Memory and Healthy Aging

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How does memory change?

Why does memory change?

What can we do about it?
Healthy, or normal, memory changes
What happens on average
How do we study memory and aging?

- Behavior or neuropsychology
- Brain imaging
What is memory?

...many types with different features
**Episodic memory**: memory for specific events that are “relived” when remembered

- Recalling activities from over the weekend
- Recalling who you spoke with earlier about the news
- Learning a new name
Semantic memory:
world knowledge

• Vocabulary
• Facts about history
• Facts about you
Prospective memory: Remembering to do things in the future

- Take medication
- Attend a social event
- Call someone at a certain time
Procedural memory: Motor learning and memory

Once learned, it is “unconsciously” retrieved
Short-term memory: temporarily held in mind, not actually stored in the brain

- Remembering an address or menu order
Not all types of memory decline with typical aging
Procedural learning and memory – “motor memory” – is generally preserved
• Basal ganglia
• Brain structures that support procedural memory
• Less change with age
Semantic memory – world knowledge, including vocabulary and facts – **IMPROVES** with age

Older adults tell more interesting stories and use more complex sentences than young adults
• Temporal lobes support learning and storage of knowledge
• Show less change with typical aging
What does change with aging?
Episodic memory – recalling specific events

- Recalling activities from over the weekend
- Learning a new person’s name
How does episodic memory change?
• You **recognize** someone as familiar but you cannot **recall** the person’s name

• You cannot visually **recall** the look of your friend’s house, but you **recognize it** when you reach the street
It is harder to remember the **source** of information

- I know I put my car in the parking garage, but what floor?
- It is harder to remember recent events relative to remote events.
- It is harder to remember “everyday” memories in comparison to personally significant memories.
- It is harder to remember all the details, but you hold on to the main theme or gist.
Prospective memory: remembering to do things in the future

- I forgot to buy bread and I knew I needed it.
- I got distracted and forgot to turn off the oven.
- I lost track of time and called 30 minutes later than I had planned.
• It is harder to remember future plans that are not part of your normal routine

• It is harder to remember to follow through with plans that must happen at a specific time

• It is harder to remember future plans when you are “multi-tasking”
Short-term memory: temporarily held in mind, not actually stored in the brain

- Distractions can be more bothersome
How does memory change?

Why does memory change?

What can we do about it?
Sensory abilities – hearing and vision commonly become less efficient with aging
• If you didn’t see it or hear it, it’s hard to remember it!
• Also requires more cognitive effort to encode
• Episodic memory and prospective memory require a lot of communication between different brain regions

• How do they communicate?
• The brain is made of neurons
• Neurons create warehouses and roads
Today is like a Tucson warehouse communicating with a Green Valley warehouse.

I19 was the main road.
• With aging, communication between neurons can slow down
• Road detours
Prefrontal cortex

- The CEO
- Plans and problem solves, resists distraction
- Critical for episodic memory and prospective memory
Hippocampus

• Major warehouse for episodic memory

• Where all the information comes together

• Is less efficient relative to before
How does memory change?

Why does memory change?

What can we do about it?
• Some older adults can perform as well as younger adults by recruiting additional brain regions

• May involve automatically using effective strategies
• Many approaches but all follow one basic principle

• Try to compensate or make up for brain changes that affect good encoding and retrieval
Let’s start with episodic memory
External memory aids – remember what happened, who you met, what you saw, and other details
Internal memory strategies – Use a “deeper” level of processing at encoding

Make each event unique, notice your surroundings and tell a story
Internal memory strategies – Use a “deeper” level of processing at encoding

Remember names by thinking of a rhyme or “self generate” the name many times
**Internal memory strategies** – Use self-referential processing at encoding

Think about how something relates to you and your life experience
Internal memory strategies – Use self-imagining

For example, while reading imagine you are at the scene of the story being told
Shallow reading
Comprehension reading
Self-imagining

Better Memory for sentences

Adapted from Grilli et al., 2017
Internal memory strategies – Test yourself!

May be most applicable if you are taking an educational course or trying to learn a new skill
After everyone studied for 7 minutes they...

- studied more
- took a practice test

Facts Recalled

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Final test took place after...
And now for prospective memory
External memory aids – remembering to do something at a certain time or after a certain amount of time has passed
External memory aids – placing items/reminders in strategic locations
Internal memory strategies – come up with a plan

• Think about exactly when/where you will be

• “When I see the Safeway on my drive home today, I will remember that I need eggs for baking”
Better memory for future plans

- Rote Rehearsal: 10%
- Self-imagining: 50%

Adapted from Grilli & McFarland, 2011
Lifestyle changes that might be helpful
If it is good for your heart, it is good for your brain
Exercise...but you don’t need to be Shirley!

- Shirley Webb is 78 years old
- She can lift 225 pounds...without pulling a muscle
Stay socially and cognitively active

• Do it in a way that is enjoyable and sustainable
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What can we do about it?
Human Memory Laboratory

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