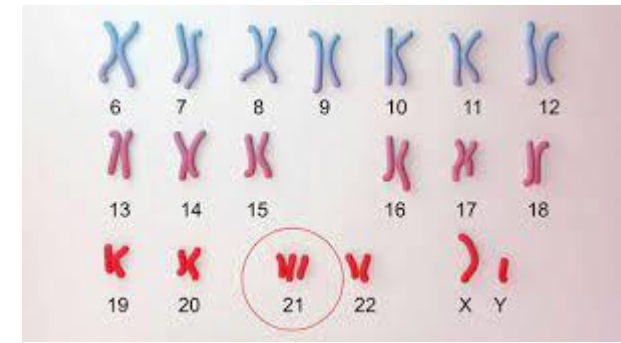


L&M across lifespan

# Down's syndrome

extra copy of chromosome 21  
(called **trisomy 21**)  
Congenital disorder



- Hippocampal, frontal cortex, cerebellum – smaller
- Episodic Memory, delayed, sub-optimal
- Delayed physical growth
- Slow development of speech and linguistic abilities
- Characteristic facial profile
- Mild to moderate intellectual disability (lower IQ)
- Reduced life expectancy
- Sensitive and emotional individuals

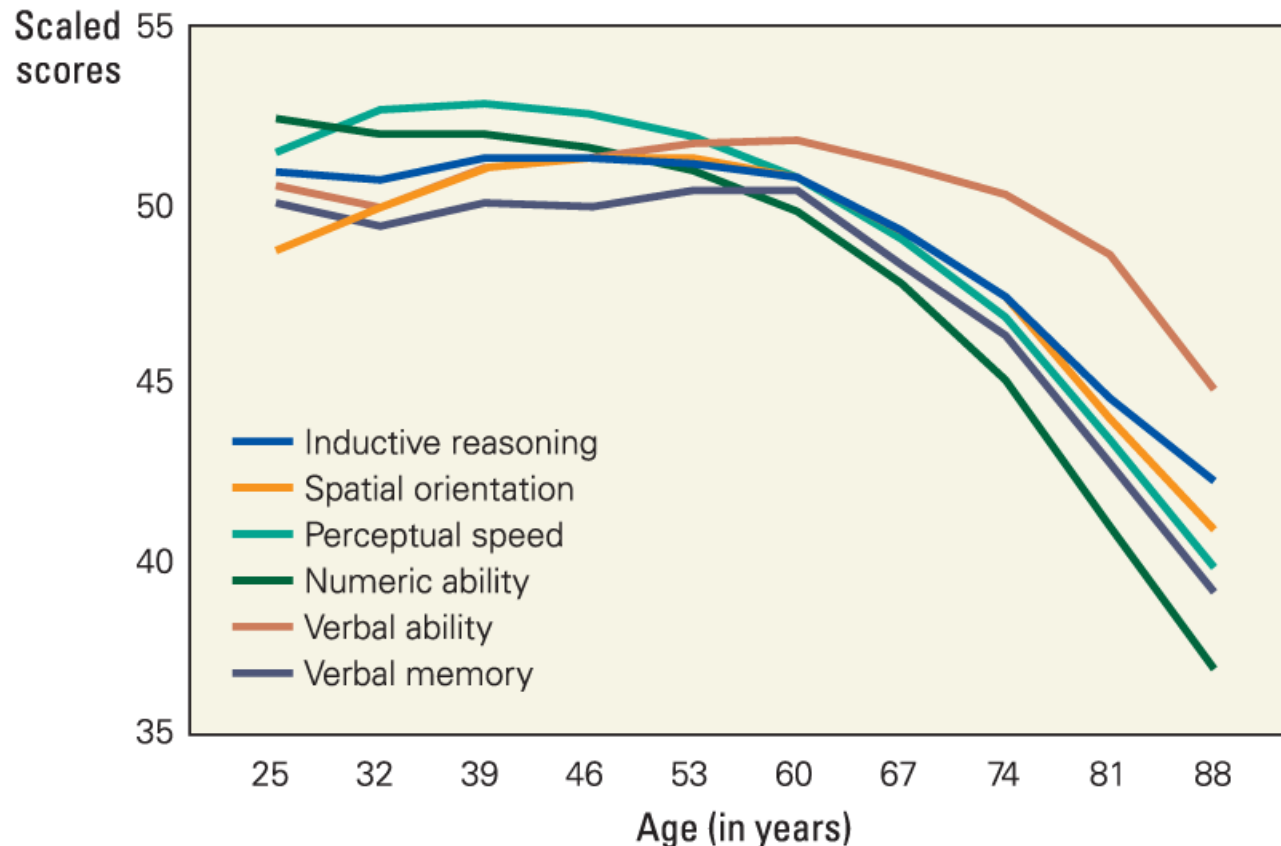


# Autism

- Avoid eye contact
- Heightened response (sensitive) to sensory information
- Imitation deficit
- Delayed speech
- Atypical connectivity in the brain
- Rote learning, semantic memory is normal/superior
- WM capacity is lowered



# Human Cognition Across the Lifespan



Gluck et al., *Learning and Memory*, 4e, © 2020 Worth Publishers

Benefits of aging?

Working memory?

Last in first out

Proactive interference?

## Non-Declarative Memory

- Conditioning is slower
- Motor skill learning is slower- eg. Computers
- Known skills are maintained - e.g. musicians, artists

London Taxi driver study – larger hippocampus

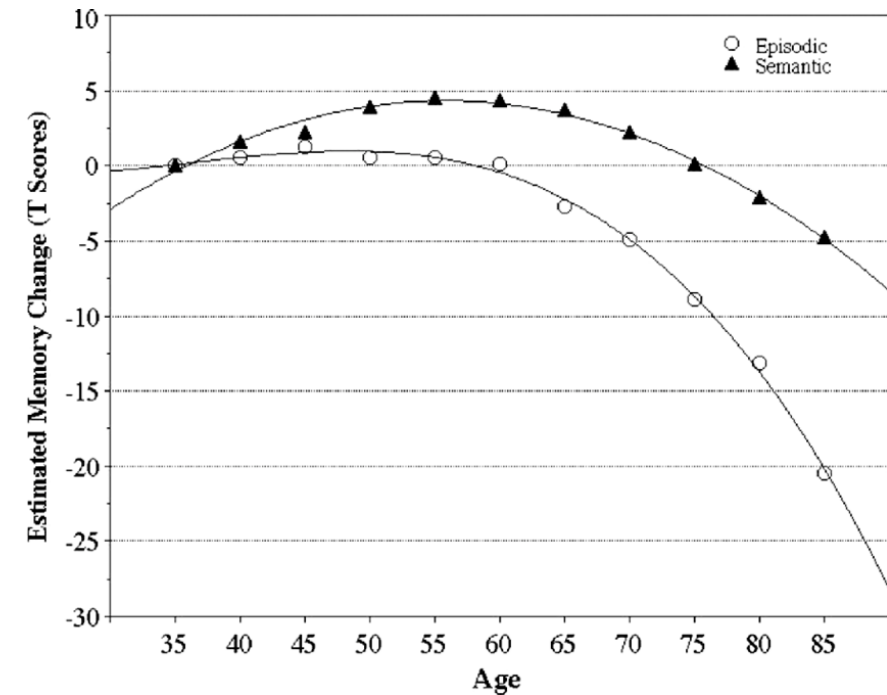
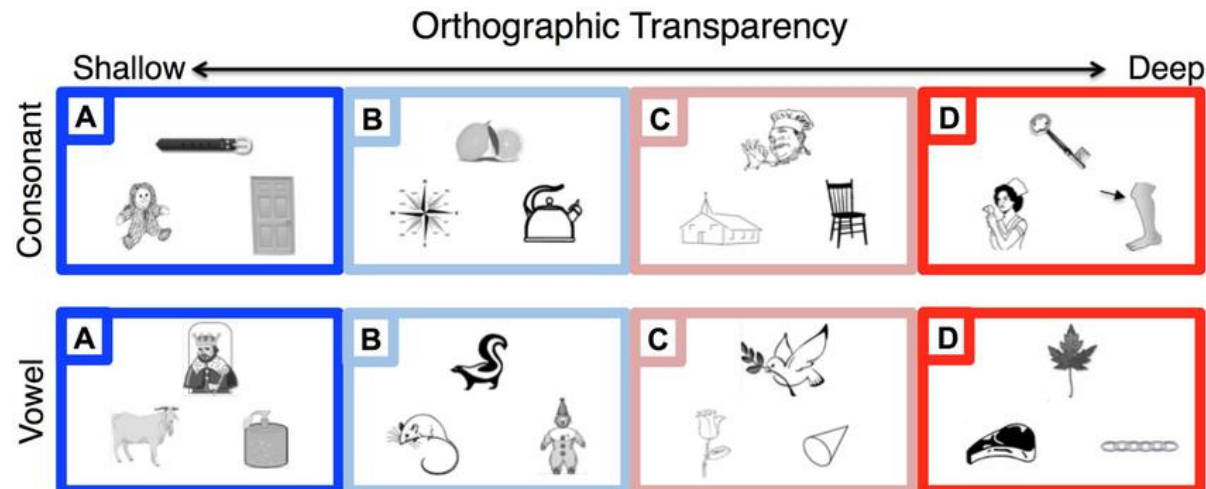
<https://www.pnas.org/doi/10.1073/pnas.070039597>

# Episodic and Semantic ?

- Binding deficit (encoding & retrieval of where, what when info) – hippocampus
- Control deficit – working memory (organization, manipulation, evaluation of info) – PFC
- Episodic → familiarity > recollection

## Semantic info

- Old = young (easy tasks, semantic judgement)
- Old < young (difficult tasks, phoneme judgement task)



# Learning and Memory in Old Age

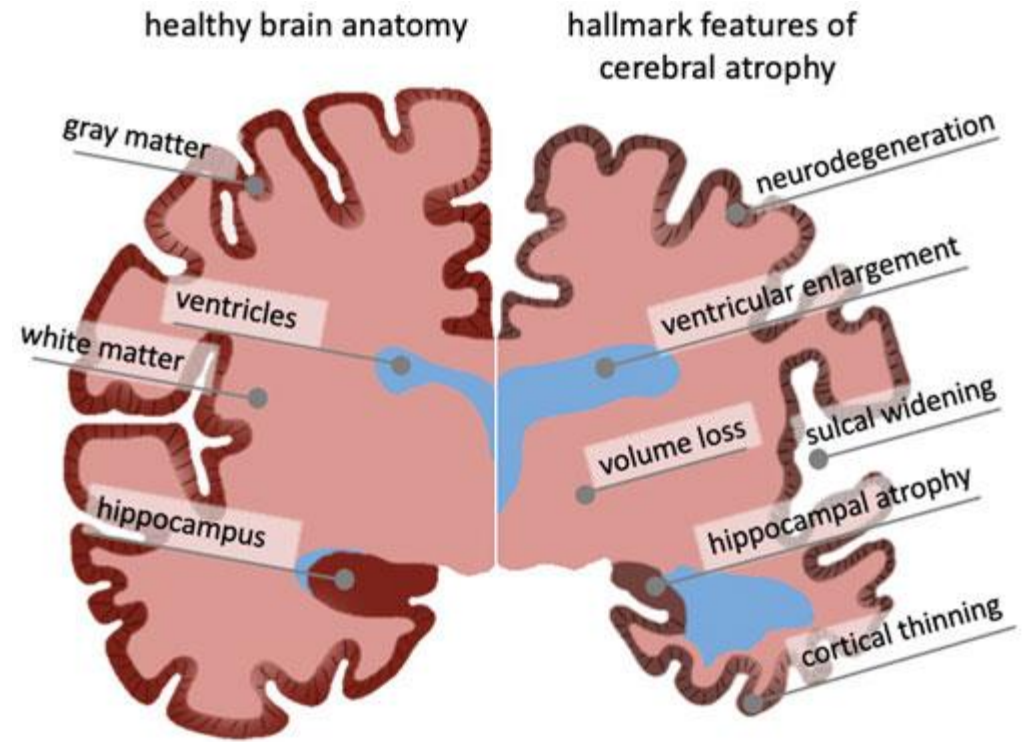
identify the learning and memory processes involved in each of the tasks described below and predict whether or not healthy older people should be able to perform them as well (or nearly as well) as when they were young adults.

1. Recalling one's wedding day
2. Remembering the items on this week's shopping list (without writing them down)
3. Remembering how to make coffee
4. Learning the name of a new friend
5. Learning how to take photos with a new phone

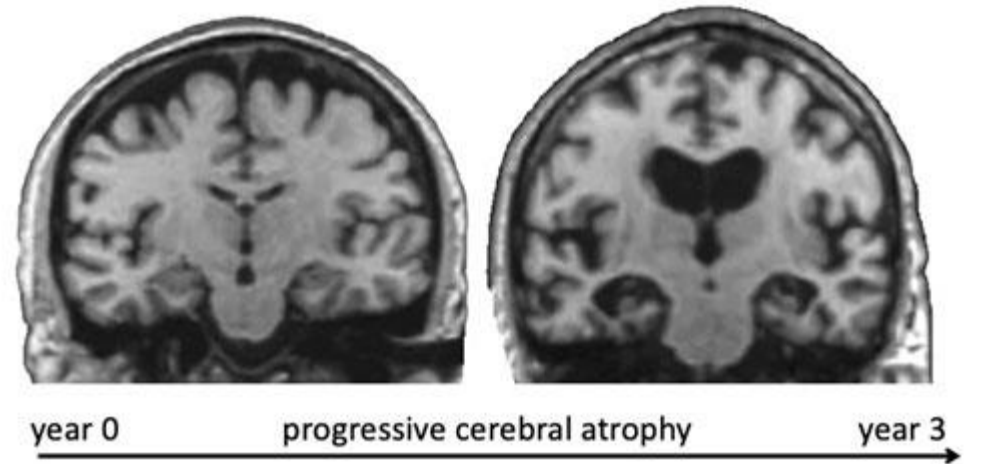


# Aging Brain

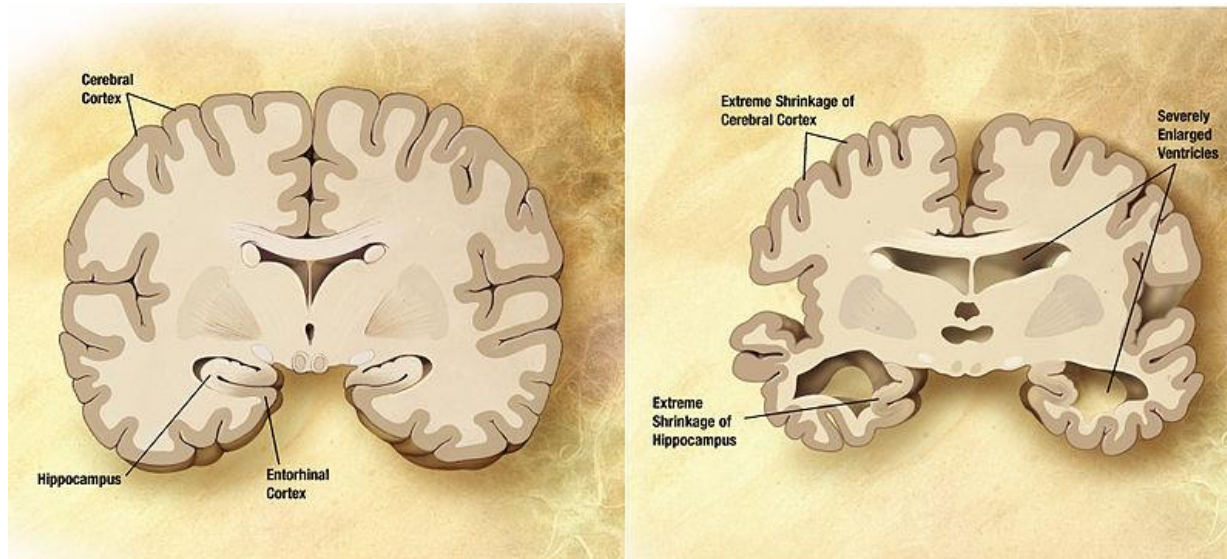
Prefrontal cortex  
Hippocampus



longitudinal imaging data reveals structural brain changes



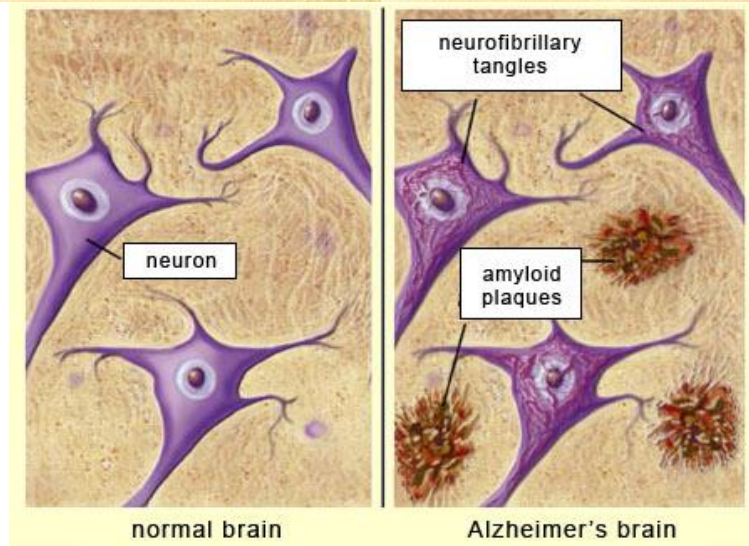
# Normally aging vs Alzheimer's disease



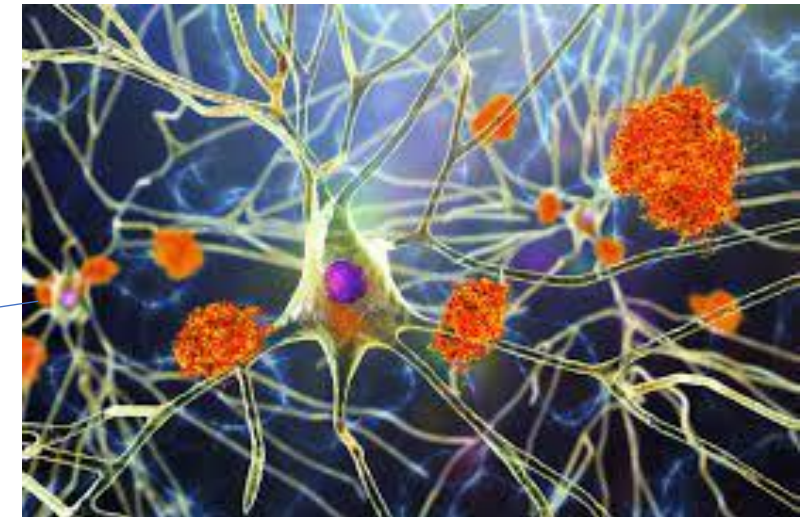
With aging



Unremoved proteins build up



accelerated



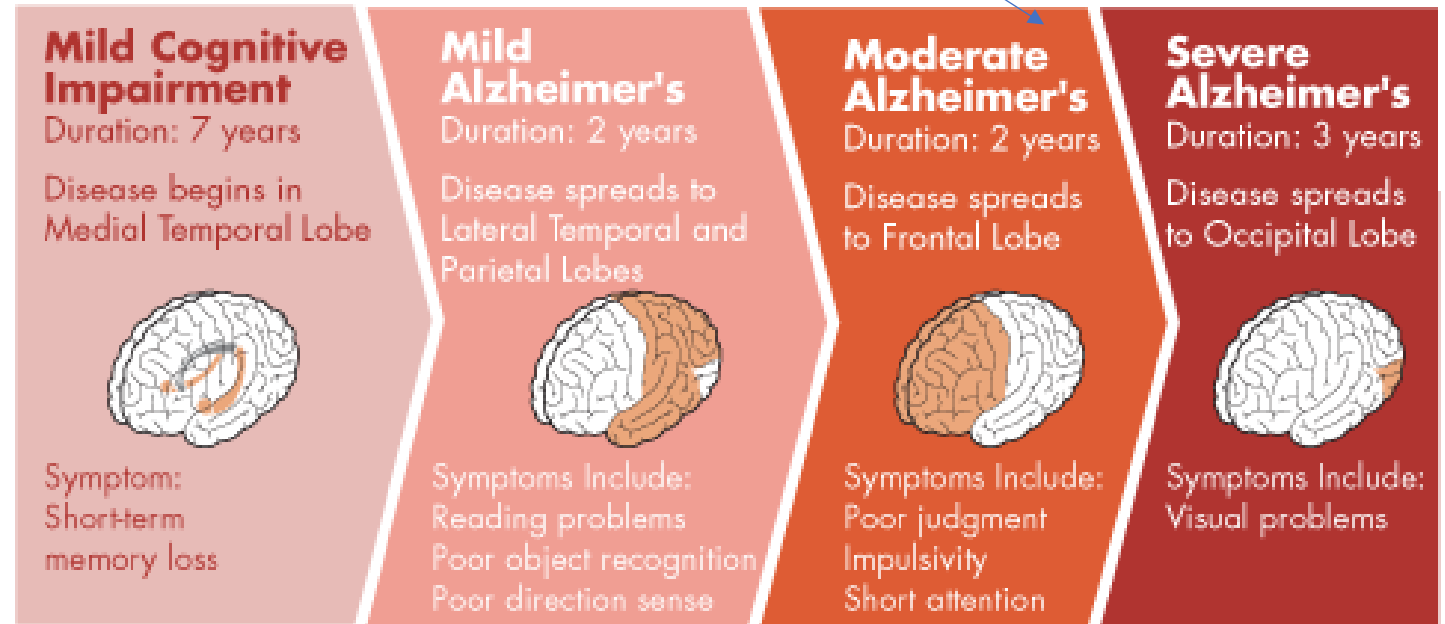


# Alzheimer's disease (AD) → cause?

- Risk factors (not clearly established)
  - Inactive lifestyle
  - lack of exercise (physical + mental)
  - Loneliness, social isolation
  - diet (vit B12/vit D deficiency)
- Inflammation (chronic diseases – diabetes, hypertension, etc.)
- Genetic

# AD progressively....

- Dementia → extreme condition of Cognitive decline
- How do you diagnose?
- Treatment?



Evolutionarily, what do we benefit from such a complex system?

- What do you plan to do after your semester is over?



# Mental Time Travel

1) Remember our past – The nature of information processing, in the internal circuits in the hippocampus, allow our past experiences to be retrieved with exceptional detail, as though we were reliving those moments.

- Adaptive advantage of episodic memory - it allows us to learn from the same event more than once. We can mentally revisit events and compare them to similar and related episodic memories.

2) Simulate the Future – By using our past experiences, we can construct or simulate future scenarios, predict outcomes in novel circumstances by reorganizing our past experiences.