Supplementary Materials 1: Fidelity Checklist

0: Not present (target was not achieved); 1: Partially present (the target was partially achieved); 2: Fully present (the target was fully achieved); N/A: Not Applicable (the target was not relevant or could not be observed)

1. Script Training

	Target	**Rating**	**Criteria**	**Notes**
1.1	The therapist speaks the first focused on phrase of the script for the participant to repeat.	0 1 2 N/A	0 if the therapist does not speak the first phrase or gives no opportunity for repetition. 1 if the therapist does not provide the full phrase, or *doesn't provide the phrase consistently*, or gives insufficient time for repetition. 2 if the therapist consistently speaks the first phrase and gives full opportunity for repetition.	
1.2	The therapist and participant read aloud the phrase together (choral reading).	0 1 2 N/A	0 if the therapist does not read aloud the phrase. 1 e.g. if the therapist reads half the phrase, reads too quickly for the participant to follow, or doesn't read the phrase consistently. 2 if the therapist consistently reads aloud along with the participant and gives him enough time	
1.3	The participant reads the phrase aloud without the therapist.	0 1 2 N/A	0 if the therapist does not give any opportunity for the participant to read the phrase. 1 e.g. if the therapist doesn't give the appropriate time for the participant to read the phrase or is inconsistent	

			2 if the therapist consistently gives enough time for the participant to read the phrase	
1.4	Across all steps the written phrase is provided using the instant messaging or note card facility in EVA Park.	0 1 2 N/A	0 if there is no written phrase provided. 1 if an incomplete phrase is provided, or if phrases are provided inconsistently. 2 if the written message is consistently provided.	
1.5	When the participant achieves at least 10 independent productions of the phrase the next phrase is introduced.	0 1 2 N/A	0 if the therapist fails to move on after 10 correct productions, moves on after very few (<7), or moves on despite the participant producing wrong productions. 1 if the therapist moves on after many >7 correct productions but where the full 10 have not been achieved, or if the therapist moves on after 10 productions in which there are some minor errors (such as a functional word, or a substitution that leaves the meaning of the phrase intact), or if the therapist is inconsistent. 2 if the therapist consistently moves on after 10 correct productions. N/A might be recorded if the opportunity to move on has not arisen e.g. because the participant is still making many errors on a phrase.	

2. Cuing

	Cuing Target	**Rating**	**Criteria**	**Notes**
2.1	The therapist says the word and asks the participant to repeat it.		0 if the therapist does not provide any cues despite	

	/ The therapist provides a first phoneme cue. / The therapist segments the word into syllables for repetition. / The therapist uses a different way of cuing.	0 1 2 N/A	the fact that the participant fails to repeat the word. 1 if minimal cues are used, if cues are not changed or augmented despite persistent participant failure, or if cues are given inconsistently. 2 if cues are consistently provided in response to participant difficulties.	

3. Maintenance of previous script

	Target	**Rating**	**Criteria**	**Notes**
3.1	Previous scripts are rehearsed at the end of sessions.	0 1 2 N/A	0 if the therapist does not rehearse previous scripts. 1 if the therapist rehearses half of the previous scripts/incomplete rehearsal. 2 if the therapist fully rehearses previous scripts. N/A if there is not any previous script.	
3.2	The participant reads the complete script or phrases from the script.	0 1 2 N/A	0 if the therapist does not give time to the participant to read the complete script or phrases. 1 if the therapist allows the participant to read only some words and not the complete script.	

			2 if the therapist gives enough time to the participant to read the complete script or phrases.	

4. Generalization

	Target	**Rating**	**Criteria**	**Notes**
4.1	The therapist varies the responses given to phrases (in scripts that involve a dialogue).	0 1 2 N/A	0 if the therapist did not vary the responses. 1 if the therapist varies responses very minimally or only to one phrase. 2 if the therapist varies the responses to at least 50% of phrases.	
4.2	The script is practiced with a different conversation partner (e.g. a student volunteer or family member). They encourage practicing the script with different partners.	0 1 2 N/A	0 if the script is not practiced with different conversation partner and no opportunity for practice with a different partner is given (e.g. outside the session or in a different session). 1 if the script is partially practiced with a different conversation partner. 2 if the script is practiced with a different conversation partner or additional practice with a different partner is discussed. N/A e.g. if it cannot be judged whether there are opportunities to practice with another partner.	
4.3	The script is practiced in different EVA Park settings.	0 1 2 N/A	0 if the script is not practiced in any other different setting.	

			1 if the script is practiced only in one or two settings. 2 if the script is practiced in a variety of settings. N/A if the script is not practiced completely in previous steps.	
4.4	Open conversation in different EVA Park settings.	0 1 2 N/A	0 if the participant is not exposed to open conversation by the therapist. 1 if the participant is exposed to very limited or brief open conversation by the therapist and different settings are not used. 2 if the participant is given at least 5 minutes of practice with open conversation in different EVA Park settings. N/A if the participant did not complete the previous steps for the script training.	

Supplementary Materials 2: EVA Park Scripts Therapy TIDieR Checklist

1	Brief Name	Scripts therapy in EVA Park
2	Why	Background: We all fall back on familiar ways of describing things. For example, when we describe our job, or explain a diagnosis we often find a set of sentences that work and use them again and again different circumstances. Script therapy, where a pre-determined script is learnt by rote, provides these islands of fluent speech for people with aphasia, whose speech is no longer automatic. Examples of scripts learnt by people with aphasia include explaining your aphasia, ordering in a restaurant, or phrases to open a conversation. 'Instance theory of automization' (Logan, 1988) is the theory that underlies this idea. The theory explains how we carry out routine tasks on 'auto pilot', tasks such as changing gears whilst driving. We also use automaticity for cognitive tasks, such as reading. These automatic functions are held in our episodic memory and built up over repeated instances of the whole task. With enough practice the task is retrieval solely from memory, no longer requires reasoning or problem solving and the task becomes fast and effortless (Logan, 1997).
3	What materials	EVA Park: a multi-user virtual island with functional spaces. Therapy Manual Participants Handbook
4	What procedures	**1. Script development** a) Have a conversation about interests: Encourage the client to tell a narrative (story) that is personally meaningful and that could be told in more than one situation, for example, as part of getting to know someone, or to reach out and connect with others. The story could be about things they have done, places they have been to, and/or things that have happened in their lives. To encourage the client to make his/her own choice, it is best to leave the instructions as open as possible. Many clients will not find it hard to select a story, but some may need prompting. For these, the therapist could suggest they think about: • things that have happened to them • things that they have done • events or places that they have been that were memorable for some reason • things that have happened to other people, maybe to a family member or a friend • information about themselves that they would share with someone else, e.g., hobbies, interests, career/jobs, places lived, travels, family, friends, places they like to visit and why. b) Support the client to think of situations where they would like to be more communicative. c) Develop 3-4 sentences around the narrative (depending on severity of aphasia). These may be monologue scripts or dialogues with the therapist as the conversation partner.

		2. Script training Structure the treatment sessions to allow at least three x 10-minute episodes of concentrated script training practice, interspersed with approximately four brief periods of relaxed, open conversation. Work on one phrase at a time. Use a cueing hierarchy: phrase repetition, reading together, client's independent production. Go over 'problem' word(s). Break it down to achieve correct production, then repeat it 5 times, then say the word in the phrase. Once the client achieves 10/20 independent productions of a phrase then add the next phrase **3. Generalisation** Client practises script in different EVA Park settings. 4.To increase or decrease demand, the client could practise carrying out the script with/without background noise. Where the script is a dialogue, the therapist purposefully varies the responses. 2.In the 4th session, the client practises the script with new conversation partners, e.g., a volunteer. **4. Home practice** The client should carry out home practice for 15 minutes a day. They may use an in- world character to talk to, e.g., Ruby Robot, sitting on the bench by the little pier by the sailing boat. Practice using the scripts in the real world.
5	Who provided	Speech and Language Therapists, both specialists in aphasia. For one participant, 1 practice session per week was delivered by a speech and language therapy student in the first year of a MSc course.
6	How provided	Treatment was provided via an internet based virtual world, EVA Park. EVA Park is built in the software OpenSim and viewed through the 3D browser 'Firestorm'. Participants need a laptop or computer (not tablet) to access the virtual world and an internet connection. Sessions were 1:1 and synchronous.
7	Where	Participants and therapist worked from a laptop or computer in their own home or from the University.
8	When and how much	20 hours of treatment delivered as 1x 1hr session a day, 4 days a week for 5 weeks.
9	Tailoring	Scripts were unique to each client. They were based on the needs identified in a development session. They were developed together with the treating therapist in a face to face session before treatment started.
10	Modifications	None
11	How well: planned	Fidelity checklist was developed based on the therapy protocol and 27% of sessions were filmed. Two speech and language therapy students checked the videoed sessions against the checklist marking components as present, partially present, absent or not applicable.
12	How well: actual	Over 80% of core components of the intervention were present in the sessions. Percentage agreement between the two raters was 81.8% with a Kappa value of .63 ($p<001$).

Logan, G. D. (1988). Toward an instance theory of automatization. Psychological Review, 95(4), 492-527. https://doi.org/10.1037/0033-295X.95.4.492

Logan, G. D. (1997). automaticity and reading: Perspectives from the instance theory of automatization. Reading & Writing Quarterly, 13(2), 123-146. https://doi.org/10.1080/1057356970130203

Supplementary Materials 3: Sample Scripts

Keats

Talk about how you're feeling

There was a year where I was lonely.

My wife left me.

Vic got a flat and Peter went to live with my ex-wife.

I got the dog!

I've been with Janice for 6 months and she is a lovely person.

My friend Charlie made me go on the dating site match.com

Austen

Can you tell me what you would say to your grandsons when you Facetime them?

Hello Louis and Harry!

Did you go to school today?

Louis, do you want to come round soon?

I love you!

(names have been changed to protect confidentiality)

STROBE Statement—Checklist of items that should be included in reports of ***case-control studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Dates: 6 Settings in Method, e.g. Ax 7; intervention p 9
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls	6
		(*b*) For matched studies, give matching criteria and the number of controls per case	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-8 outcome measures 9-11 intervention
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-8
Bias	9	Describe any efforts to address potential sources of bias	7 (blinding of assessment scoring)
Study size	10	Explain how the study size was arrived at	4 (rational for single case data)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	11 (Kappa statistic for fidelity rating data 13-14 (McNemar statistic for script data)
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a

		(*d*) If applicable, explain how matching of cases and controls was addressed	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	11 (no attrition reported)
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6; Table 1
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers in each exposure category, or summary measures of exposure	

Main results		16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 3 – 6 for individual data on outcome measures 13-14 for analyses
			(*b*) Report category boundaries when continuous variables were categorized	
			(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses		
Discussion				
Key results	18	Summarise key results with reference to study objectives		15-16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias		17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence		17-18
Generalisability	21	Discuss the generalisability (external validity) of the study results		17
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based		Title page

*Give information separately for cases and controls.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.