

# Split Mindssplit Brains: Historical And Current Perspectives

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## A dual task priming investigation of right hemisphere inhibition for people with left hemisphere lesions

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### Abstract

**Background:** During normal semantic processing, the left hemisphere (LH) is suggested to restrict right hemisphere (RH) performance via interhemispheric suppression. However, a lesion in the LH or the use of concurrent tasks to overload the LH's attentional resource balance has been reported to result in RH disinhibition with subsequent improvements in RH performance. The current study examines variations in RH semantic processing in the context of unilateral LH lesions and the manipulation of the interhemispheric processing resource balance, in order to explore the relevance of RH disinhibition to hemispheric contributions to semantic processing following a unilateral LH lesion.

**Methods:** RH disinhibition was examined for nine participants with a single LH lesion and 13 matched controls using the dual task paradigm. Hemispheric performance on a divided visual field lexical decision semantic priming task was compared over three verbal memory load conditions, of zero-, two- and six-words. Related stimuli consisted of categorically related, associatively related, and categorically and associatively related prime-target pairs. Response time and accuracy data were recorded and analyzed using linear mixed model analysis, and planned contrasts were performed to compare priming effects in both visual fields, for each of the memory load conditions.

**Results:** Control participants exhibited significant bilateral visual field priming for all related conditions ( $p < .05$ ), and a LH advantage over all three memory load conditions. Participants with LH lesions exhibited an improvement in RH priming performance as memory load increased, with priming for the categorically related condition occurring only in the 2- and 6-word memory conditions. RH disinhibition was also reflected for the LH damage (LHD) group by the removal of the LH performance advantage following the introduction of the memory load conditions.

**Conclusions:** The results from the control group are consistent with suggestions of an age related hemispheric asymmetry reduction and indicate that in healthy aging compensatory bilateral activation may reduce the impact of inhibition. In comparison, the results for the LHD group indicate that following a LH lesion RH semantic processing can be manipulated and enhanced by the introduction of a verbal memory task designed to engage LH resources and allow disinhibition of RH processing.

### Background

Language processing is dynamic and requires the participation of both cerebral hemispheres. The left hemisphere (LH) is considered to be the language dominant hemisphere, however, the right hemisphere (RH) is also accepted to play an important role in language

processing. The RH has been linked with processing of discourse, comprehension of inferences, ambiguity and metaphorical language, and underlying much of this, is its role in lexical-semantic processing [see for a review of RH language processing (1)]. According to dynamic models of cognitive functioning bilateral lexical-semantic processing will involve both interhemispheric activation and inhibition (2). The language dominant LH is suggested to inhibit aspects of RH participation in order to maximize the efficiency of word level processing and

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