Variations in working memory capacity: Suppression of distractors or enhancement of targets?

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Dissociable mechanisms underlying individual differences in Working Memory Capacity

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QUESTION
The ability to control attention to minimize distraction is the primary factor determining working memory capacity (WMC), a characteristic that strongly correlates with cognitive abilities, including intelligence. We tested whether superior attention control abilities exhibited by high-WMC individuals are mediated by:
- stronger suppression of irrelevant information,
- enhancement of relevant information,
- or both?

RESULTS
Behavioral performance
- In a frequency-tagged version of the Eriksen flanker task, as in a standard version, conflict-related theta band (3-7 Hz) power was increased. However, frontal midline theta did not show WMC-related differences.
- Increase in theta-band (3-7 Hz) power in peri-response time window (-200 - 100 ms) in frontocentral electrodes.

Strategic WMC-related differences in both target and distractor processing
- Both WMC groups: increased attention to the target compared to the flankers.
- Different strategies to obtain the same signal-to-noise ratio: The low-WMC increased attention to the target, whereas high-WMC suppressed attention to the flankers.

Control analysis
- Statistically significant group differences in SSVEP amplitudes were observed only in occipital electrodes that showed strong SSVEPs.

DISCUSSION
- WMC is related to the control of attention to both relevant and irrelevant information. High-WMC individuals inhibit distractors more strongly, whereas low-WMC individuals enhance targets. Two different strategies can result in similar behavioral performance, yet suppression might be more neurally efficient.

REFERENCES

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