Performance of HAL-like word space models on a semantic categorization task.
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The clusters produced by optimized parameters are very accurate for the 2-group solution (see Table 1), with only MYSTERY being misclassified. For the 3-group solution, the clusters did not correctly categorize words with medium imageability into a distinct cluster (see Table 2). For the 2-way solution, the purity was higher and the entropy was lower for the optimized parameter sets than for the original HAL parameter sets (see Table 3).

Results: The purity of a clustering solution is defined as the average of cluster members that come from the predefined category. Higher purity is better. The entropy of a clustering solution is defined as the sum of each cluster’s entropy, weighted by the size of the cluster. The entropy of a cluster measure how much order it has. Lower entropy is better.

Conclusion: HAL-like word space models have the potential to algorithmically cluster English nouns semantic categories that closely match those in psycholinguistic databases. The original parameters of the HAL model were chosen arbitrarily. Our optimized parameter sets created a more accurate semantic categorization than the original HAL parameters. This is consistent with other work. Bullinaria & Levy, 2007; Shaoul & Westbury, in preparation showing that the original HAL parameters are not optimal for predicting human behavior.

References: