

Critical Review:

Is script-fading an effective procedure to promote verbalized social interactions for children diagnosed with Autism Spectrum Disorder?

Jessica Gainforth
M.Cl.Sc (SLP) Candidate

University of Western Ontario: School of Communication Sciences and Disorders

This critical review investigates the effectiveness of the script-fading procedure in promoting verbalized social interactions for children with Autism Spectrum Disorder (ASD). A literature search using computerized databases generated five multiple baseline design studies, which fit the criteria for this review. All studies included individuals between the ages of 2;11 and 12 years, who were diagnosed with ASD. Results of this critical appraisal yield promising evidence for the use of script-fading as a viable treatment for conversational language with children with autism. Clinical implications are discussed.

Introduction

Autism Spectrum Disorder (ASD) is characterized by impairments in social interaction, verbal and nonverbal communication skills, and restricted or repetitive behaviours (American Psychiatric Association, 2013). The primary social skill deficit with which children with autism typically present, is the inability to spontaneously initiate and sustain appropriate conversations (Wichnick, Vener, Pyrtex, & Poulson, 2010). Children with autism who have participated in intensive language therapy may continue to have limited relevant verbal interactions during play, indicating that their taught social skills have not been successfully generalized (McClannahan & Krantz, 2005). Thus, the concept of “social scripts” and “script-fading” were developed to aid individuals engage in appropriate conversation.

Social scripts are verbal statements in either written or audio format, which allow children with autism to appropriately start or continue a conversation (McClannahan & Krantz, 2005). Once the ASD individual learns to successfully follow the script, the script is faded word-by-word, from back to front, to promote generalization (Krantz & McClannahan 1993). For example, if the written script was, “Look, I drew a picture”, the script would be visually faded as follows:

1. “Look, I drew a _____”
2. “Look, I drew _____”
3. “Look, I _____”
4. “Look _____”
5. _____

After scripts are introduced and faded, children with ASD are intended to continue to use the learned scripts when they are not present, and to combine parts of scripts and/or language that was used by their conversation partner, therefore producing spontaneous unscripted language (McClannahan & Krantz, 2005).

Objectives

The primary objective for this paper was to critically evaluate existing articles regarding the effectiveness of the script-fading procedure in promoting verbal social interactions for children diagnosed with ASD.

Methods

Search Strategy

Using the University of Western Ontario’s computerized library databases, including PubMed, JSTOR, ERIC, and also using Google Scholar, articles were searched for using the following keywords: [(autism spectrum disorder) OR (ASD) OR (autism)] AND [(script-fading) OR (“script fading”)] AND (child*). In addition, relevant studies referenced in obtained articles were reviewed for selection.

Selection Criteria

The studies selected for this critical review were required to investigate the effectiveness of script-fading to promote verbal social interactions for children with ASD. No limits were set on the type of intervention program, study design, outcome measures, dates of articles published or geographical location of research participants.

Data Collection

This literature search resulted in a total of five articles that aligned with the aforementioned selection criteria. These articles each examined the effectiveness of script-fading via a single-subject, multiple baseline research design.

Data Analysis

The five articles were critically appraised using 14 evaluative questions (Logan, Hickman, Harris & Heriza, 2008) to assess quality and validity, and Dollaghan's Critical Appraisal of Treatment Evidence (2007) was also used to rate the level of evidence in each study. According to Dollaghan (2007), studies can be ranked by three descriptors. Studies ranked as "compelling" provide incontrovertible evidence. Studies ranked as "suggestive" are considered evidence that is open to debate. Finally, studies ranked as "equivocal" are evidence in which unbiased experts make opposite conclusions.

Results

Single-subject designs take individual differences of each participant into account. This type of design is therefore appropriate for testing a population where each participant has a different level of severity of autism. In addition, the use of a multiple baseline design added to each study's internal validity, by decreasing the opportunity for other explanations to account for the observed changes, since the start of treatment is staggered across individuals.

Krantz and McClannahan (1993) introduced the idea of "script-fading" to promote appropriate verbal interactions in children with ASD. This study analyzed the effectiveness of written scripts and a 5-step script-fading procedure to produce peer initiations. The participants were well described, and consisted of 4 children (ages 9-12) who were diagnosed with autism, who also had histories of impaired imitation skills, severe communication deficits, and minimal or absent social, academic, and daily living skills. Each child was provided a script during 3 different art activities. Treatment procedures were described in great detail, which allows for future replication. Unscripted peer initiations, responses, cross-setting generalization, and maintenance were recorded by two observers in the room, and acceptable inter-observer agreement was reported.

Visual analysis revealed that an appropriate number of measurements (≥ 6) were taken during each study phase, and a stable baseline was obtained. The study

was completed over 40 sessions with interventions beginning on sessions 5, 12, 18, and 24. The script-fading treatment was clearly associated with an increase in the dependent variables (increased initiations and responses) shown in the properly-labeled, and legible graphs in the paper. After the treatment (scripts) was removed during the third phase, the unscripted initiations subsequently increased, indicating that the treatment was effective. Initiations were successfully generalized to new settings and activities, and maintained at a 2-month follow-up. It was concluded that the script-fading procedure allowed children with severe social deficits to successfully engage in unprompted, on-topic interactions with their peers.

This paper demonstrates a clinically relevant purpose with a concise presentation and analysis of results. Given the substantial strengths of this paper, this study provides compelling evidence for the use of script-fading in promoting social interactions for children with ASD.

Krantz and McClannahan (1998) completed a multiple baseline single subject study across three children (4-5 yrs.) attending a developmental institute designed for children with ASD who were not observed to initiate conversation and had limited expressive vocabulary to assess the effectiveness of script-fading procedures by measuring the frequency of each child's social interaction post script-therapy. Scripts were basic statements (e.g., 'Watch me'), and were faded in 3 steps by taking away portions of the card. Acceptable inter-observer reliability was reported based on scorings of two independent observers.

Visual inspection revealed a systematic increase in unscripted verbal interactions after the script-fading procedure was implemented. Analysis concluded that this procedure promoted frequent unscripted verbal interactions and were also generalized to appropriate interactions with new peers.

In this article, Krantz and McClannahan (1998) included adequate detail in the methods for replication purposes. Further strengths include a clearly stated and appropriate selection of design, and replication of treatment over 3 subjects, which is an acceptable amount for this type of design. The study was completed over 66 sessions with interventions beginning on sessions 7, 23, and 37. A stable baseline and an adequate number of data points (≥ 7) in each phase for each participant, which infers that valid design measures were used. Overall, this study's significant findings provide compelling evidence

regarding implementing the script-fading procedure with children with autism.

The purpose of the Reagon and Higbee (2009) study was to broaden the use of scripts and script-fading procedures to a non-clinic setting, by training parents to help create, implement and systematically fade audio scripts in children with ASD, to promote appropriate social interactions at home. Three children with ASD, ages 2;11 – 6;10, and the mother of each child participated in this multiple baseline design study. The criteria of the child participants were that they had verbal speech but did not initiate conversation, and had minimal conversational exchanges (≤ 5) that were contextually appropriate during play.

Baseline data was obtained, the mothers were trained, the treatment was implemented, and follow-up occurred 2 weeks after script fading was completed under conditions identical to baseline, to adequately assess generalization. During therapy, activities had specific audio scripts, which were statements activated with a push-button per a target toy. The child was prompted to push the button, and imitate the script during play. Sessions were videoed and scored by parents and trained researchers. Each initiation score was compared to the scoring of the other, and acceptable inter-observer reliability was reported.

Visual analysis indicated that all 3 participants readily acquired scripted initiations during play. More importantly, an increase in appropriate unscripted initiations occurred for all three boys post-treatment. Furthermore, unscripted initiations also increased during the generalization assessment with novel toy stimuli, from no responses during baseline to a mean of eight unscripted responses per child. Initiations were maintained at moderate levels during follow-up.

This article provides novel information, that after brief training, parents of children with ASD are able to successfully implement script-fading procedures at home. The strengths of this article include the appropriate number of well-described participants, and clearly defined dependent variables. However, this study has multiple limitations. The intervention conditions were not detailed enough for replication purposes, and the visual analysis was reported in very minimal detail. An inadequate number of only 3 data points were collected for one of the participants during baseline, and the baseline stability seemed questionable, which weakens the validity of the results. Furthermore, the graphs used for visual

analysis were not clearly labeled, and the scales of the y-axis were inconsistent for each individual, giving the illusion of inflated positive results.

Additionally, the authors also mentioned several procedural limitations to their study; for example, the audio button was present during sessions, even after the script had been faded, which may have been an unintentional prompt for the child, to evoke the scripted statements. Overall, due to the number of aforementioned limitations, this study provides a suggestive level of evidence.

Sarokoff, Taylor and Poulson (2001) taught 2 children (8-9 yrs.) to use scripts embedded in product packaging (ie. Skittles) to improve reciprocal conversation skills. Participants were both able to read, and attended a treatment center for children autism. A multiple baseline across three sets of stimuli were used,, and script-fading was implemented using Krantz's (1993) procedure. The study was conducted over 40 sessions, with script-fading beginning on sessions 9, 14, and 19. Inter-observer agreement was calculated for 80% of sessions, and was between 88-100% consistent during each phase. Generalization was assessed 1 month and 3 months post-therapy, over six 3-minute follow-up sessions, with no scripts.

Visual inspection was used to analyze the results. A steady baseline was obtained over the 8-18 sessions, where both boys made only 0-2 verbal statements. When scripts were introduced during the intervention phase, each participant's verbal statements rapidly increased. During the generalization session with novel stimuli and a novel peer, the boys engaged in a mean of 7 and 5 scripted statements, as well as 9.5 and 3 unscripted statements. It was concluded that after the script-fading procedure, all participants were able to generalize the learned communication skills, hence increasing their reciprocal social skills.

This study displayed validity by collecting an adequate number of data points (≥ 8) in each phase,, and demonstrated reliability using strong inter-rater agreement. Additionally, a unique aspect of this study is the analysis of embedded textual stimuli in conjunction with the script-fading procedure to assess conversational exchanges. There are however, a number of limitations. The sample size was small ($n=2$), therefore limiting the generalizability of their findings. Furthermore, the participants, dependent variables, and treatment conditions were only moderately described, making replication an ambiguous process. Secondly, the use of embedded text may have limited applications to prompt

conversation in a natural setting, as items with embedded texts may not be available at all times. Further researchers may want to address these limitations. This study provides a suggestive level of evidence for positive outcomes in teaching children with ASD to engage in conversations using scripts with embedded texts.

Wichnick, Vener, Pyrttek & Poulson (2010) used pre-recorded scripts to teach three children (5-7 yrs.) to competently respond to each other's initiations. The setting and conditions were adequately described, and data recorded from two observers. Records were compared between observers to obtain inter-observer agreement (of 88-100%) to acquire accurate reliability. The study was conducted over 105 sessions, with treatment beginning on session 26, 45, and 69. During intervention sessions, various recording devices with pre-recorded audio scripts were matched with pairs of toys, and given to each child. The child was initially prompted to push the button to emit the audio recording, then prompted to imitate the message. After 8 or more successful scripted responses to peer initiations were spoken, script-fading began.

Visual inspection indicated that unscripted responses systematically increased after script-fading was implemented, since scripted responses generalized to novel responses. Overall, the number of social interactions significantly increased post-therapy. This study has numerous strengths, including the use of an appropriate analysis, with an adequate number of participants, and a detailed methodology. The study also displayed a steady baseline with an impressive number of 25 data points or more, increasing the reliability of the results. The authors also included a table listing the steps of fading for each child's script, and another table showing every unscripted response each child stated. These tables allow the readers to have a deeper insight of the procedure, and outcome of the results. However, one limitation is that follow-up assessments were not conducted; it is therefore unknown if the children in this study maintained their new social skills over time. Overall, the results provide a compelling level of evidence that script-fading procedures increase the responses to peer-initiations of children with ASD.

Discussion

Social scripts are used to teach communication skills to children with ASD, as they provide exemplar statements that are appropriate a child's current activity/setting. This paper reviewed 5 multiple baseline design studies, to determine if the script-

fading procedure was an effective intervention in promoting spoken interactions for children with autism. It is important to note that individual participant characteristics and small sample size must be considered when interpreting the results of studies using a single-subject design. Nevertheless, these articles had numerous shared strengths. First of all, every article displayed positive results in their findings. All participants in each study demonstrated a marked increase in appropriate verbal interactions, from baseline to intervention. It was determined that the articles showed consistent compelling and suggestive evidence for implementing script-fading therapy to children with ASD to promote appropriate verbal interactions. Secondly, each article used a multiple baseline design, which was appropriate and effective for this question and population. This type of design takes into account the range of severity levels of an individual with autism, as previously mentioned. Thirdly, each study used acceptable inter-rater reliability of dependent measures, based on the comparison of scored data of 2 or more independent observers. The yielded evidence therefore suggests that script-fading procedures could be used to elicit spontaneous verbal initiations and responses. However, it is important to consider the limitations discussed above when choosing which type of script-fading therapy to implement.

Conclusion

Scripts are effective tools for teaching children with autism verbal communication skills, ranging from simple to complex. Results indicate that children with ASD continue to use their scripted statements once their script is progressively faded during intervention sessions. Additionally, participants generalized the learned script during novel activities and settings, with new peers, therefore successfully producing spontaneous unscripted language.

Overall, the conclusion of this review is that the script-fading procedure is an effective, functional approach to teaching children with ASD to spontaneously socialize in an appropriate manner.

Clinical Implications

Social scripts and script-fading procedures are appropriate therapy for speech language pathologists (SLPs) to implement during therapy, to promote verbalized social exchanges for children with autism. However, due to the heterogeneity of this population, SLPs should ensure that the child with ASD meets the appropriate requirements for this type of intervention.

Furthermore, some caution is warranted to SLPs when planning specific types of script-fading therapy, due to the aforementioned limitations of certain studies, including:

- a) more evidence is needed to determine if SLPs can teach parents to effectively create, implement, and fade scripts successfully at home, to teach their child with ASD to appropriately initiate verbally;
- b) more evidence is needed for SLPs to use scripts with embedded texts.

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