The Memory Retrieval Debate Revisited: Is it Spreading Activation or Compound-Cue?

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Spreading Activation and Compound-Cue Theories

Two major competing theories explaining the process of memory retrieval are Spreading Activation (e.g., Anderson, 1983) and Compound Cue (e.g., Ratcliff & McKoon; 1994). The theories disagree on whether the retrieval process begins with the activation of a particular concept in long-term memory or with formation of a retrieval cue in short-term memory. Three-step priming can be explained by spreading activation but not by compound-cue theories. Thus, the present study tested for the occurrence of three-step mediated priming.

Generation of Word Pairs

Participants in a free association task were 77 undergraduate psychology students. 144 words (taken from McNamara & Altarriba, 1988) were divided into six lists containing 24 words each. Each participant was randomly given one of the six lists, and instructed to write down as many associates as possible for each word on the list. Participants were given 45 seconds to list responses to each word. On average, participants listed 5-10 words for each word.

Based on the results of the free-association task, 160 possible three-step mediated word pairs and 100 possible unrelated word pairs were constructed. Words listed as associates for each of the 144 words used in the free-association task were considered to be direct associates if they appeared more than two times.

To construct the three-step mediated word pairs, chains of four words were constructed on the basis that words 1 and 2, words 2 and 3, and words 3 and 4 in the chain were direct associates. No association was allowed between words 1 and 3, 2 and 4, and 1 and 4. For the 100 possible unrelated word pairs, no association was allowed. Unrelated word pairs were also checked for possible mediators, and were discarded if a possible mediating chain was detected. All 260 word pairs were individually entered into LSA in order to determine if any underlying relationships existed. Results of a paired samples t-test indicated that there was no significant difference in relationship strength between three-step mediated pairs and unrelated pairs, $t(39) = -.86$, $p = .40$. In addition to the 40 mediated and 40 unrelated word pairs, one list each of 50 neutral words and 50 pronounceable non-words were created through use of Word Gen (Duyck, Desmet, Verbeke, & Brysbaert, 2004).

Priming Experiment

Ninety-eight undergraduate psychology students participated in the priming portion of the study. To test for any bias in the two- and three-step mediated primes, two paired-samples t-tests were run comparing the two-step items with the unrelated items and the three-step items with the unrelated items. The significance level was lowered to .025 to control for family-wise Type I errors. Results indicated that the two-step mediated words were not more related ($M = .058$) than the unrelated pairs ($M = .043$), $t(15) = -1.67$, $p = .12$. The three-step mediated pairs were no more related ($M = .029$) than the unrelated pairs, $t(15) = -1.76$, $p = .10$. These findings indicate that any three-step priming effects observed could not be the direct result of the previously viewed primes. Primary results indicate that response times were significantly shorter in response to the three-step mediated pairs ($M = 578.81$ ms) than to the unrelated word pairs ($M = 598.65$), $t(86) = 3.35$, $p = .001$, $d = .22$. Results indicated that a significant three-step priming effect did occur.

Discussion and Conclusion

Shorter reaction time for three-step mediated priming compared to unrelated words provides strong support for spreading activation theories over the current versions of compound-cue theories of memory retrieval.

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