Project title: SemaFoRe: Semantic Feature and Repetition therapy in aphasia: A pilot RCT

Authors: Dr Julie Morris - Newcastle University
Professor David Howard - Newcastle University
Mrs Frauke Buerk - Newcastle upon Tyne Hospitals Trust

Plain language summary
This project focused on therapy for word finding difficulties in aphasia, an acquired communication problem, often following stroke. The project was designed as a pilot study to inform future research, looking at whether the research was feasible and acceptable. It examined two treatments to improve word finding: ‘Semantic Feature Analysis’ (SFA) and ‘Repetition in the Presence of a Picture’ (RIPP). In SFA, you generate ideas around a particular word. RIPP involves repeating words. Participants’ communication was assessed before and after therapy, including the ability to retrieve words via naming and describing pictures. Participants’ views of their communication and therapy were collected.

In terms of findings about feasibility and acceptability of the research, we considered recruitment to the study, retention and acceptability (whether people stayed in the study and what they thought about it). We had 41 people referred to the study with 25 suitable. We aimed to recruit 30 in total. Recruitment was slightly slower than we had anticipated at the start. Of the 25 who took part, 23 completed every aspect of the study; this is a major achievement given the commitment (8-9 month period). The 2 people who did not complete were unable to because of ill health. Participants reported favourably about therapy; they liked both therapies with little they would change. It therefore appears that the research is feasible and acceptable to participants.

In terms of more specific results, though this is a pilot study, our results do not completely replicate previous findings. Importantly, both treatments appear only to have an effect on the words treated; previous evidence suggested that SFA would improve word finding generally but this study did not find that, certainly in correct retrieval of words. Additionally, participants appear to benefit from either both or neither treatment.

The implications of our research is that the methods used are acceptable to participants and it was possible to recruit and retain participants. The findings, whilst a pilot study, are based on results from 23 people; this is a larger sample than typical when such well defined therapies are investigated. Results suggest effects of these therapies are restricted to treated items; if this is the case, this has important implications for selection of treatment words. Further research in this area is warranted and we are currently developing a proposal to take to funders.

Keywords
Aphasia, Anomia, Word-finding, Semantic feature analysis, Therapy, Treatment, Rehabilitation

Summary of research findings
BACKGROUND
This study aims to contribute to the development of research and the evidence base about treatment for word retrieval in aphasia. Aphasia is an acquired communication problem, usually after stroke or head injury. One of the most frequent difficulties experienced is a
problem with word retrieval; this is therefore a frequent goal of intervention. One of the treatments in clinical use is Semantic Feature Analysis (SFA). In SFA the person is shown a picture and asked to retrieve semantic information about it (e.g. what it is used for). This treatment is of interest as some evidence suggests that treatment effects generalise to words not worked on in therapy. This is in contrast to other word retrieval therapies where effects have been shown to be restricted to treated words. If working on one word can effect change in another (untreated) word, this is an attractive treatment option; the impact of treatment is maximised. However, although widely used, there is a limited evidence base for SFA (limited by number of participants and items as well as other aspects of methodology). The evidence base also describes a set of word retrieval interventions which are more phonological in nature, involving pairing of phonology with meaning, often involving repeating the word. We have called this Repetition in the Presence of a Picture (RIPP). In RIPP, treatment effects are restricted to words seen in treatment. This study involved both treatment approaches, within a pilot cross over randomised control trial.

AIMS AND OBJECTIVES
This study is a pilot RCT which aimed:
1. To determine the approximate effect size for the primary outcome measure to inform the power calculation for a trial.
2. To assess whether the randomised crossover design is an appropriate trial design in this context.
3. To establish patterns of recruitment, consent and retention, including whether the burden of data collection required by multiple assessments in a cross-over design is acceptable.
4. To evaluate whether all planned assessment points are necessary to inform the study.
5. To evaluate overall satisfaction for the people with aphasia with the delivery of therapy.

METHODS
Participants were recruited by speech and language therapists (SLTs) across several hospital trusts. Participants were at least 3 months post stroke and had word retrieval difficulties, scoring 10%-60% on a naming test. They had no other significant cognitive difficulties. Participants stopped SLT for the study period, though could attend support groups. Following consent, a brief screen of speech production, comprehension and cognitive skills took place. Eligible participants were randomly assigned to one of two treatment orders; SFA followed by RIPP or RIPP followed by SFA. The random allocation was generated via an external randomisation service (Newcastle Clinical Trials Unit).

Each therapy took place twice weekly over a 6 week period with sessions of 1 hour, either in University rooms or the participant's home. Treatment protocols were established based on literature and discussion with the primary authors in each field. The person administering therapy worked with another SLT to refine the protocols and then to ensure adherence to the protocols.

The items used in therapy were subsets of a 150 item word/picture set. In each phase of therapy, one sub-set of 50 items was treated. The sub-sets were specific to participants; the division into sets A (used in therapy A), B (used in therapy B) and C (control; never treated) was on pre-therapy performance and matched for word frequency and length. Within these constraints, items were randomly allocated to the three sets.
An SLT administered therapy, with assessments carried out by a different SLT who was both blind to treatment condition (SFA vs. RIPP) and item set (set A, B, C). It was not possible for participants to be blind to condition since this was obvious during therapy. For analysis of connected speech, the person transcribing and analysing the samples was completely blinded using anonymised, time referent free samples. Participants’ performance was assessed after each treatment phase, with a gap between the two phases of therapy (of equivalent duration to a therapy period). This led to seven assessment points (Ax.1 & Ax.2 prior to any therapy, Ax.3 following therapy A, Ax.4 prior to therapy B, Ax.5 following therapy B, Ax.6 six weeks and then Ax.7 ten weeks after all treatment ended), with approximately equal gaps between assessments 1-6.

The primary outcome measure was the percentage of the 150 words named correctly. Secondary outcome measures were a comprehension task involving the 150 words, measures of connected speech and a measure of the participant’s perception of change in their communication.

KEY FINDINGS
There are two aspects to the findings from this study. The first relates to the pilot nature of the study and concerns the feasibility of the methods and design. The second concerns the findings in relation to the treatment effects. Taking the pilot aspects first and considering recruitment: of the 41 people recruited to the study, 25 people were appropriate. Reasons for not being included in the study were typically that word retrieval abilities were above or below the 10-60% criteria. Rates of recruitment were therefore reasonable, with a relatively high referral to consent to participation ratio (i.e. appropriate people were referred). Recruitment was slightly slow in the initial phases and improved. In terms of retention, of the 25 people recruited to the study, there was excellent retention. Only 2 participants were lost to the study due to ill health. 23 participants completed therapy and took part in assessment at all 7 points (spanning approx. 8-9 months), representing a significant commitment. Participants completed an aphasia friendly post-therapy questionnaire (at assessment time points 3 and 5). Participants were overwhelmingly positive about therapy, with very little that they would change. Within the questionnaire, 13 participants stated they had no preference for one therapy, 9 preferred SFA and 1 preferred RIPP.

In terms of participants’ response to treatment, we found an average effect size (primary outcome measure) for treatment of 11.0 extra items with RIPP (95% CI 16.5-5.4, d=0.49), and 3.3 with SFA (7.7-1.0, d=0.15). The difference was highly significant (CI: 12.5-2.8, d=0.34). Across all 23 participants there was a significant overall improvement: a linear trend (z=8.79, p<<.0001). We also saw differences between people: homogeneity test $\chi^2 (22) = 197.4$, p<<0.0001 (which is unsurprising given the variation within aphasia). When the treatment effect was examined by therapy period and considering whether items had been within the treated set or not, the results demonstrated that both treatments were effective; however there was significantly larger effect of treatment for RIPP than for SFA. For both treatments the effect was seen for those items seen within treatment (contrary to predictions for SFA). Analysis of this pilot data also suggests that participants benefited from both or neither therapy. The predictor variables available to us in this study (background language, wider cognitive and demographic variables) did not allow us to predict the benefit.

In considering the secondary outcome measures, there was small but significant change for the semantic verification task and also for the participant rating measure (COAST) over time.
We are continuing to analyse the data from the connected speech measures, with a focus on the picture description task from the Comprehensive Aphasia Test, which was completed across each assessment point and for which there is data on the reliability and validity of scoring.

All seven assessment points appear important and feasible to deliver on. The two pre therapy assessments facilitated item selection to treatment sets, it is essential to have pre and post therapy assessment to allow comparison of performance and the final post-therapy measurements are clearly important both to the clinical community and to participants (with questions at dissemination events about the longer term benefits of treatment).

EXPECTED IMPACT AND CONCLUSION
This study demonstrates the feasibility of a crossover RCT of specific aphasia therapies. Referral to a study of this type is feasible; our experience suggests that in future, the recruitment drive needs to start before the study is ready to recruit to facilitate consultation with potential participants. This study only used SLT recruiters; it was not possible to utilise the resources of the (then) Stroke Research Network. Strong support was given to the study, but referrers needed to know in detail about potential participants’ aphasia and about other therapy needs. Retention within the study and acceptability to participants were both excellent, suggesting the design and methods are appropriate. However, it is important to remember that one therapist delivered all intervention, with one research site and so participants had a great deal of consistency and this may have contributed to this success. The study, whilst a pilot, also generated interesting results regarding the two treatments. Both were effective, but RIPP more so; neither treatment showed generalisation to untreated items on the primary outcome measure (contrary to predictions). This has a potential impact on treatment choices for word retrieval; if the more complex SFA treatment cannot be demonstrated to have an advantage, then RIPP may be the treatment of choice for this specific aspect of aphasia rehabilitation. Results from this pilot study suggest we need to better understand the impact of treatment on everyday communication and confidence in communication, whether we can get generalisation of treatment effects, what might predict benefit and also explore whether there is a more efficient way to deliver the repetition therapy.

Patient and public involvement
Involvement of patients has grown with this project and spread beyond this project to influence subsequent projects (from PhD studies to project grants). In developing the original project proposal, a small Aphasia Research User Group (ARUG) was set up, and has discussed (in varying depth) this project on 6 occasions. Aphasia adds a challenge to involvement of patients; people have communication difficulties which can affect their understanding of spoken and written communication and their ability to convey their ideas. This has meant meetings need to be facilitated; both in terms of understanding (of spoken and written material) and expression of ideas. Meetings have been small (typically 4-5 members with 2 facilitators who are qualified SLTs). Over time, we have developed our skills in ensuring members are able to truly contribute their views, but importantly members have gained experience and the confidence to put forward their ideas. We have also recently invited a family member to join the group, to widen consultation. We have also worked with one member, a gentleman with aphasia and with a scientific background, who has been able to comment on specific queries via e-mail (this project, and others) and this has been useful.
He has commented on the lay summary of this report and has been sent the full report. We remain mindful of ensuring people with aphasia themselves are able to fully contribute. The importance of considering what to consult about, and what amount has been important as has building on information over time. The group appears to have a sense of ownership of this particular project.

ARUG has gone on to be involved with other projects (e.g. Reading Comprehension in Aphasia) and to shape ideas within that project. We also encourage students (PhD, UG) who are completing projects involving people with aphasia, to present to and consult with ARUG as part of their research training (e.g. Fiona Menger, Stroke Association Fellow).

We are now looking at ways to ensure ARUG is sustainable over time. This is both in terms of members but also in terms of the researchers' time involved. Ideally there needs to be some consistency of facilitator and/or overall coordinator. We are looking to a model where in future these costs might be met by funded grants (by having a costing model for any future grants). The aim would be to enable ARUG to continue consultation in the very early stages (when there is no identified funding stream) into a funded role in funded projects. ARUG members have not wanted reimbursement for their time to date, but this, along with other principles, would need revisiting over time. ARUG would like to develop a web presence and a set of guidelines for researchers, drawing on its experience.

The project also held a wider PPI event in November 2014, inviting participants, family members and referring speech and language therapists to a dissemination and future plans event. Results of the project were discussed and then small groups discussed their views on possible future directions for the research (summary available on request). These are being taken forward as we consider the next stages.

As seen in the ResearchFish submission, there has been on-going engagement of the SLT profession, particularly regionally, who have been engaged in discussion about this project since the outset.

Data sharing statement
See link [https://www.nihr.ac.uk/documents/nihr-position-on-the-sharing-of-research-data/12253] for the NIHR position of the sharing of research data. The NIHR strongly supports the sharing of data in the most appropriate way, to help deliver research that maximises benefits to patients and the wider public, the health and care system and which contributes to economic growth in the UK. All requests for data should be directed to the award holder and managed by the award holder.

Disclaimer
This project is funded by the National Institute for Health Research (NIHR) under its Research for Patient Benefit (RfPB) Programme (Grant Reference Number PB-PG-0609-18074). The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

This project was carried out between March 2011 and November 2014. This final report has not been peer-reviewed. The report was examined by the Programme Director at the time of submission to assess completeness against the stated aims.