

Three Criteria for Defining Compensatory Brain Activity in Older Adults

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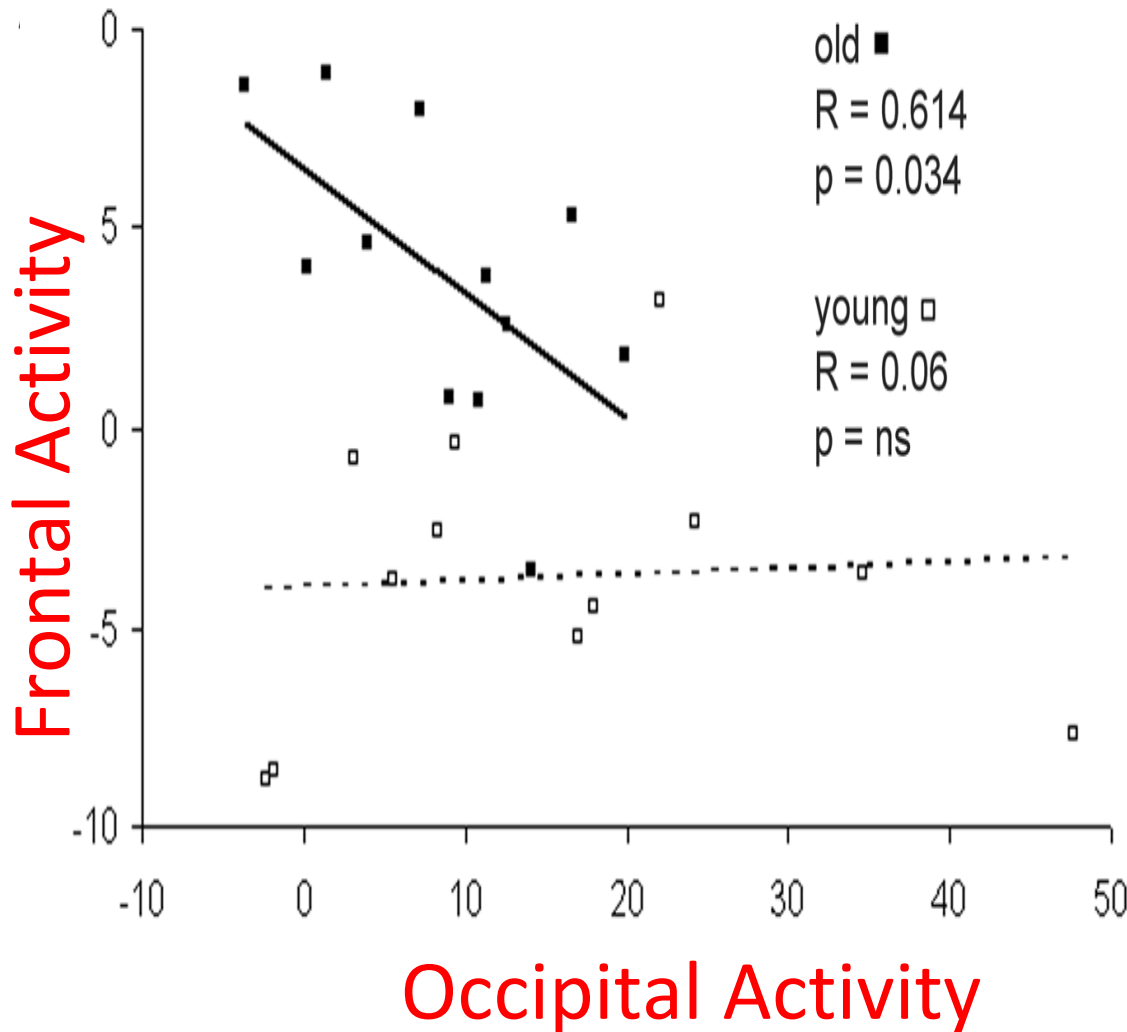
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Three Criteria for Compensation: The Eyeglasses Metaphor

- If eyeglasses compensate for eyesight deficits, then one may expect at least three things:
 1. The worse the eyesight, the stronger the eyeglasses
 - The greater the deficit, the greater the compensation
 2. Wearing eyeglasses should enhance vision
 - The greater the compensation, the better the performance
 3. Not wearing the eyeglasses should impair vision
 - Disrupting compensation should impair performance
- Over-recruitment of frontal regions in older adults fulfills all three criteria

Criterion 1: The greater the deficit, the greater the compensation



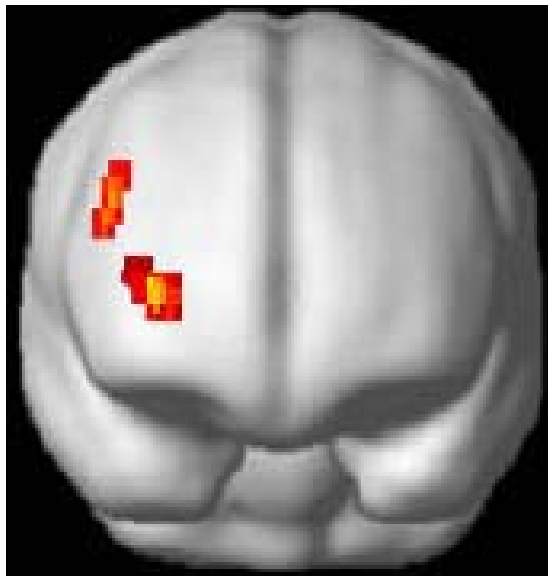
It has been suggested that greater frontal activity compensates for weaker occipital under-recruitment in older adults
e.g., Grady et al., 1994

Davis, Dennis,
Madden, & Cabeza
(2007, Cereb Ctx)

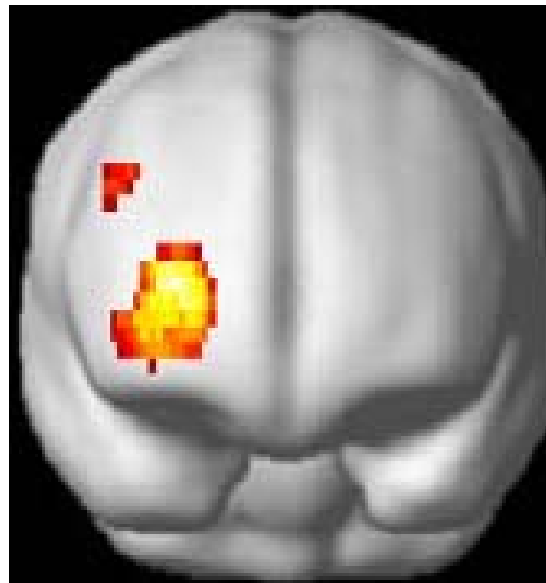
Criterion 2: Compensation is associated with better performance

It has been suggested that bilateral frontal activity in older adults is compensatory (e.g., Cabeza, 2002, *Psych Aging*)

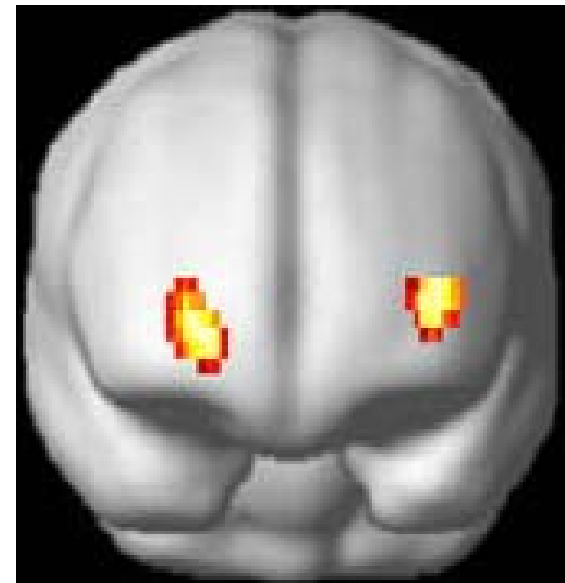
Young Adults



Low-Performing Older Adults



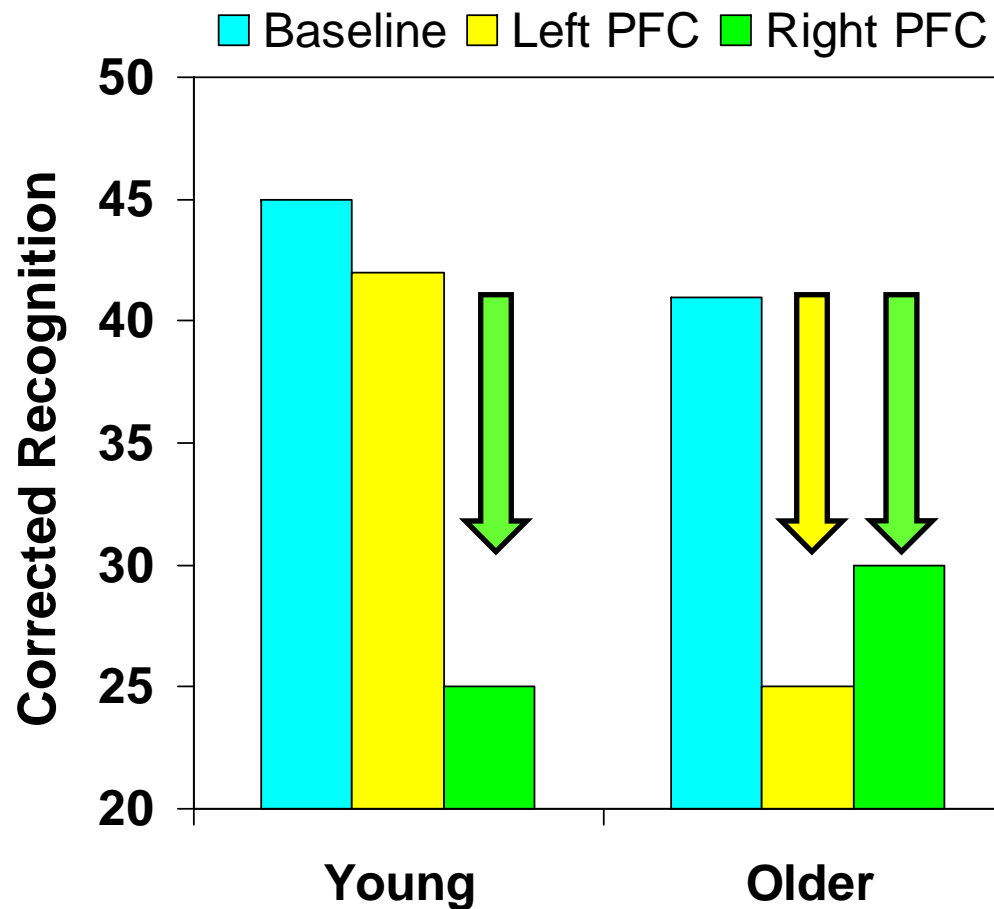
High-Performing Older Adults



Cabeza et al. (2002, *Neuroimage*)

Criterion 3: Disrupting Compensation Impairs Performance

Transcranial Magnetic Stimulation (TMS) during episodic retrieval



Rossi et al.
(2004, *J Neurosci*)

Compensation Triangle

