

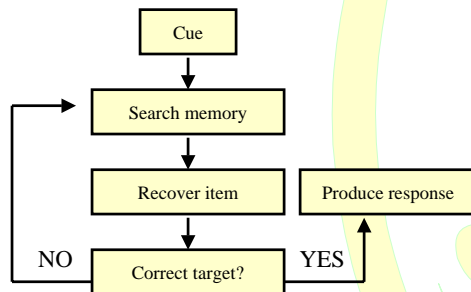
A Multiple-Cue Hypothesis for the Testing Effect

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Introduction

Two-process models of recall (see figure below) propose that information is recovered and identified from memory based on cue-target relatedness, such that target information highly related to the cue is recovered rather quickly whereas target information remotely related to the cue is likely to be recovered after additional information (related to the cue and target, but not the target itself) is recovered first. Soraci et al. (1994) has shown that this “extra” information recovered prior to the correct target can account for the incongruous generation effect, that is, the advantage for the target word *CAP* generated from the first cue below as opposed to the second cue: (1) *Not a policeman: C _ P*, (2) *An article of clothing: C _ P*.

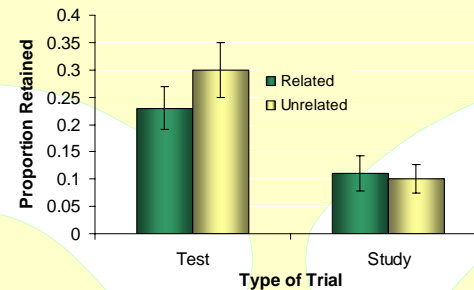


Reconstructed diagram of two-process model of recall (e.g., Raaijmakers & Shiffrin, 1981)

Three experiments investigated whether the *multiple-cue hypothesis* applies to the testing effect. According to this view, test trials (TT) lead to better retention than study trials (ST) because extra information is recovered during TT but not ST that may serve as later retrieval cues for target items. If the testing effect is explained by extra information that is ordinarily recovered on TT but not on ST, then manipulations designed to increase the extra information associated with TT but not ST should enhance the magnitude of the testing effect (Experiment 1), whereas manipulations designed to increase the extra information associated with ST but not TT should reduce or eliminate the testing effect (Experiments 2 and 3).

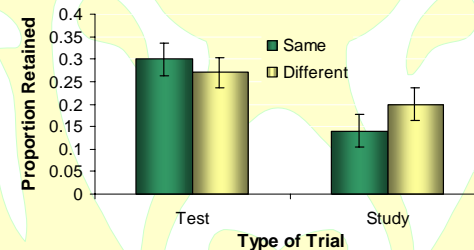
Experiment 1

Cue-target pairs that were either strongly related (*dough: bread*) or weakly related (*basket: bread*) were presented, followed by an intervening cued-recall test or an additional study opportunity. Retention of targets was tested using a final free-recall test.



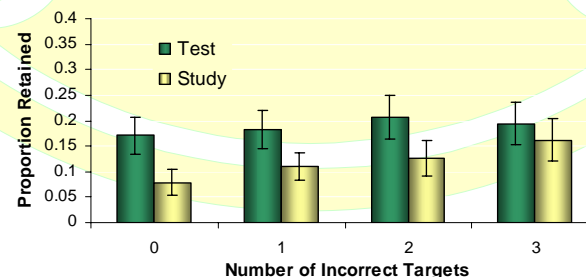
Experiment 2

Related cue-target pairs (*dough: bread*) were presented, followed by an intervening cued-recall test or an additional study opportunity in which the cue was either the same (for test and study respectively, *dough: _____* or *dough: bread*) or different (*toast: _____* or *toast: bread*) from the one presented during encoding.



Experiment 3

Unrelated cue-target pairs (*basket: bread*) were presented, followed by an intervening yes/no recognition test or additional study opportunity in which the number of incorrect targets that preceded the correct target was either 0, 1, 2, or 3.



Results & Discussion

Experiment 1

Significant main effect for type of trial and significant Trial x Cue Interaction indicate that tested items were retained better than studied items, and that the unrelated cues significantly benefited retention for tested items but not studied items.

Experiment 2

Significant main effect for type of trial and significant Trial x Cue Interaction indicate that tested items were retained better than studied items, and that the different cues significantly benefited retention for studied items but not for tested items.

Experiment 3

Significant main effects for type of trial and number of incorrect targets indicate that tested items were retained better than studied items, and retention was better for items presented with more as opposed to fewer incorrect targets. Simple main effects analyses revealed that the number of incorrect targets benefited retention for studied items but not for tested items, and the testing effect was strongest at 0 incorrect targets, followed by 1 incorrect target, then 2 incorrect targets, and was eliminated at 3 incorrect targets.

References

- Raaijmakers, J. G., & Shiffrin, R. M. (1981). Search of associative memory. *Psychological Review*, 88, 93-134.
- Soraci, S. A., Jr., Franks, J. J., Bransford, J. D., Chechile, R. A., Belli, R. F., Carr, M., & Carlin, M. (1994). Incongruous item generation effects: A multiple-cue perspective. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 20, 67-78.

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