

Background

Attentional resource allocation (ARA) is the ability to deploy limited attentional capacity to process information despite ongoing task demands. Strong individual differences in ARA have been found depending on individuals' fluid intelligence, working memory capacity, and executive functioning^{1,3,4}. Individually, however, these factors cannot explain most of the variability observed in ARA. In the present study, we examined cognitive reserve (CR) as a potentially more comprehensive factor contributing to individual differences in ARA and performance. Cognitive reserve is a latent construct believed to explain inter-individual variability in cognitive task performance through better flexibility, efficiency, and capability in both recruiting brain networks and coping with increased difficulty through alternative cognitive strategies⁵.

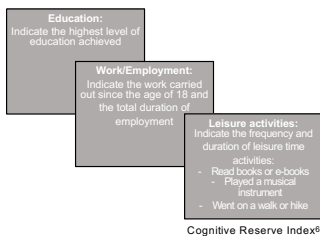
Objectives

1. Evaluate the influence of individual differences in cognitive reserve (CR) on attentional resource allocation.
2. Compare fluid intelligence (gF) and CR models and their respective contribution to variability in attentional resource allocation.

Measures

Cognitive Reserve (CR):

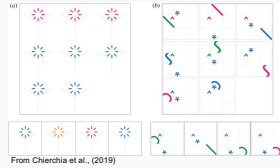
CR is indirectly measured through proxy variables representative of life experiences (education, occupational and leisure activities) and crystallized intelligence⁶ (gC) tasks.



Measures, Cont.

Fluid intelligence (gF):

The MaRs-IB⁷ (matrix reasoning item bank) was used as a measure of gF. Participants are instructed to deduce the relationship between puzzles' pieces to correctly complete the 3x3 matrix.



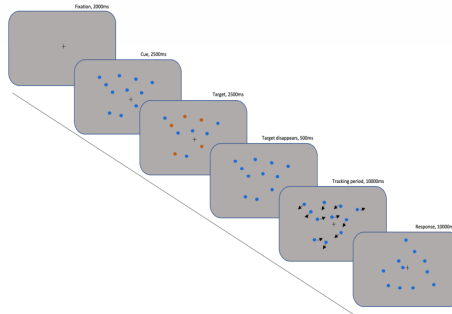
Crystallized intelligence (gC):

A composite score was computed based on performance on three tasks measuring general knowledge (General Information task), and vocabulary (synonym/antonym and Abram's vocabulary tasks).

<p>To which musical family does the oboe belong?</p> <p>a. Percussions b. Strings c. Brass d. Woodwinds</p> <p>General Information task</p>	<p>Circle the word that is most nearly the SAME in meaning to the word in capital letters.</p> <p>COVET a. Crave b. Claim c. Avenge d. Clutch e. Comply</p> <p>Synonym task</p>	<p>Complete the following item with the alternative that best fits the sentence.</p> <p>Fundamental reasons are: a. Logical b. Basic c. Acceptable d. Convenient e. Hidden</p> <p>Abram's task</p>
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Multiple Object Tracking (MOT) task:

The MOT task is a sustained visuospatial attention task². While maintaining fixation at the center of the screen, participants track 2 or 5 discs (10 seconds) and then report which discs were the targets. Through different numbers of discs to track (2 and 5), this task allows for the manipulation of cognitive load and attentional effort.



Participants

39 participants (mean age = 19.3, SD = 1.47) from which 84% were female. Participants were adults between 18 and 30 years old, with no history or neuro-developmental or neurological disorders.

Procedure

- MOT task
- gF or gC tasks (counterbalanced)
- Questionnaires:
 - Cognitive Reserve Index;
 - Need for Cognition;
 - Big Five Inventory

Results

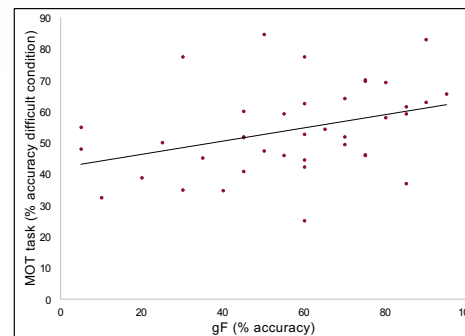
Note: Findings are preliminary. Data collection is ongoing.

Cognitive Reserve

- Cognitive reserve was not found to be a predictive factor of performance on the MOT task (difficult: $R^2=-0.03$, $\beta=0.071$, $p=0.997$; easy: $R^2=0.01$, $\beta=-3.687$, $p=0.243$).

Fluid Intelligence

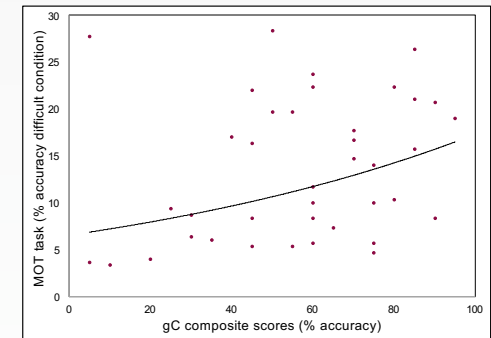
- Fluid intelligence was a significant predictor of MOT performance, but only in the difficult condition ($R^2=0.11$, $\beta=0.615$, $p=0.024^*$).



Results, Cont.

Crystallized Intelligence

- Crystallized intelligence (%accuracy) approached significance as a predictor of improved performance in the MOT task, but only in the difficult condition ($R^2=0.06$, $\beta=1.816$, $p=0.082$).



Conclusions

Objective 1: New Higher cognitive reserve (CRI alone or CRI+gF scores) did not predict better performance on the attention task.

Potential explanation: CR is built up throughout one's lifetime. Our homogeneous sample of young adults might not show strong CR differences yet.

Objective 2: Like others^{1,2,4}, we found that individual differences in gF can account for some variability in performance on a sustained attention task.

Individuals with higher gF had better MOT performances than individuals with lower gF.

The same, albeit weaker, relationship was observed with gC scores.

References

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