Although all individuals with aphasia have difficulty retrieving words, patterns of lexical access impairment vary in different types of aphasia. The ease with which words are retrieved depends on many factors, including characteristics of the words themselves and the eliciting stimuli, and characteristics of the speaker's aphasia profile. One factor that is receiving an increasing amount of attention is the context in which words are being retrieved. It has long been noted, for example, that individuals with non-fluent aphasia have more difficulty retrieving the same words in connected speech tasks than in single-word naming tasks, whereas individuals with fluent aphasia often show the opposite pattern (e.g. Pashek & Tompkins, 2002; Schwartz & Hodgson, 2002; Williams & Canter, 1982).

This dissociation can be explained by a difference in the underlying impairment that gives rise to word retrieval impairments in non-fluent agrammatic aphasia and fluent anomic aphasia. One explanation is that word retrieval in naming relies primarily on input from the semantic features of the target word, and that this semantic input is disrupted in anomic aphasia; by contrast, word retrieval in connected speech relies more heavily on input from syntactic-sequential cues—that is, input from the syntactic requirements of the sentential framework, as well as semantic association cues from the context—and this input is hypothesized to be disrupted in agrammatic aphasia (Barde, Schwartz, & Boronat, 2006; Gordon & Dell, 2003).

Following on these hypotheses, the current study compares the effects of two therapy approaches on lexical access deficits in agrammatic aphasia. It is proposed that, if the word retrieval impairment of those with agrammatism is related to weakened syntactic-sequential cues, then a treatment approach which strengthens the relationships among words in context should improve lexical access in these subjects more than a therapy approach designed to strengthen only the semantic relationships of a target word.

Subject. The first participant (Ag1) was an 18-year-old girl who suffered a left hemisphere CVA 14 months prior to the onset of the study, resulting in moderately severe Broca's aphasia. Her output consisted primarily of single words and short automatic phrases, and demonstrated other characteristics of agrammatism, such as particular difficulty producing function words.

 Therapy Protocol. The Semantic Treatment condition, similar to Semantic Feature Analysis (SFA, Boyle & Coelho, 1995), explicitly focused on strengthening the associations between a target word and its prototypical semantic characteristics. The subject first named a picture of the target word, then described four semantic features of the item. These features were reviewed by the clinician, and the subject named the picture again, with cueing as necessary. In the Contextual Treatment condition, the same protocol was followed but, instead of describing the item's semantic features, the subject listened to a story about the target word, then attempted to retell the story, thus implicitly strengthening the target word's syntactic and semantic associations with other words in the story.

Each condition included a training set of 40 words, divided into 5 semantic categories with 8 exemplars in each category. In addition to these treated words, there were two untreated exemplars in each semantic category, to test for within-category generalization. The categories in the Semantic Treatment were different from the categories in the Contextual Treatment, to minimize the likelihood of generalization across treatment conditions. In addition, the stimuli in the two conditions were matched on frequency of occurrence and length. Both treatments were

administered in each session, their order counter-balanced. Treatment occurred twice weekly for a total of 17 sessions, representing six cycles throught the two treatment sets.

Hypotheses. It was hypothesized that Ag1 might benefit from the Semantic Treatment, since Coelho and colleagues have shown beneficial effects of SFA for both fluent and non-fluent aphasic subjects (Boyle & Coelho, 1995; Coelho, McHugh, & Boyle, 2000; Conley & Coelho, 2003), and might also show some generalization of these benefits to untreated items in the same semantic categories (see Conley & Coelho, 2003). However, improvement—if achieved—was not expected to generalize to connected speech tasks. On the other hand, the Contextual Treatment was predicted to facilitate *greater* gains in word retrieval of treated items than the Semantic Treatment, to the extent that it directly addresses the underlying impairment in agrammatism. Hearing and producing the target items within specific syntactic/semantic contexts was expected to strengthen the associations of the target words with other words with which it occurs in grammatical contexts. Furthermore, although generalization was not expected to occur to untreated items within the same semantic categories, generalization in this treatment condition was expected for the retrieval of content words in connected speech.

Results. At the initiation of treatment, Ag1 was able to name about 40% of the items in each treatment set (38% of Contextual items and 43% of Semantic items). By the end of the treatment period, her naming had improved to 60% for the Contextually Treated items and 73% for the Semantically Treated items (see Figure 1). These gains had dropped slightly, to 53% and 65% respectively, by the maintenance probe two months later. Untreated items in the Semantic condition also improved from baseline, but untreated items in the Contextual condition did not, as predicted. In connected speech tasks (picture description and story retelling) conducted during post-testing, Ag1 did not show the expected improvement in production of content words, but did show a significant improvement in the production of function words, used to connect content words into utterances.

Discussion. Both treatment approaches were effective for this subject. However, contrary to expectations, the Semantic Treatment was at least as effective as the Contextual Treatment. There are several possible reasons for such an outcome. It may be, for example, that the efficacy of both treatments relies on the same mechanism, such as the repetition of the target word during treatment, or the strengthening of semantic-associational cues. Results, if replicated, call into question either the hypothesized mechanisms of the two therapy approaches, or the hypothesized deficit underlying word retrieval impairments in agrammatic aphasia. Nevertheless, it was encouraging to note that word retrieval was facilitated by the previously untested Contextual Treatment, an approach that is arguably more representative of actual language use than other naming treatments. Improvements in connected speech tasks following treatment suggest that the Contextual Treatment may facilitate the connection of words to form utterances, although the improvement cannot unequivocally be attributed to the Contextual Treatment.

Follow-up. A replication of this treatment study is being completed with a second agrammatic participant (Ag2) to test the generality of the effects found with Ag1, and further clarify the mechanisms of the Contextual Treatment approach. In the replication, some of the shortcomings in the original protocol were addressed to increase the reliability of the generalization effects. Final data from this participant are currently being collected. Depending on the outcome of this treatment, the study will be extended to participants with anomia, to test the corollary hypothesis that the Semantic Treatment condition should result in greater gains in word retrieval than the Contextual Treatment in these subjects.

Figure 1. Naming performance of Ag1 across stimulus sets.
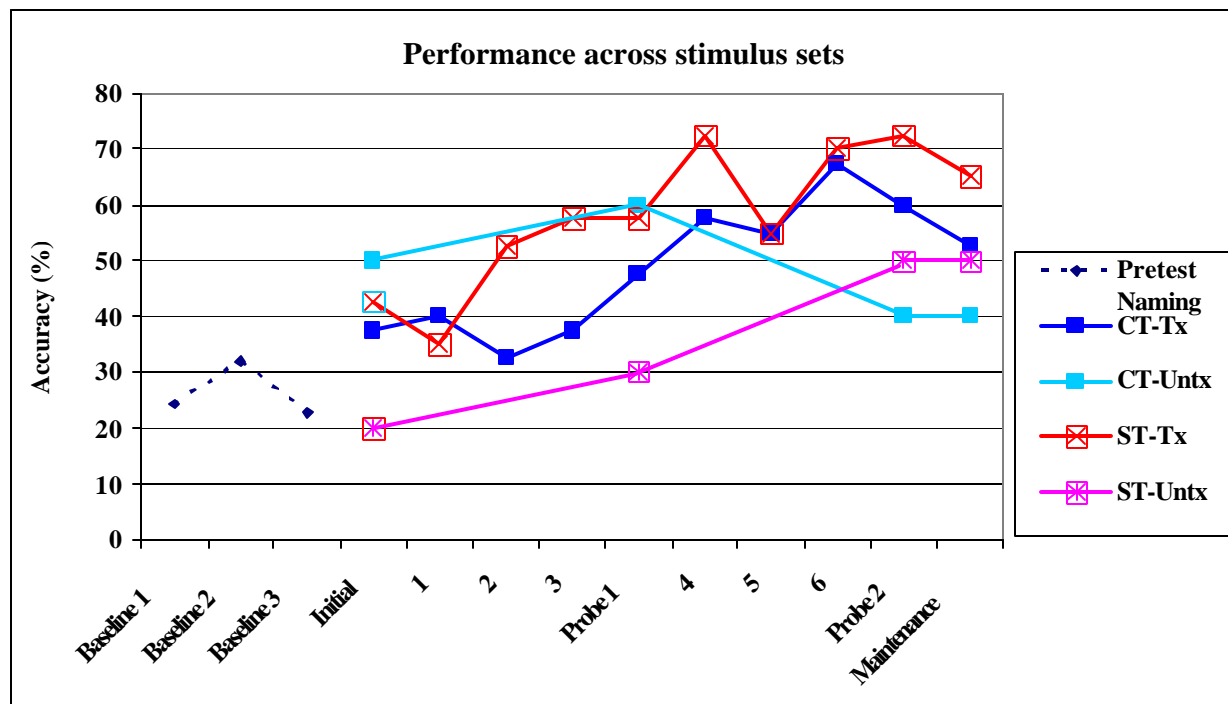
References

Barde, L. H. F., Schwartz, M. F., & Boronat, C. B. (2006). Semantic weight and verb retrieval in aphasia. Brain and Language, in press.

Boyle, M., & Coelho, C. A. (1995). Application of semantic feature analysis as a treatment for aphasic dysnomia. American Journal of Speech-Language Pathology, 4, 94-98.

Coelho, C. A., McHugh, R. E., & Boyle, M. (2000). Semantic feature analysis as a treatment for aphasic dysnomia: A replication. Aphasiology, 14(2), 133-142.

Conley, A., & Coelho, C. A. (2003). Treatment of word retrieval impairment in chronic Broca's aphasia. Aphasiology, 17(3), 203-211.

Gordon, J. K., & Dell, G. S. (2003). Learning to divide the labor: An account of deficits in light and heavy verb production. Cognitive Science, 27, 1-40.

Pashek, G. V., & Tompkins, C. A. (2002). Context and word class influences on lexical retrieval in aphasia. Aphasiology, 16(3), 261-286.

Schwartz, M. F., & Hodgson, C. (2002). A new multiword naming deficit: Evidence and interpretation. Cognitive Neuropsychology, 19(3), 263-288.

Williams, S. E., & Canter, G. J. (1982). The influence of situational context on naming performance in aphasic syndromes. Brain and Language, 17, 92-106.