

“Living long, living well”
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What is attention?

- *“Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. ... It implies withdrawal from some things in order to deal effectively with others,*” William James, 1890

James was on the right track, but he seriously underestimated the complexity --and marvels-- of attention.

Goals and hurdles

•Goals:

- Understand how aging affects --or spares-- attention
- Develop remediation strategies.

•Hurdles:

- Attention is not monolithic.
- Develop a sensitive, flexible assay of attention that reflects the way that attention is used in everyday activities.
- But first, consider some of the things we now know about attention.

The Attention Networks

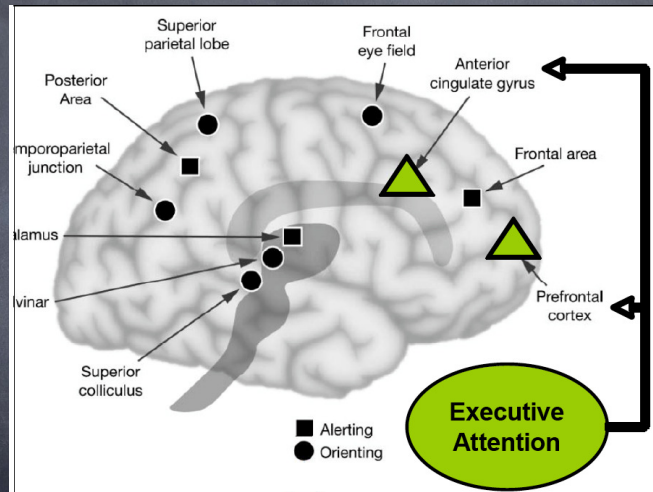
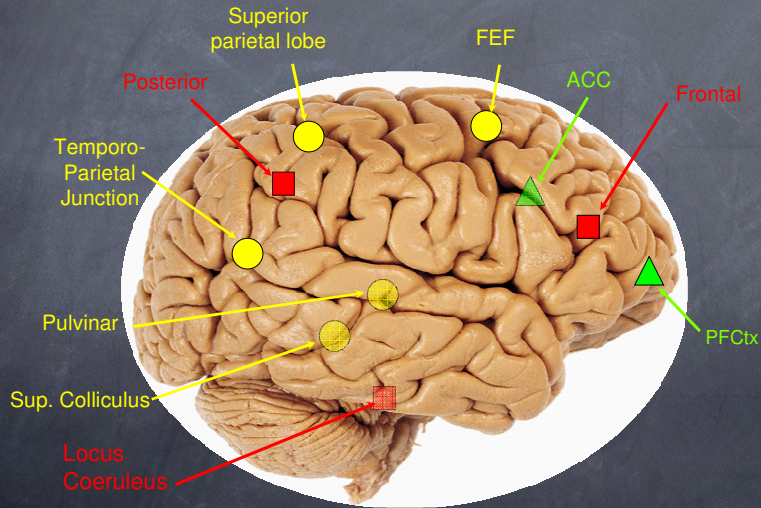
Function	Origins	Main modulator	Targets
<i>Alerting</i>	Locus coeruleus, frontal & parietal Cortex	Norepinephrine	Superior parietal Cortex, Temporo-parietal junction, Superior colliculus
<i>Orienting</i>	Superior parietal Cortex, Temporo-parietal junction, Frontal eye fields, Superior colliculus	Acetylcholine	Primary sensory areas (V1, A1, S1)
<i>Executive Control</i>	Anterior cingulate, Basal ganglia, lateral ventral Prefrontal cortex	Dopamine	Most brain areas

Key components of the brain's networks for attention

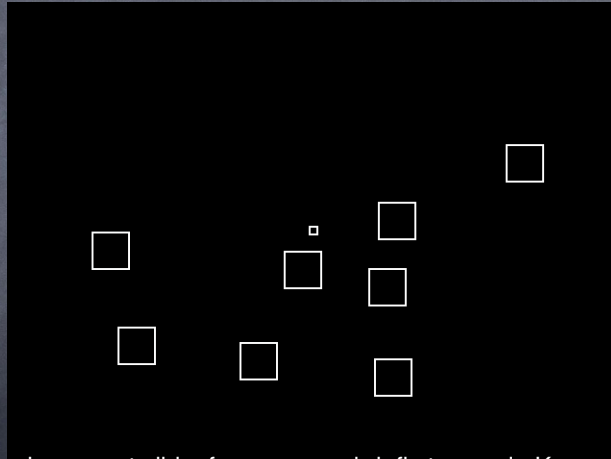
Alerting

Orienting

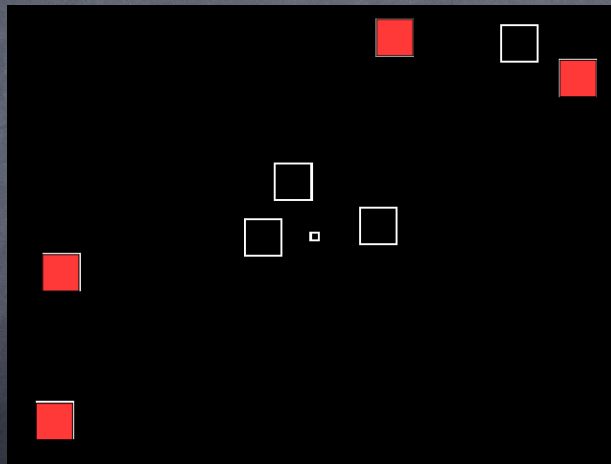
Executive



A useful, flexible assay: Multiple Object Tracking



In the movie on next slide, four squares briefly turn red. Keep your mind's eye on those four while all of the squares move about. When they stop moving try to identify the squares that had been red.



Here're the final positions of the four squares that you should have tracked by means of selective attention.

Main questions

1. How does age alter MOT performance when varying demands are made on sustained visual attention?
2. Can age-related differences in MOT be explained by some factor other than aging?
3. Is memory for individual tracked items all-or-none or graded in strength?

Key test conditions

- 10 black disks --randomly distributed over screen
- 2, 3, 4 or 5 highlighted for tracking
- All move about randomly --for 5 or 10 seconds
 - Two different speeds
 - No collisions, no overlap --made it relatively easy
- After motion stopped, subjects tried to identify the tracked discs, one at a time -starting with one about which they were most confident

Age groups, video game groups

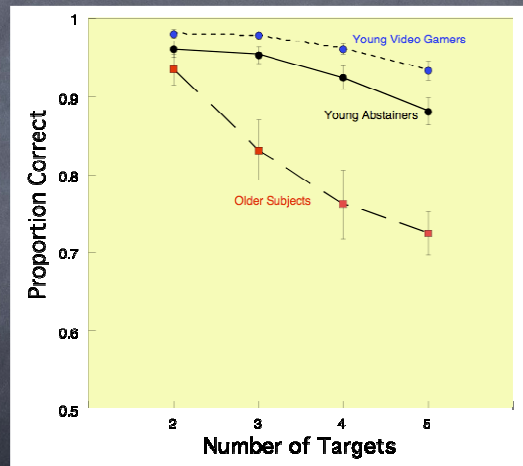
		VGP	NVGP	Older
Age	Range	18-29	18-28	66-84
	Mean±SD	20.6±3.1	20.6±2.3	75.3±5.7
Visual Acuity	Range	20/16 - 20/22	20/16 - 20/22	20/16 - 20/35
	Mean±SD	20/18±1.8	20/17.6±1.6	20/25.2±5.7
Contrast Sensitivity	Range	1.64 - 1.92	1.64 - 1.84	1.44 - 1.68
	Mean±SD	1.71±0.09	1.72±0.08	1.60±0.10
Video Game Hours per Week	Range	5-30	0-3	0-1
	Mean±SD	11.6±7.5	0.4±0.8	0.3±0.9

Good vision
MMSE > age norms
Visual Activities Questionnaire

But older and younger subjects differ in video game experience. Might that difference in experience matter?



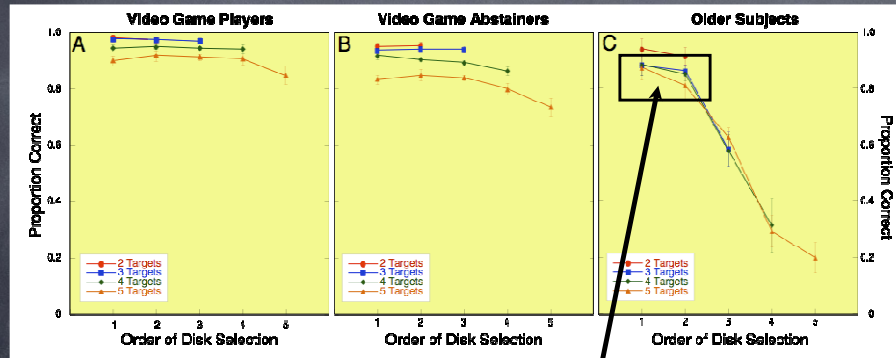
Basic result



Are results merely a matter of age-related changes in memory?

- How much of the age-related differences came from simple age-related changes in memory?
- With stationary discs varying delays (0, 5, 10 sec) no difference with age --99.4% correct

Average performance distorts the nature of age-related changes



Older subject clearly had two of the discs firmly in mind.

Subjects seemed to know that they know --or don't.

What's next on the agenda?

- Identify neural bases of effects
- Develop techniques to ameliorate age-effects
 - Attentional and emotional training
 - Effectiveness
 - Persistence
 - Impact on everyday life
- Examine age-related impact of distracters

The End