Impairment-based therapy for apraxia of speech: a single case study

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Apraxia of Speech (AOS)

- An acquired syndrome subsequent to brain damage (CVA, TBI, neurodegenerative disease) in which person is hypothesised to have impaired translation of phonological representations into specifications for articulation (McNeil et al., 1997)
- Results in impaired co-ordination within & between articulators, within and across segments, hence
  - Segment errors and distortions
  - Poor transitionalisation between segments and syllables
  - Reduced speech rate
  - Altered prosody
  - Articulatory groping, struggle, multiple attempts

Treatment for AOS

- 80+ publications in the literature, but extremely limited evidence for treatment efficacy
- Academy of Neurological Communication Disorders & Sciences (Wambaugh, Duffy, McNeil, Rogers, Robin)
  “Overall the evidence supporting various approaches to the treatment of AOS appeared to be meager and rather weak.”
- Many reports where diagnosis questionable
- Many reports where improvement (if demonstrated) not reliably linked to treatment
  (Committee Update, JMS-LP, 11, 2003)

Clinician-researcher approach

Clinicians involved in cognitive remediation of all types encouraged to design therapy delivery to determine:
1. Whether there is any measurable improvement
2. Whether improvement due to treatment intervention(s) — rather than other factors (e.g. spontaneous recovery, placebo effect)
(Wilson, 1987, 1997)

Aim of this study

To adopt a clinician-researcher approach in order to determine whether everyday therapy for AOS using speech pathologist’s usual techniques improved
1. Speech initiation (reduced blocking and struggle)
2. Single word production
3. Fluency in conversational speech

Case History

FB: Anglo-Australian male retail stock taker (54 years)
Late 2001: CVA, in-patient admission
- Imaging showed L basal ganglia haemorrhage
- Initially anomic with speech sound production errors, but returned to premorbid abilities within a few months (received speech pathology but no details available)
Sept 2002: CVA, in-patient admission
- Imaging showed L parietal infarct
- Similar speech difficulties, resolved within a brief period
Nov 2002: in-patient admission with speech deterioration
- Imaging showed no further infarct but widespread small vessel disease in white matter


Other variables manipulated

Speech task
- 1/3 words elicited in Picture naming, 1/3 in Reading aloud and 1/3 in Repetition at Baseline and Post-test
- To determine whether impairment at a level of speech processing common to all tasks (i.e. subsequent to phonological encoding)

Lexical frequency
- 21 High-frequency words (55.1 / million CELEX spoken)
- 24 Low-frequency words (4.65 / million)
- To determine whether HF words show no advantage Varley & Whiteside (2001) hypothesise that AOS is due to loss of pre-stored articulatory plans for HF syllables

Results: Correct production of words pre- and post-therapy

Results: Rate of multiple attempts pre- and post-therapy

Results: Was FB improving over baseline?

Results: Other variables

Baseline (no. eventually correct & no. attempts)
- Task
  - No difference in no. eventually correct across tasks
  - More attempts in Repetition than Reading and Naming (mean 13.4 vs 12.7 & 11.7 per word)
- Set
  - No difference in no. eventually correct and no. attempts in Treated and Untreated sets
- Frequency
  - No difference in no. eventually correct and number of attempts in High vs Low Frequency
- Frequency X Set Interaction
  - Not significant

Results: Other variables

Post-test (no. correct at first attempt)
- Task
  - Trend for Repetition to be more accurate than Reading and Naming (analysis in progress)
- Set
  - No difference between Treated and Untreated sets
- Frequency
  - More High Frequency words correct than Low frequency words
- Frequency X Set Interaction
  - More High Frequency than Low Frequency words correct in Treated Set. No difference between High and Low Frequency words in Untreated Set.

Results: Conversation

Short samples (approx 250 words) from initial period, baseline, therapy phase and post-test compared for
- total number of recognisable words
- number of syllables (if word incomplete or unrecognisable)
- number of morphemes
- number of adjacent recognisable words
- number of adjacent recognisable words without adjacent repetitions
- Mean length of utterance (MLU) = ratio of recognisable morphemes to utterances (adjacent recognisable words)

Results: Conversation

Correct word production in conversation

MLU in conversation

Summary of Results

- Striking improvement in number of words correct at first attempt (Treated & Untreated sets)
- Decrease in multiple attempts from 14 per word to negligible (Treated & Untreated sets)
- Treated HF words improved more than Untreated HF words (small effect)
- Repetition improved more than Reading and Naming (analysis in progress)
- Measures so far do not demonstrate improvement in conversation in clinical setting (analysis in progress)

Discussion

- FB very positive about effects of speech therapy and his improvement, but no evidence of generalisation to conversation in clinic. Conversation at home could not be assessed because Ps did not make recordings (although suggested by SLP)
- Generalisation to untreated single words but not conversation. Many cognitive therapies show limited generalisation to other contexts

→ Next step for a client like FB would be to explicitly target transfer to conversation