment. The dependent variable was initiations to peers and was scored if participants made a verbal statement or question while facing another individual their age without prompting from adults. Scripted initiations were scored if they followed the written scripts. Unscripted initiations were scored if the verbal production differed from what was written down by more than just conjunctions, pronouns, and prepositions. The scripts were written and

displayed in front of the students during activities that were conducted at a rectangular table. The children could interact with the activity materials but were also prompted to ask questions or make comments on previous, present, or future activities using the social scripts. An example of one of the scripts was “(Name) did you like playing on the swings during recess today?” In the beginning, the participants required manual guidance to pick up a pencil, point to the script, move the pencil along the script as it was read, and orient their head to whom they were speaking. This manual guidance was faded as quickly as possible by gradually reducing the presence and prompting of the teacher. When the manual guidance was fully faded, the script began to be faded. This was done from end to beginning in five phases or steps. That is, each phrase was divided into five parts and one part would be taken away at a time. For example, if the phrase was “Mike what do you like to do best on Fun Fridays?” then it would be broken down into five parts; (a) “Mike what do you like to do best,” (b) “Mike what do you,” (c) “Mike, what,” (d) “M,” and (e) “(no statement).” Generalization was tested using a different setting, different teachers, different peers, and different activity materials. The observation periods were 10 min in length and two pairs of observers recorded the data for each of two children. In baseline sessions, the children were able to follow a written direction to participate in an activity but were unable to follow a written direction to “talk a lot.” With the intervention, 10 scripts were used to have the student initiate verbal correspondence with their peers. Results showed that as the scripts were faded, unscripted initiations increased and the children were able to adapt to new situations using similar scripts. In a 2-month follow-up session, the children were still

making more initiations but the majority of the initiations were different from those taught in the scripts. Researchers speculated that by teaching them these scripts, the children were able to learn examples of how to initiate conversation, and expand upon it. This was a landmark study to show the effectiveness of this new intervention and focused on initiation of social interactions and used simple short one-step conversations.

Krantz and McClannahan (1998) performed another study involving script fading. In this study, they worked with three boys with ASD between the ages of 4 and 5 years old. These boys had limited expressive language repertoires and typically used one word phrases and these were usually to request desired items. The researchers desired to determine if script fading could also benefit children who had low expressive language skills in developing skills to participate in social exchanges. The research was conducted in a small classroom setting. A familiar teacher was present as the recipient of interaction. Sessions were conducted once or twice daily. The participants were provided with a photographic activity schedule and were taught to read the words "Look" and "Watch Me" that were presented on flash cards in random order. In this study, interaction was defined as one or more understandable words that were verbalized while the child was within 1 m of the recipient with his body oriented toward the recipient. If the child's response was prompted by the teacher, then it was not scored as an interaction. The scripted interaction included the two previously taught words of "Look" and "Watch Me." Elaborations were scored if a child used any unscripted dialogue following "Look" or "Watch Me." They were also scored if the child

responded to the feedback or response from the adult. Unscripted interactions included any understandable words that were used in the absence of a script or portion of the script. A multiple baseline design was used to assess the frequency of interaction with adults. Interactions were considered one or more understandable words that were said with their body oriented toward and within 1 m of the adult. A response to questions, repeating words/phrases, or any verbal behavior that was prompted was not considered an interaction. The targeted script responses of "Look" or "Watch Me" were provided in their visual schedule along with specific materials. For example "Look" was included with Lego Blocks so the child could show off something he made. "Watch Me" was paired with a fireman's hat so the child could say this phrase before putting on the hat and pretending to put out fires. These prompts were faded as quickly as possible from full physical prompts (hand over hand assistance) to partial physical prompts (hand on elbow, etc.), then to shadowing (hand hovering above the elbow with close proximity). As a last step, the physical proximity of the teacher to the children was reduced until the teacher was across the room from the children. The scripts were faded for the children in three stages by cutting away 1/3 of the card at a time until, in Step 3, the final third was removed. New activities and new recipients were introduced periodically to probe for generalization. In baseline, none of the children interacted with the teacher. After teaching the scripts two of the three children quickly began to use the scripts, and also, to elaborate and make unscripted statements. The third child had a low rate of response until the textual cues were attached to his wristband before he approached the teacher. After that point, the child began using the scripts and was

also found to use unscripted dialogue and elaborations. The frequency of interactions remained high even with changes in activities, recipients, and after the scripts were faded and taken away from all three of the children. Thus, this procedure proved to be effective for these children with lower expressive language and interactions with adults or any other recipient.

Reagon and Higbee (2009) assessed whether or not script fading could be taken out of the clinical or educational setting and placed in the home between parent and child to increase social dialogue during interaction with play materials. In this study, there were three participants who were diagnosed with ASD and their mothers. Each child was receiving services from a University preschool program. Each of the children had a generalized repertoire of verbal imitation and used speech as their primary means of communication. Given a screening assessment, all of the participants showed limited conversational initiations and exchanges. The sessions were conducted in open living areas of their respective homes. The study used a multiple baseline across subjects and the sessions were 10 min in duration. A button activated voice recorder was used throughout the sessions to deliver scripts and scripts were faded by removing the last word from the previous script. Three scripts were provided for three toy sets. Parents recorded frequency of scripted and unscripted verbal initiations. Trained researchers also collected data live or from video to determine the inter-observer agreement. Brief corrective feedback was given following a low procedural fidelity score. Results of the intervention were that all three of the children learned and used the scripted initiations for the three play sets. All three participants produced unscripted initiations for the

targeted play sets and also new play sets, indicating generalization. This study showed that script fading was not limited to being effective in school or clinical settings but can also be implemented in homes to benefit children with ASD in this important setting.

All of the previously discussed studies showed the effectiveness of the script fading procedure and demonstrated that social scripts can be used to teach students with ASD to initiate interactions with peers, teachers, and parents. All of these studies addressed one-step initiations and social exchanges. There are currently no social script studies that address training on multiple scripts to be used sequentially to promote the conversational skill of back-and-forth exchanges. The research is currently limited in this area. Also, the research has been focused on promoting dialogue related to activities and objects with which the participants were engaged. In the current study, we explored script fading with multiple scripts used sequentially to promote back-and-forth conversations to determine the effects on teaching students with ASD to increase the overall number of conversational exchanges in social dialogue within two settings. One setting involved direct training of social scripts and the other a natural setting that would allow them to use their social scripts to engage in conversation with the people around them. This second setting was primarily used to probe for generalization of the social scripts. For the purposes of this study a contextually appropriate statement was defined as verbal behavior lasting between 2 and 30 s directed at another individual with the intent of eliciting a social interaction, acquiring information from that individual, or sharing information with that individual. Multiple scripts used sequentially could be used to open up a wide variety of conversation in which students

with ASD could participate. The more language students with ASD acquire, understand, and use, the more doors will be open to facilitate educational opportunities and meaningful contact with others around them. The purpose of this study was to determine the effect of using multiple scripts in a script fading procedure on the number of contextually appropriate back and forth statements or conversational exchanges within verbal dialogue for students between 16 and 21 years old in a public school setting. The research question was as follows: Given adolescent and young adult males with ASD in a special education school setting, what effect will multiple scripts used in a script-fading training procedure have on (a) the total number of contextually appropriate statements and conversational exchanges within a social conversation, and (b) the generalization of initiating these scripts or other appropriate unscripted dialogue in different settings and with different conversational partners?

METHOD

Participants

Four adolescent male participants between the ages of 16 and 21 who attended a public school for special education services in the Rocky Mountain region of the U.S. participated in the study. Criteria for participation included (a) diagnosis of ASD, (b) the ability to read at a second grade level or higher, (c) the ability to vocally communicate by requesting desired items or activities; repeating what is heard; naming or identifying basic objects, actions, or events; read written text; and answer basic questions, (d) no medical factors that restricted them from regular daily activities at school, and (e) independent mobility. Potential participants were not considered for the study if they did not meet the criteria listed above, if absenteeism rates were high, if vision or hearing loss made the requirements of the study difficult, or if parents/guardians did not provide informed consent for participation in the research.

Prior to the study the participants demonstrated minimal conversational initiations and exchanges. Participant 1, when seeing others he knew by name for the first time that day, would frequently greet those around him, most often by saying their name and shaking their hand. Beyond this his expressive language was few and far between. His expressive language involved answering direct questions easily but struggled with more open ended questions; for example he could easily answer "What are you up to?" but struggled to answer "What do you want to do after you graduate?"

Participant 2 had much less verbal communication or dialogue than Participant 1. He would go several days in a row without any initiation of dialogue with others. He

would respond to questions from others but not always the first time. Sometimes his communication partners would have to press him to respond before he would. He would often be found mumbling to himself under his breath, often lines from a movie or a show he was fond of.

Participant 3 would initiate dialogue frequently but it was often inapplicable to his conversational partners or the context of the situation he was in and therefore socially inappropriate. He also had a significant limitation or difficulty with his expressive communication because he had significant difficulty with saying his vowel sounds and spoke mostly in consonants. It would be difficult for his conversational partners to understand what he was trying to say. This was alleviated for the study because the scripts were written out so they knew what he was trying to say unless he went off script. He was very limited in his responses to dialogue initiated by others, he would very often respond with just “Yeah” and refuse to say anything else.

Participant 4 would initiate dialogue with unfamiliar people or people he did not see often by asking “What’s your name?” and then when the person would say their name he would repeat their name several times. This was the only initiation he would do. He was able to answer basic questions if really prompted to but would most often just respond to directions by doing them but not giving any verbal response except sometimes repeating the direction once or more (echolalia).

Setting and Materials

Baseline and training sessions took place in both the classroom and vocational

settings while generalization sessions only took place in the vocational settings. The classroom settings included four self-contained special education classrooms within a school exclusively for students with disabilities and the community-based vocational settings included a retirement home, an office supply store, and a store on the school campus. Participant 3 was in Classroom 1 which had five divided areas, each of which had single table and one to two chairs. There was also a larger group instruction area with a large table that could accommodate a group of up to seven people. Participant 1 was in Classroom 2 which had a large instruction area with several group tables. This particular classroom was large and had an uncarpeted floor which contributed to a significant noise level. The noise level made it difficult to get good film coverage of the training sessions so Participant 1 received most of his training sessions in the hallway just outside his classroom. Participant 2 was in Classroom 3 which had several group tables and four areas divided for individual desks or small tables. Participant 4 was in Classroom 4 which had two tables with no individual desks. The community-based vocational settings were utilized to assess for and facilitate generalization of the skills. These included an office supply store where Participant 4 worked, a nursing care facility where Participants 1 and 2 worked, and a school store where Participant 3 worked. All of these settings were located in suburban towns. Participants performed custodial work within this nursing care facility and in the office supply store. In the school store, they stocked items and did light cleaning and straightening up. The baseline sessions were conducted at different times of the day (morning, midday, and afternoon). The generalization sessions were always conducted sometime between 10:30 am and 11:20

am with the exception of Participant 3. Participant 3 had a more flexible work schedule at the school store so his generalization sessions were conducted between 9:19 am and 12:45 pm. Table 2 details the percentage of time each participant spent at each site (see Appendix).

The only materials used in this study were the social scripts and two IPADs that were used to video record the sessions. Each set of scripts was typed out for the individuals on a 7.6 x 12.7 cm card. The scripts are detailed in Table 1 (see Appendix). The participants had a set of cards and their conversational partners also had a set of cards. Each set of scripts had a different color of card. A set consisted of three social scripts for the participant and two scripted responses for the conversational partner.

Pre-Experimental Generalization Probes

To acquire a baseline, participants selected for the study were observed for 5 min pre-experimental sessions in each location. Data was collected on the total number of contextually appropriate statements they made independently. These data were taken in both their school setting and in the community vocational settings.

Pre-Training Following Scripts

Before the scripts used in the study were taught, participants were taught the basic skill of reading and following a script. The researcher presented them with a script that was unrelated to the dialogue; "The sun is yellow." This script was not used in any other sessions. The researcher taught the script by first modeling the procedure then

giving the participants the script. As needed, the researcher used verbal prompts to have the participant follow and read the script out loud. This was repeated and prompts faded until the participants could read from the script independently. Following this, the script was faded by eliminating the last word of the script, then the second to last word, and so on until there was a blank card. This pre-training was continued until the participant was successfully able to say the script independently and correctly for one session without the written script used to prompt them.

Informed Consent

Parents/guardians were given an informed consent form. This form described the basic purpose of the study and possible benefits and potential harm that may result from participation in the study. Those conducting and organizing the study and their credentials were identified on the form. The form explicitly stated that participants were not required to participate and there would be no penalty given if they did not give consent for their student to participate. The form also stated that participants or their parents could choose to withdraw from the study at any time without penalty. This consent form was approved by Utah State University's Research and Evaluation Committee as well as the local school district before it was given out to parents/guardians.

Dependent Variables and Response Measurement

This study assessed the number of contextually appropriate statements made

independently within a conversational exchange before and after social script training and the generalization of these skills in different environments with different people. Independent responding was defined as any statement made independent of any physical, verbal, or gestural cues given by any person or object within the environment. An independent response would consist of the participants reading the script off of the card without any prompt other than the social scripts themselves. If participants were cued to start the social scripts but no other prompts were given to complete the social scripts this was considered an independent response. The study was divided into training sessions and generalization sessions and data were collected during each. Training sessions were conducted both in the classroom setting and in the vocational setting. Throughout the study the training sessions were conducted each day of the week; the majority of the training sessions took place between 9:15-9:45 a.m. although some sessions were also conducted in the afternoons between 1:15-1:45 p.m. The duration of the training sessions was 1-5 min depending on how easily the participant was able to read through the scripts. When training sessions were conducted at the school site there was a 1-2 hour window in between the training session at the school and the generalization session at the work site. This was due to the participants leaving the school site and accessing public transportation to get to their work site and then going through the procedures in starting their labors at the site. When the training sessions were conducted at the work site the generalization sessions would happen within minutes (1-10) of the training session. Percentages of time participants spent in the training sessions and in the work sites can be referenced in Table 2. For all four

participants, the training sessions were first conducted in the classroom settings and then later were changed to the work settings in an effort to improve generalization. During the training sessions, the number of contextually appropriate statements made independently (without prompts of any kind other than those described above) was measured. If any form of a prompt was used to assist the participant in verbalizing the scripts then that statement was not counted as a contextually appropriate statement. Contextually appropriate was defined as dialogue that had applicable meaning to the conversational partner and his/her current environment. Comments about special interests, previous events/environments not related to the current topic (e.g., delayed echolalia), or other dialogue that was not meaningful to their environment and conversational partner were not considered contextually appropriate. Conversational partners involved one peer for two of the participants in one session each, the rest of the conversational partners used in all sessions were adults that regularly worked with the participants. In this particular school the participants were divided into groups and they stayed with those groups throughout the day and all during the week, therefore they were exposed to the same adults and peers as conversational partners all throughout the study. Generalization sessions also measured the number of contextually appropriate statements made independently. The generalization sessions involved placing the participants in an opportunity to participate in conversational interactions with adult or peer conversational partners with which they engaged during the training sessions without any scripts present. The generalization sessions were conducted in the vocational settings 100% of the time. During the generalization

sessions, the scripts were not present and participants were not prompted to use the social scripts or to engage in conversation in any other way. The participants were video recorded and, later, the researcher observed and recorded if they made contextually appropriate statements within a conversational exchange within the 5 min session. The conversational partners in all settings were previously trained to use conversational statements that did not involve questions followed by a “delay time” (e.g., in response to “How are you today?” they would say “I’m tired” and then say nothing more giving quiet air time for the participant to respond with something like “Why are you tired?”). This was done instead of “I’m good, how are you?” since questions like this would prompt the participant what to say next.

Interobserver Agreement (IOA)

A second independent observer observed the videos and collected data on the dependent variable for 35% of the baseline, treatment, and generalization sessions to determine IOA. IOA was calculated by dividing the smaller count by the larger count and multiplying by 100. An agreement was recorded when both the researcher and the independent observer recorded the same number of contextually appropriate statements made independently. A disagreement was recorded when the researcher and the independent observer recorded a different number of contextually appropriate statements made independently. IOA for all participants across all sessions averaged 86% (range 0-100%). IOA for each participant is broken down into baseline, training, and generalization sessions in Table 3.

Treatment Integrity

Treatment integrity was examined by an independent observer who recorded the occurrence of critical components of the training procedure. Critical components included (a) social scripts were presented on the same 7.6 x 12.7 cm cards with the same fonts, (b) different conversational partners were utilized; (c) training was conducted both in the classroom setting and in the community-based vocational settings. Data to determine training integrity was collected on 40% of the training sessions. To report on the correct usage of the cards with the social scripts the number of correct implementation steps scored was divided by the total number of opportunities, and this amount was multiplied by 100 to generate a percentage score. To report on the use of different conversational partners, the total number of different partners used was given. To report that the training was conducted both in the classroom setting and in the community-based vocational setting the total number of sessions in each of the two environments was given. Participant 1 was observed for seven sessions. In all seven sessions, or 100% of the time, he was presented with scripts on the same type, size, and color of cards with the same font type. He worked with a total of four different partners. Five of the trainings were held in the school/classroom environment and two were held in the vocational work site.

Participant 2 was observed for seven sessions. In all seven sessions, or 100% of the time, he was presented with scripts on the same type, size, and color of cards with the same font type. He worked with a total of five different partners. Five of the

trainings were held in the school/classroom environment and two were held in the vocational work site.

Participant 3 was observed for nine sessions. In all nine sessions, or 100% of the time, he was presented with scripts on the same type, size, and color of cards with the same font type. He worked with a total of four different partners. Six of the trainings were held in the school/classroom environment and three were held in the vocational work site.

Participant 4 was observed for 10 sessions. In all 10 sessions, or 100% of the time, he was presented with scripts on the same type, size, and color of cards with the same font type. He worked with a total of five different partners. Seven of the trainings were held in the school/classroom environment and three were held in the vocational work site.

Experimental Design

A multiple baseline across participants design (Cooper, Heron, & Heward, 2007) was used to evaluate the effects of multiple scripts on participants with ASD increasing the number of contextually appropriate statements made within conversational exchanges in multiple environments and with multiple conversational partners. Because of the irreversibility of the target behavior (i.e., contextually appropriate language), a withdrawal design was not implemented. Therefore, the researcher identified the multiple baseline design across participants as the better option.

Procedures

Baseline, training, and generalization conditions were implemented within the multiple baseline design across all participants.

The baseline condition involved taking data in 5-min sessions in the school or community based vocational setting. Data were taken on the number of contextually appropriate statements made independently within conversational exchanges. No scripts were present during baseline. Conversational partners did not initiate any interaction with the participants but were ready and available to respond if the participants approached them and engaged in any type of social dialogue.

Independent Variable

The independent variable for this study was the social script fading/training procedure. For this training, three sets of scripts were chosen. Each set contained three type-written scripts read by the participants and two responses read by their conversational partners. These particular scripts were chosen because they were age appropriate and widely used within a variety of social and vocational settings throughout the local region and beyond. These scripts are presented in Table 1. The scripts were taught to the participants by the researcher and corresponding staff who first presented a model of the scripts for the participants. After modeling the procedure for the participants a couple of times, a staff member stood behind the participant and assisted them with verbal and gestural prompts as needed in orienting their body posture toward their conversational partner, following the script as written on the card

and waiting for their conversational partners response before reading the next scripted statement. Modeling the procedure for the participant only occurred on the first training session for each participant. After that the participants were familiar with the procedure and did not require the modeling. Gestural prompts included gently turning the shoulders of the participant to face their conversational partner and covering up the scripts with their hands to cue the participant to wait for their partner's response before reading the next scripted statement. Verbal prompts included both full and partial verbal prompts. A full verbal prompt would include saying one or more full words contained within the script or some form of verbal direction such as "Wait for her to respond." A partial verbal prompt would include saying just a part of a word such as "Wh..." to prompt the participant to say "What." Verbal prompts were given to assist the participant in remembering the next word or line in the script and occasionally to keep the participant engaged in the scripts (if they became distracted), waiting for responses from their conversational partner or other details involved in performing the scripts correctly. The staff removed this assistance as soon as the participants were able to read the scripts independently. Assistance was reintroduced later if the participants became confused or disoriented and then removed again as soon as independence was reestablished. The participants each began the study working with three different sets (nine total social scripts read by the participants) during each of the training sessions. Due to lack of acquisition of the scripts and time constraints, two of the four participants were trained on only one set (three social scripts) in the latter part of the study. The participants received this training procedure once daily in the classroom

setting (with the exception of days they were absent) and also occasionally in the community based vocational settings. If the participants had difficulty with the scripts such as mixing up the scripts or not recalling the omitted words , the session was repeated with the attempt to end the session with a correct performance of the scripts but this was not always possible due to difficulty level or time constraints. The primary researcher or the participants' support staff conducted all training sessions. Each of the participants was trained on the same three sets of social scripts and was trained on all three sets of social scripts at the same time. Conversational partners were support staff that were previously trained and worked directly with the student on a regular basis and one fellow student/peer for Participants 1 and 2. These conversational partners followed their scripted responses to the social scripts word-for-word in the training sessions. The trainer would give a verbal cue to the participant to begin the social scripts (with the trainer behind the participant as needed) as they interacted with a conversational partner. The participant (or the trainer as needed) held the card with the social script as they participated in the dialogue. As needed, the trainer assisted the participants in acquiring the person's attention, orienting their body/face toward their conversational partner, following the script, and remaining with the conversational partner until after the closing statement. The trainer would first use gestural prompts, and if those did not facilitate correct responding they used manual prompts. Manual prompts would include gently turning the participant to their conversational partner, taking away the cards to cue the participant to wait for their partner to respond before reading the next script, etc. The trainer avoided using verbal prompts, only using them

as a last resort when other prompts had failed to facilitate correct responding. The trainer removed any prompts used and their close-proximity/physical presence immediately behind the participant as the participants performed each step of the procedure independently with zero prompts for one training session. Participant 1 had a trainer present for the first session and then did not need one thereafter. Participant 2 had a trainer present for his first training session and for the third training session but not for any other sessions. Participant 3 had a trainer behind him for his first three sessions but nothing after that. Participant 4 had a trainer behind him for his first training session and for the third thru seventh sessions. He did not have one available for his second session and did not require one for his last six sessions. When a trainer was not present the person running the video equipment or the conversational partner would give prompts or corrective feedback as needed. As they completed one training session with zero prompts, they were given new 7.6 x 12.7 cm cards. These cards had the last word of each of the three statements of each of the three sets omitted and they were required to recall from memory what the omitted words were. This procedure was repeated with the second to last word in each of the three sets being omitted in subsequent training sessions, then the third to last word of each of the three sets, and so on until they had a blank 7.6 x 12.7 cm card. For three of the four Participants the final training session was conducted without a 7.6 x 12.7 cm card in which the participant was required to recall all of the scripts from memory.

The error correction procedure was utilized if the participant did not respond to physical, gestural, or partial verbal prompts. This procedure involved stopping the

participant, modeling the correct response and having the participant practice the correct response (with supports/prompts as needed) until they were able to do it correctly without any help at least once, sometimes twice. Again, if this procedure was utilized the statements were not counted as independent.

Generalization

The generalization condition involved observing the participants in the school or community based vocational settings for 5-min sessions with familiar and with novel conversational partners. There were no scripts visible during the generalization sessions. These generalization sessions were conducted after differing numbers of training sessions. The participants were given differing numbers of training sessions according to their acquisition of the scripts. Participants 2 and 4 were observed during six generalization sessions, Participant 1 during seven generalization sessions, and Participant 3 during 11 generalization sessions. These generalization sessions also involved videotaping the participants in these settings and the researcher later recorded the data according to the criteria described above.

RESULTS

Participant 1 memorized the scripts quickly without any prompts being used beyond the initial modeling at the beginning of the study. He was able to perform the scripts with lines only for two sessions, with blank cards for two sessions and was able to perform the script with no cards when asked "Can you do it without the cards?"

Participant 2 needed a few more prompts along the way, often due to mixing up the scripts. He did get to the point where he was able to perform the cards with only lines and no words. When he got to this point in the study however, he did not come back to school for the last couple of weeks in the school year. He therefore never got the chance to perform the scripts with blank cards or without cards.

Participant 3 needed prompts to wait for his conversational partner to respond, and several verbal prompts to say the correct statements. He would often mix up the social scripts, showed signs of frustration, and occasionally refused to continue with the training. Due to time constraints and due to his level of frustration, he was reduced to one set (three social scripts) and was able to learn that set of scripts well enough to perform it without cards for one session.

Participant 4 also struggled to wait for his conversational partners to respond before saying the next part of his script. Physical prompts were used to block the script and prompt him to wait for a response for the first eight training sessions. Due to his difficulty in acquiring the social scripts quickly and because of time constraints, he was also reduced to one set of three social scripts. With one set (three scripts) he performed the script well enough without the cards for two sessions. He had multiple performances of the script with just lines and with blank cards within the same

days (before acquiring the new cards or asked to do it without the cards from the researcher).

As shown in Figure 1, all four participants were able to acquire at least one set of three social scripts and rehearse the script independently from memory within the training sessions. A horizontal line across the top of the graphs indicates the “ceiling line” to show the maximum number of contextually appropriate statements the Participants would make if they followed all the scripts correctly and independently. Participants 1 and 2 were able to acquire all three sets (nine total scripts) while participants 3 and 4 only mastered one set each (three total scripts). It is interesting to note that we were able to completely fade the scripts during treatment sessions for 3 of 4 participants with only Participant 2 requiring the cards to be present with blank lines on them to occasion appropriate responding. As also shown in Figure 1, however, none of the four participants demonstrated increased levels of contextually appropriate statements during generalization sessions. This was likely due to several factors (as discussed in more depth in the discussion section).

Within the generalization sessions, contextually appropriate statements were counted if the statements were applicable to the conversational partner and to the setting and if they were initiated by the participant. If another person initiated a dialogue (e.g., a supervisor gave the participant corrective feedback and the participant responded to that feedback), that statement was not counted. Echolalia, delayed echolalia, mumbling to themselves under their breath, unintelligible words, and words that had no meaning to the context or people around them was not counted.

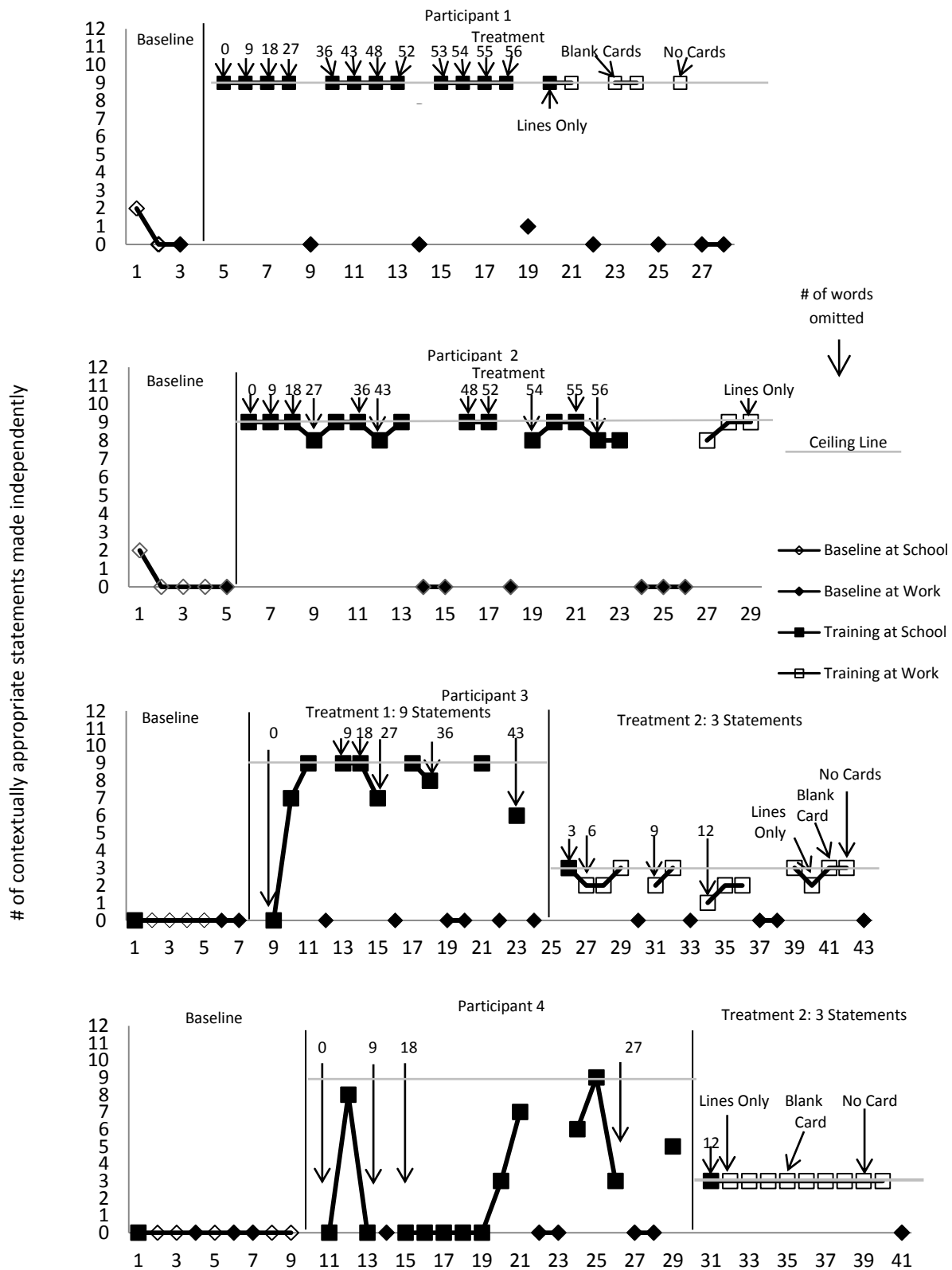


Figure 1. Data on number of contextually appropriate statements made independently.

During the social script training sessions, contextually appropriate statements were counted if the statements followed the established scripts. There was some degree of allowance to vary from the script as long as the statement had the same basic meaning. This was evidenced by the scripted response being applicable from their conversational partner. For example, if the participant said “What are you doing today?” instead of “What are you up to today?” and the conversational partner’s response was “Just working then going home.” This would be scored as a contextually appropriate statement. If any prompts were used to assist the participants in any way, then the statements were not counted. Participants 3 and 4 initially had difficulty waiting for their conversational partner’s response before moving onto their next statement. So a physical prompt was used to cover the script until their partner had the chance to respond. This was considered a prompt and those statements were not counted.

DISCUSSION

The participants demonstrated acquisition of the scripts by performing the scripts without any prompting for two or more of the last sessions they participated in. All four participants were able to independently perform the scripts with only blank lines on the cards. Three of the four participants were able to perform the scripts with blank cards and with no cards present. It is important to note however that the sessions with blank cards and the sessions with no cards present were performed on the same day with one session immediately preceding the other. These sessions were conducted on the last day the participants were at their respective vocational training sites. Because of this, there was not an opportunity to assess whether or not the participants could have performed the scripts with no cards present in a session where it had been one or more days since they had seen the cards. It should also be noted that Participant 2 started summer break early and therefore was not present for the last sessions to assess whether he was able to perform the scripts with a blank card or with no cards present. While the participants did show mastery or acquisition of the scripts within the training sessions, they did not increase the number of contextually appropriate statements made independently within the generalization sessions in the participant's natural work and school settings. Due to the large variation in responding between the training sessions and the generalization sessions it is important to emphasize the differences between these sessions. Both types of sessions shared the same settings, the same video recording equipment (IPAD) and the same conversational partners (although each participant had multiple conversational partners). The differences

included the presence of the researcher and the social script cards, the behavior of the conversational partners, and a verbal cue to engage in the scripts given by the trainer or their conversational partner. The training sessions were initiated by the researcher or the corresponding supporting staff. Often the participants would be cued to prepare for the social scripts just by seeing the researcher or corresponding staff come into the room with the cards and the video recording device (IPAD). The participants would be handed the colored cards and asked to practice their social scripts. A conversational partner stood close by them (also holding cards) and waited for them to read the scripts. Within the generalization sessions, the same conversational partners were present but the social script cards were not present or visible and the conversational partner would not stand next to the participant awaiting a conversational dialogue. The participant would have had to seek out or approach their conversational partner and initiate the conversational exchange which they did not do. It is also notable that the majority of the time the researcher was not present during the generalization sessions and the video was recorded by a supporting staff member. Thus, the presence of the experimenter could have functioned as a discriminative stimulus to initiate conversation with the conversation partner.

The failure to generalize the social scripts within the participant's natural work and school settings could possibly be attributed to several factors. The first of these factors is that the participants had no natural cue or discriminative stimulus to cue them to use the social scripts other than the cards themselves or the instruction to engage in the scripts. Their responding was dependent upon the presence of the cards and a cue

to engage in the social scripts by the researcher or a supporting staff member. Also the total number of words within all three scripts was 57 words. This is a large number of words for participants who spoke very few, if any words in the baseline sessions (i.e. they did not use very many words in their typical dialogue). It is possible that the number of words used were too overwhelming for these participants. Participants that use more words in their typical dialogue would likely be better suited for this type of intervention. Participants similar to those within this study may respond better to scripts involving fewer words or learning fewer scripts. Other factors that may have played a part would include the lack of time to alter components of the study to facilitate more responding (such as pairing their responding to a natural cue), the similarity of the scripts causing confusion for the participants as they would frequently intermix the scripts, and the lack of personal meaning of the scripts to the participants. The training sessions were most often conducted once a day and only for a short period of time (1-5 min). It is quite possible that more time spent in the training sessions such as conducting multiple sessions per day could facilitate more rapid learning of the scripts and therefore increase the time to facilitate generalization of the scripts. If it would be difficult for the researcher to follow all the participants around to their different activities and settings throughout the day it may be necessary to train multiple staff members so they could conduct the training sessions without the direct supervision of the researcher. There would also need to be enough materials to spread around as needed. It is not the belief of the researcher that this study speaks to the overall effectiveness of social script training or even the use of multiple scripts. The

researcher believes the study yielded evidence of crucial details that can have a big impact on the effectiveness of social script training. Attention to these crucial details can be used as a guide in more careful attempts at similar trainings in the future.

This study also had other limitations that should be considered. One such limitation is that there are a small number of participants and all of the participants come from similar racial and socioeconomic backgrounds. This study may not account for differences that could result with participants affected by different cultural influences and may not demonstrate accurate results for a larger and more diverse group of participants with ASD. Another limitation to this study is that one of the participants is diagnosed with behavioral disorders and has had a long history of exhibiting severe problem behaviors. Such problem behaviors had an impact on the study as he would show signs of frustration when mixing up the scripts. This could have interrupted the acquisition or use of the social scripts and obscured the results.

Future research on multiple scripts could be more cautious or prudent on the number of words they use and how much of a discrepancy there is between the number of words in the social scripts and the number of words the participants typically use in their interactions with others. Future research on multiple scripts could also include facilitating the use of another (preferably natural) discriminative stimulus or cue other than the cards, for example, reversing the order presented in this study and having a conversational partner initiate a dialogue and training the participants on how to respond to socially typical dialogue; varying the scripts so they do not sound so similar to each other; and perhaps including words or components of the script that would

have more personal meaning to the participants. Future studies would also need to assure more time in their implementation. Future research should be conducted on a larger number of participants that come from diverse cultural backgrounds that would include different races, socioeconomic status, urban and rural living environments, etc. Future research on using multiple scripts could also be conducted on participants that do not have such an established history of severe problem behaviors as this is rarer and research would want to determine if social script fading could help the more typical person with ASD. Future research could also be conducted over a longer period of time to probe for how well social scripts help with social interactions over time and if it proves to be a true skill acquisition or more of a temporary fix to social deficits. Future research could compare a group of participants who received social script training with another group of participants who did not to compare if those who did receive social script training were able to develop more relationships and interact more effectively with others in social and vocational settings. Social scripts are an exciting new technology and development but because it is in its infancy much research and development of the concept is still needed. It is hoped that this study will add to the body of research by giving valuable insight in components needed for an effective social script training and generalization and move this treatment forward in improving the lives of those with ASD.

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APPENDIX

Tables

Table 1

Social Scripts Used in the Study

Set 1:

Participant	Conversational Partner
Hello, how are you today?	I'm good.
What are you up to today?	Just working then going home.
Sounds good, I will see you later.	

Set 2:

Participant	Conversational Partner
Good afternoon, are you having a good day?	Yes, I am.
Good to hear, what makes it good?	Oh, I've just been able to get a lot done today.
That's always nice. Well, have a good rest of the day.	

Set 3:

Participant	Conversational Partner
Hey there, what's up?	Not much.
Are you staying busy?	I'm trying to.
Well don't work too hard.	

Table 2

Percentage of Training Sessions Conducted in Classroom and Work Settings

Participant	% of Training Sessions In Classroom	% of Training Sessions In Work Site
1	76%	24%
2	83%	17%
3	48%	52%
4	62%	38%

Table 3

Inter-Observer Agreement Within and Across Participants

Participant	Baseline	Training	Generalization
1	0%	95%	100%
2	100%	100%	100%
3	50%	97%	100%
4	100%	90%	100%