When dog is more wolf than bone: Computational and electrophysiological evidence for featural organization of semantic memory

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Abstract: Semantic space algorithms account for human performance in semantic tasks via knowledge representations derived from the analysis of large text corpora. The N400 Event-Related Potential (ERP) component is thought to reflect automatic access of the same lexical-semantic information. We trained LSA (Landauer & Dumais, 1997) and HAL (Lund & Burgess, 1997) on a random selection of Wikipedia articles and compared the algorithms' performance at predicting the similarity between N400 waveforms elicited during reading. HAL was best at explaining the ERP data, suggesting that its representations—thought to be more semantic-featural than lexical-associative in nature—are most similar to those automatically accessed during N400 processing. These results are consistent with findings that, although the N400 is sensitive to lexical relationships, it seems to represent access of information arranged primarily by semantic features. Preliminary evaluations of other algorithms (e.g., COALS, Rohde, Gonnerman & Plaut, submitted) further support this conclusion.