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Irony comprehension in right-frontal brain-damaged patients: the role of context

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Introduction

Many right-hemisphere damaged patients experiment pragmatic impairments, affecting especially the processing of non-literal language, such as irony. Irony is defined as an utterance in which the intended meaning is different, and in some cases opposite, to the literal meaning. Last decades, several researchers have been interested in the cognitive aspects underlying pragmatic impairments, such as executive functions (inhibition, flexibility) and contextual processing (Martin & McDonald, 2003). Indeed, to understand an ironic utterance requires integrating different sources of contextual information (eg. contextual incongruity) to infer the intentional meaning of the speaker. The right hemisphere plays a crucial role in the holistic treatment of utterances. Therefore, it is possible that some RHD individuals process utterances locally rather than globally, leading them to opt for the literal interpretation of these utterances. However, no study has shown whether the difficulty manifested by RHD individuals in understanding irony comes from a lack of sensitivity to the context (difficulty in capturing or detecting relevant contextual information) or from an inability to integrate contextual information (correctly detected). It should also be noted that not all RHD individuals present such disorders and that different patterns of deficits exist among RHD individuals (Champagne-Lavau & Joannette, 2009; Coté et al., 2007).

Thus, the aim of this study was threefold: (1) to determine whether the degree of contextual incongruity influences the extent to which individuals with right-frontal-hemisphere damage understand irony; (2) to identify the disrupted process (detection versus integration of contextual information) leading to impaired irony comprehension; and (3) to identify potential different pragmatic profiles within the RHD group.

Methods

Twenty individuals with right-frontal-hemisphere damage (RHD) and twenty healthy control (HC) participants matched for age and educational level were recruited. They were tested on neuropsychological measures (assessing cognitive flexibility, inhibition and working memory) and on their comprehension of irony. The latter was assessed through short written scenarios, ending with a literal or ironic target utterance. The context was manipulated to create three conditions: a literal condition, without incongruity between the context and the target utterance, and two ironic conditions,

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characterized by a weak or strong incongruity between the context and the target utterance. Participants were asked to read each of the 36 stories and then to answer a question about the speaker's intention ("What does X (the speaker) really mean?") and a control question about relevant contextual information needed to answer the first question (Champagne-Lavau et al., 2012).

To characterize different profiles, a hierarchical cluster analysis (Ward's method) was undertaken according to RHD performance on the task assessing understanding of ironic intent. Given the small sample size of each RHD subgroup, non parametric tests (Friedman and Wilcoxon test) were then performed to explore group differences on the irony task.

Results

The hierarchical cluster analysis revealed an heterogeneous performance within the RHD group on pragmatic measures. On the one hand, 14 RHD participants (RHD-U (Unimpaired)) had similar performance to HC participants for the speaker intention's question: that is, more errors in the weak incongruity context condition than in the no incongruity context condition ($Z = -1.992, p = .046$) and the strong incongruity context condition ($Z = -2.522, p < .012$), but no difference between the no incongruity context condition and the strong incongruity context condition ($Z = -.516, p > .05$). On the other hand, six RHD participants (RHD-I) were impaired in their understanding of irony: they failed to identify the ironic intention of the speaker, regardless of the degree of the incongruity between the context and the target utterance (weak incongruity context condition = strong incongruity context condition ($Z = -1.604, p > .05$) < no incongruity context condition ($Z = -2.214, p < .027$)).

Discussion

Our results are consistent with previous studies that demonstrated impairments in the comprehension of irony in some RHD individuals (Champagne et al., 2003; Kaplan et al., 1990; Winner et al., 1998). This also confirms the known heterogeneity found after a right-hemisphere lesion (Champagne-Lavau & Joannette, 2009). Finally, they provide interesting insights into the processes underlying the deficits in understanding irony, especially the contextual processing. Indeed, the absence of a difference between the strong incongruity and weak incongruity context conditions in the RHD-I group suggests that the difficulty in understanding irony would be due to a lack of sensitivity to the contextual information rather than to a difficulty in integrating this information. RHD-I participants would use a local, analytic strategy to process the target utterance, leading them to opt most of the time for the literal meaning of the sentence (Cornejo et al., 2007).

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