CONTRIBUTIONS OF HIPPOCAMPAL AND STRIATAL GRAY MATTER INTEGRITY TO MNEMONIC DISCRIMINATION ACROSS THE LIFESPAN

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DOES STRIATAL INTEGRITY RELATE TO MNEMONIC DISCRIMINATION?

- Converging evidence indicates that the striatum (caudate, putamen) contributes to EPISODIC MEMORY.
- For example, functional neuroimaging studies have shown both HIPPOCAMPAL and STRIATAL engagement during item recognition (Scimeca & Badre, 2012) and paired-associate learning (Mattfeld & Stark, 2010).
- Successful performance on these tasks requires discrimination of novel events from previously encountered events (i.e., MNEMONIC DISCRIMINATION).
- Thus, we tested whether the striatum relates to this fundamental component of memory using diffusion tensor imaging in 125 healthy adults (20-87 years, 80 F).
- Given our lifespan sample, we first had to consider the effect of age on the memory and integrity measures.

ENCODING PHASE

- View 128 common objects
- Judge "indoor"/"outdoor"

TEST PHASE

- View repeated target, novel foil, and similar lure objects
- Judge "old"/"similar"/"new"
- Increased age was associated with decreased mnemonic discrimination $[\text{LDI-AUC} = \text{p("similar" | lure) - p("new" | lure)], but not recognition p("old" | target) - p("old" | foil}]

GRAY MATTER INTEGRITY DECLINES WITH AGE

- Diffusion imaging is increasingly common in gray matter (e.g., Beukema et al., 2015; Rathi et al., 2014).
- Diffusivity may indicate microstructural differences (e.g., neuron density, arborization), especially within the relatively well-organized hippocampus and striatum.

- Increased age was associated with declines in striatal and hippocampal integrity (increased MD, AD, RD).

INTERPRETATIONS

- These preliminary findings may indicate that:
  1) Mnemonic discrimination is in fact mediated by integrity of hippocampal and striatal memory systems.
  2) Age accounts for the apparent relationships between mnemonic discrimination and striatal integrity, which disappear after controlling for chronological age; but this overly general explanation lacks specificity.
  3) An unknown 3rd variable may mediate hippocampal and striatal integrity, accounting for relationships with mnemonic discrimination; consistent with these regions sharing more variance than can be attributed to age and/or global integrity.

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