Effects of Individual and Group Therapies on Verb Production in Aphasia

Language interventions are frequently classified along a continuum (Paul & Cascella, 2007). At one end of the continuum are impairment-based approaches that aim to remediate a particular language skill. Successful treatments often utilize models of cognitive-linguistic processing and have been shown to improve language performance in individuals with aphasia (Thompson & Shapiro, 2005; Whitworth, Webster, & Howard, 2005, Wertz et al 1981). At the other end of the continuum is the participant-centered approach. These types of interventions place the client at the center of the intervention. Group treatment is a socially oriented intervention and an example of a participant-centered approach. Studies support the use of conversation group treatments to improve language performance in individuals with aphasia (Wertz et al., 1981, Elman & Bernstein-Ellis, 1999b). Considerable evidence exists in the literature to support both these types of interventions and both interventions seek to improve communication in the individual with aphasia (Martin, Thompson & Worrall, 2008). However, there have been no studies that compare the effects of these two approaches .

This study compared the effect of these two approaches on remediation of verb production in aphasia. The goals were 1) to determine if performance on verbs trained in an impairment-based approach, a participant-centered approach, or an integrated context that used both approaches improved to a greater extent, and 2) to determine whether combining these training approaches led to improvements in related language functions and in verbal communication.

Methods

Participants:

Twelve subjects greater than six months post-onset of a single, language-hemisphere dominant cerebrovascular accident participated in this study. Participants ranged in age from 48-70 years (mean=58.8) and time post-onset of stroke from 1.5 to 20 years (mean = 8.75).

Treatment

Three sets of thematically related transitive verbs were created. Each set contained three sets of ten verbs organized according to functional "conversation topics," such as dining, travel, occupation, news/current events (Appendix). Verbs in each category were matched within and across sets of length and frequency (Kucera and Francis, 1967).

Participants were randomly assigned to three treatment groups. Each subject received treatment on each verb set, one in each training condition. Treatment was counterbalanced across subject and training groups.

Individual treatment consisted of a modified version of Verb Network Strengthening Treatment (VNeST; Edmonds et al., 2009). Group treatment followed a conversational format frequently described in the literature (Elman & Bernstein-Ellis, 1999b; Simmons-Mackie et al, 2008).

Outcome measures

The following language measures were obtained at two intervals pre- and two intervals post-treatment: *Philadelphia Naming Test*, Short Form (PNT; Walker & Schwartz, 2012), *Northwestern Verb Naming Test* (VNT; Thompson, 2002), *Psycholinguistic Assessment of Language-Sentence Production* (PAL; Caplan & Bub, 1990), and a story generation task for two minutes in response to a standardized picture: (Nicholas and Brookshire, 1993). An informal verb probe was administered ten times throughout the study: week 1, weeks 5 – 12, and week 16. The probe contained photographs of the target 81 verbs organized by

category. The categories in the verb probes were presented in random order each week to minimize a learning effect. The *Assessment of Living with Aphasia (ALA;* Kagan et al, 2010) and the *American Speech-Language and Hearing Association Functional Assessment of Communication (ASHA FACS*; Fratalli et al, 1995) were obtained once pre- and once post-treatment.

Results

<u>Treated verbs</u>

Accuracy in producing the treated verbs was analyzed in a logistic regression with the factors of time and treatment type. There was a significant effect of time: there was non-significant change in performance in the pre-treatment weeks 1- 4, a significant effect in weeks 5-12 and a significant effect at the post treatment week 12 (Table 2 and Figure 1). Accuracy improved during the treatment period and deteriorated post treatment. There was no significant effect for treatment type, and no interaction of treatment type and time.

Table 1 and Figure 1 here

<u>Language measures</u>

The Friedman test statistic showed that there was a difference over time for the four language measures: PNT, VNT, PAL Sentence Production, and the Verb Probe. Wilcoxon signed-rank tests showed statistically significant treatment effects for all measures from pre- to post-treatment and not for either the two pre- or two post-treatment tests. (Table 2, Figure 2).

Table 2 and Figure 2 here

<u>Discourse Production</u>

Performance on the picture description task was scored as percent correct information unit (total number of new correct information words divided by total number of words: Nicholas and Brookshire, 1993). The Friedman test statistic showed that there was a difference over time for the percent CIU, the number of verbs produced, and the number of complete sentences. Wilcoxon signed-rank tests showed statistically significant change in the number of complete sentences from pre- to post-treatment and not for either the two pre- or two post-treatment tests, and a trend towards a change in the percent CIU from pre- to post-treatment and not for either the two pre- or two post-treatment tests (Table 3, Figure 3).

Table 3 and Figure 3 here

Functional Communication and Quality of Life Measures

The Wilcoxon Signed-Ranks test statistic showed significant improvements on the Assessment of Living with Aphasia (z=1.964, p=.05) on the ASHA FACS (Z=-2.136, p=.03) when comparing pre-treatment and post-treatment scores.

Discussion

Results indicate that treatment of verb production provided a positive change in producing the treated verbs during the treatment period, which was not sustained a month post-treatment. There was an improvement in producing other verbs and nouns, and in producing sentences, during the treatment period, all of which were sustained a month post-treatment. There was an increase in the number of complete sentences produced in narratives, and a trend towards a greater proportion of correct information units during the treatment period. The ALA and ASHA FACS showed significant changes in scores pre-post treatment. These results indicate that the treatments were effective in producing improved language abilities, that individuals who

interacted with these pwa noticed a change in the their functional communication, and that the participants identified a lesser impact of aphasia on their quality of life following treatment.

The primary focus of this study was to compare different treatment approaches. Analysis of the verb probe data revealed that there was no significant difference between performance on verbs in each treatment condition -- all trained verbs improved regardless of whether they were trained exclusively in individual or group conditions or whether they were trained in the combined condition.

These findings demonstrate improved linguistic and psychosocial changes as a result of the treatments used. While the results did not demonstrate superior outcomes for verbs trained in a combined manner in comparison to those trained exclusively in an individual or group environment, this is likely because this study did not control the environment sufficiently. Given the generative, participant-oriented style of the group treatment, many individual verbs were also produced in the group condition. To better understand the specific benefits of each training environment, a randomized controlled study should be undertaken using different participants in each condition.

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Table 1 Effects of Treatment Condition Over Time on Production Trained Verbs

Source	DF	Chi-Square	Significance
Treatment	2	3.64	0.16
Week	1	0.10	0.75
Week*Treatment	2	4.57	0.10
Week 5	1	8.23	<0.01
Week 5*Treatment	2	4.09	0.13
Week 12	1	10.14	<0.001
Week 12*Treatment	2	1.25	0.54

Table 2 Changes in Linguistic Measures over Time

Measure	Interval	Test Statistic	Significance
PNT	Friedman test: Four baselines	χ^2 25.486	**<.001**
	Wilcoxon: pre tx baselines	Z=-.679	.497
	Wilcoxon: pre-post tx	Z=-2.866	**.004**
	Wilcoxon: post tx baselines	Z=-.119	.905
VNT	Friedman test: Four baselines	χ^2 30.273	**<.001**
	Wilcoxon: pre tx baselines	Z=-.1.483	.138
	Wilcoxon: pre-post tx	Z=-3.062	**.002**
	Wilcoxon: post tx baselines	Z=-1.069	.285
PAL Sent Prod.	Friedman test: Four baselines	χ^2 10.421	**.015**
(No. of sentences)	Wilcoxon: pre tx baselines	Z=-.406	.684
	Wilcoxon: pre-post tx	Z=-2.375	**.018**
	Wilcoxon: post tx baselines	Z=-1.612	.107
Verb Probe	Friedman test: Four baselines	χ^2 31.119	**<.001**
	Wilcoxon: pre tx baselines	Z-1.616	.106
	Wilcoxon: pre-post tx	Z=-3.063	**.002**
	Wilcoxon: post tx baselines	Z=-.1.584	.113

Table 3 Changes in Discourse Production Over Time.

Measure	Interval	Test Statistic	Significance
Percent CIU	Friedman test: Four baselines	χ^2 9.113	**.028**
	Wilcoxon: pre tx baselines	Z=-.445	.657
	Wilcoxon: pre-post tx	Z=-1.690	**.09**
	Wilcoxon: post tx baselines	Z=-.204	.838
No. of Verbs Produced	Friedman test: Four baselines	χ^2 8.912	**.03**
	Wilcoxon: pre tx baselines	Z=-1.911	.056
	Wilcoxon: pre-post tx	Z=-.806	.420
	Wilcoxon: post tx baselines	Z=-.476	.634
No. of Complete Sentences Produced	Friedman test: Four baselines	χ^2 16.986	**<.001**
	Wilcoxon: pre tx baselines	Z=-1.236	.216
	Wilcoxon: pre-post tx	Z=-2.558	**.011**
	Wilcoxon: post tx baselines	Z=-1.000	.317

Figure Captions:

Figure 1: Changes in Production of Treated Verbs over Time, by Treatment Condition

Figure 2: Changes in Language Measures Over Time

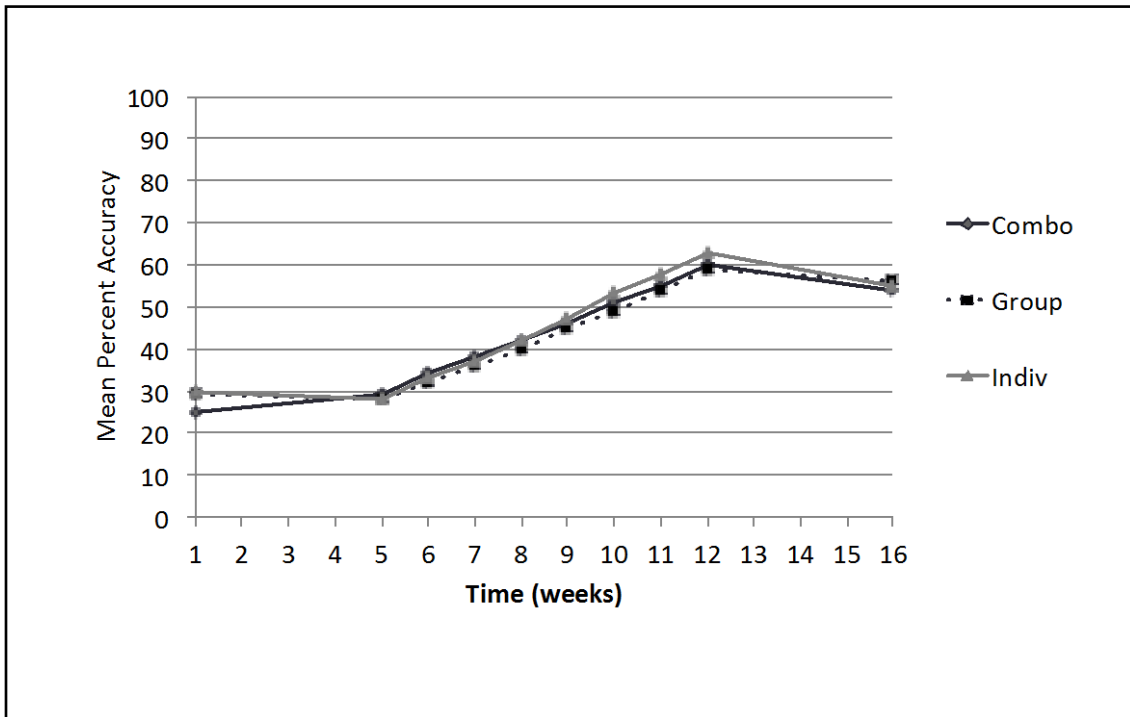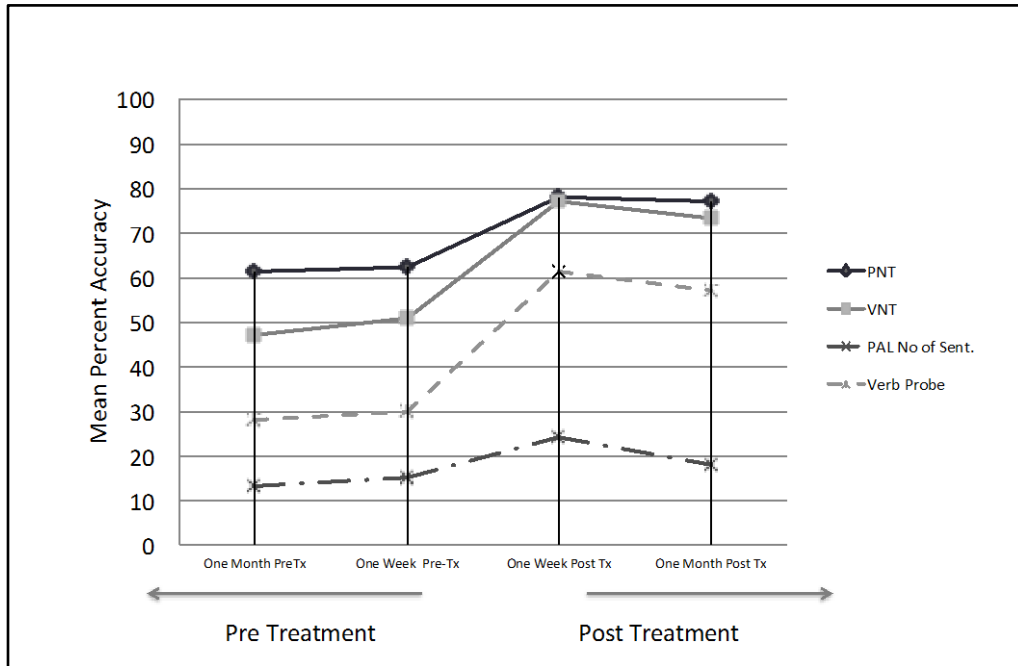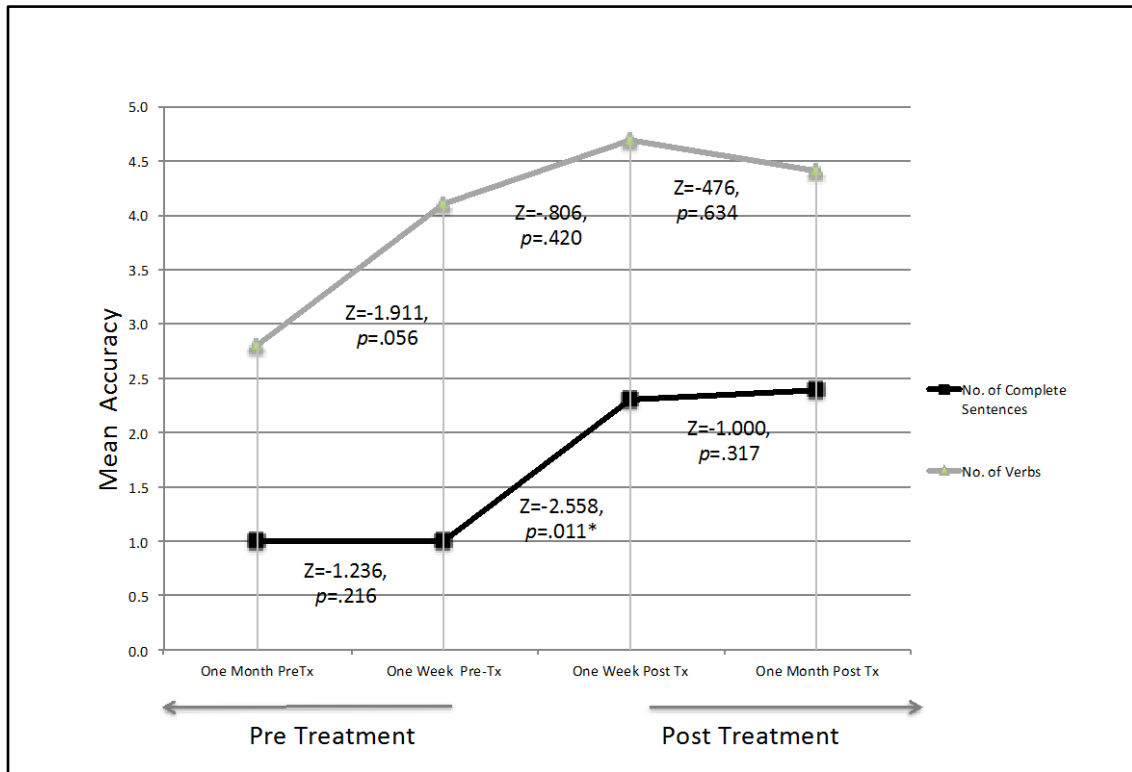Figure 3: Changes in Discourse Production Over Time

Figure 1

Figure 2

Figure 3

APPENDIX

Verb Categories: Example for Subject Group 1

Individual Treatment Verbs:

Dining	*Hobbies*	*Sports*
Wipe	Cook	Finish
Choose	Collect	Play
Drink	Read	Start
Eat	Paint	Hit
Order	Draw	Pass
Pay	Find	Race
leave	Walk	Catch
Taste	Build	Run
Share	Dance	Score

Group Treatment Verbs:

Travel	*Communication*	*News/Events*
Miss	Meet	Vote
Search	Call	Charge
Carry	Hear	Protest
Board	Fight	Lost
Change	Show	Judge
Visit	Marry	Stop
View	Kiss	Free
Buy	Answer	Arrest
Remember	Tell	Attack

Combined Treatment Verbs:

Occupation	*Household*	*Healthcare*
Bake	Break	Pack
Sell	Clean	Prescribe
Count	Hold	Push
Save	Move	Check
Teach	Open	Test
Repair	Polish	Weigh
Write	Slice	Take
Own	Wash	Rest
Sort	Sweep	Scan