

Age-related Differences in Cognitive and Neural Resources: Evidence for Plasticity and Compensation

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Brain Activity in Older Adults

Maintenance

- Preserved task-related patterns of activity

Selective Vulnerability

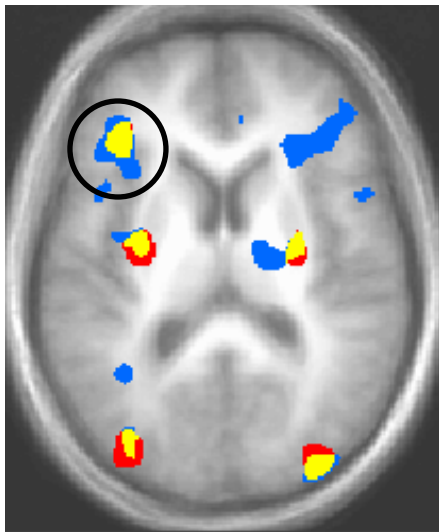
- Reduced activity in occipital cortex
- Reduced activity in hippocampus

Plasticity

- Over-recruitment of brain areas, usually PFC
- Differential utilization of brain areas active in young adults
- Recruitment of different brain networks or altered activity in networks

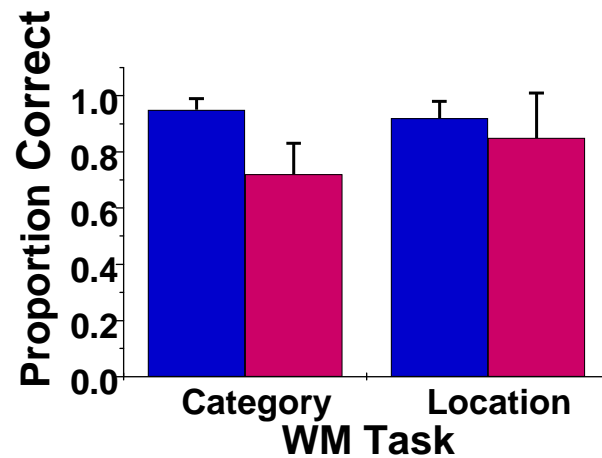
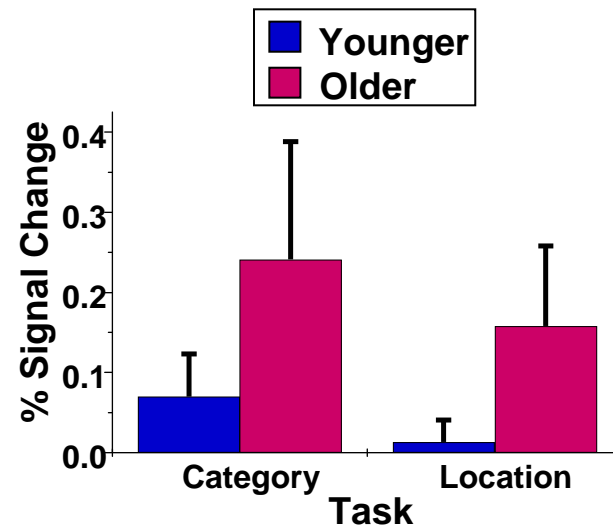
Over-Recruitment of Brain Activity in Older Adults

Over-Recruitment during Auditory WM for Spatial and Non-spatial Information



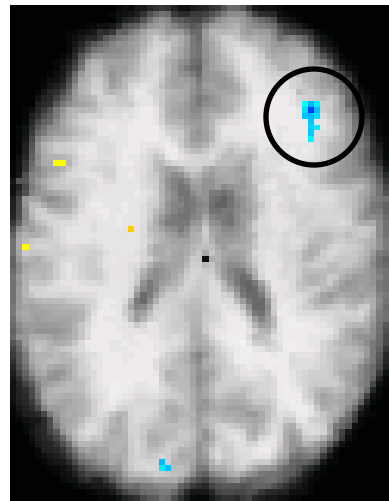
Greater Activity in Older Adults

- Category
- Location
- Both Tasks

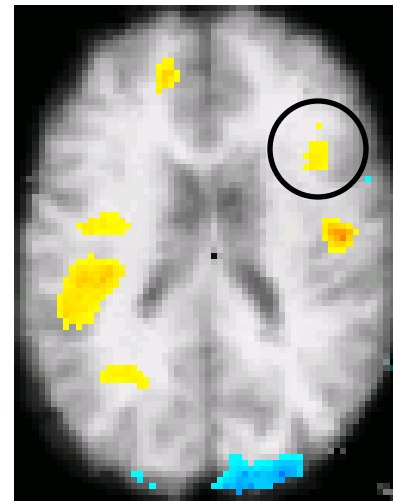


Over-Recruitment during Recognition Memory

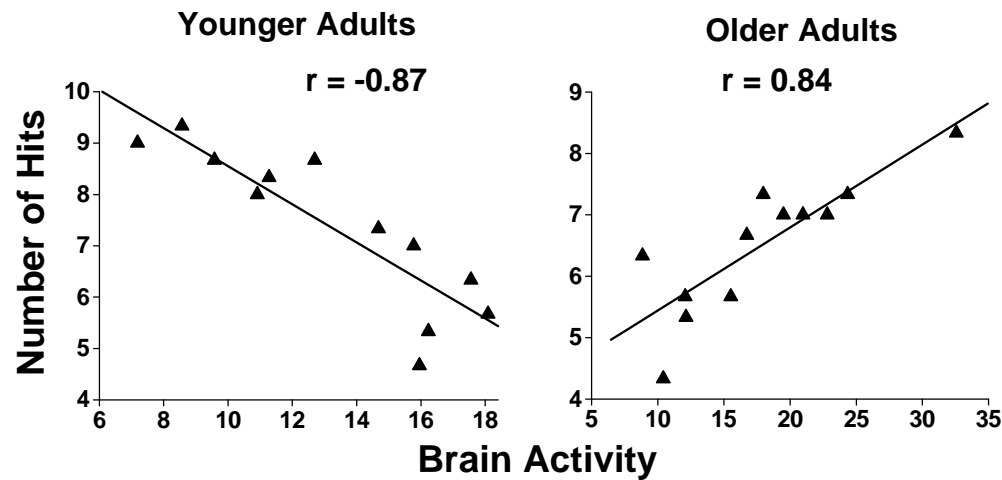
More active in older adults



Correlated with better memory only in older adults

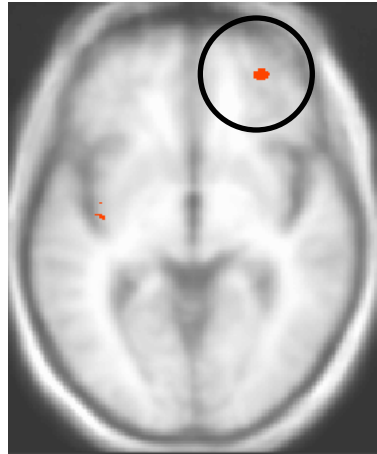


No age difference in hit rates

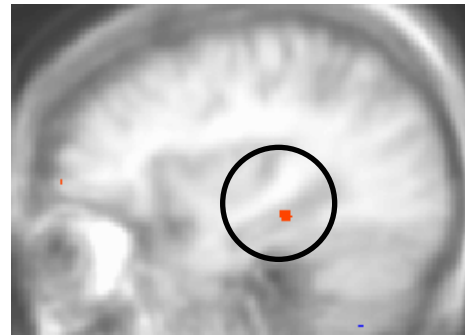


Age Differences in How Brain Activity is Utilized

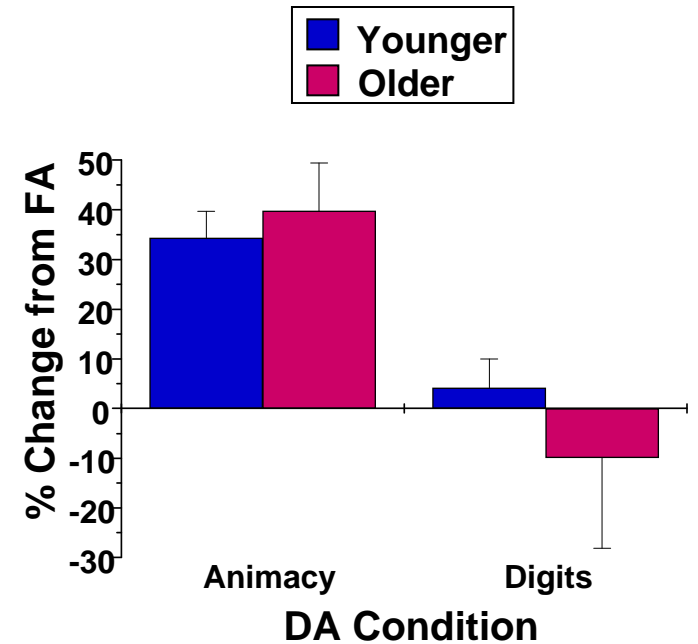
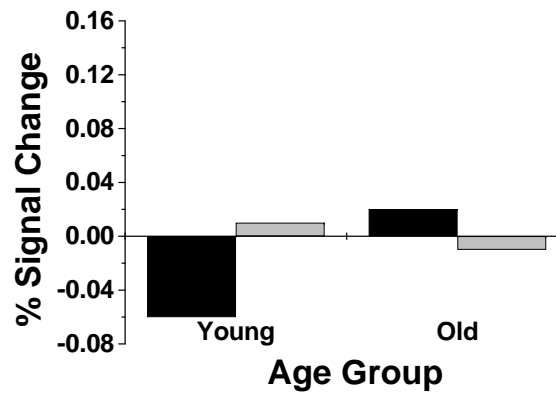
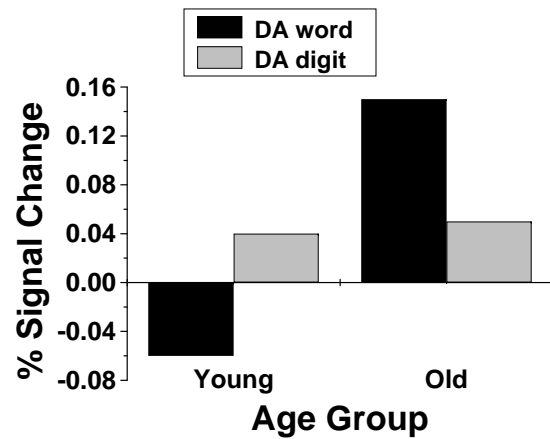
Verbal Recognition during DA-Animacy



Right PFC



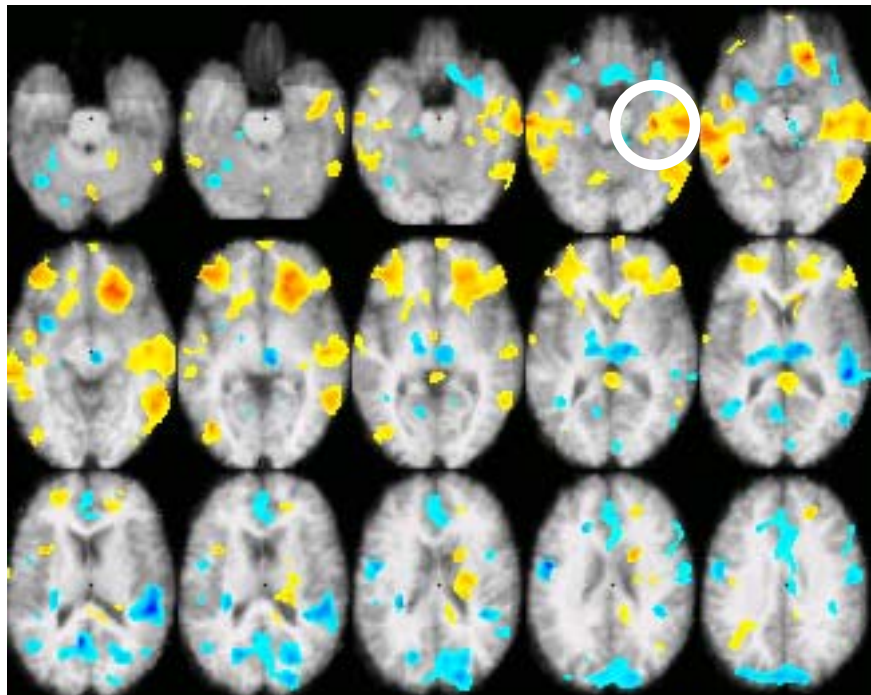
Right Hippocampus



Age Differences in Large-Scale Brain Networks

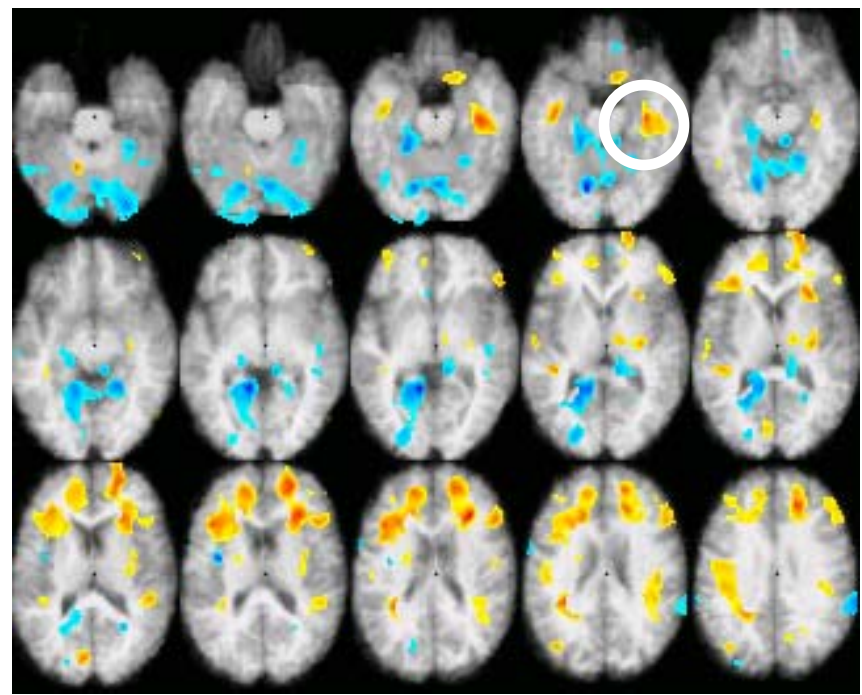
Encoding Networks for Objects

Younger Adults



	<u>Rhip</u>	<u>Rec</u>
Young	0.91	0.79
Old	0.06	0.20

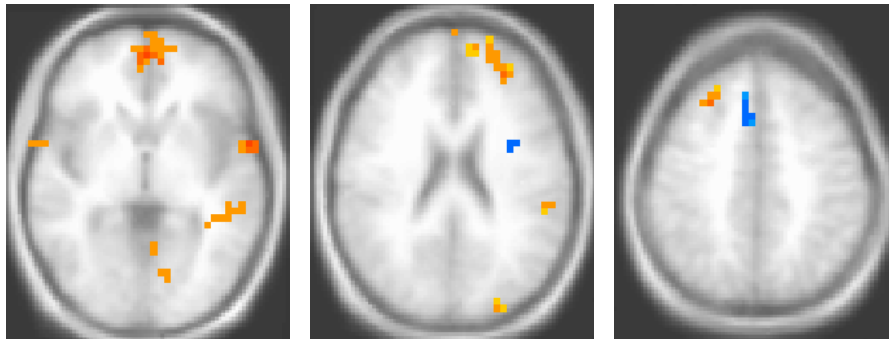
Older Adults



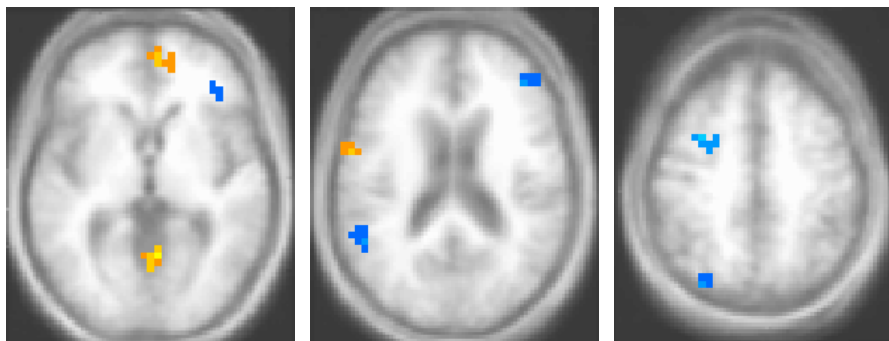
	<u>Rhip</u>	<u>Rec</u>
Young	-0.38	0.02
Old	0.64	0.84

Distributed Patterns of Activity Associated with Emotion Identification

Younger Adults

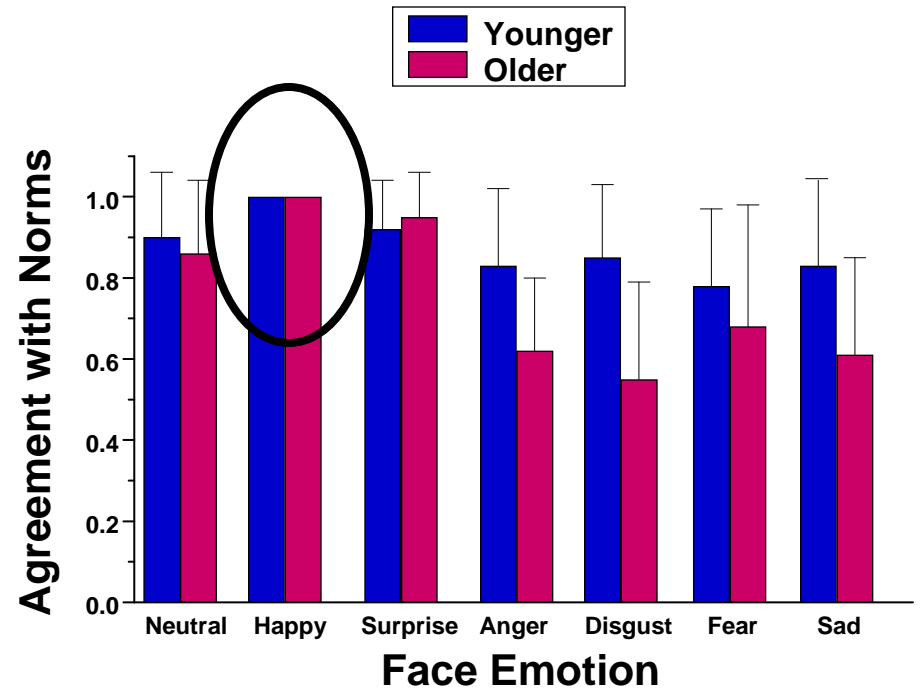


Older Adults



Happy < Other

Happy > Other



How Important Are Plasticity, Compensation, and Selective Vulnerability to Cognitive Aging?

Very Important!

- 1. Older adults show considerable plasticity in their brain activity during cognitive tasks. Is there also evidence for compensation?**
 - Over-recruitment of PFC –yes
 - Changes in the balance between cognitive and/or brain strategies – yes
 - Alterations in large-scale brain networks – yes
- 2. This plasticity/compensation may be in response to reduced activity in other brain areas or to age changes in structure or neurochemistry of the regions showing these plastic changes**
- 3. One challenge for the future will be to find *specific* links between vulnerabilities and deficits due to aging and those plastic changes that can compensate**

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