Metacognitive Sensitivity Deficits in Late Adulthood

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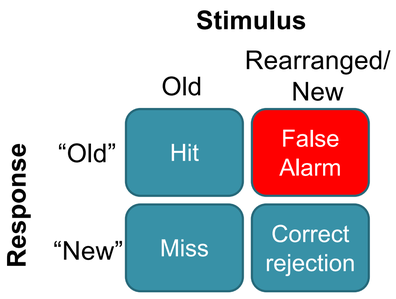
Introduction



Older adults are more likely to falsely remember things that did not occur in the past (Kensinger & Schacter, 1999), especially in memory tasks in which items presented at study are recombined at test (**rearranged pairs**, Shing, et al., 2008).

Additionally, older adults are **more confident** than younger adults when they produce false alarms (Fandakova, Shing, & Lindenberger, 2013).

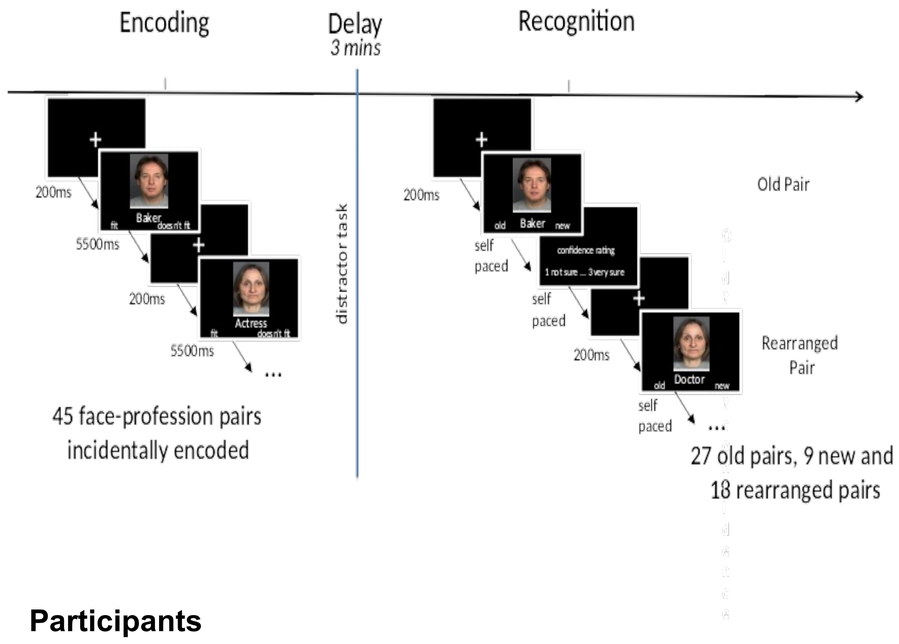
It is still not clear to what extent reduced metacognitive sensitivity depends on older adults' deficits in associative memory and how it is related to the aging brain.

Research questions:

1. Is age-related metacognitive sensitivity deficit distinct from a general age-related decline in memory discrimination?
2. Is metacognitive sensitivity associated to the integrity of specific cortical brain regions?

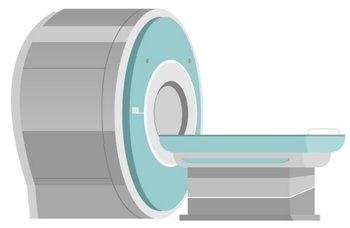
Methods

PARADIGM



Participants
YA: 391 (mean age = 28.3, range = 21-36 years)
OA: 1511 (mean age = 67.57, range = 60-83 years)

MRI Measurements

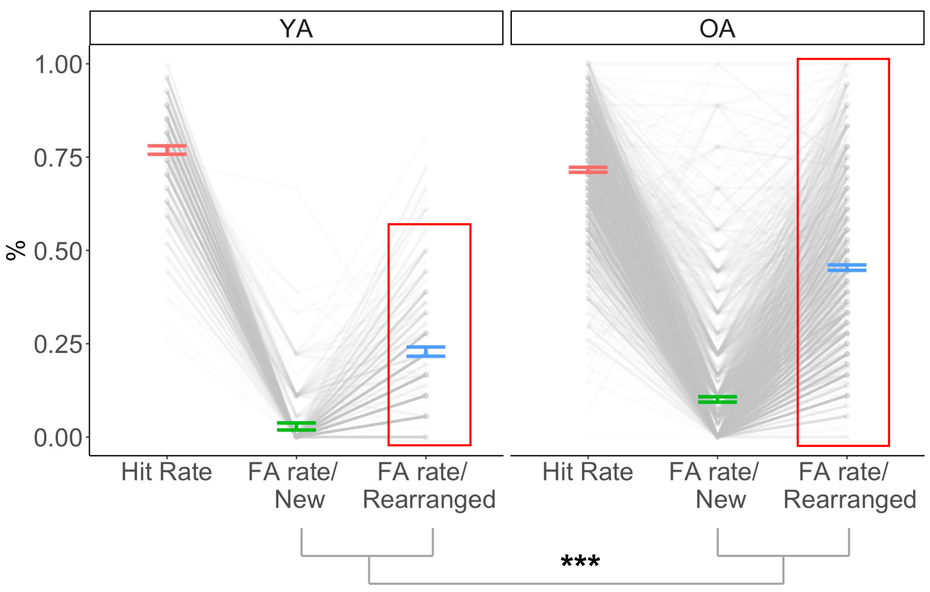


- Regions of Interest selected depending on previous studies on metacognition
- Volumes have been adjusted for intracranial volume.
- Both volumes and thickness have been aggregated (left and right hemisphere).

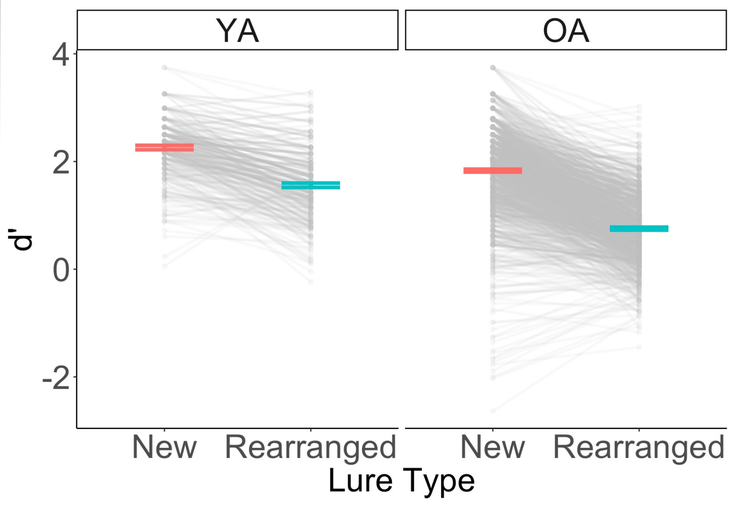
Participants
YA: 75 (mean age = 27.8, range = 21-36 years)
OA: 231 (mean age = 67.3, range = 60-80 years)

Results

Response Rates

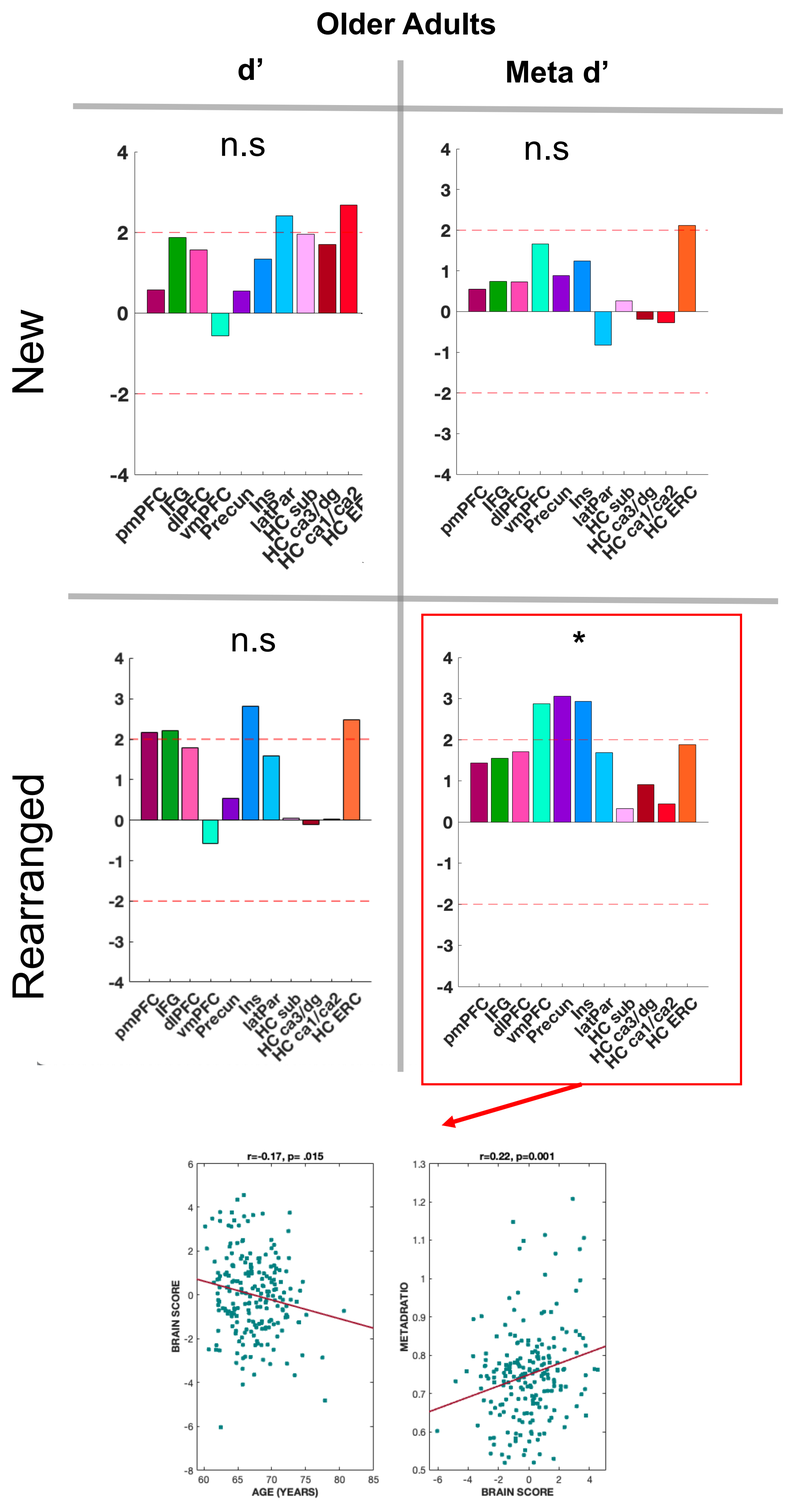


d'

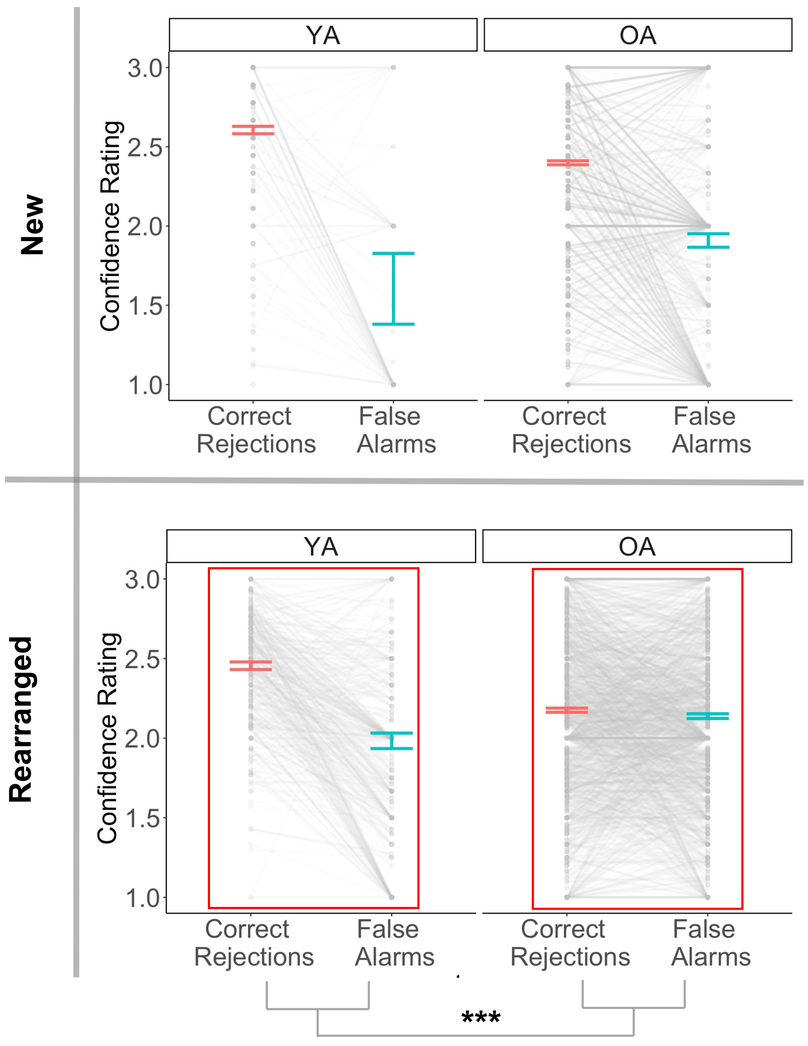


Partial Least Square Correlation

One single score (latent variable) that captures brain structures related to behavioural measures (Krishnan et al, 2011).



Confidence



Older adults make more false alarms for rearranged pairs and are more confident when committing them.

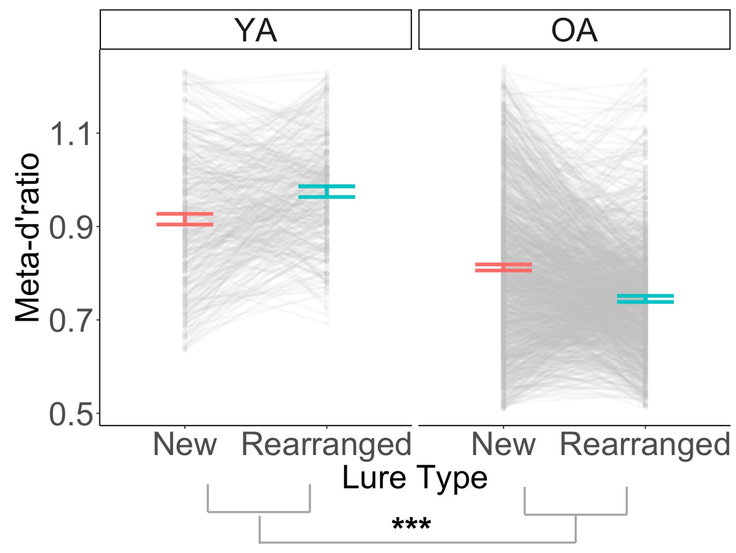
Meta-d' ratio

The value of type 1 sensitivity (d') expected to give rise to observed confidence rating data if the subject was ideal in confidence ratings, in d' units (Fleming & Dolan, 2012).

Sensory evidence available for metacognition.

Meta-d' ratio: meta-d'/d'. 1 means ideal value of metacognitive efficiency. 0.7 means that 30% is lost when making cognitive judgements.

Estimated through Hierarchical Bayesian Estimation (Fleming, 2017).



Lure Type by age group interaction: Young adults show higher meta-d' ratio for rearranged pairs, compared to new pairs. Older adults show the opposite pattern.

Conclusions

- Metacognitive sensitivity is a distinctive age-related deficit, above and beyond a general age-related decline in memory discrimination
- It is associated with the structural integrity of a set of brain regions, particularly ventromedial prefrontal cortex, precuneus, and insula.

References

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