The reactivation of task rules triggers the reactivation of task-relevant items

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Background

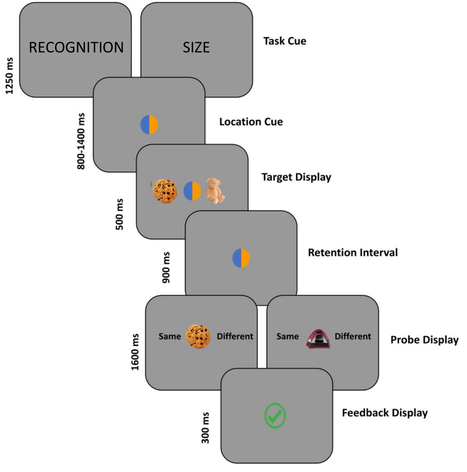
Items repeatedly stored in working memory (WM) are handed off to long-term memory (LTM) *(Carlisle et al., 2011; Gunseli et al., 2014a,b).*

In these studies, the repeated LTM target was used in a repeated task setting. However, in daily life, we sometimes use a repeated target for a novel task.

What is the impact of switching to a **new task rule** on the storage of task-relevant **items available in LTM**?

We hypothesized that memory reactivation of task rules and task-relevant items are interdependent given that adjusting to new situations often require novel rules and novel task-relevant items.

Method



EEG Measures

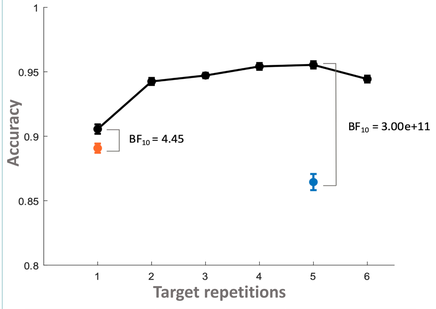
Contralateral Delay Activity (CDA)
Index of working memory storage
(Ikkai et al., 2010; Vogel & Machizawa, 2004).

Contralateral Alpha Suppression
Index of lateral spatial selective attention (within WM)
(Klimesch, 2012; Woodman et al., 2021).

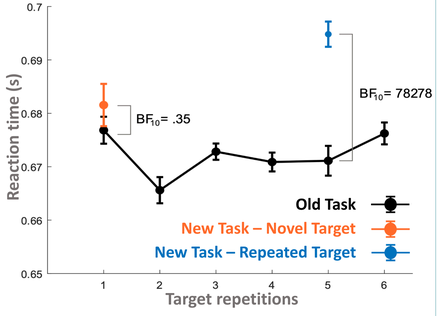
Bilateral Alpha Suppression
Index of global selective attention (within WM)
(Fukuda et al, 2015; Woodman et al., 2021).

Results (N = 45)

Behavioral

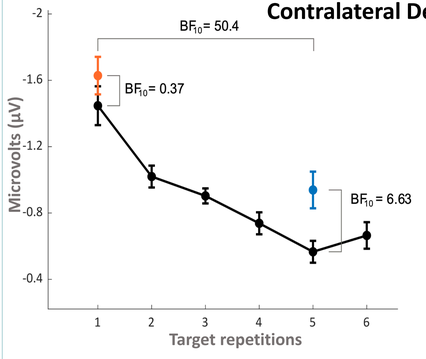


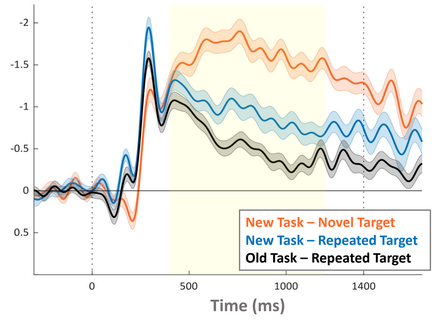
Target repetition	Task switch (novel target)	Task switch (repeated target)
✓	✓	✓



Target repetition	Task switch (novel target)	Task switch (repeated target)
✗	✓	✓

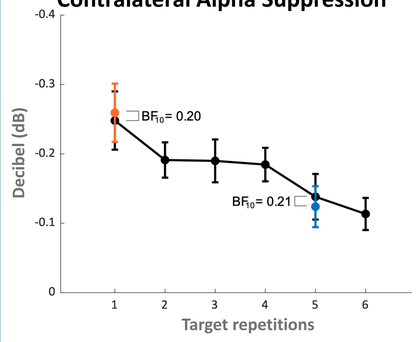
Contralateral Delay Activity (CDA)





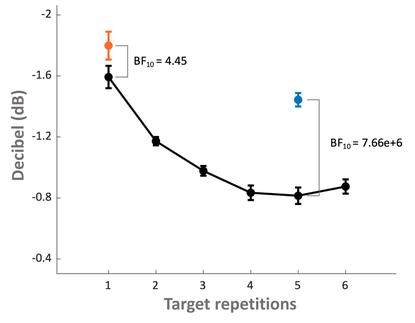
Target repetition	Task switch (novel target)	Task switch (repeated target)
✓	✗	✓

Contralateral Alpha Suppression



Target repetition	Task switch (novel target)	Task switch (repeated target)
✓	✗	✗

Bilateral Alpha Power Suppression



Target repetition	Task switch (novel target)	Task switch (repeated target)
✓	✓	✓

Discussion

Repeatedly stored task-relevant items transition from WM to LTM in a few trials *(Carlisle et al., 2011; Gunseli et al., 2014a,b; Reinhart & Woodman, 2014)*.

Updating task rules triggers the memory reactivation of task-relevant items. This interplay suggests the **interdependence** of the procedural and declarative WM subsystems *(Barrouillet et al., 2015; Sali and Egner, 2020)*.

This interdependence could mean that costs associated with task switching might be in part due to the involuntary updating of task-relevant items in addition to updating of task rules.

Switching to a new task rule for a repeated item does not increase contralateral alpha suppression but increases the CDA. This result highlights a **dissociation** between selective attention and storage in WM *(Günseli et al., 2019)*.

Switching to a new task rule for a novel item does not increase the CDA or contralateral alpha suppression, but increases bilateral alpha suppression. Thus, we propose that the CDA and contralateral alpha suppression are stimulus-specific (eg, a spatial **pointer**) while bilateral alpha suppression reflects non-stimulus-specific factors such as arousal or **cognitive effort**.

Scan for references