Concurrent Treatment for Reading and Spelling in Aphasia

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Abstract

The therapeutic value of a combined treatment for reading and spelling was examined in an individual with chronic aphasia, alexia, and agraphia. Oral Reading Treatment (ORT) and Copy and Recall Treatment (CART) were implemented to increase reading accuracy and rate for text and to improve spelling accuracy for single words. Results showed improvements for both reading and spelling, and gains were maintained on follow-up probes. Pre- and post-treatment measures indicated generalized improvement in several areas: reading accuracy for new text, reading and writing of functors not targeted in treatment, and increased content and grammatical complexity of spoken language.

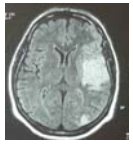
Introduction

Reading and writing impairments often persist in individuals with chronic aphasia. A number of techniques have been shown to improve reading (Cherney, 1986, 1995; Beeson & Insalaco, 1998) and writing skills (Beeson, et al., 2002; Hillis, 1986) in individuals with alexia and agraphia. However, few studies have examined the value of concurrent reading and writing treatments. The goal of the current treatment was to increase reading accuracy and rate for text, and spelling accuracy for single words. In addition, we examined the influence of this treatment on spoken language performance.

Methods

Participant BB

- 58 year-old, right-handed man
- 2 ½ years post large embolic left hemisphere frontoparietal stroke
- Broca's to anomic aphasia (evolved to borderline fluent)
- *Western Aphasia Battery* (WAB) Aphasia Quotient = 77.6
- Single word reading accuracy better preserved than spelling
  - 120-word list presented for oral reading and written spelling
    - Reading = 96% correct; Spelling = 9% correct



Pre- and post-treatment assessments

Reading and Writing	• Gray Oral Reading Test – 3 (GORT-3) • Reading 20 functors • Writing 20 functors
Spoken Language	• WAB picture description • Conversation sample

Treatment

- 16 weeks total
  - Weeks 1-6: 1 time per week for 1 hour (reading treatment alone)
    - Stimuli: Nonfiction passages from SRA (38-90 words)
  - Weeks 7-17: 2 times per week for 1 hour (combined treatment)
    - Stimuli: Personally relevant scripts (73-156 words)
    - Relevant single words chosen from scripts for spelling
- Probe data for reading accuracy and rate and spelling accuracy collected prior to training each new passage.
- Criteria for advancement to new script:
  - *Sessions 1-18:* 90% reading accuracy
  - *Sessions 19-25:* 90% reading accuracy and 60 wpm (rate)

Probes

Reading:

- BB read passage aloud.
  - Reading timed and deviations recorded.
  - Measures: Accuracy (% words correct) and rate (wpm)

Spelling:

- Write target words to dictation (sets of 5 or 10 words)
  - Measure: Accuracy (% spelled correctly).

After probe data were recorded, reading treatment commenced.

Oral Reading Treatment (ORT)

Treatment session:

- Clinician read sentence aloud while pointing to each word.
- BB and clinician read sentence together, pointing to each word.
- BB read sentence alone aloud, pointing to each word.
  - Incorrect productions corrected on-line.
  - Repeat until mastery achieved.

Homework:

Reading homework was assigned to be completed every day using a photo album with a recording feature for each page (Sharper Image ™). Text for each sentence was placed in the album with the corresponding oral recording of the text.

- Play recording and follow along silently.
- Read sentence aloud with the recording until accurate.
- Read sentence aloud until correct.

Copy and Recall Treatment (CART)

CART is a homework-based treatment for spelling that was trained and reviewed during treatment sessions for accountability. A total of 50 words were targeted over the course of treatment.

- Copy each word 3-5 times.
- Write words from memory (recall).
- Check spelling and make corrections.
- Repeat procedure until recall without error.

Results

Reading

- Reading accuracy increased for practiced texts.
- Reading of novel text tended to show increased accuracy.
- Maintenance of gains without repeated practice.

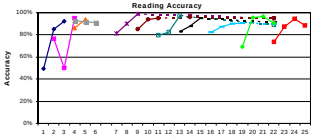


Figure 1: Reading accuracy in percent of words correct for text. Individual passages are plotted separately. Solid lines = probe data collected during treatment of the passage. Dotted lines = follow-up probe data.

- Reading rate consistently increased with repeated practice.
- Follow-up probes showed that rate continued to increase without repeated practice.
- In general it appeared that an increase in reading rate was not at the expense of reading accuracy.

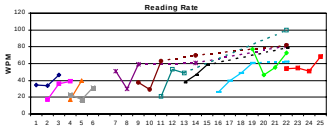


Figure 2: Reading rate in words per minute (wpm). Solid lines = probe data collected during treatment of the passage. Dotted lines = follow-up probe data.

Spelling

- Spelling accuracy increased for targeted sets of words.
- Initial performance for new sets of words improved.

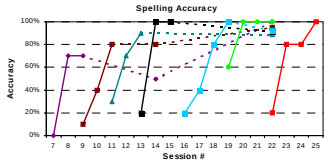
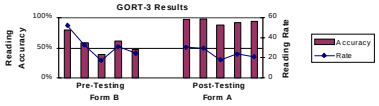


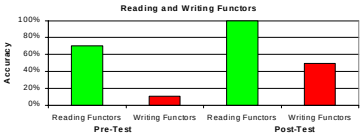
Figure 3: Spelling accuracy at the single word level using CART. Sessions 7-12 = 10 words per set; Sessions 13-24 = 5 words per set. Solid lines = measures taken during treatment of the passage. Dotted lines = follow-up probes.

Pre- and Post-Testing

- GORT-3
  - Reading accuracy increased significantly (t = -6.2; p = .003)
  - No significant change in reading rate (t = 1.85; p = .14)



- Reading functors increased significantly (p = .02)
- Writing functors increased significantly (p = .01)



Spoken Language

WAB picture descriptions and conversation were analyzed for syntactic length and complexity using Systematic Analysis of Language Transcripts (SALT, Miller & Chapman, 2000) and T-unit analysis. Improvements were noted for all domains for picture descriptions, with conversation analysis consistent with those results.

Table 1: SALT analysis of mean length of utterance (MLU) in words and one-word utterances.

	Pre-treatment	During Treatment	Post-treatment	Post-treatment
	WAB picture description			Conversation
MLU in words	3.62	6.32	7.4	9.47
1-wd. utt. (in % of total utt.)	30.77%	4.55%	8.33%	0%

Table 2: Analysis of syntactic length and complexity of spoken picture description and conversation.

	Pre-treatment	During treatment	Post-treatment	Post-treatment
	WAB picture description			Conversation
Words per T-unit	5.00	5.69	5.2	5.96
Subordinate clauses	0	0	0	3 (adverbial)
Productivity	69.1%	64.4%	79.5%	81.7%
Grammaticality of T-units	33% grammatical	100% grammatical	100% grammatical	98% grammatical
Index of syntactic complexity	39%	72%	83.9%	80%

Grammaticality of T-units = (# grammatical T-units / total # of T-units). Index of syntactic complexity = (# of words in T-units / total usable words). Productivity = (# of usable words / # of total words).

Conclusions and Clinical Implications

These results support the value of concurrent reading and spelling treatment in an individual with moderate aphasia. Due to differential impairment of written language processes, reading treatment was implemented at the text level, while spelling was treated at the single-word level. The use of personally relevant scripts provided the context for these treatments, and had the added benefit of improving spoken production for conversation.

- Following treatment, BB's reading accuracy for text remained high, and reading rate continued to improve without additional practice. In contrast, the response to spelling treatment was item-specific and continued practice was required for the maintenance of newly learned spellings.
- It was of interest that spoken language increased in syntactic length and complexity in response to treatment directed only toward reading and spelling. The increased content and grammaticality of spoken utterances was noted both in conversation and picture descriptions. This effect was likely related to the fact that oral reading treatment involved the provision of grammatically correct models that BB rehearsed repeatedly, similar to that observed by Cherney (1995).
- We suggest that concurrent treatments offer an efficient approach to language intervention that may capitalize on interactive cognitive processes. Concurrent treatments such as this may be tailored to the abilities of a wide range of individuals, including those with differential levels of impairments.

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