Does Response Selection Use Working Memory?

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Background

- To flexibly control behavior, our current goals and actions must be represented in the brain. It is widely assumed that response selection processes engage working memory (WM) to select responses. However, this assumption is usually underspecified and has received little systematic study.
- Previous studies have demonstrated that the amount of interference produced by holding items in WM on an intervening task depends on the similarity between the type of information held in WM and the intervening task (Cocchini et al., 2002; Duff & Logie, 2001; Klauer & Zhao, 2004; Logan, 1979). This is consistent with the proposal that response selection engages WM; more interference is expected to occur when there is greater overlap between the two tasks. Unfortunately, these studies did not systematically manipulate the type of information held in WM and the stimulus – response pairings.

PURPOSE OF STUDY

- We propose that the current stimulus and its associated response are represented in working memory (WM). If this is true then **(a)** these representations will interfere with a WM load and **(b)** the interference should be greatest when the modalities of the stimulus and/or response match the modality of the load.
- In a series of experiments, we asked subjects to select responses (speeded) for a choice RT task while holding information in WM. **The critical manipulations were the type of information held in WM and the output modality for the choice RT task.**

Overview of Procedure

Two tasks: WM task & Choice RT

Trial: WM load → Choice RT → WM Probe

➤ **WM task:** Either presented with **auditory** information or **visual** information (a binding of color and location). Probe consisted of determining if the probe matched one of the previously presented stimuli.

➤ **Choice-RT task:** Categorize visually presented words (3 appeared in succession). Words were types of bugs, foods, or trees. Subjects responded **vocally** or **manually**.

Task Order

• **Auditory** - Depending on the experiment, the auditory stimuli were either **tones** or **non-sense syllables**.

• **Visual Binding** - Consisted of binding a sequence of 4 color squares to a location.

Results: Capacity

■ WM alone
■ WM & Choice RT

WM Task

Auditory-Syllables Auditory-Tones Visual-Binding

Results: Choice RT task

■ Word 1
■ Word 2
■ Word 3

WM Task

Auditory-Syllables Auditory-Tones Visual-Binding

Results: Primacy & Recency

Auditory - Tones Visual - Binding

Conclusions

- These findings suggest that response selection processes activate information in WM, leading to modality-specific patterns of interference.
- Binding condition demonstrated that a vocal response did not lead to more interference.
- Future directions: Use a purely spatial WM task.

References

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