

## **Efficacy of Repeated Choral Reading for Individuals with Chronic Nonfluent Aphasia**

*Oral Reading for Language in Aphasia* (ORLA) is a treatment technique in which the person with aphasia repeatedly reads aloud sentences and paragraphs, first in unison with the clinician, and then independently. Based on neuropsychological models of reading, ORLA was developed to improve reading comprehension in individuals with aphasia by providing practice in the phonological and semantic reading routes.

However, in preliminary studies, improvements in other modalities, including oral expression, auditory comprehension, and written expression were seen in both fluent and nonfluent aphasia (Cherney, 1996; 2004; Cherney et al., 1986, 1995, 2004). Several explanations for the cross-modal generalization have been suggested, and these may be related to other features of the ORLA technique. For example, ORLA focuses on connected discourse rather than single words, permitting the modeling of more natural rhythm and intonations. It also allows practice on a variety of grammatical structures, rather than just one specific grammatical form. ORLA is consistent with a stimulation approach (Schuell et al., 1964; Duffy & Coelho, 2001), using repetitive multimodality stimulation to elicit a response. It is also consistent with principles of learning theory, such as active participation by the learner, repetitive practice in the overlearning of skills, and use of meaningful materials that are graded in difficulty. ORLA has four levels based on length and reading level: *Level 1*. Simple 3-5 word sentences at a first grade reading level; *Level 2*. 8-12 words that may be single sentences or two short sentences, at a third grade reading level; *Level 3*. 15-30 words, divided into 2-3 sentences, at a sixth grade reading level; *Level 4*. 50-100 words comprising a 4-6 sentence simple paragraph, also at a sixth grade reading level. The graded nature of ORLA therefore makes it appropriate for individuals who present with a broad range of aphasia severities.

This presentation reports the results of ORLA, administered to 25 individuals with chronic nonfluent aphasia of varying severity levels. The possibility that generalization to specific modalities may be related to severity of aphasia is explored.

## **METHODS**

### **Subjects**

25 individuals (16 males; 9 females) with chronic aphasia (more than 12 months post onset ) participated. All subjects were right handed, with at least a 12<sup>th</sup> grade education. Age at time of stroke onset ranged from 25.2 years to 80.36 years, and age at time of initial testing ranged from 35.18 years to 81.65 years. All subjects were classified with nonfluent aphasia, and none were considered clinically to present with global aphasia. However, severity of the aphasia, as determined by the Aphasia Quotient (AQ) of the Western Aphasia Battery varied greatly. Therefore, subjects were divided into three groups based on severity. AQ range for 6 severe subjects was 9.7 – 21.1 (mean = 13.73; SD =3.97); AQ range for 9 subjects in the moderate group was 49.4 – 60.7 (mean = 54.74; SD = 3.53); and AQ range for 10 subjects with mild-moderate aphasia was 66 – 81.5 (mean = 76.84; SD = 5.56).

A delayed treatment design was utilized; therefore all subjects received treatment following a period of no-treatment. Subjects were initially evaluated (Baseline testing) using the Western Aphasia Battery (WAB), four subtests of the Reading Comprehension Battery for Aphasia (RCBA-2), and several discourse measures. RCBA-2 subtests included paragraph level reading (Paragraph-Picture, Paragraph-Factual, Paragraph-Inferential) as well as Functional Reading. Discourse tasks included descriptions of two composite pictures and two narratives based on a series of picture sequences (Nicholas & Brookshire, 1993). The elicited discourse samples were analyzed for rate of speech (words per minute) and informational content (CIU's per minutes). A second assessment (Pre-treatment testing) occurred 7-12 weeks later, following a no-treatment period. Subjects then participated in 24 one-hour sessions of ORLA treatment, typically twice a week. A post-treatment assessment took place immediately after the end of treatment. A comparison of change in scores from baseline to pre-treatment versus pre-treatment to post-treatment provides an index of the efficacy of the ORLA treatment.

## RESULTS

Preliminary statistical analyses for the group as a whole indicated a mean change in AQ test scores from pre- to post-treatment of 3.4 (SD = 4.5) compared to a mean change of -0.36 (SD = 3.1) in the 8-12 week pre-treatment interval.

Since we are interested in how ORLA impacts aphasic individuals of different severity levels, Table 1 presents results for each of the three severity levels. Because of the relatively small numbers of subjects per severity group, statistical analyses have not been conducted – rather trends are discussed in relation to each severity group.

For subjects with severe aphasia, the most noticeable change from pre-treatment to post-treatment was in the WAB Reading scores. Since ORLA was initially designed to improve reading comprehension, this finding is not surprising. A small but noticeable change in reading scores from pre- to post-treatment was also obtained on selected subtests of the RCBA-2. With regard to discourse production, increased rate of speech (words / minute) was found on the picture description task, but responses across subjects were variable.

For subjects with moderate aphasia, mean change on the WAB AQ was greater from pre-treatment to post-treatment as compared to baseline to pre-treatment. However, the mean WAB AQ change from pre- to post-treatment was relatively small, and it is difficult to ascertain the functional significance of this mean change. Examination of individual scores showed that one subject obtained a WAB AQ increase of 16.3 points as compared to pre-treatment and 12.2 points as compared to baseline; two other subjects showed gains of 9.3 points and 4.9 points respectively. Reading comprehension improved on the RCBA-2, but this change was not seen in the WAB reading scores. A greater increase in CIU's per minute, particularly for the narrative discourse, was evident from pre- to post-treatment.

For subjects with mild-moderate aphasia, mean change on the WAB AQ was greater from pre-treatment to post-treatment as compared to baseline to pre-treatment, with 4 of the subjects demonstrating a change of greater than 6 points. The greatest pre-post treatment

change was on the WAB writing and on the discourse measures, with increases noted for both words/minute and CIU's/minute for picture description and narrative discourse tasks.

## DISCUSSION AND CLINICAL IMPLICATIONS

Results indicate that subjects with severe aphasia displayed greatest improvements in reading, while subjects with mild-moderate aphasia displayed changes in writing and in discourse production. These results will be discussed in relation to both group data, as well as in relation to data obtained on individual subject performance. Interpretation of results will also consider the sensitivity of the tests that were used as outcome measures and clinical implications for use of these tests. It is also of interest to note that the severe group was also the oldest group; in addition to the impact of age on outcome, other demographic variables that may affect results will be explored.

Clinical implications regarding intensity of the ORLA treatment also will be addressed. In this study, although the number of treatment sessions was consistent across subjects, the frequency of treatment was low. Greater changes may be anticipated if treatment is administered at a higher frequency and this will be discussed in the light of recent research that suggests the need for high frequency of treatment for individuals with aphasia.

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Table 1. Demographic Information and Test Scores

	Severe Aphasia (AQ < 25)	Moderate Aphasia (AQ 45-65)	Mild-Moderate aphasia (AQ 66-85)
Number of subjects	6	9	10
Males : Females	2 : 4	5 : 4	9 : 1
Age at stroke onset Mean (Std Dev.) Range	66.33 (11.79) 50.21 – 80.36	51.62 (17.59) 25.20 – 78.60	50.59 (9.10) 33.95 – 64.03
Months post onset Mean (Std Dev.) Range	31.98 (24.13) 12.36 – 71.97	71.83 (83.86) 12.16 – 253.21	47.34 (43.38) 12.16 – 138.56
Age at Baseline testing Mean (Std Dev.) Range	69.00 (10.28) 56.22 – 81.65	57.61 (13.46) 39.06 – 79.64	54.54 (10.74) 35.18 – 71.95
WAB AQ – Baseline Pretreatment Post-treatment	13.73 (3.97) 15.73 (4.78) 18.48 (5.06)	54.74 (3.53) 54.91 (6.75) 57.34 (5.93)	76.84 (5.56) 77.63 (6.36) 79.75 (4.71)
WAB Reading – Baseline Pretreatment Post-treatment	29.00 (13.94) 26.83 (14.29) 33.83 (14.03)	61.56 (17.11) 65.89 (15.49) 58.44 (15.93)	85.90 (9.61) 88.40 (9.41) 87.80 (9.34)
WAB Writing – Baseline Pretreatment Post-treatment	8.17 (6.14) 7.42 (6.61) 7.33 (6.06)	38.50 (16.65) 41.22 (17.65) 39.78 (20.22)	69.60 (15.99) 69.35 (17.08) 75.05 (18.66)
RCBA – 4 subtests Baseline Pre-treatment Post-treatment	6.17 (4.75) 6.50 (4.0) 7.50 (6.16)	17.44 (8.60) 17.78 (10.72) 20.22 (10.84)	32.10 (4.12) 31.60 (33) 32.00 (6.63)
Discourse Wds/min Picture description Baseline Pre-treatment Post-treatment	9.58 (7.50) 7.90 (9.47) 12.19 (22.69)	34.15 (21.36) 32.93 (21.36) 33.31 (17.48)	44.85 (19.90) 44.70 (20.89) 55.65 (18.51)
Discourse CIUs/min Picture description Baseline Pre-treatment Post-treatment	0.00 (0.00) 0.00 (0.00) 0.00 (0.00)	10.96 (10.10) 11.55 (8.99) 12.17 (9.13)	26.49 (16.52) 26.11 (13.81) 31.93 (13.49)
Discourse Wds/min Narrative Baseline Pre-treatment Post-treatment	5.37 (4.39) 10.12 (11.17) 11.89 (18.78)	39.44 (19.07) 31.89 (23.27) 35.75 (16.91)	45.82 (17.74) 47.76 (23.64) 55.90 (20.96)

Discourse CIUs/min			
Narrative			
Baseline	0.00 (0.00)	10.90 (9.84)	24.54 (12.67)
Pre-treatment	0.11 (0.27)	10.39 (10.32)	28.73 (15.37)
Post-treatment	0.19 (0.46)	15.18 (12.88)	31.28 (14.52)