



Understanding & Maintaining Memory

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Today:

- Brain Basics
- Understanding Memory Systems
- Normal Aging Brain vs Dementia
- Maintaining Brain Health

Electroencephalography - EEG



Magnetoencephalography – MEG



Magnetic resonance imaging – MRI





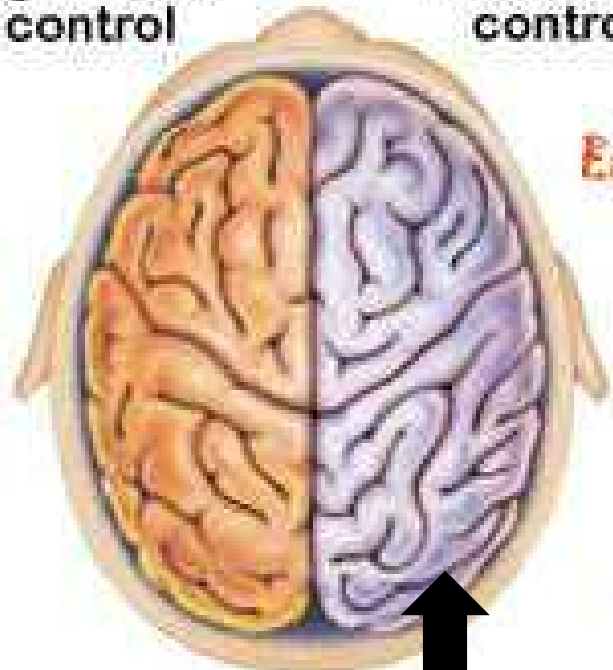
- **Brain Basics Handout**



Right hand control



Left hand control



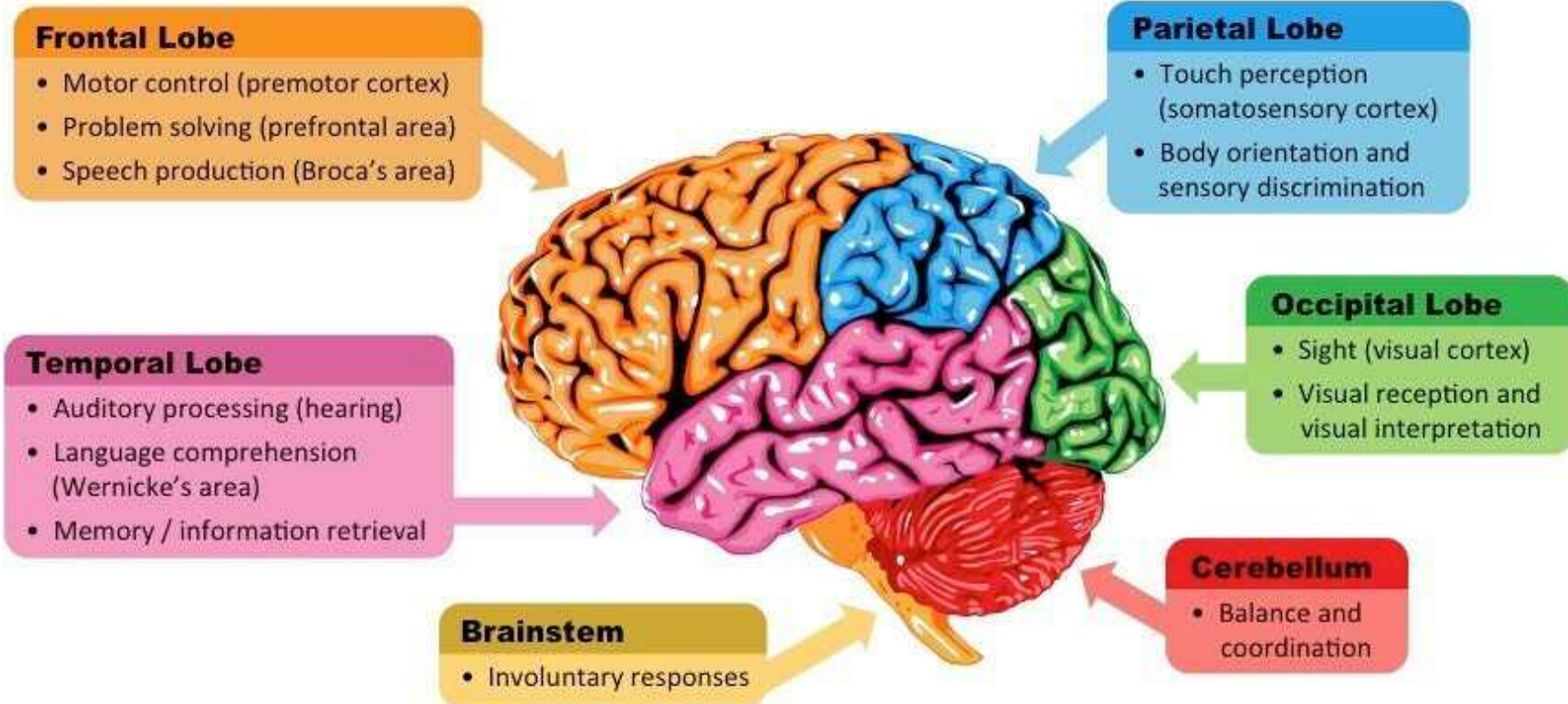
Writing
Language
Scientific skills
Mathematics
Lists
Logic

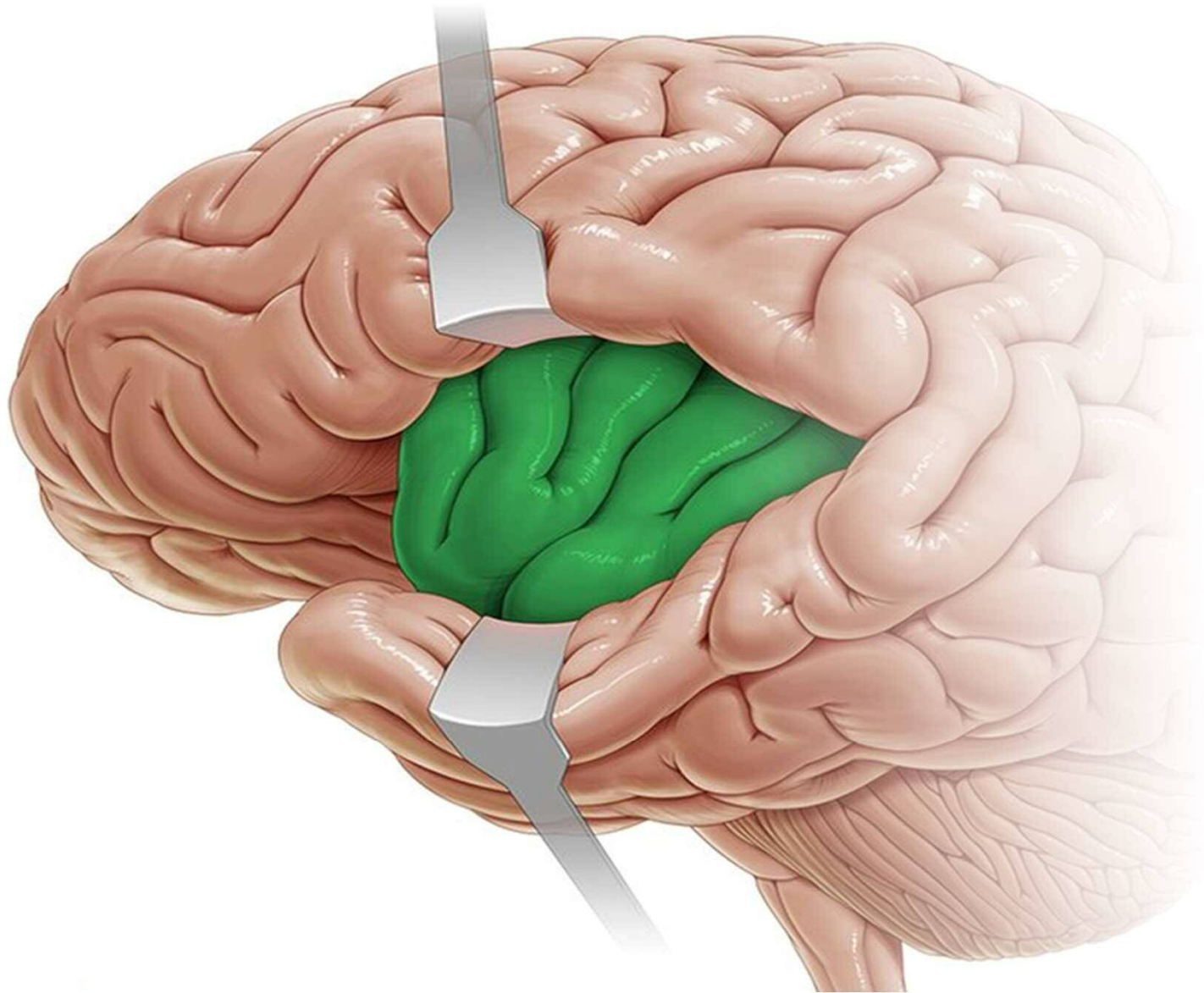
Emotional expression
Spatial awareness
Music
Creativity
IMAGINATION
Dimension
Gestalt (whole picture)

LEFT HEMISPHERE

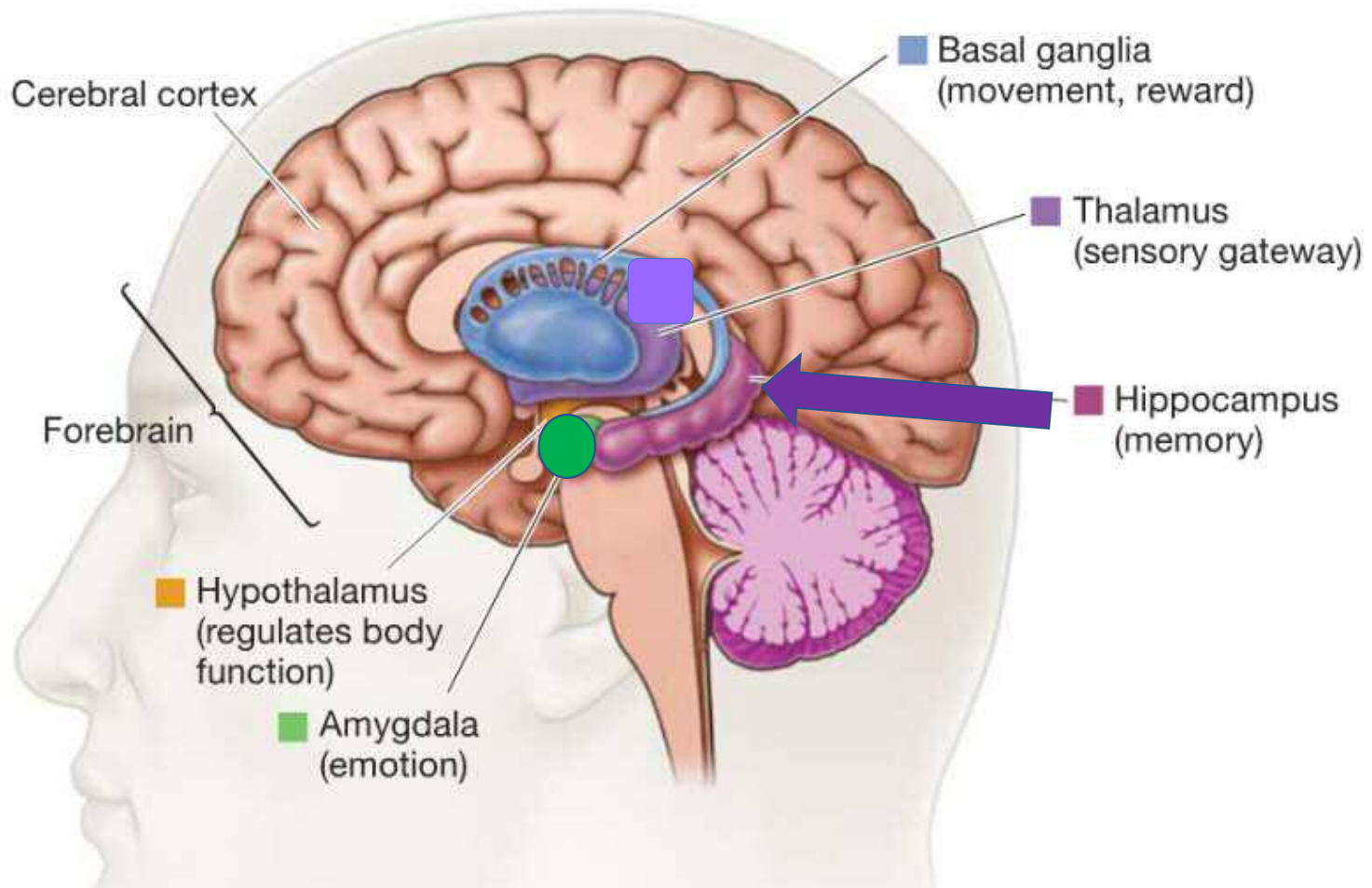
RIGHT HEMISPHERE





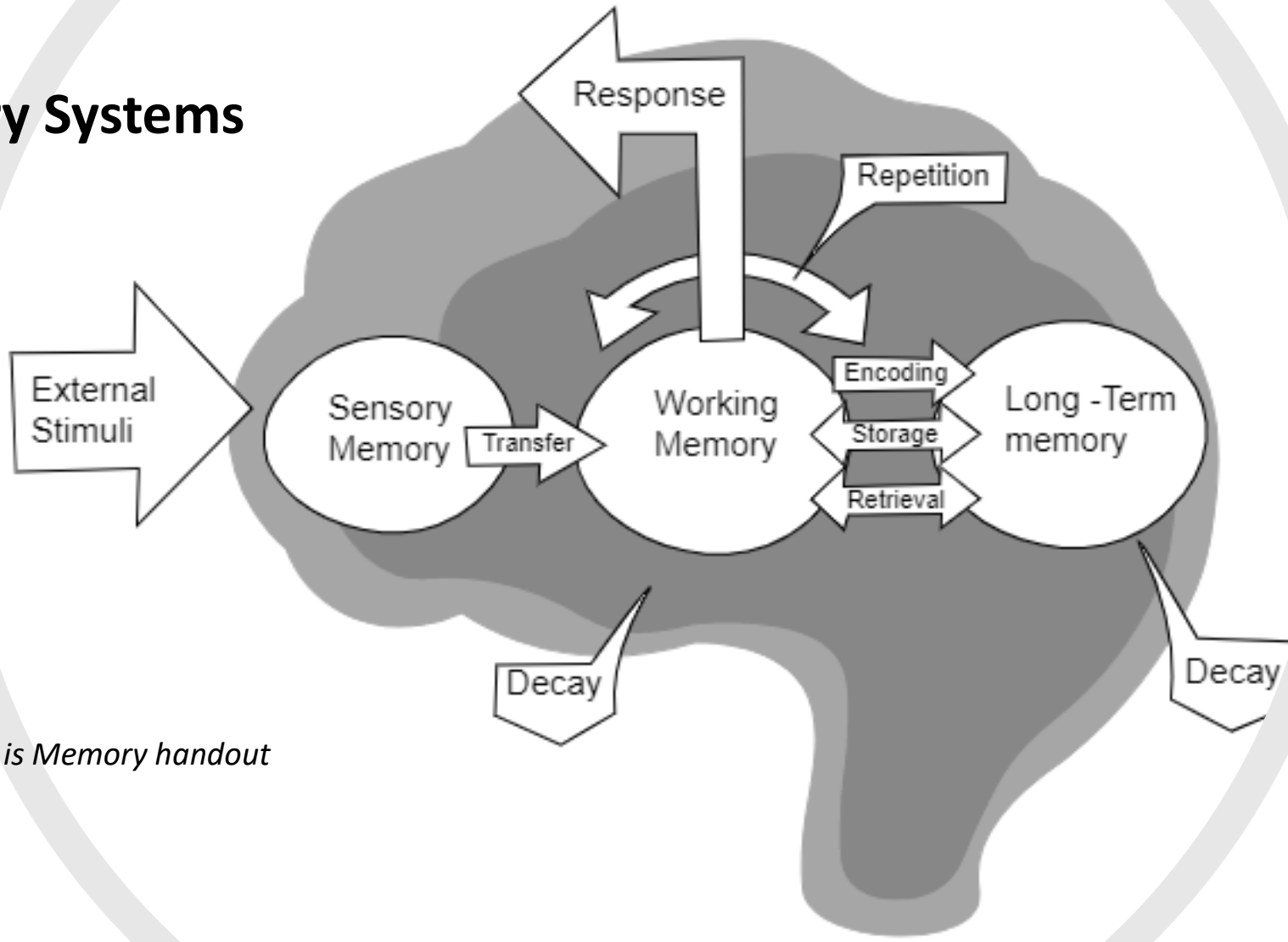


Looking
at the
Limbic
System





Memory Systems



See What is Memory handout

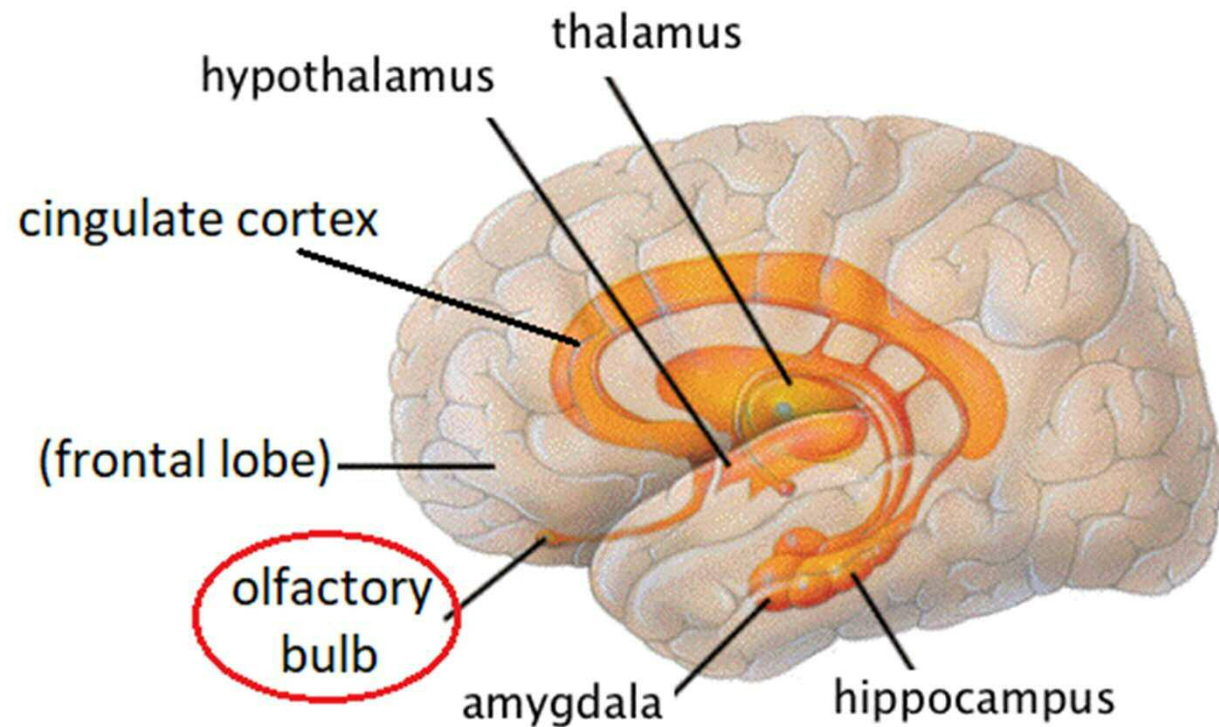
Sensory Memory

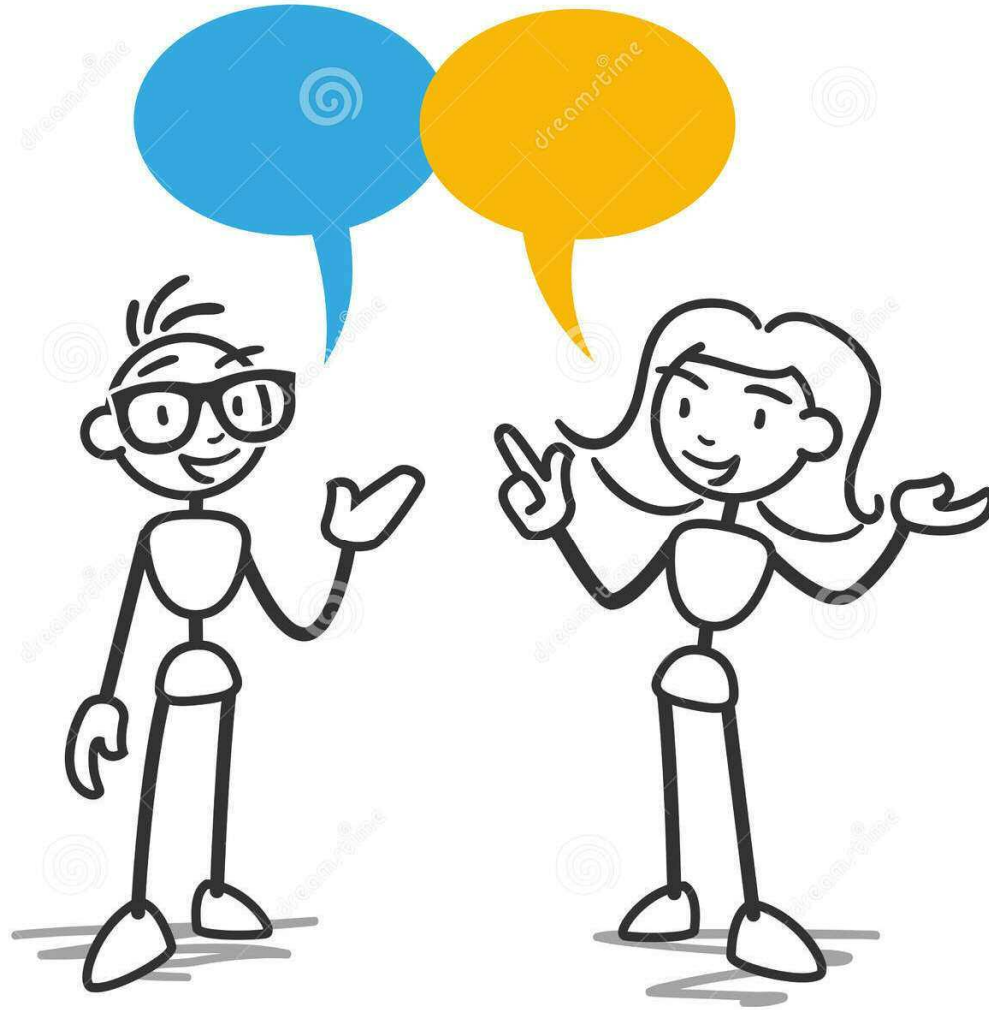


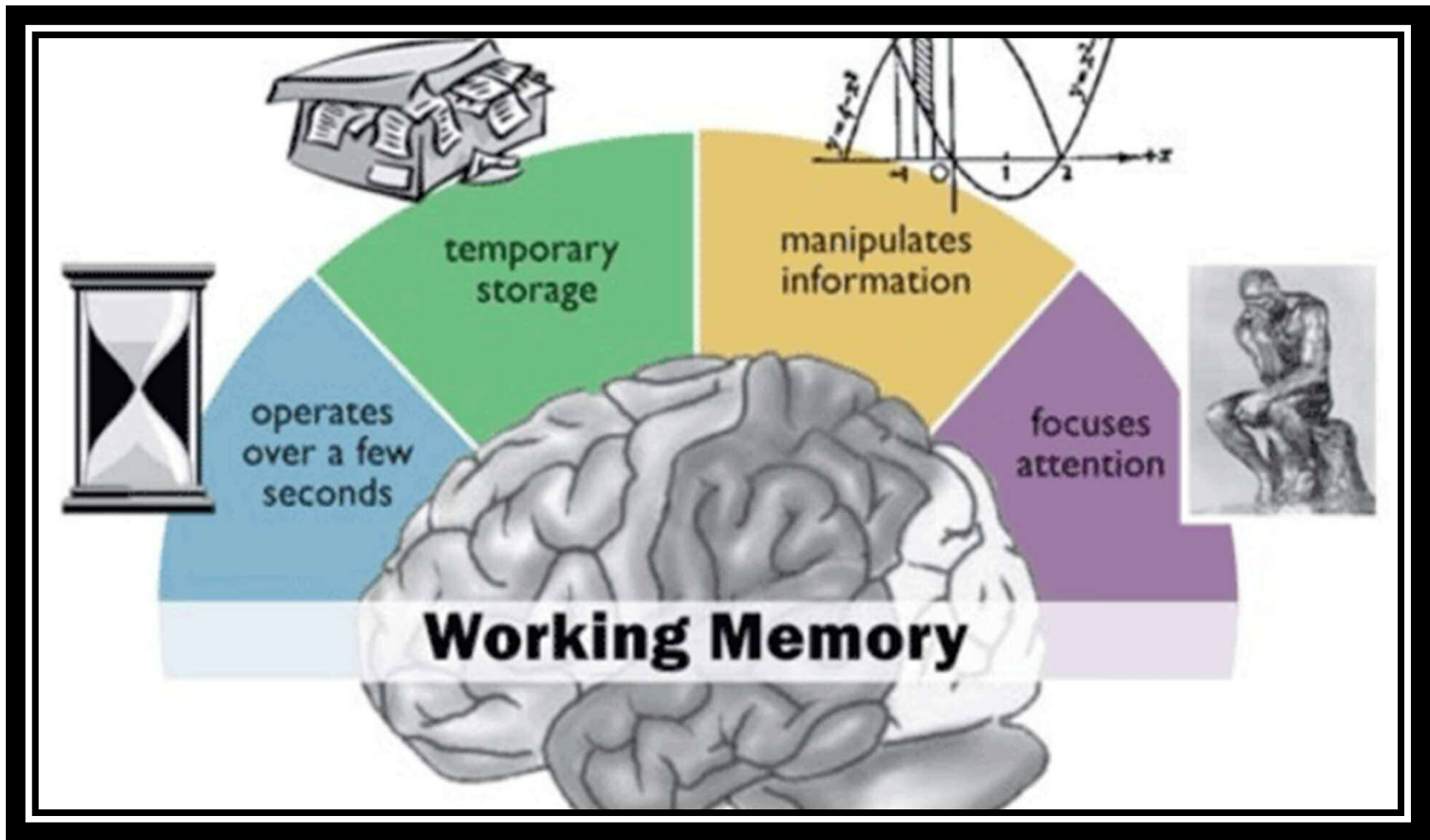
Proust Effect



The olfactory bulb—which sends smell information from the nose to the brain — is one of the first brain regions to sustain damage in Alzheimer’s disease







7 4 9 2 7 5 1

7 4 9 2 7 5 1

5 2 1 6 7 8 2 9 3 6

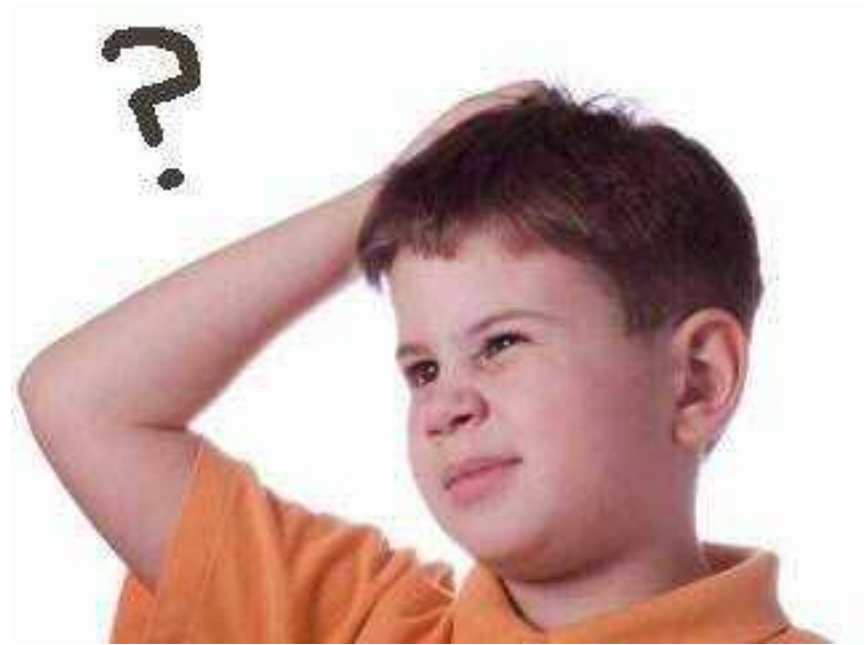
5 2 1 6 7 8 2 9 3 6

7 4 9 2 7 5 1

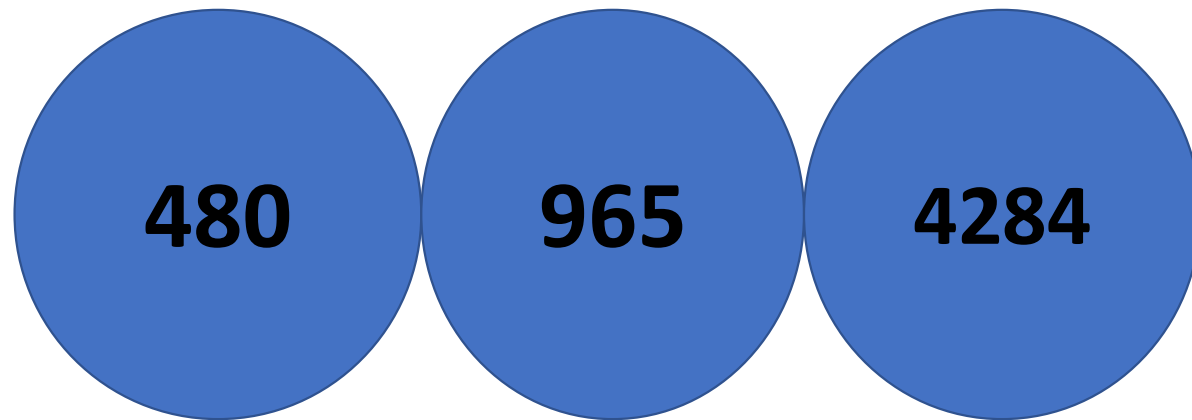
5 2 1 6 7 8 2 9 3 6

Short-term Memory

- Capacity is developmental
- 3 years – 1 bit
- 5 years – 2 bits
- 7 years – 3 bits
- 9 years – 4 bits
- 11 years – 5 bits
- 13 years – 6 bits
- 15 years – 7 bits
- 15-40 - 7 bits
- 40-65 - 6 bits
- 65+ depends on health



Billie's ASU Phone Number





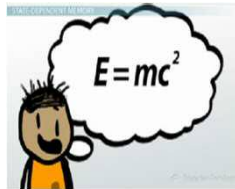
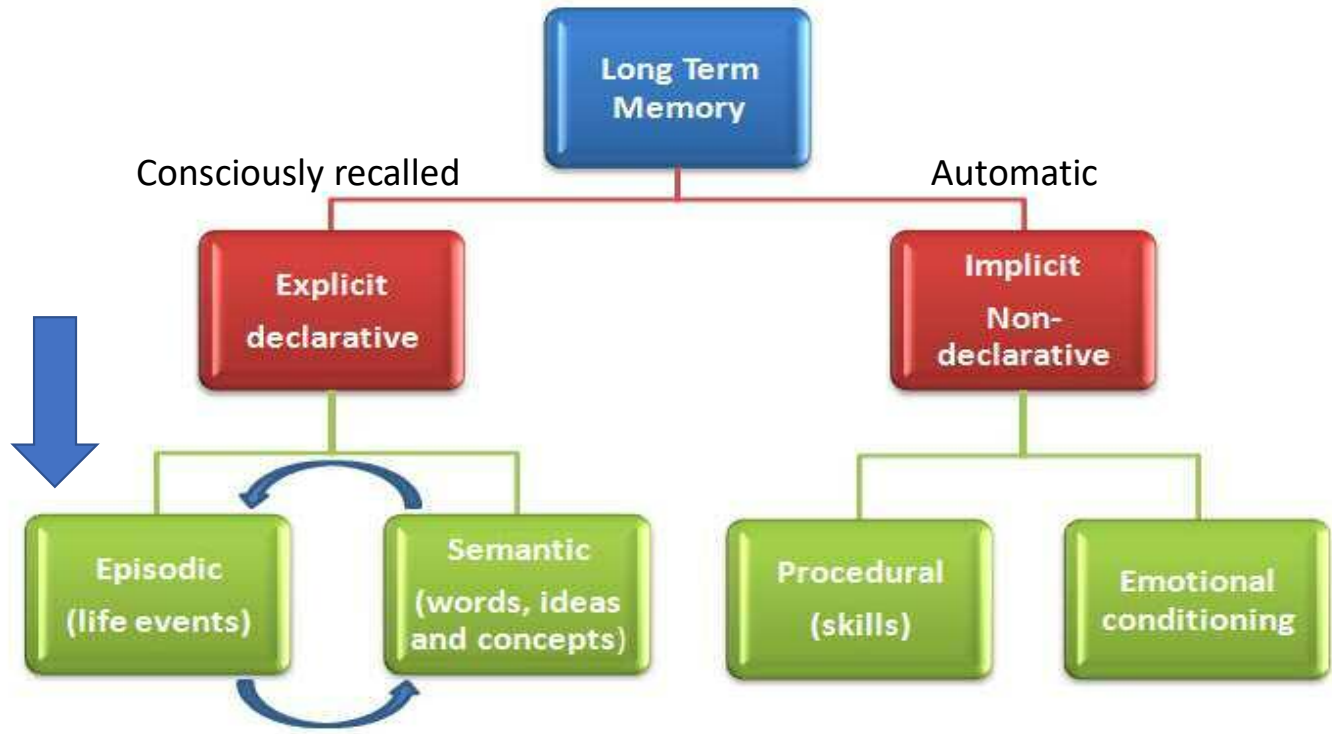
Typical Assessment for Working Memory

Pencils down

- Chair
- Penny
- Lamp

MY LONG TERM VS SHORT TERM MEMORY





Explicit - Episodic memory

Think back to your earliest memory

Infantile amnesia?



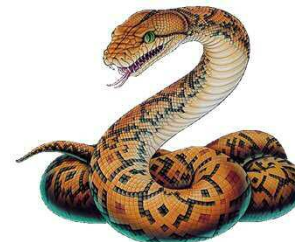
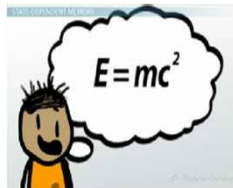
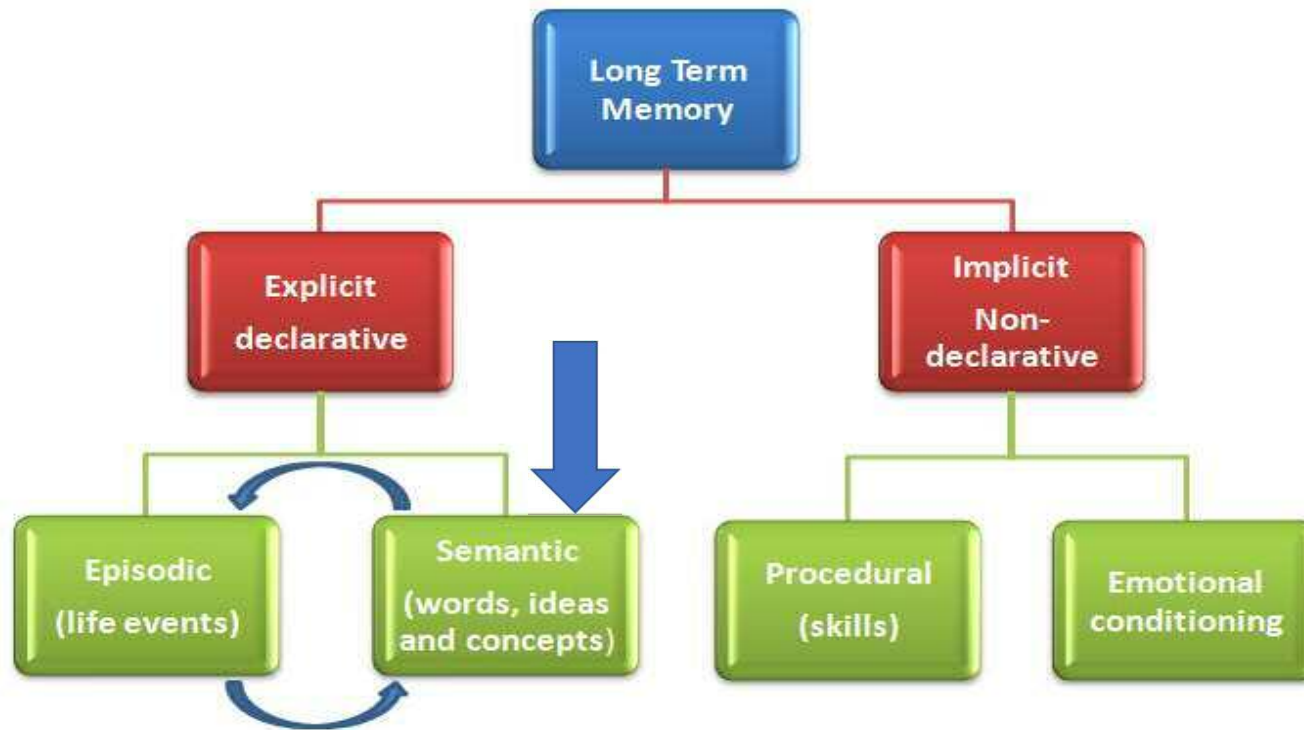


How do episodic memories “stick”?

- **Emotional Firsts**
 - Lost tooth
 - Kiss
 - Engagement
 - Wedding
 - Job interview
 - Children’s birth

Working Memory Check

- Chair
- Penny
- Lamp



Explicit - Semantic Memory

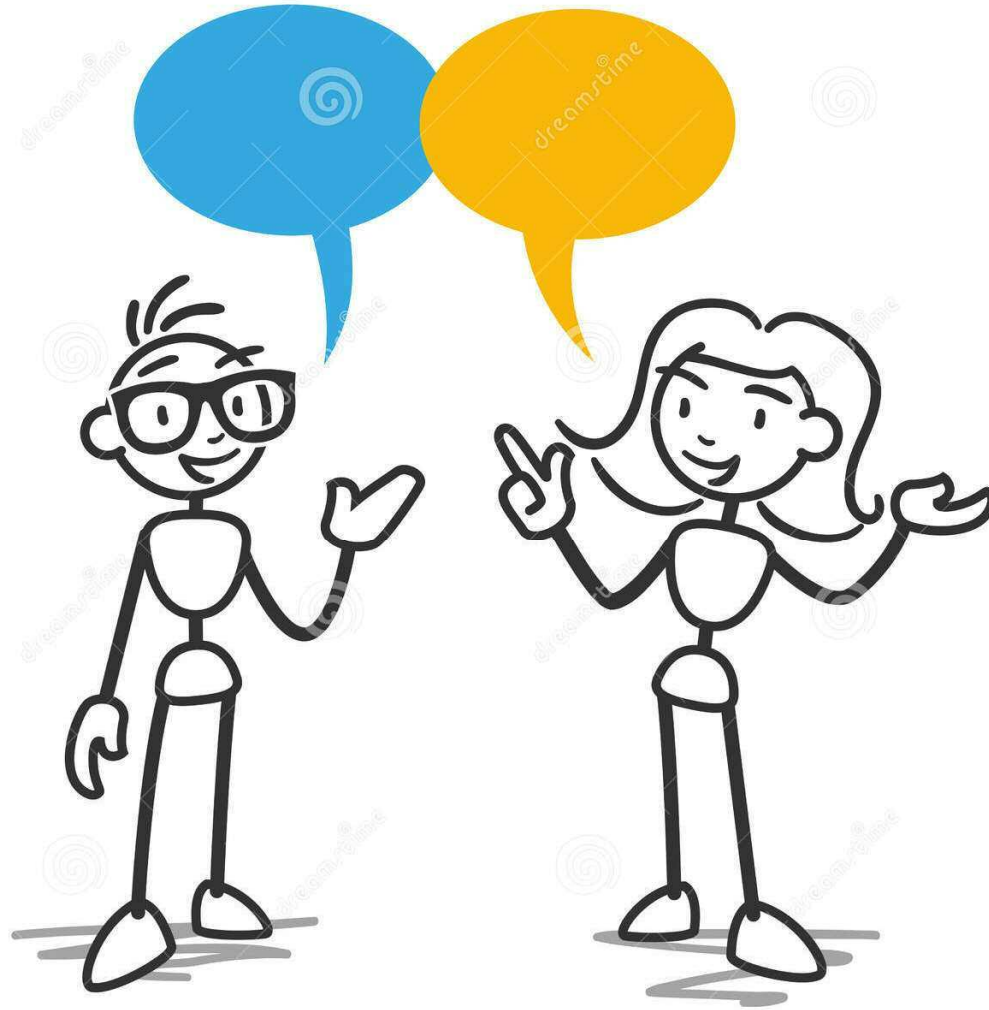


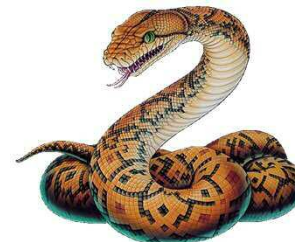
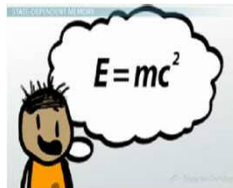
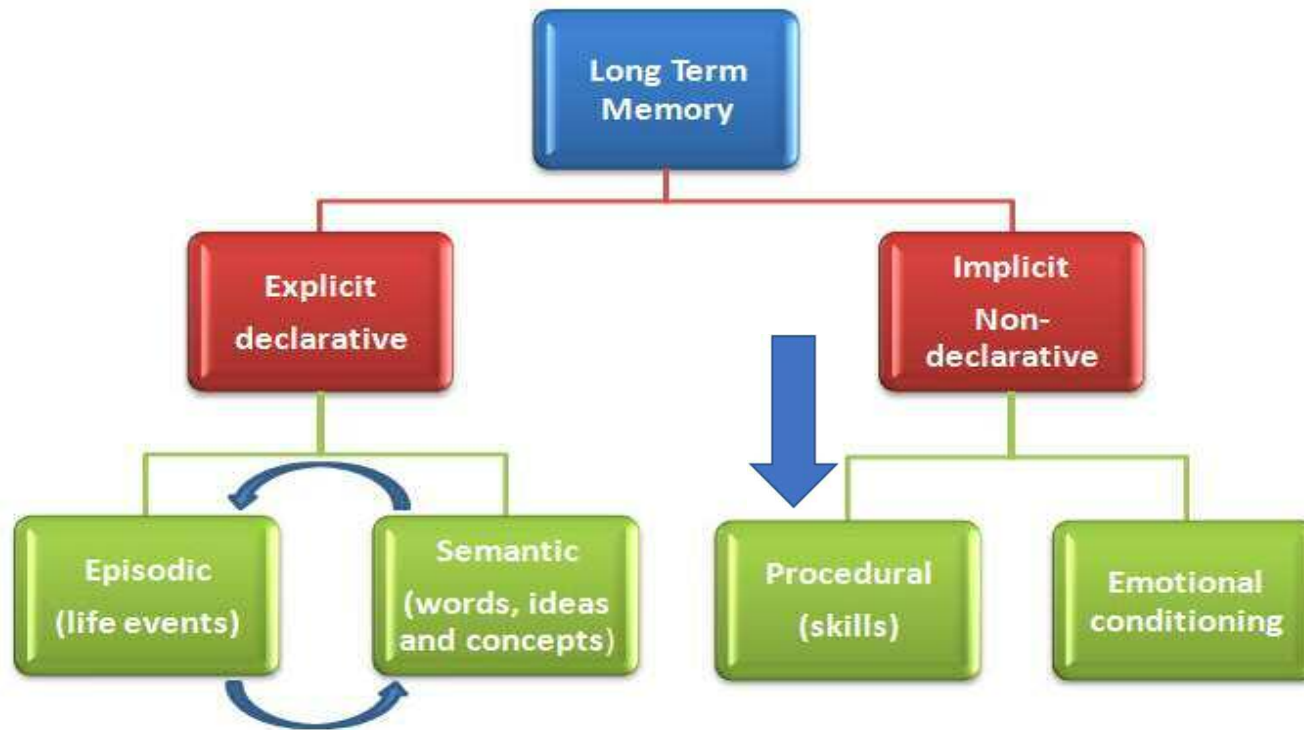
- What is this?
- Where is this located?
- Who designed it?
- When was it built?
- What is it made of?

Semantic Memory

- Who is this?
- When did he begin to make movies?
- Who did he marry?
- Can you name some of his movies?
- What else is he famous for?





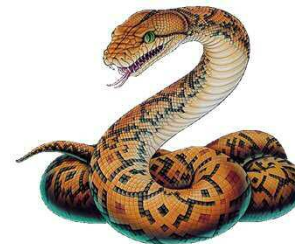
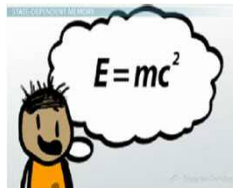
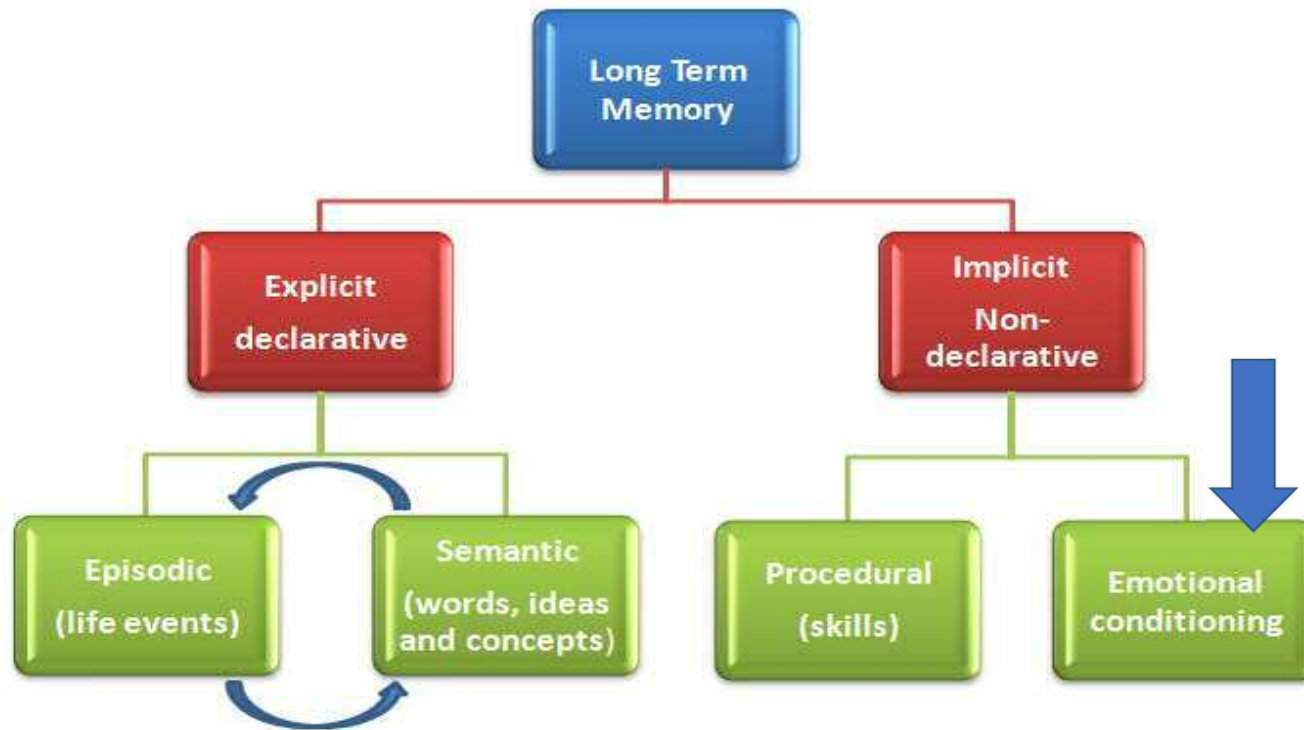




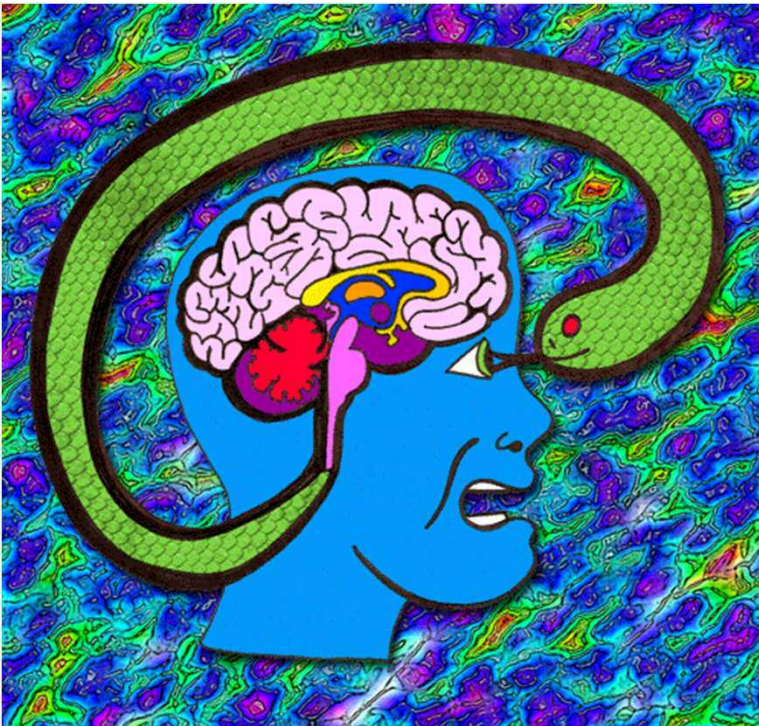
Implicit - Procedural







Implicit - Emotional Conditioning



Amygdala High-Jack

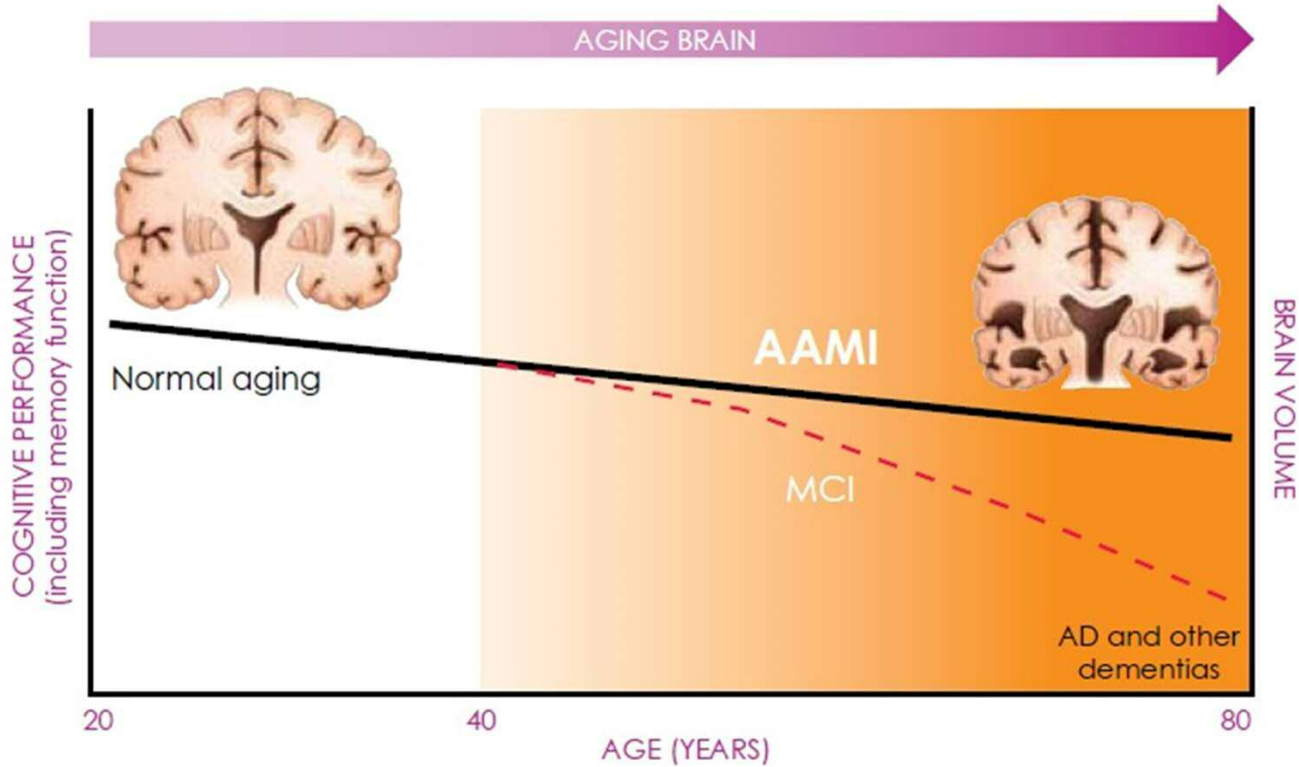




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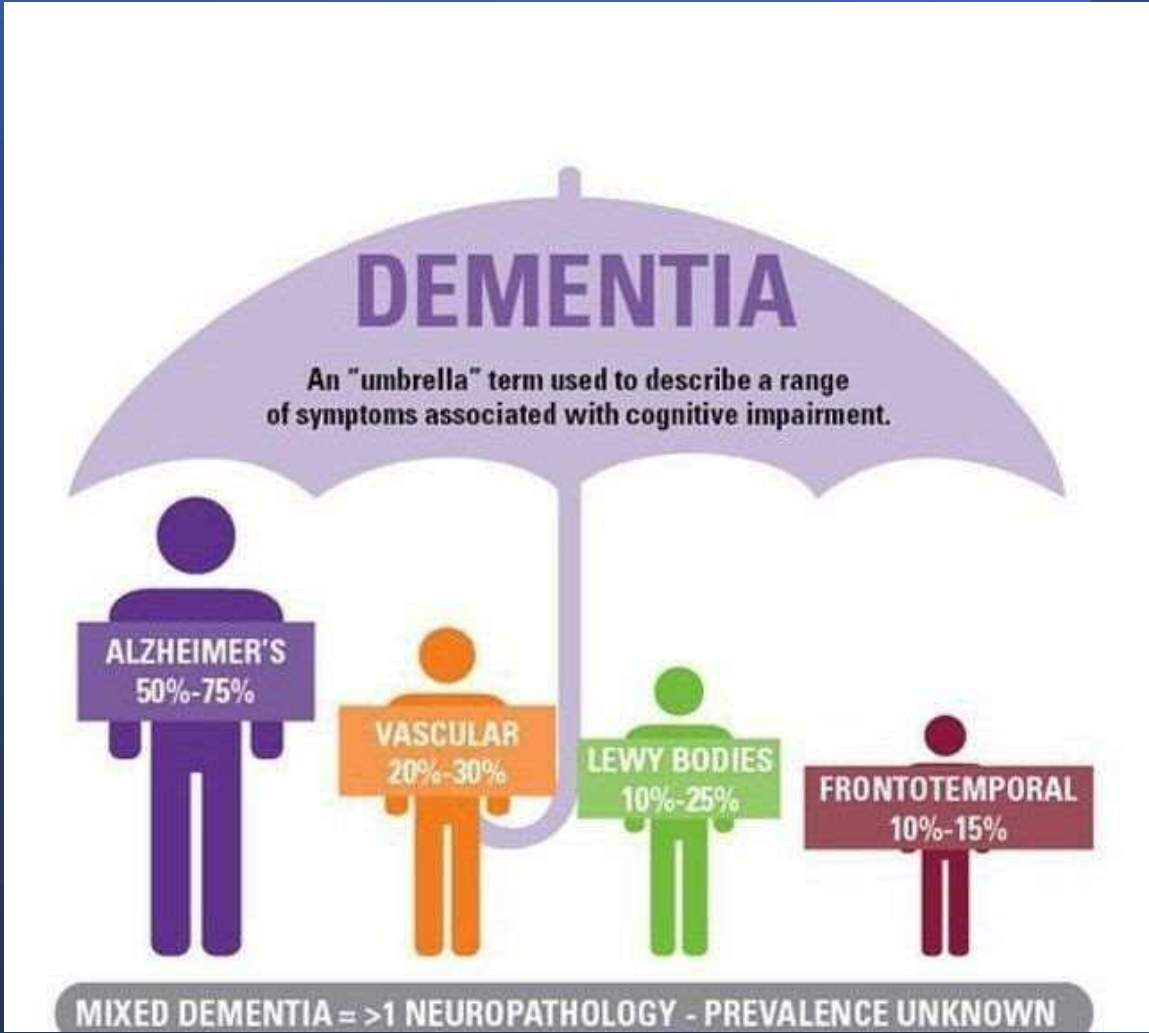
Normal Aging Brain vs Dementia

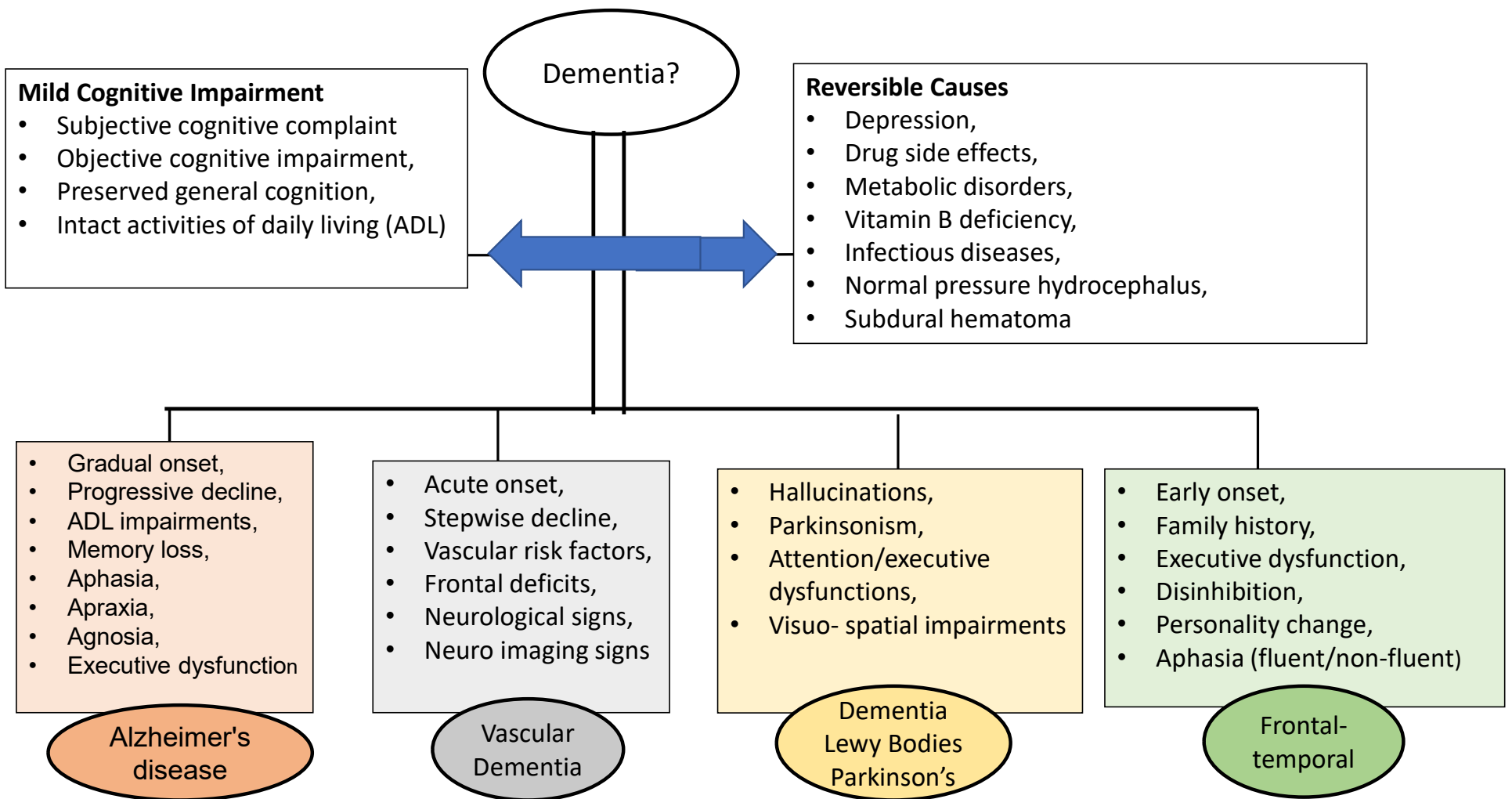
Age-Associated Memory Impairment vs. Mild Cognitive Impairment vs. Dementia

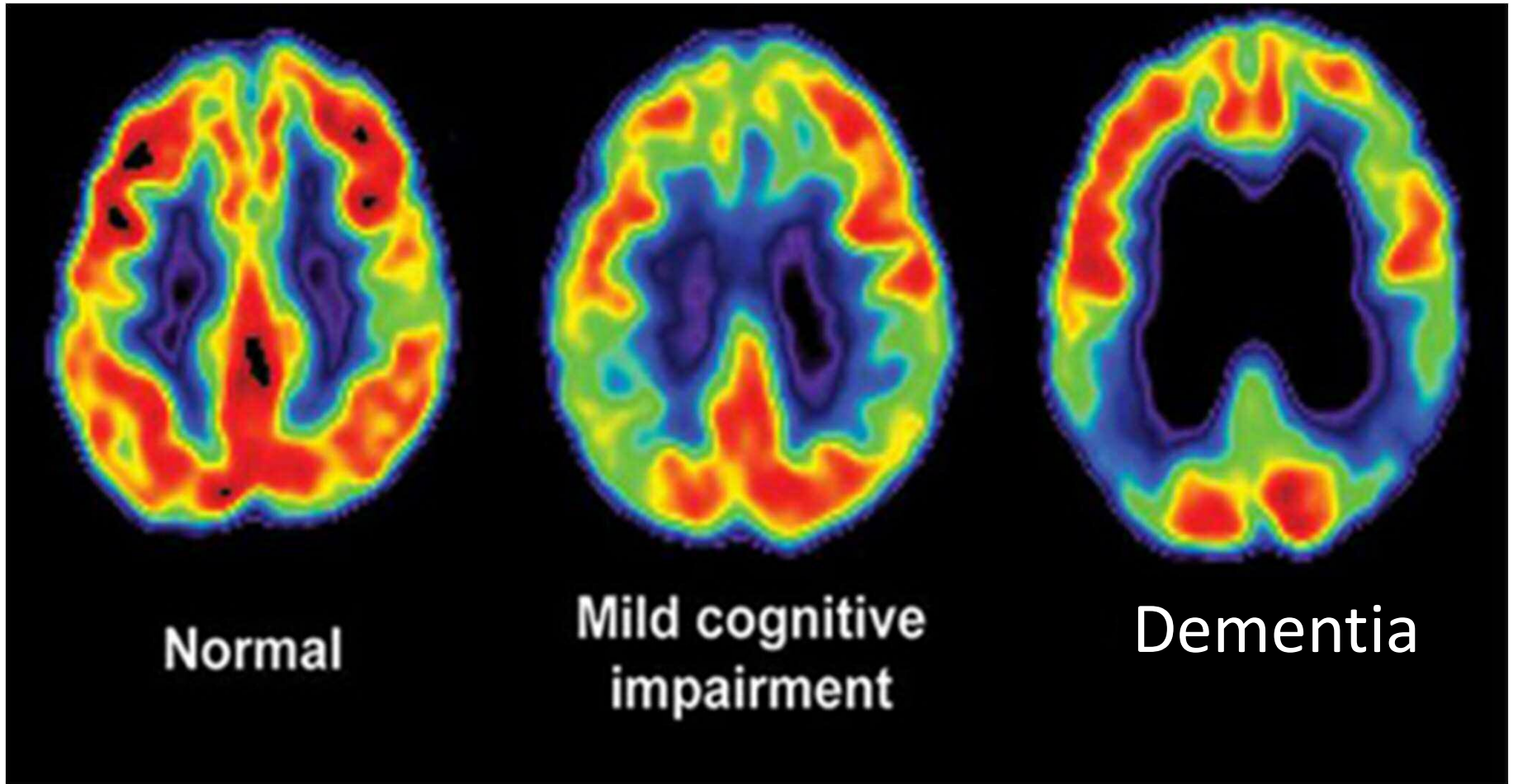


MCI = mild cognitive impairment AD = Alzheimer's disease

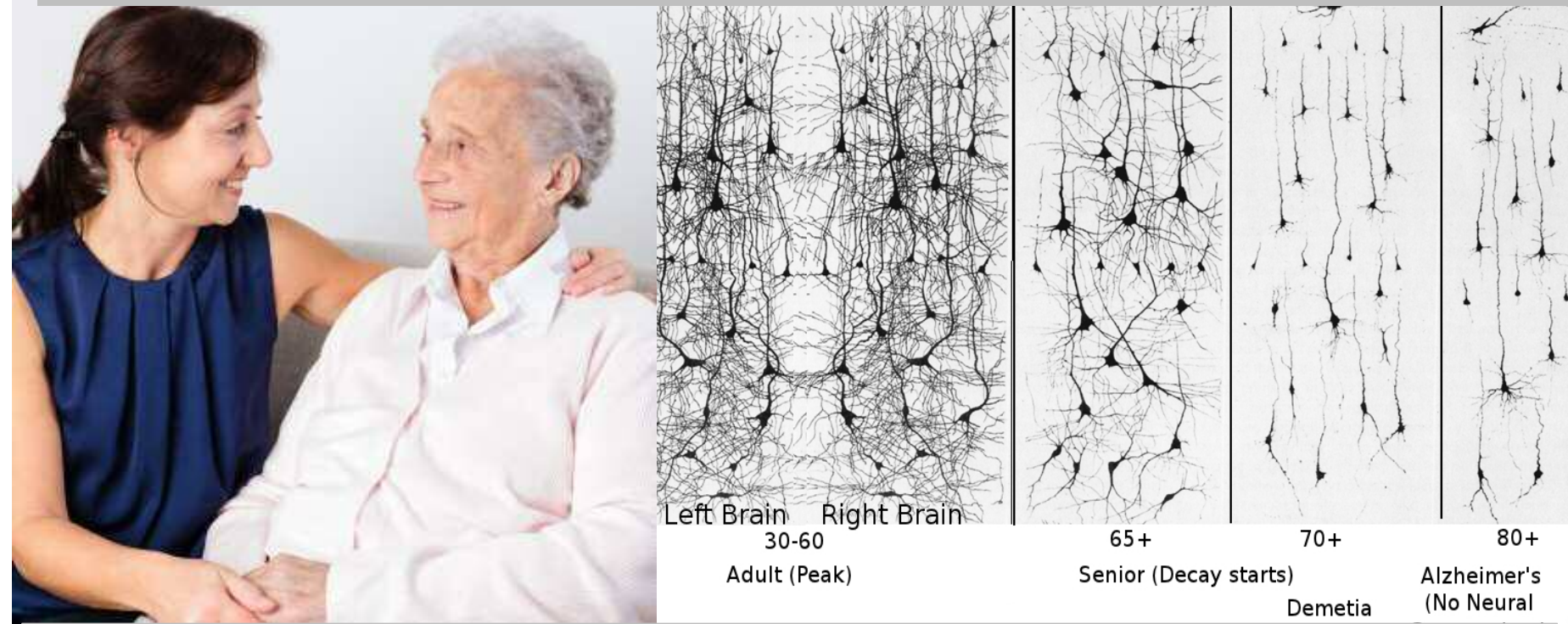
As the brain loses volume with age, individuals experience a decline in memory function.^{3,4}







Brain Changes— Physical and Cognitive Health Play a Major Role



Normal.....

- Misplacing common objects
- Not being able to produce the right word at times
- Not remembering something you just read
- Walking into a room and not remembering why
- Calling people, you care about, by the wrong name occasionally

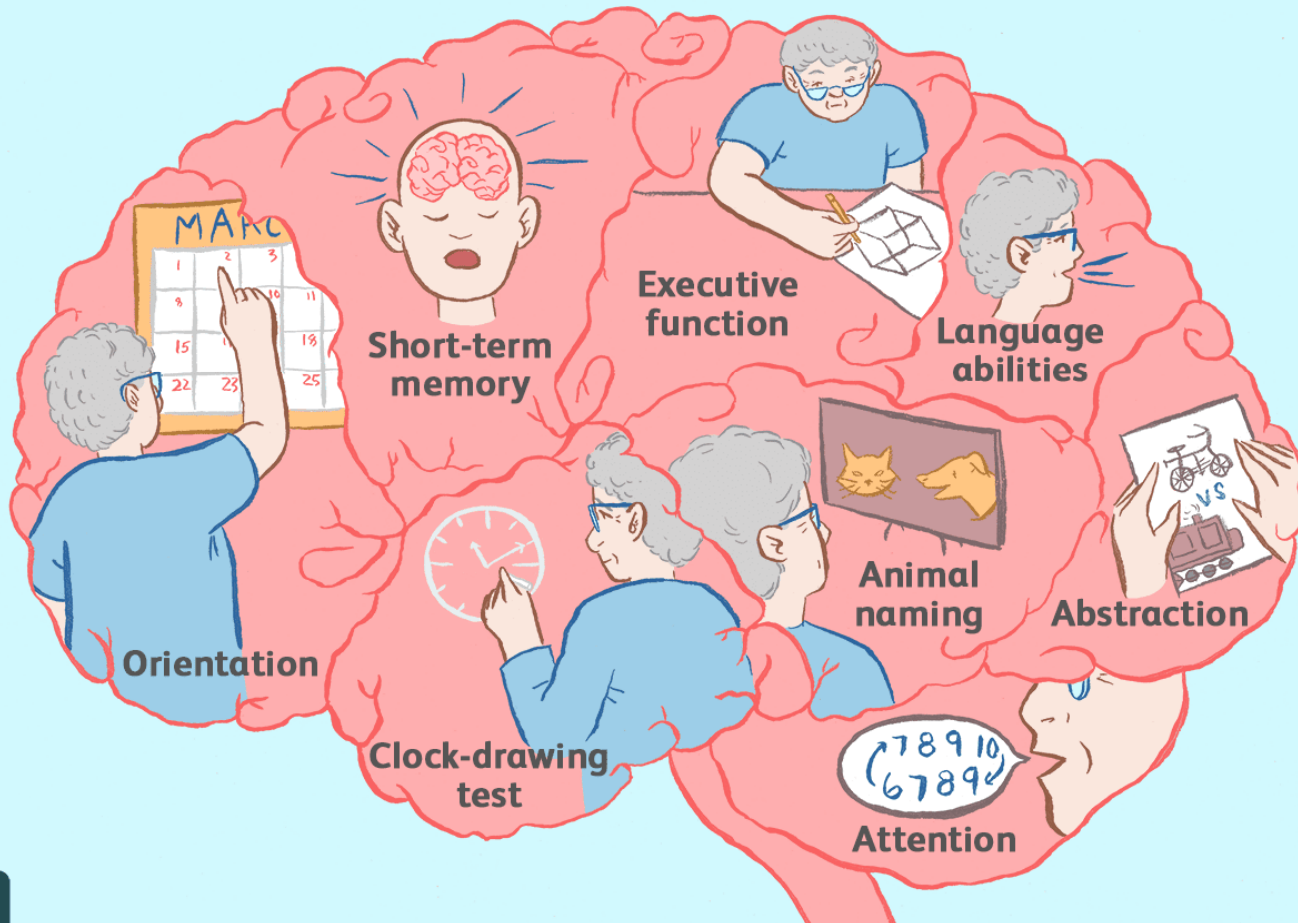


To be concerned about

- Getting lost when you're close to home
 - Having a hard time following simple book or movie plots
 - Struggling to keep up with daily tasks like paying bills or preparing meals
 - Not remembering whether you've eaten or not
 - Asking the same question repeatedly
 - Experiencing personality changes
-
- Friends and family express concern about your memory issues to you.

What Does the Montreal Cognitive Assessment Evaluate?

The MoCA assesses cognitive abilities, including:



Cognitive,
Behavioral, and
Physical
Assessments

- Multiple Data Points

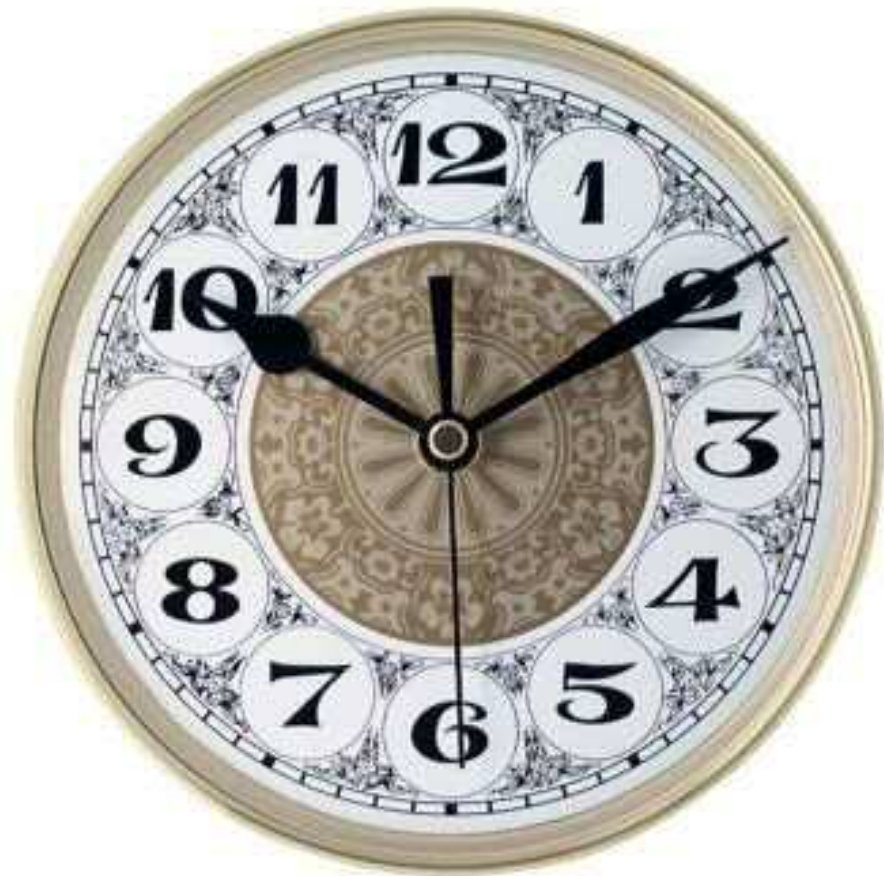
You have 1 minute to write down
every word you can think of that
starts with the letter

F

A score below 15 is reason
for secondary screening.

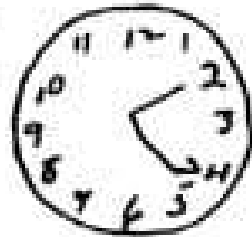
Draw a Clock

- Paper & pencil
- 3 minutes
- Ten past ten





**Normal
Score 10**



**Mild
Cognitive
Impairment
(Numbers error
and
placement
of hands)
Score 8**



**Moderate
Cognitive
Impairment
Score 4**



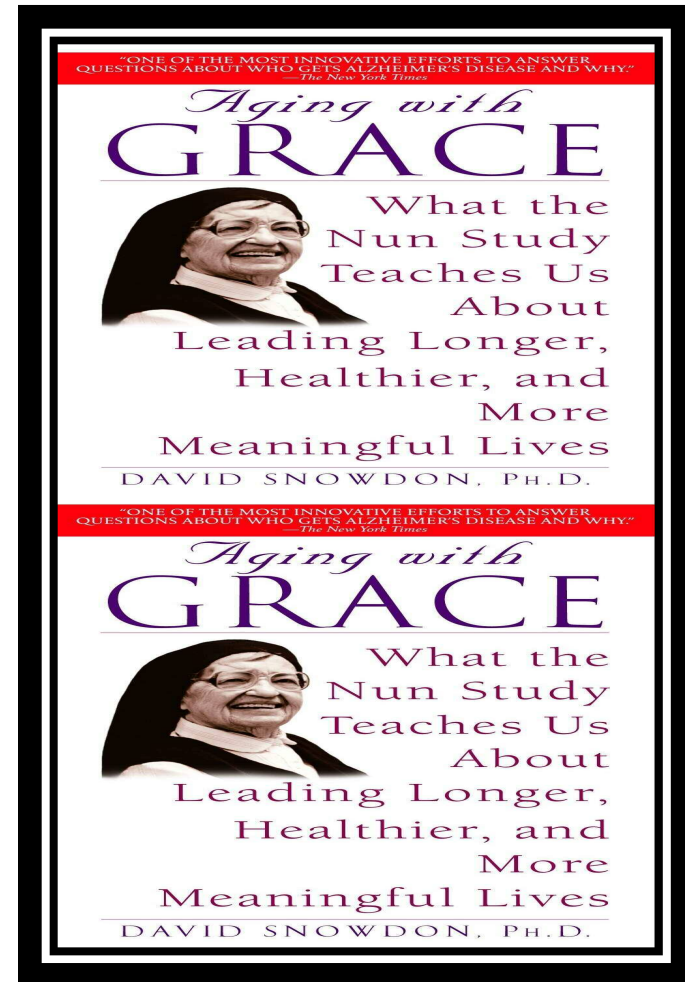
**Severe
Cognitive
Impairment**

Maintaining a Healthy Brain: The Nuns Study



Summary

- A strong ability in languages may help reduce the risk of developing dementia symptoms,
- Education past and present appears to help reduce the risk of development symptoms,
- Staying physically active daily may help reduce the risk of developing dementia symptoms,
- Being part of a community where you frequently contribute may help reduce the risk of developing dementia symptoms,
- Eating a diet rich in fruits and vegetables may help reduce the risk of developing dementia symptoms.





Maintaining Brain Health

Maintaining Brain Health



Short Term Memory

Grocery List

Vegetables	Fish	Household	Dairy	Cheese	Etc.
<input type="checkbox"/> Baby spinach	<input type="checkbox"/> Salmon	<input type="checkbox"/> Diapers	<input type="checkbox"/> Milk	<input type="checkbox"/> Parmesan	<input type="checkbox"/>
<input type="checkbox"/> Mixed greens	<input type="checkbox"/> Clams	<input type="checkbox"/> Toothpaste	<input type="checkbox"/> Butter	<input type="checkbox"/> Bites	<input type="checkbox"/>
<input type="checkbox"/> Broccoli	<input type="checkbox"/> Mussels	<input type="checkbox"/> Soap	<input type="checkbox"/> Yogurt	<input type="checkbox"/> Cheddar	<input type="checkbox"/>
<input type="checkbox"/> Cauliflower	<input type="checkbox"/> Shrimp	<input type="checkbox"/> Shampoo	<input type="checkbox"/> Eggs	<input type="checkbox"/> Pizza	<input type="checkbox"/>
<input type="checkbox"/> Carrots	<input type="checkbox"/> White	<input type="checkbox"/> Kit	<input type="checkbox"/> Cheese	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Herbs	<input type="checkbox"/> Fresh	<input type="checkbox"/> Garbage bags	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Potatoes		<input type="checkbox"/> Cleaners			
<input type="checkbox"/> Onions		<input type="checkbox"/> Laundry			
<input type="checkbox"/> Garlic		<input type="checkbox"/> Toilet paper	Frozen	Organic	
<input type="checkbox"/> Green onions	Bread	<input type="checkbox"/> Paper Towel	<input type="checkbox"/> Peas	<input type="checkbox"/> Grains	
<input type="checkbox"/> Greens	<input type="checkbox"/> Tortillas	<input type="checkbox"/> Tissues	<input type="checkbox"/> Corn	<input type="checkbox"/> Legumes	
<input type="checkbox"/> Peppers	<input type="checkbox"/> Pitas		<input type="checkbox"/> Brussels	<input type="checkbox"/> Edamame	
<input type="checkbox"/> Root	<input type="checkbox"/> Sandwich		<input type="checkbox"/> sprouts	<input type="checkbox"/> Tomatoes	
	<input type="checkbox"/> Whole grain	Cans &	<input type="checkbox"/> Elderberries	<input type="checkbox"/> Seaweed	
		Bottles	<input type="checkbox"/> Raspberries	<input type="checkbox"/> Flax	
Fruit	Meat	<input type="checkbox"/> Tomatoes	<input type="checkbox"/> Fruit	<input type="checkbox"/> Cleaners	
<input type="checkbox"/> Limes	<input type="checkbox"/> Bacon	<input type="checkbox"/> Tomato Paste		<input type="checkbox"/> Soy Rice milk	
<input type="checkbox"/> Lemons	<input type="checkbox"/> Sausage	<input type="checkbox"/> Tuna fish	Beverages	Baking	
<input type="checkbox"/> Oranges	<input type="checkbox"/> Beef	<input type="checkbox"/> Sardines	<input type="checkbox"/> Orange juice	<input type="checkbox"/> AP Flour	
<input type="checkbox"/> Apples	<input type="checkbox"/> Pork	<input type="checkbox"/> Beans	<input type="checkbox"/> Apple juice	<input type="checkbox"/> WW Flour	
<input type="checkbox"/> Pears	<input type="checkbox"/> Chicken	<input type="checkbox"/> Condensed milk	<input type="checkbox"/> Soy Rice milk	<input type="checkbox"/> Sugar	
<input type="checkbox"/> Bananas	<input type="checkbox"/> Ham Hocks	<input type="checkbox"/> Clams	<input type="checkbox"/> Water	<input type="checkbox"/> Brown sugar	
<input type="checkbox"/> Melons	<input type="checkbox"/> Turkey	<input type="checkbox"/> Olive Oil	<input type="checkbox"/> Mixers	<input type="checkbox"/> Baking powder	
<input type="checkbox"/> Strawberries		<input type="checkbox"/> Cooking Oil		<input type="checkbox"/> Chocolate	
<input type="checkbox"/> Tropical				<input type="checkbox"/> Cornmeal	

m + w + th + f + sa + su
date: _____

today's goals:

- _____
- _____
- _____
- _____
- _____

hydrate

☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑

daily do's

- respond to emails
- take a multi-vitamin
- 15 min kitchen de-clutter
- water the plants

things to do!

for me

appointments

Time: _____ Event: _____
: _____ : _____
: _____ : _____

fitness

Get Organized Develop Routines

Long-Term Memory



Billie & Skip's
50th Anniversary

March 29, 1972 - 2022



Protect your sensory systems



Memory Loss & Hearing Loss



Adults with hearing loss develop a significant impairment in their cognitive abilities, **3.2 years sooner** than those with normal hearing.

Those with hearing loss experience a **30% to 40%** greater decline in thinking abilities compared to their counterparts without hearing loss.



HEALTHY EATING PLATE

Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.



The more veggies – and the greater the variety – the better. Potatoes and French fries don't count.

Eat plenty of fruits of all colors.



STAY ACTIVE!

© Harvard University



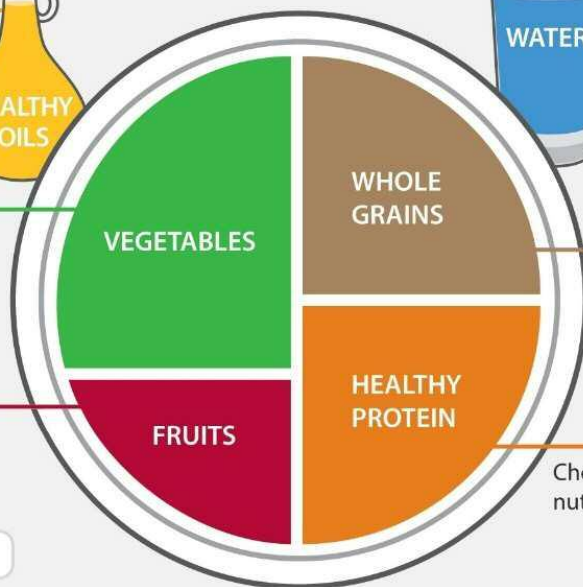
Harvard T.H. Chan School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource



Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

Eat a variety of whole grains (like whole-wheat bread, whole-grain pasta, and brown rice). Limit refined grains (like white rice and white bread).

Choose fish, poultry, beans, and nuts; limit red meat and cheese; avoid bacon, cold cuts, and other processed meats.



Harvard Medical School
Harvard Health Publications
www.health.harvard.edu



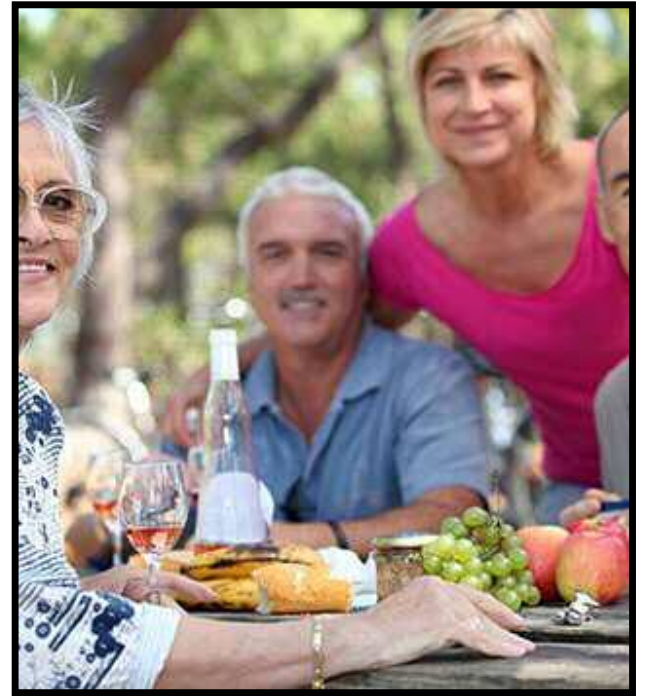
Stay Physically Activity

- Physical activity increases blood flow to your whole body including your brain!!!
- **20-30 minutes per day!**
 - Swimming
 - Golfing
 - Walking
 - Yoga – Pilates – Tai Chi
 - Gardening – Yard work – House Keeping
 - Lifting light weights

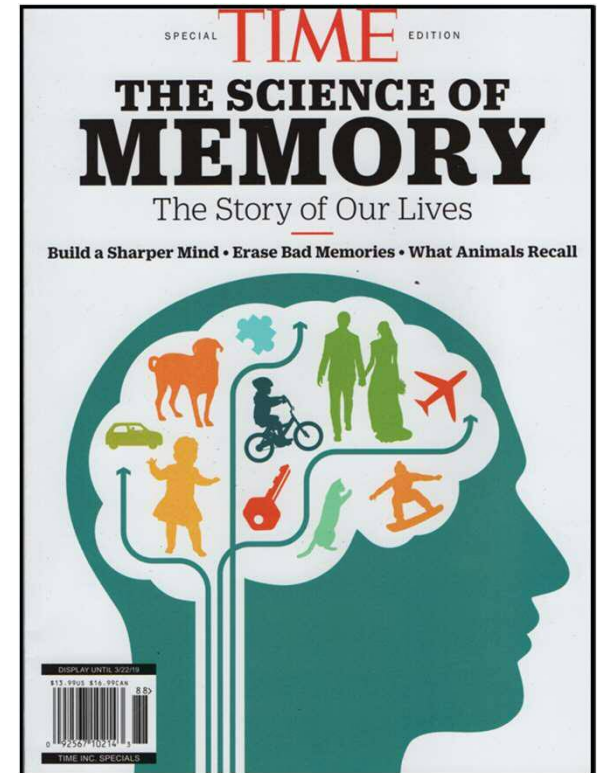
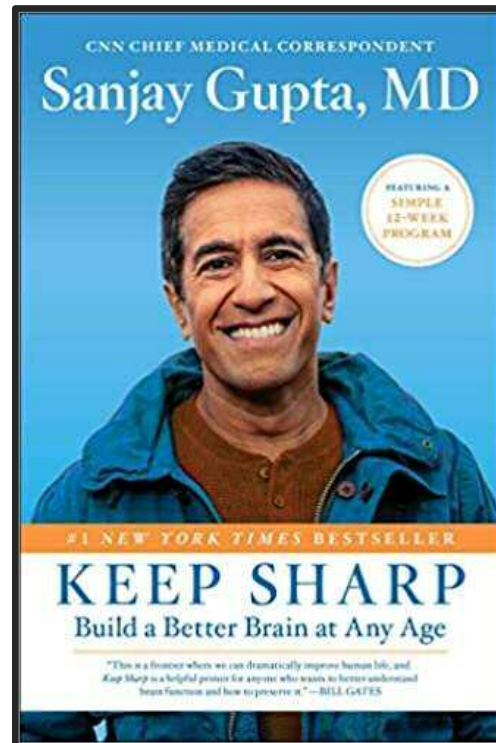
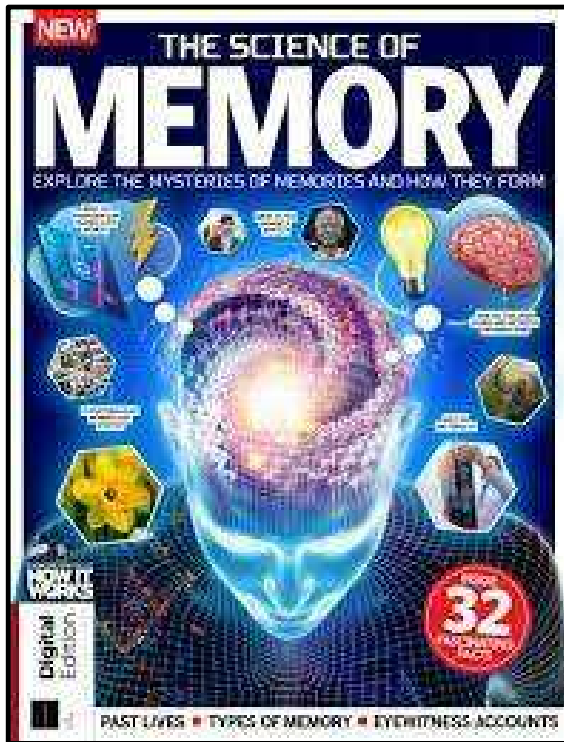


Social Dancing





Social Interactions



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