Inhibitory Interference in Reflexes: Evidence for Cue Confusability

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Current ACT-R-based model of cue-based retrieval

The extension of the cue-based retrieval model by activation-dependent fan sensitivity and dynamic cue similarity explains three so far unexplained patterns (A–C).

Proposal 1: Activation-dependent fan sensitivity

In standard ACT-R, the fan effect is simply based on the number of overlapping features. We propose that the impact of the fan also depends on an item's activation in the antecedent mismatch compared to distractors, which is less affected by similarity-based interference.

Predictions:

A) Generally less interference in antecedent match conditions due to high activation of fully matching antecedent.
B) Stronger inhibitory interference in antecedent match conditions when distractors are highly activated (subject focused) or when there are multiple distractors.

Proposal 2: Cue confusion due to dynamic cue similarity

Previous modeling assumed that retrieval cues perfectly distinguish matching features from non-matching ones. But in the general ACT-R framework, features can be similar to each other, like any other memory chunk.

We propose that task requirements (frequent co-occurrence of certain cues in similar retrieval contexts) and individual differences (working-memory limitations) dynamically influence how cues are treated during a retrieval request. Sometimes it is efficient and "good enough" to treat certain cues as similar, i.e., to confuse them.

Predictions:

C1) Inhibitory interference in antecedent mismatch conditions when structural and non-structural cues are treated as similar due to frequent co-occurrence (leads to fan effect despite absence of feature overlap).
C2) Inhibitory interference in a NAM context for readers with low WM capacity because confusing cues might conserve cognitive resources.

Discussion

2 new proposals

4 patterns unexplained:

A) Less interference effects in antecedent match conditions.
B) Correlation between presence of effects and prominence of distractors.
C) Inhibitory interference in antecedent mismatch conditions (manipulation, low WM, recipients).
D) Facilitatory interference in antecedent match (DF) for exceptionally highly activated single distractors (e.g. focused on a task, facilitation in antecedent match conditions impossible in other model due to muesels.)

The effect combination (pink/green) has been observed occasionally in experiments.

<table>
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<tr>
<th>Pattern</th>
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<tbody>
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Formal implementation of the extended model in ACT-R shows strong correspondence with empirical data: when matching features are rare, inhibitory interference is present even in antecedent match conditions. This is illustrated in Figure 7.

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References:


