CLINICAL APHASIOLOGY CONFERENCE 2009

A New Treatment for Aphasia? Borrowing from the Field of Foreign Language Learning

Introduction

New evidence has emerged that highlights the importance of the right (unaffected) hemisphere in language recovery after a left hemisphere stroke resulting in aphasia. There is a substantial literature examining the 'holistic' approach to the treatment of aphasia, in which right hemisphere mediation is presumably invoked (Ansaido et al., 2002; Basso et al., 1989; Heiss et al, 1999; Jodzio et al., 2005; Karbe et al., 1998; Papanicolaou et al., 1988; Tabuchi et al., 1998; Thompson, 2000; & Winhuisen et al., 2007).

From the field of foreign language education, a new method of teaching has emerged which relies on a holistic approach to language acquisition, as opposed to the analytical traditional approach. Called Total Physical Response (TPR), this method theorizes that language is learned most quickly and effectively when paired with movement (Asher, 2000). TPR instruction is conducted in a relaxed setting and the primary emphasis is placed on listening comprehension; language is presented in chunks and combined with gestures and movement.

The TPR methodology lends itself to aphasia treatment. During recovery from a left hemisphere stroke, it is important to recruit the intact right hemisphere which may aid neural reorganization and support language recovery. The TPR methodology recruits both hemispheres equally. Therefore, it is reasonable to apply TPR principles to the treatment of aphasia.

Methods

A single subject, alternating treatment design was utilized.

The alternating type design was chosen for two reasons. The nature of the design allowed us to choose two sets of stimuli (Set One and Two) and to target one at a time. In the first condition, Set One was the focus of treatment; Set Two became a control that allowed us to monitor whether generalization of language principles had occurred. For example, in Set One, the preposition "with" was included in the phrase "point with your finger". In Set Two, the same preposition was used in "tap with a ruler".

The second advantage of the alternating type is that once criterion is met and sets are switched, retention of learned materials can be observed. When Set Two was introduced and Set One withdrawn, the latter became a control to monitor retention of learned language structures. Because TPR is advocated for its long term retention, this phase was of particular interest to us.

The study was designed to answer three questions:

1. Does the language improvement generalize, as evidenced by spontaneous improvement of control stimuli (Set Two)?
2. Will the improvement be maintained during the withdrawl phase?
3. Do family members report a significant increase in functional communicative status as a function of TPR therapy?

Subject

The subject was a 69 year old white man with a history of seizures and multiple strokes. The first stroke in 2002 did not result in a noticeable language deficit. The second hemorrhagic stroke in 2005 resulted in a severe fluent aphasia. The subject did not receive speech therapy services for two years.

Measures

The following measures were used as pre-and post-treatment evaluation measures: The Western Aphasia Battery (WAB) (Kertesz, 1982), for an overall evaluation of language status, The Communication Effectiveness Index (CETI) (Lomas et al., 1989) for functional communication, The Aphasia Depression Scale (Benaim, Cailly, Perennou, & Pelissier, 2004), for emotional status, and Correct Information Units (CIUs) to evaluate the informativeness and efficiency of speech (Nicholas & Brookshire, 1993).

Stimuli

8 short sentences were chosen for a comprehension task. In compliance with TPR rules, all vocabulary was manipulable: the nouns were concrete (e.g. table, chin), and the verbs were simple (e.g. point, rub). The sentences included basic prepositions such as "inside", and "under". The following is an example of a stimulus, "Put the pen under the Book". Realia (object representations) were present at every session. Comprehension was measured by a complete response to the stimulus; no partial credit was accorded. Baseline (Phase A) was measured at three separate points in time, averaging 23.33%.

Procedures

Of the 8 sentences, 4 were chosen for Set One and the other 4 for Set Two. During each session, the four target sentences were presented in a typical TPR sequence:

1. the task was modeled as the sentence was repeated
2. modeling was faded gradually
3. verbs were combined with the nouns and prepositions of all other sentences to create new sentences
4. Humor was included in the creation of new sentences (e.g. "put your chin under the book.")
5. The session was kept active, fun and stress-free; when auditory overload became apparent, we switched tasks immediately.

Probes were taken at every session. When criterion was met (accuracy of 80% or more over 3 sessions), we switched sets.

Results

For this pilot study, the subject participated in 11 TPR-based therapy session (after baseline). Figure One shows the daily progress of the subject. By the 4th session, there was a clear and dramatic improvement in performance on both Set One (Targeted) and set Two (Untargeted) stimuli, with the subject achieving 80%, followed by 100% and 80% on Set One stimuli, and 60%, 40%, 60% on untargeted ones.

On the first day of administration of the new set of sentences, the probe showed 80% accuracy which was consistent over the next three sessions. Accuracy levels on the old stimuli were 100%, 80%, 60% and 80%.

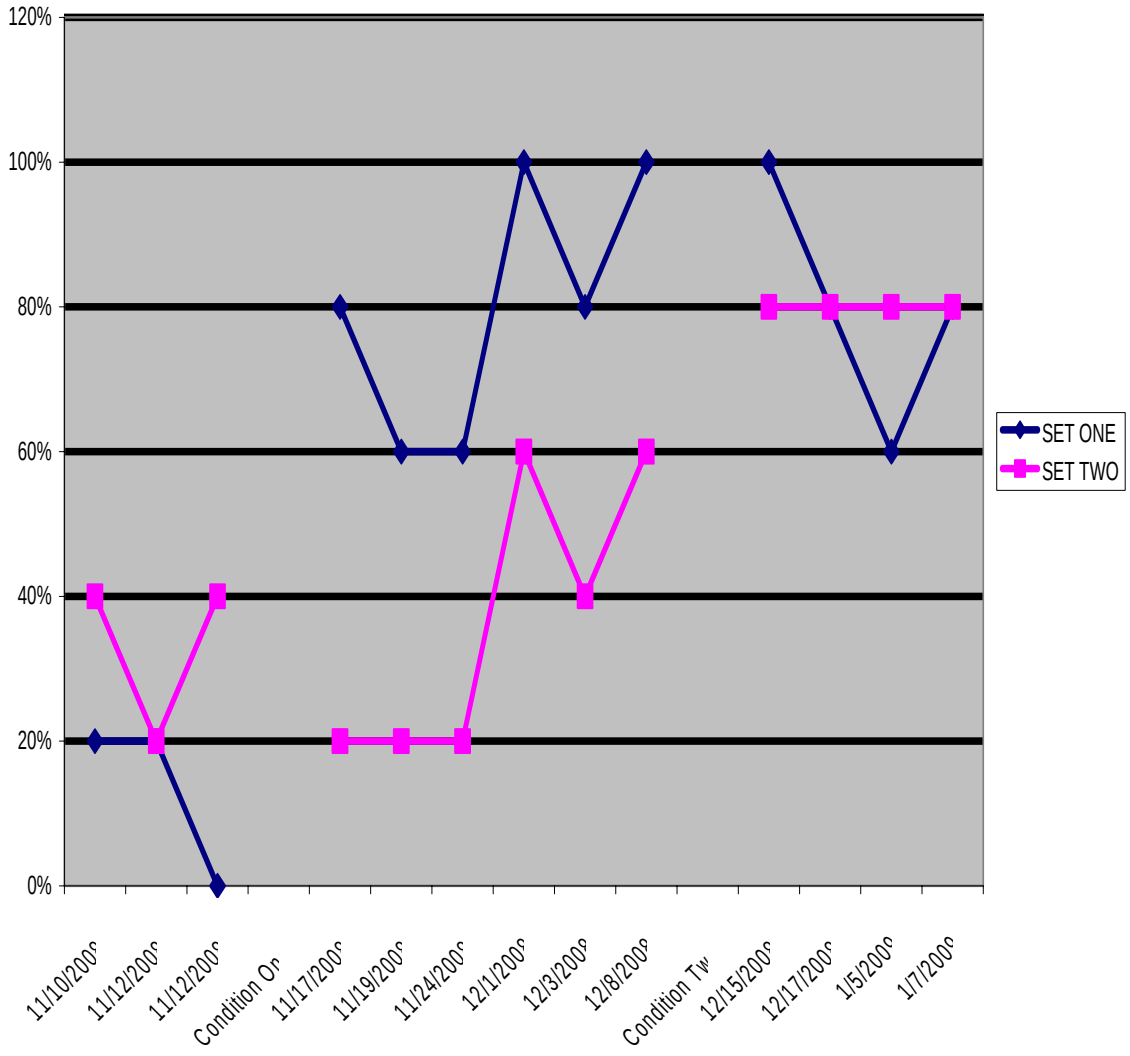
Discussion

We began this pilot study with three research questions to help us determine the usefulness of TPR-based aphasia therapy. The first question was whether language improvement generalizes, as evidenced by improvement of control stimuli (Set Two). Examination of Figure 1 shows that after three TPR-based therapy session, the subject improved his scores of Set Two (untreated stimuli) to 60%, 40%, and 60%. The average accuracy is 56.7%. However, this represents an accuracy level well above chance. To get a correct score, the subject was required to show comprehension of all the elements of the sentence; no partial credit was accorded. Therefore, for "set the pen near the ruler," the nouns "pen" and "ruler", the verb "set", and the preposition "near" were to be demonstrated. We conclude that these accuracy levels are substantive and indicative of generalization.

The second question was whether improvement would be maintained during the withdrawal phase. Once Set One was no longer treated (withdrawal), accuracy levels (see Figure 2) were measured at 100%, 80%, 60%, and 80%. The average accuracy level across the sessions was 80%, and the duration of the withdrawal phase was three weeks. We conclude that the language learned was maintained during this phase.

The findings suggest that TPR as a treatment for aphasia should be evaluated in a larger study comparing this new therapy with tradition speech therapy approaches.

Figure 1: Daily TPR-based therapy data



References

Ansaido, A.l., Arguin, M., & Roch lecours, A. (2002). The contribution of the right cerebral hemisphere to the recovery from aphasia: a single longitudinal case study. *Brain lang*, 82(2), 206-222.

Asher, J.J. (2000). *Learning Another Language through Actions* (6 ed): Sky Oaks Productions, Inc.

Basso, A., Gardelli, M., Grassi, M.P., & Mariotti, M. (1989). The role of the right hemisphere in recovery from aphasia. Two case studies. *Cortex*, 25(4), 555-566.

Beanim, C., Cailly, B., Perennou, D., & Pelissier, J. (2004). Validation of the aphasic depression rating scale. *Stroke*, 35(70, 1692-1696.

Heiss, W.D., Kessler, J., Thiel, A., Ghaemi, M., & Karbe, H. (1999). Differential capacity of left and right hemispheric area for compensation of poststroke aphasia. *Ann Neurol*, 45(4), 430-438.

Jodzio, K., Dum, D.A., Nyka, W.M., .Lass, P., & Gasecki, D.(2005). The contribution of the left and right hemispheres to early recovery from aphasia: a SPECT prospective study. *Neuropsychol Rehabil*, 15(5), 588-604.

Karbe, H., Thiel, A., Weber-Luxenburger, G., Herholz, K., Kessler, J., & Heiss, W.D. (1988). Brain plasticity in poststroke aphasia: what is the contribution of the right hemisphere? *Brian lang*, 64(2), 215-230.

Kertesz, A., (1982). Western Aphasia Battery. Harcourt brace Jovanovich, Inc.

Lomas, J., Pickard, L., Bester, S., Elbard, H., Finlayson, A., & Zoghaib, C. (198(). The communicative effectiveness index: development and psychometric evaluation of a functional communication measure for adult aphasia. *J Speech hear Disord*, 54(1), 113-124.

Nicholas, L.E., & Brookshire, R.H. (1993a). A system for quantifying the informativeness and efficiency of the connected speech of adults with aphasia. *J Speech hear Res*, 36(2), 338-350.

Papnicolaou, A.C., Moore, B.D., Deutch, G., Levin, H.S., Eisenberg, H.M. (1988). Evidence for right-hemisphere involvement in recovery from aphasia. *Arch neurol*, 45(9), 1025-1029.

Tabuchi, M., Fujii, T., yamadori, A., Onodera. K., & Endou, K. (1998). [The role of the right hemisphere on recovery from Wernicke's aphasia]. *No To shinkei*, 50(4). 355-359.

Thompson, C.K. (2000). Neuroplasticity: evidence from aphasia. *J Commun Disord*, 33(4), 357-366.

Winhuisen, L., Thiel, A., Schumacher, B., Kessler, J., Rudolf, J., Haupt, W.F., & Heiss, W.D. (2007). The right inferior frontal gyrus in poststroke aphasia: a follow-up investigation. *Stroke*. 38: 1286-1292.