



# Semantic Search Strategies in the Remote Associates Test



Kevin A Smith, David E Huber, Edward Vul

## Introduction

- Remote Associates Test (RAT): find a single word associated with three cues (Mednick, 1962): 'bee' 'comb' 'dew' -> 'honey'
- Classic test of creativity, problem solving
- Few prior studies directly investigate the search process
- Studying this as a two stage process:
  1. Constraining potential answers to likely set
  2. Searching through constrained set

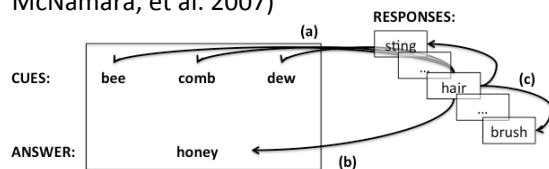
## Methods

### Experimental Procedure

- N = 71
- 25 RAT problems; 2min/problem to solve
- Subjects type all words considered (right or wrong)

### Analysis of Semantic Similarity

- Measured semantic similarity between each of these responses and:
  - a) The cues
  - b) The answer
  - c) Other responses
- Semantic similarity defined by Latent Semantic Analysis cosine-distance metric (Landauer, McNamara, et al. 2007)



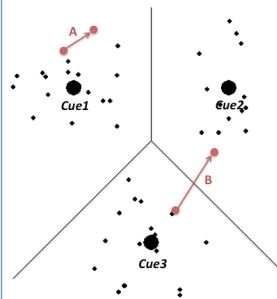
## Results – Constraining Responses

*How are cues combined to generate hypothesized answers?*

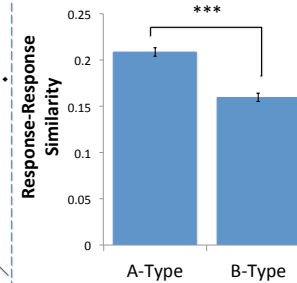
### Effects of single cues

- 'Clustering' of responses would occur if one cue was primary driver of constraints
- Clustering evidence: within-cluster similarity (A) greater than other (B) - ( $F(1,3803)=92, p<0.001$ )

### Diagram of clustering



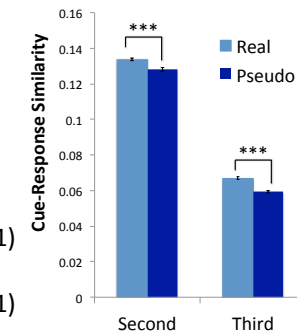
### Test for response clustering



### Influence of other cues

- 'Pseudo-responses': equally related to primary cue as real; chosen from set of other responses
- Real responses more similar to second ( $t(14932)=4.4, p<0.001$ ) and third best cues ( $t(15095)=8.2, p<0.001$ )

### Test for impact of non-primary cues

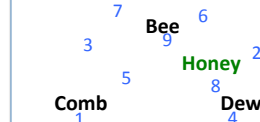


## Results – Search Process

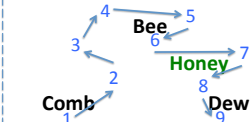
### Evidence for non-random search?

#### Random Search:

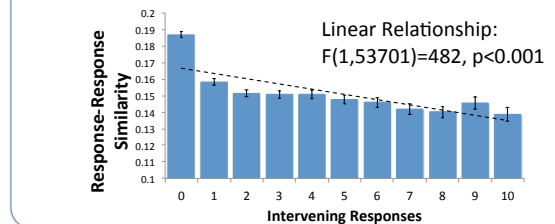
Independent samples



#### Local Search: Dependence on prior responses



### Test for local dependence



## Discussion

- Findings:
  1. Constraints primarily based on one cue, but affected by the other two
  2. Search is locally-dependent
- Why not equal weighting on cues, and why dependence in search?
  - Rational search process?
  - Memory structure/limitations?

## References

- Mednick, S. (1962). "The associative basis of the creative process." *Psychological Review*, 69(3): 220-232.
- Landauer, T. K., D. S. McNamara, et al. (2007). *Handbook of Latent Semantic Analysis*. Mahwah, New Jersey, Lawrence Erlbaum Associates.