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## Use of Scenari-Aid to aid maintenance of stuttering therapy outcomes

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### Abstract

Scenari-Aid is a free online tool providing real-world simulation activities. This study investigated if using Scenari-Aid improves maintenance of stuttering therapy outcomes. An ABAB single subject design (A: pre-access and withdrawal; B: Scenari-Aid access) was used. Post-treatment gains in communication attitude and social participation were maintained 6-months post-treatment. Some improvements in weekly measures were present from A1 to B1 but there were no changes from B1 to A2 or A2 to B2. The participant reported using Scenari-Aid to aid initial desensitisation and then only occasionally. Further research is necessary to clarify the role of Scenari-Aid in the maintenance of treatment gains.

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### 1. Introduction

Difficulties with transfer and maintenance of speech gains from therapy in cases of chronic stuttering (adolescents and adults) is well documented (Finn, 2003) resulting in wasted time and resources for clients and speech pathologists and disappointment in clients who have not achieved desired outcomes. Yet little research has

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been done into strategies that lead to successful maintenance of fluency gains in real-world situations (Finn, 2003; Ingham, 2012). Factors which have been identified as improving transfer and maintenance outcomes include role-playing real-life situations in the clinic (Blood, 1995), use of the new speech skills outside of the clinic environment (Finn, 2003), clients' internal locus of control and self-efficacy regarding their speech, and teaching skills to promote self-regulation and problem-solving (Blood, 1995; Finn, 2003). Attempts are often made to include these components within therapy but some, such as incorporating skills into real-life situations, can be difficult to replicate realistically within the clinic environment. Virtual worlds and virtual reality have been conceived and created to assist with the transfer of speech skills (Meredith, Miller, & Simmons, 2012; Packman & Meredith, 2011). While both of these platforms are still in their early days of appraisal and continuing developments, findings are positive, indicating they may be viable platforms in the future. In the meantime affordable and accessible platforms are required.

### *1.1. Scenari-Aid*

Scenari-Aid is an online application designed by the second author. Scenari-Aid was originally designed as a free DVD application for people who stutter with over 1000 copies being distributed worldwide. Scenari-Aid is now a free website containing over 100 staged streaming scenarios which people can work through in their own time and pace. Each scenario is comprised of a number of video-based steps which the user can pause at any time and respond to in a shape or form that suits. This gives the user time to reflect on how to respond to the narrative of the scenario and a chance to practice their preferred fluency techniques. Scenarios include job interviews, shopping, eating out, booking appointments, conversing socially, medical and many others ([www.scenariaid.com](http://www.scenariaid.com)). Scenari-Aid is free to use, is available online and is not heavily resource dependent making it very accessible to people who stutter. It has the potential to be a useful tool in promoting the maintenance of gains from speech therapy.

Scenari-Aid provides real-world simulation activities to bridge the gap between clinic and real-life. It incorporates many of the factors which have been identified as potentially assisting transfer and maintenance listed above. Previous survey research into the DVD version of Scenari-Aid found that the majority of participants either agreed or strongly agreed that when using Scenari-Aid their speech fluency improved, their confidence in their speech improved, and that Scenari-Aid assisted them to transfer use of their speech techniques into real world settings (Meredith & Achterbosch, 2014).

### *1.2. Study purpose*

Strategies and tools which promote successful transfer and maintenance of speech fluency gains in chronic stuttering treatment are of great importance to reduce the client and clinician costs of unsuccessful therapy attempts. Scenari-Aid has the potential to aid in skill transfer and generalisation, and it has received positive client feedback. However to promote evidence-based practice it is essential to know if using Scenari-Aid results in improved transfer and maintenance outcomes compared to not using it as part of stuttering therapy. This study was designed to gain objective evidence and to identify effect sizes that will inform a power analysis for a further randomized controlled trial.

### *1.3. Research questions*

The specific research questions were:

Compared to not using Scenari-Aid, does use of Scenari-Aid result in:

- improved speech fluency outcomes in real-life situations?
- improved maintenance of speech fluency outcomes?
- improved communication attitude?
- improved social participation?

## 2. Method

Treatment for chronic stuttering is typically divided into 3 or 4 phases: pre-instatement and instatement phases (client learns the technique and practices to a point of stability in clinic), transfer phase (client uses the technique outside of the clinic), maintenance phase (client has reduced clinical contact and is expected to problem-solve issues) (see JelčićJakšić & Onslow, 2012). The participant was approached to participate in the study towards the end of the transfer stage of his stuttering treatment. Data were collected over a period of 26 weeks from the beginning of maintenance. An ABAB single subject design (A: pre-treatment and withdrawal phases; B: treatment phase). The participant was assessed with formal measures to assess speech fluency from a 5-10 minute telephone call with a stranger, communication attitude and social participation prior to the end of the transfer phase, at the end of the 8 week baseline period (A1), after 6 weeks using Scenari-Aid (B1), after 6 weeks without Scenari-Aid (A2), and after a further 6 weeks using Scenari-Aid (B2). Additionally the participant completed weekly probes on a 9 point scale assessing perceived stuttering severity and 7 point Likert scales assessing speech confidence, transfer of speech skills, and social participation. Weekly probe measures were collected via text message. The participant also provided permission to conduct a case file audit to retrieve pre-treatment assessment data to provide demographic information. This study has ethics approval from both participating institutions.

### 2.1. Inclusion and exclusion criteria

Inclusion criteria: participants were required to be 18 years or older, diagnosed by a speech pathologist as stuttering and had completed the instatement and transfer phases of a stuttering treatment program.

Exclusion criteria: potential participants would be excluded if they had commenced stuttering treatment but did not complete the instatement and transfer phases or were planning to receive active treatment (that is, speech pathology clinic attendance greater than monthly maintenance sessions) or use other therapeutic devices (for example, altered auditory feedback devices) during the study period.

### 2.2. Participant demographics

The participant was a 32 male who spoke Mongolian, Russian and English and stuttered in all languages. He had a family history of stuttering, with a father and brothers who also stuttered. He had a history of covert stuttering, including word and situation avoidance, resulting in a lack of social participation and unemployment since his move to Australia 5 months prior to attending the clinic. He had not previously received any therapy for stuttering. At initial assessment he reported negative self-concept related to his stuttering and strong negative emotions of embarrassment and annoyance when he stuttered. His aims for therapy were to have the confidence to seek employment and to perform well in daily conversations and job interviews.

The participant's pre-treatment assessment results were:

- English speech sample: 2.4%SS (703 syllables, 17 stutters)
- Mongolian speech sample: 1.6%SS (625 syllables, 10 stutters)
- Severity rating = 4 (English); 3 (Mongolian)
- OASES Total score: 3.24 (moderate/severe) (Yaruss & Quesal, 2010)
- Modified Erickson S-24: 17 (typical of a person who stutters) (Andrews & Cutler, 1974)

### 2.3. Treatment

Therapy was provided by student speech pathologists under the supervision of the primary author, a Certified Practising Speech Pathologist with doctoral-level qualifications in stuttering treatment. Treatment was individualised for the client and conducted in Mongolian and English. The client initially participated in a 7 day intensive program consisting of stutter modification techniques, including identification of stuttering moments,

desensitisation to stuttering, voluntary stuttering, cancellations, pull-outs and preparatory sets (Fraser, 2010); speech restructuring utilising the Camperdown Program teaching methods (O'Brian, Carey, Onslow, Packman, & Cream, 2010); and cognitive work from the Institute of Stuttering Treatment and Research *Facilitating Fluency* workbook (Webster & Poulos, 1989). Following the intensive program, the client participated in 7 weeks of 2 ½ hour transfer clinic sessions, consisting of individual and group sessions focussing on transfer of skills and problem-solving issues that had arisen during the previous week.

#### 2.4. Clinical assessments

Clinical assessment of the randomised recorded participant speech samples was conducted by the third author, who had no involvement with the sample collection. The speech samples were analysed using the clinical measures of percentage of syllables stuttered (%SS), using the formula *number of syllables stuttered / number of syllables spoken x 100* (Jones, Onslow, Packman, & Gebski, 2006). Percentage syllables stuttered were calculated in real-time from the audio-recordings using a push-button counter *True Talk 2* device.

Clinical assessment of the participant's communication attitude was undertaken using the Modified Erickson Scale of Communication Attitude (S-24) (Andrews & Cutler, 1974), a 24 question assessment of speech-related attitude of adolescents and adults. Clinical assessment of the participant's social participation was conducted using the Overall Assessment of Speakers' Experience of Stuttering (OASES-A). The OASES-A is a 100 item self-report measure divided into 4 sections: general information (OASES I), reactions to stuttering (OASES II), communication in daily situations (OASES III), and quality of life (OASES IV), based on the WHO-ICF framework. Scores are given for each section, as well as an overall score, which are classified into different levels of clinical severity (Yaruss & Quesal, 2010). These assessments are routinely used in the assessment of clients at the Flinders University Fluency Clinic.

Weekly probes consisted of three 7 point Likert Scales assessing: average level of confidence when speaking (1 = extremely low, 7 = extremely high); ability to use speech skills in the real world (1 = none of the time, 7 = every time I wanted to); average level of participation in situations requiring talking to others (1 = extremely low, 7 = extremely high). Additionally the participant used a 9 point rating scale (1 = no stuttering, 9 = extremely severe stuttering) (O'Brian, Packman, Onslow, & O'Brian, 2004) to provide an average rating of stuttering severity for the week.

#### 2.5. Statistical analysis

Scores from the speech measures, Modified Erickson S-24 and OASES-A were analysed against norms and the participant's previous assessment results. Confidence intervals (95%) and changes in classification (e.g. from "below average" to "average") were used to determine clinically-significant differences between scores at each point.

Weekly probe data collected were analysed using visual inspection (i.e. slope change, level change, variable baseline and treatment scores) of a visual representation of the data (i.e. graph). The graph visually presents the ABAB approach used in the study with time represented by the horizontal axis and outcome scores represented by the vertical axis (Janonsky, 1991). This was done to identify any changes in stuttering severity, speech confidence, transfer of speech skills and social participation.

The C statistic was used to assess any significant changes in the repeated measures. Each score of the repeated measures during baseline was subtracted from the following score and each value obtained was squared. The squared values were summed (*a*) and the mean value of the scores collected at the baseline data collection points was calculated. Each raw score was subtracted from the mean value, squared, summed up and multiplied by 2 (*b*). The C-score is calculated using the formula:  $C = 1 - (a/b)$ . The standard error (SE) for the C statistic is calculated using the formula:  $SE = \sqrt{[(n-2)/(n-1)(n+1)]}$ , where *n* is the number of scores used to calculate the C statistic.  $Z = C/SE$  which is significant if greater than 1.645. If the baseline data exhibit non-significance (i.e. stable baseline), they are combined with the data from B1 and the C statistic is recalculated to determine if any significant change has occurred due to the treatment (Nourbakhsh & Ottenbacher, 1994). If the baseline is unstable, each data point in A1 is subtracted from the corresponding data point in B1 until one data set is exhausted. The C statistic is then calculated using these difference scores with a significant result indicating a change in trend during each phase.

### 3. Results

The participant did not return the OASES-A and Modified Erickson S-24 questionnaires in-between baseline and the first Scenari-Aid access, but a phone call was completed at this transition point. All other transition points had complete data sets. The participant sent through weekly measures every 1-2 weeks throughout the study period.

#### 3.1. ABAB phase transitions

Modified Erickson S-24 scores improved from assessment to the end of transfer (score = 9), making a clinically significant shift into the range more typical of a person who does not stutter. Further improvements were noted throughout the study period, see Table 1.

Table 1. Formal assessments at phase transitions

Data collection	English %SS (syllables; stutters)	Modified Erickson S-24	OASES-A Total Score
Assessment	2.4%SS (703; 17)	17	3.24
End transfer	1.8%SS (595; 11)	9	1.91
End A1	1.7%SS (792; 14)		
End B1	2.3%SS (506; 12)	8	1.51
End A2	1.7%SS (710; 11)	6	1.34
End B2	1.6%SS (1104; 18)	5	1.41

There was no change in the participant's English %SS scores from assessment through to the end of maintenance, with stuttering remaining at a mild severity level (see Table 1).

The OASES-A showed clinically significant improvements across all four areas from assessment through to the end of transfer which were maintained or improved over the maintenance period (see Table 1 and Figure 1).

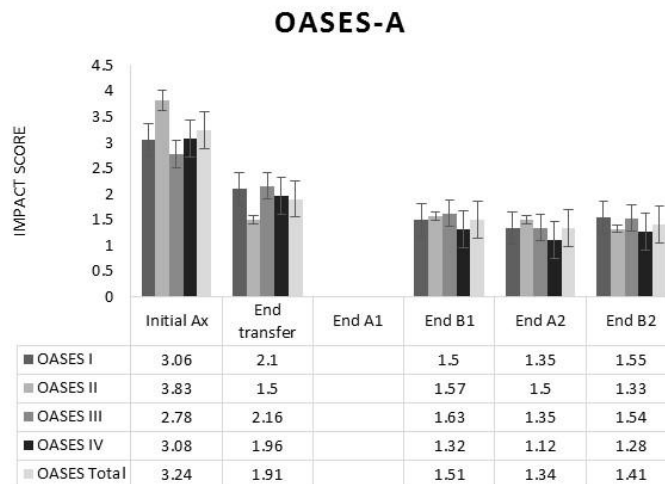


Fig. 1. OASES-A scores from initial assessment through to the end of maintenance, showing 95% confidence interval error bars.

3.2. Weekly measures

The weekly measures are presented graphically in Figure 2. Statistically stable baselines were obtained for confidence when speaking ( $Z = 1.48$ ) and level of participation ( $Z = 1.18$ ), but not severity rating ( $Z = 1.91$ ) or ability to use speech skills ( $Z = 1.85$ ). Visual analysis indicated that overall improvements occurred from A1 to B1 but these were not statistically significant for any measure. No change was observed with the subsequent removal (A2) and reinstatement (B2) of Scenari-Aid.

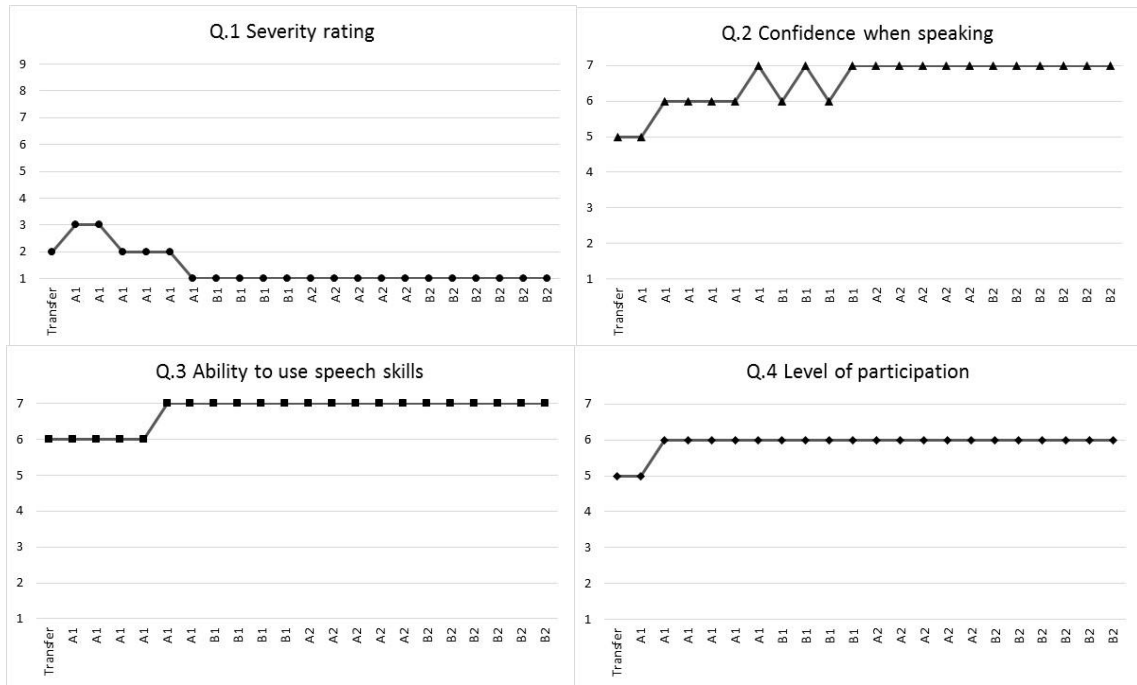


Fig. 2. Weekly measures from transfer through baseline (A1), Scenari-Aid access (B1), Scenari-Aid withdrawal (A2) and reinstatement (B2).

3.3. Participant report

At the end of the study the participant was asked about how often he used Scenari-Aid, whether or not he found it helpful to maintaining his therapy gains and whether he planned to continue using it following the completion of the study. The participant reported that he used Scenari-Aid initially to help desensitize himself to stuttering and to practice the stutter modification techniques. This helped to reduce his avoidance and greatly increased his participation as evidenced by the following quote when asked if he found using Scenari-Aid beneficial:

*“Yes. Because I used to avoid tough situation, for example, giving orders in the restaurant and making some purchases in the shop. In those situations I tend to avoid. After the course I learn and I know that stuttering is not very big problem and I don’t mind stuttering. Also, I learnt how to control my breathing and my emotions and talking. It really helped but before I went to this course I usually avoid and replace words. Now it’s much different.”*

The participant indicated that following his initial use of Scenari-Aid to help with desensitization he had only used it occasionally when he had increased difficulty with his speech and felt that he needed some additional practice.

#### 4. Discussion

For this participant the therapy he received resulted in a clinically significant shift from moderate-severe issues with quality of life, participation restrictions and communication attitude to mild-moderate quality of life issues, markedly increased participation and a communication attitude within the normal range. Therapy gains were maintained for over 6 months with no change or modest improvements in test scores continuing over that time period.

No change was observed in the English speech fluency measures across the course of treatment. As the participant's overt stuttering was in the mild-moderate range initially, it was not impacting negatively upon his ability to communicate. Rather, his covert stuttering and avoidance were resulting in restricted participation and negative communication experiences. Dealing with these covert aspects significantly improved the participant's communicative participation and reduced his concern about stuttering. Thus, the mild overt stuttering was no longer an issue for him. It is likely that no changes were observed in the speech measures as the mild overt stuttering did not impact negatively upon his communicative exchanges and thus was not a priority for remediation.

Improvements in some weekly measures were observed from baseline (A1) to initial Scenari-Aid access (B1), although this was not statistically significant. A ceiling effect occurred for use of speech skills which reduced the potential for observed differences between phases. There were no differences between outcomes when the client had access to Scenari-Aid (B1 and B2) and when he did not (A2). Thus, it is unclear whether or not Scenari-Aid access played a role in maintaining therapy outcomes. The participant report indicates that he found the stutter modification techniques helpful and that Scenari-Aid helped him to desensitise to using them in public situations. He reported that he initially used Scenari-Aid to help with this desensitisation but then only used it occasionally. It is possible that there were no changes in the weekly measures between B1, A2 and B2 because the client had already used Scenari-Aid to desensitise and was no longer routinely using it by the time it was removed.

##### 4.1. Limitations and further directions

The small numbers of adult clients currently coming through the Flinders University Fluency Clinic has limited recruitment. The lack of stability in baselines for the weekly measures for this one participant has limited the ability to find statistical differences between phases and reduced the confidence that can be placed in these findings. Data from this one participant are ambiguous and so there is a need for more data to determine if access to online simulation tools such as Scenari-Aid helps with client transfer and maintenance.

Future directions include recruiting more participants to determine effect sizes and build an evidence-base for Scenari-Aid, conducting a randomised controlled trial investigating access to Scenari-Aid versus no access in maintaining treatment gains (maintenance phase research), and a randomised controlled trial investigating use of Scenari-Aid versus in-clinic role plays in aiding transfer and treatment outcomes (transfer phase research).

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