Aha! Under Pressure: Is the Aha! Experience Constrained by Cognitive Load?

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Is the Aha! Moment Resource Dependent?

Everyday problem solving is marked by its conscious, step-by-step strategy to find the solution (i.e., non-insight)¹. However, occasionally, a protracted period of solution search is resolved by a quantum leap in understanding. The felt component of this experience is popularly known as the Aha! Moment (i.e., insight)². Although there is a consensus that insight is phenomenologically different from non-insight, extant theories disagree on its driving mechanisms¹. On the one hand the *business-as-usual* view presumes that insight relies on the same conscious problem-solving strategies as non-insight¹. Therefore, both solution-types depend to a same extent on the availability of cognitive resources³. On the other hand, the *special-process* view assumes that insight is the result of a distinct set of unconscious processes, not constrained by the availability of cognitive resources⁴. In order to distinguish between these two views, we will assess whether insight and non-insight problem solving are hampered differentially by limiting the available cognitive resources.

Method

Compound Remote Associates Test (CRAT)

- $N = 80$
- 70 CRAT
- Memory-load conditions
 - No-load
 - Low-load = 2 numbers
 - High-load = 4 numbers
- Insight vs. non-insight
- Only 70% ACC memory task

Dual-Task paradigm

- Dependent measures
 - RT
 - ACC
 - Confidence
 - # correctly solved

Result

Main effects

- On average, insight solutions compared to non-insight solutions were:
 - More frequent (22 VS 14, $F(1,77) = 16.51$, $p < .001$, $\eta_p^2 = .18$, $BF_{\text{incl}} = 24076.13$)
 - Found faster (6.3 VS 8.1 sec, $F(1,77) = 27.09$, $p < .001$, $\eta_p^2 = .26$, $BF_{\text{incl}} = 31676.27$)
 - More often correct (90 VS 69%, $F(1,77) = 85.24$, $p < .001$, $\eta_p^2 = .52$, $BF_{\text{incl}} = 4.36 \times 10^{12}$)
 - Received a higher solution confidence (80 VS 60, $F(1,77) = 171.30$, $p < .001$, $\eta_p^2 = .69$, $BF_{\text{incl}} = \infty$)

Interaction effects

Conclusions

- Increasing memory load slowed down non-insight solutions, but not insight solutions
- Increasing memory load decreased the number of correctly solved CRATs for non-insight, but increased the number of correctly solved CRATs for insight
- Memory load had no impact on the accuracy and the solution confidence
- An unconscious process (special-process view)?
- Differential deployment of cognitive resources?
 - Insight = stable, low intensive use of cognitive resources
 - Non-insight = incremental, intensive use of cognitive resources

References

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