Academy of Aphasia 2011

Comprehension of Textual Inferences: Effects of Lesions in Right and Left Hemispheres

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Introduction

Textual inferences are mental representations constructed by the reader, beginning with their own knowledge added to the explicit information which allows them to establish relations and associations to understand the implicit information in a message. One of the most-frequently used associations distinguishes *logical* (demanding logical reasoning and the process of deduction) and *pragmatic* inferences (demanding suggestion and calls on contextualization). Studies indicate co-activation of cerebral hemispheres to process the inferences into textual comprehension, with ample participation of all the cerebral lobes. The greater the demand for inferential reasoning, the greater the participation of the right hemisphere (RH). Individuals with brain lesions on the left (LH) and right hemispheres can present difficulties and, especially the latter, have difficulty in processing complex inferences.

Objective

To compare the performance of normal individuals, and individuals with RH lesions and LH lesions in textual comprehension tasks and inferential processing.

Methods

Thirty-four individuals were evaluated: 12 with LH lesion (age=45.8 years, SD$\pm$17; schooling=12.9 years, SD$\pm$4.8); 10 with RH lesion (age=57.6 years, SD$\pm$14.5; schooling=9.2 years, SD$\pm$3.6) and 12 individuals healthy control (age=47.4 years, SD$\pm$16.3; schooling=11.4 years, SD$\pm$3.8). They were all right-handed and speakers of Portuguese. The lesions were chronic and of a vascular etiology. The individuals were submitted to a reading screening to exclude difficulties in decoding the written material. The instrument used was "*La Géstion de L'implicite*" (May-Carle, 2000) translated and adapted to Portuguese, comprised of 20 texts, with *explicit, logical, pragmatic, distractor and other* inferences.

Results & Discussion

The individuals with RH lesions performed worse than the normal individuals and those with LH lesions on the total test score. Relative to the interpretation of the different inference types, the individuals with a RH lesion presented greater difficulty in the *pragmatic* and *others* inferences than those in the control group and those with LH lesion. In *logical* inferences, all of the groups were differentiated (Table 1). The worse performance in patients with RH lesion on the *logical, pragmatic and others* inferences can be explained by the fact that they are more complex and demand greater formal and contextualized reasoning, signalizing greater demand of the RH to

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realize the task. The execution of *logical* inferences needs formal reasoning and integration of premises and the execution of *pragmatic* inferences requires a group of operations (integration of textual and contextual clues, with multiple and/or concurrent interpretations). Those of the *others* types represent the totality of logical and pragmatic processes. It was concluded that the individuals with RH and LH lesions differed from one another based on the degree of the inference demand. Those with RH lesions had greater difficulty in the more complex inferences, which leads us to the interpretation of this hemisphere's contribution in tasks with greater cognitive demand.

Table 1 – Comparison of performance of the groups in the test to execute inferences.

Types of Inference	Controls (N=12) M (DP) Min-Max	LH (N=12) M (DP) Min-Max	RH (N=9) M (DP) Min-Max	p bicaudal	Multiple comparison
Explicit (11)	10.1 (1.4)	9 (0.9)	8.6 (2.5)	0.111	
	7 - 11	8 - 11	4 - 11		NA
Logical (12)	10 (1.9)	7.8 (2.2)	5.5 (2.5)	< 0.001	all differ from one another
	6 - 12	4 - 10	2 - 8		(p< 0.05)
Pragmatic (18)	15 (1.75)	13.9 (1.5)	10.5 (4.6)	0.003	RH ≠ controles and LH
	11 - 17	11 - 16	3 - 16		(p< 0.05)
Distractor (13)	10.3 (3.8)	8.4 (4.1)	7.3 (4.3)	0.241	
	1 - 13	1 - 13	0 - 12		NA
Others (6)	4 (1)	4 (0.9)	2.2 (1.6)	0.003	RH ≠ controls and LH
	2 - 5	3 - 6	0 - 5		(p< 0.05)
Total (60)	49.6 (6.2)	43.6 (6.9)	34.5 (11.3)	0.001	RH ≠ controls and LH
	38 - 57	33 - 56	12 - 48		(p< 0.05)

M = median

SD = standard-deviation

Min = minimum

Max = maximum

NA – not-applicable

Reference

May-Carle, A. D. (2000). *La géstion de l'implicite*. Isbergues, France: Ortho Edition.