

Models of semantic processing in the brain suggest that semantic activation differs both qualitatively and quantitatively between the two cerebral hemispheres. A common view is of the left hemisphere (LH) quickly activating highly salient, dominant meanings, with the right hemisphere (RH) more slowly activating low-salience, alternative meanings; models that overlap here include Beeman and colleagues' *Fine-Coarse Semantic Coding Theory (CSC)* (Beeman et al. 1994; Beeman & Chiarello, 1998; Beeman, 2005) and Giora's *Graded Salience Hypothesis (GSH)* (Giora, 1997, 2003).

Idioms provide an excellent test case for such models, as they frequently have both literal and figurative interpretations available. This is sometimes referred to as *IDIOM AMBIGUITY* (Briner & Virtue, 2014) or *LITERAL PLAUSIBILITY* (Titone, Holzman, & Levy, 2002). *LITERALLY PLAUSIBLE* (semantically well-formed) idioms (e.g., *kick the bucket*) have an available literal interpretation, whereas *LITERALLY IMPLAUSIBLE* idioms (e.g., *shoot the breeze*) are only interpretable figuratively. If the *non*-figurative interpretations of literally plausible idioms such as *kick the bucket* are taken to be the less salient, subordinate interpretations, as suggested by Mashal et al. (2008), the RH would likely show an advantage with plausible idioms and with probe words semantically related to the literal interpretation of an idiom, with the LH showing an advantage with implausible idioms and probes related to the figurative interpretation.

A number of studies have seemed to point to such a conclusion. In a divided visual field (DVF) study that looked only at plausible (ambiguous) idioms, Mashal et al. (2008) found an advantage in the left visual field (LVF/RH) for literal-related probes. In a similar study using only figurative probes, Briner and Virtue (2014) similarly found plausible idiom priming in the LVF only, and implausible idiom priming in the RVF only. Indeed, facilitation effects with both plausible and implausible idioms have been reported across a range of studies, including non-DVF studies. In a cross-modal priming study involving both schizophrenics and healthy controls, for example, Titone et al. (2002) found both plausible and implausible idiom priming with figurative probes for the healthy controls, but only implausible priming for schizophrenics, with limited evidence of priming with literal probes for both groups. Titone & Libben (2014), however, found that an idiom's plausibility is inversely correlated with priming of figurative probes, particularly early in the timecourse.

The picture, then remains unclear, possibly due to the differences in experimental procedure between these studies, as well as to the relatively unbalanced stimuli involved; until now, all DVF studies on this topic (to our knowledge) have used either only plausible or only implausible idioms, or only figurative or only literal probes, or presented idioms as bare verb phrases or in figurative-biased contexts (e.g., *After years of ill health, the old man finally kicked the bucket*); any of these factors may have produced artificial effects. The present study sought to correct for this with a large-scale (n=133) experiment involving fully counterbalanced stimuli, using the divided visual field paradigm to examine differences in idiom processing cross-hemispherically, with centrally-presented sentences as primes and laterally-presented words as probes.

The stimuli in this study varied along four dimensions: *prime type* (plausible idiom, implausible idiom, literal control), *probe type* (figurative-related, literal-related, or unrelated), *visual field presentation* (left/right), and *inter-stimulus interval* (time intervening between prime and probe: 250 or 750 ms). Additionally, half the subjects used their right hand to respond, and half used their left, and both sex and familial sinistrality were considered as between-groups factors.¹

¹ These results will be reported in a separate paper.

Significant main effects were found for visual field, and significant interactions were found between prime type and probe type, along with a number of interactions between these effects. Most notably, significant figurative-related priming was found for implausible idioms only, an effect that was stronger early in the timecourse in the LVF/RH. No literal-related priming was apparent with implausible idioms, but significant literal-related facilitation was seen with plausible idioms, an effect that was significant at short ISIs, particularly in the LVF/RH. At long ISIs, however, a strong trend towards significance was apparent in the RVF/LH.

Unlike previous studies, no facilitation was found for plausible idioms with figurative-related probes. We conclude that the facilitation reported in previous studies may have been an artificial effect, caused by experiment-specific processing biases. Our findings suggest instead that the competing literal interpretations associated with plausible idioms prevent early activation of the figurative meaning, in an effect that is mostly limited to the LVF/RH early in the timecourse but that may spread to the RVF/LH later on. This view is largely consistent with the conclusions of Titone & Libben (2014) that idiom plausibility is inversely correlated with figurative activation, particularly early in the timecourse, but is only partially consistent with Fine-Coarse Semantic Coding Theory and the Graded Salience Hypothesis and the conclusions of Mashal et al. (2008) and Briner and Virtue (2014).

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