

MEG evidence for distinct processing of polysemy, homonymy and semantic relatedness bilaterally

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How are different senses of the same word represented (e.g., 'paper' meaning writing material and an article)? Are they represented in the lexicon or generated "on the fly"? Klein & Murphy (JML, 2001) found that activating one sense of a word slowed down processing of a different sense, concluding that senses were represented distinctly. Here we used magnetoencephalography to investigate whether sense-relatedness, i.e. polysemy, shows combined effects of phonological and semantic relatedness or whether polysemy effects are qualitatively different from the effects of sound and meaning relatedness alone, as predicted by theories where polysemy involves morphological identity. 17 healthy young participants judged whether visual two-word target phrases made sense, after judging a prime phrase involving either a homonym (savings BANK - river BANK), a polyseme (shredded PAPER - liberal PAPER) or a semantic relative (monthly magazine - shredded PAPER) of the target. Magnetic fields were recorded with a whole-head 148-channel MEG system and current sources modeled as equivalent current dipoles. Stimulus type affected source latency at 300-400ms bilaterally. In the left hemisphere, the latencies of the M350 source, hypothesized to index of lexical activation (e.g., Pykkänen & Marantz, TiCS, 2003) were reduced for polysemy and semantic relatedness, and delayed for homonym targets, as compared to unrelated controls. Concurrent activity in the right hemisphere showed a different pattern: source latencies were delayed for polysemy, reduced for semantic relatedness and showed no reliable effects of homonymy. These results suggest that polysemy processing is special: unlike homonym and semantic priming, polysemy priming involves parallel left-hemisphere identity priming of lexical activation and right-hemisphere competition between senses.