A metaphor comprehension intervention for patients with right hemisphere brain damage: A pilot study

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Lundgren, K., Brownell, H., Roy, S., & Cayer-Meade, C. (2006). A Metaphor Comprehension Intervention for Patients with Right Hemisphere Brain Damage: A Pilot Study. *Brain and Language*, *99(1-2)*, 69-70. doi: 10.1016/j.bandl.206.06.044

Made available courtesy of Elsevier: http://dx.doi.org/10.1016/j.bandl.2006.06.044

Abstract:

This intervention program addresses an important need in the clinical literature: tools for remediation of communication deficits associated with right hemisphere brain damage (RHD). Our program is motivated by the literature documenting non aphasic communication deficits, including deficits in metaphor comprehension, subsequent to RHD (Joanette et al., 1990, Myers, 1999 and Tompkins, 1995). The intervention is based on two themes. One is that RHD, particularly in posterior regions, limits a patient's ability to process "coarse grained" semantic information such as, for example, weak or connotative associations between words (Beeman, 1998). A second notion is that lesion in frontal regions (in either hemisphere) can affect working memory and thereby curtail a patient's ability to review information and to select the most relevant alternative from a set (e.g., Tompkins, Bloise, Timko, & Baumgaertner, 1994). For example, the concepts "family" and "cradle" each give rise to several associations, as illustrated in the figure below. The metaphor "a family is a cradle" works if a listener can generate a broad range of associations to each concept and, then, can identify appropriate shared associations, such as safety and comfort.

Keywords: Metaphor | Figurative language | Right hemisphere brain damage

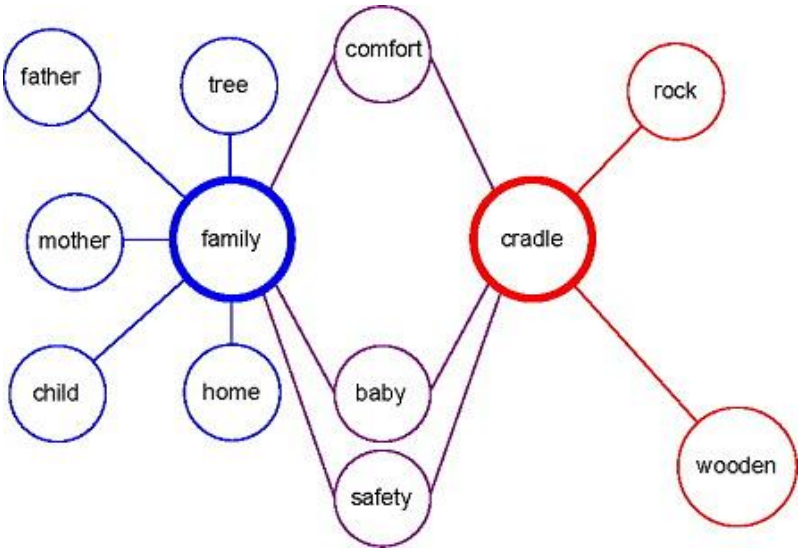
Article:

Introduction

This intervention program addresses an important need in the clinical literature: tools for remediation of communication deficits associated with right hemisphere brain damage (RHD). Our program is motivated by the literature documenting non aphasic communication deficits, including deficits in metaphor comprehension, subsequent to RHD (Joanette et al., 1990, Myers, 1999 and Tompkins, 1995). The intervention is based on two themes. One is that RHD, particularly in posterior regions, limits a patient's ability to process "coarse grained" semantic information such as, for example, weak or connotative associations between words (Beeman, 1998). A second notion is that lesion in frontal regions (in either hemisphere) can affect working memory and thereby curtail a patient's ability to review information and to select the most relevant alternative from a set (e.g., Tompkins, Bloise, Timko, & Baumgaertner, 1994). For example, the concepts "family" and "cradle" each give rise to several associations, as illustrated in the figure below. The metaphor "a family is a cradle" works if a listener can generate a broad range of associations to each concept and, then, can identify appropriate shared associations, such as safety and comfort.

Outline of intervention program

The intervention program is based on a simple mode of representing semantic relations in words and narrative that has been used extensively with children, Thinking Maps® (Hyerle, Innovative Learning Group, 1995). Thinking Maps® are visual-verbal learning tools that provide graphic, completely explicit, visual representations of the features shared between words that provide a potential basis for metaphor. This mode of graphic computer display, which is well within the visuospatial abilities of most brain-injured patients more than a few weeks post onset of their illness, allows easy tabulation and evaluation of word meaning such that the ingredients of this type of metaphor are available in concrete form for practice and review. Intervention items are presented to patients using two types of Thinking Maps®, the single bubble map and the double bubble map, which is shown below. The graphic format consists of one or two large circles (bubbles) and, from each, up to eight short lines to smaller circles (bubbles).



The intervention program uses a single-subject experimental design. For some patients, we measure baseline performance (10 sessions) on metaphor interpretation prior to starting intervention. Assessments of metaphor interpretation continue during and after intervention and provide the primary data for analysis. For other patients we use an extended baseline (20 sessions) prior to intervention for purposes of controlling for gains due solely to the periodic assessments (rather than intervention). Intervention consists of tasks tapping (1) difficulty generating typical rather than personalized associations to single words using a single bubble map (an initiation problem that is likely correlated with working memory performance and with lesion to frontal regions); (2) difficulty evaluating certain types of weak, "coarse grained" associations again using a single bubble map (a deficit tentatively linked to apprehension of connotation and with lesion to posterior regions); and (3) difficulty selecting from a set of alternatives associations shared between two words and illustrated using a double bubble map (a deficit related to working memory and lesion to frontal regions). Patients may have difficulty with one or more component task and may require varying amounts of training to reach criterion for task completion.

We have developed a pool of 250 items for intervention tasks and assessments.

Comprehensive speech and language and neuropsychological testing is completed on all patients prior to entry into the protocol and, again, after completion of the program. Testing includes assessment of working memory, neglect, visuospatial ability, sensitivity to connotative word meaning and comprehension of nonliteral sentences using the Familiar and Novel Language Comprehension Test (FANL-C, Kempler and Van Lancker, 1996).

Patients and results

This program has been completed with one stroke patient and initiated with three others, all of whom pre-intervention showed impaired comprehension of nonliteral sentences. Patients were from 60 to 77 years old and from 2 to 25 years post onset of their stroke, and had from 12 to 18 years of education. All patients displayed to some degree characteristics associated with right-sided disease: denial of deficits, disinhibition, inappropriate remarks, personalization, literalness, and decreased empathy.

Results obtained to date suggest that significantly impaired RHD patients are capable of carrying out all of the component tasks and that they find the protocol sufficiently interesting to remain with the program to its completion. One patient for whom testing is complete displayed clear evidence of a response to the intervention as demonstrated by his ability to reach criterion on all intervention tasks and his improved post-training performance on a metaphor interpretation. This patient's visuospatial performance did not change noticeably over the course of intervention, ruling out any general recovery effect as an explanation for the improvement on metaphor interpretation.

Implications

The results suggest a means to improve metaphor performance of individuals with RHD, even years post stroke, and, more generally, suggest an approach to treating deficits associated with RHD. This intervention approach can be adapted for use with patients with brain damage due to various etiologies such as traumatic brain injury.

Acknowledgments

This work was supported by NIH Grants R21 DC007165, P30 DC05432, and RO1 DC0520702 from the National Institute on Deafness and other Communication Disorders.

References

Beeman, M. (1998). Coarse semantic coding and discourse comprehension. In M. Beeman & C. Chiarello (Eds.), Right hemisphere language comprehension. Perspectives from cognitive neuroscience (pp. 255–284). Mahwah, NJ: Erlbaum.

Hyerle, D. (1995). Thinking Maps: Tools for Learning. Innovative Learning Group, Innovative Sciences, Inc.: Cary, NC.

Joanette, Y., Goulet, P., & Hannequin, D. (1990). Right hemisphere and verbal communication. New York: Springer.

Kempler, D., & Van Lancker Sidtis, D. R. (1996). The Familiar and Novel Language Comprehension Test.

Myers, P. S (1999). Right hemisphere damage: Disorders of communication and cognition. San Diego: Singular Publishing Group.

Tompkins, C. A (1995). Right hemisphere communication disorders: Theory and management. San Diego: Singular Publishing Group.

Tompkins, C. A., Bloise, C. G. R., Timko, M. L., & Baumgaertner, A. (1994). Working memory and inference revision in brain-damaged and normally aging adults. Journal of Speech and Hearing Research, 37, 896–912.