



**Managing Your
Memory**

Sarah A. Raskin, PhD



S u m m e r - 2 0 2 2
BRAINSTORM



Winter
BRAINSTORM



Spring
BRAINSTORM



Summer
BRAINSTORM



Fall
BRAINSTORM

This series is supported by Kessler Foundation, the Northern New Jersey Traumatic Brain Injury System, and by a grant from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), Grant #90DPTB0003.

Interested in joining a study? Go to <https://kesslerfoundation.org/research/studies/traumatic-brain-injury>

Watch the
event video



Join a Study



Managing Your Memory

Sarah A. Raskin

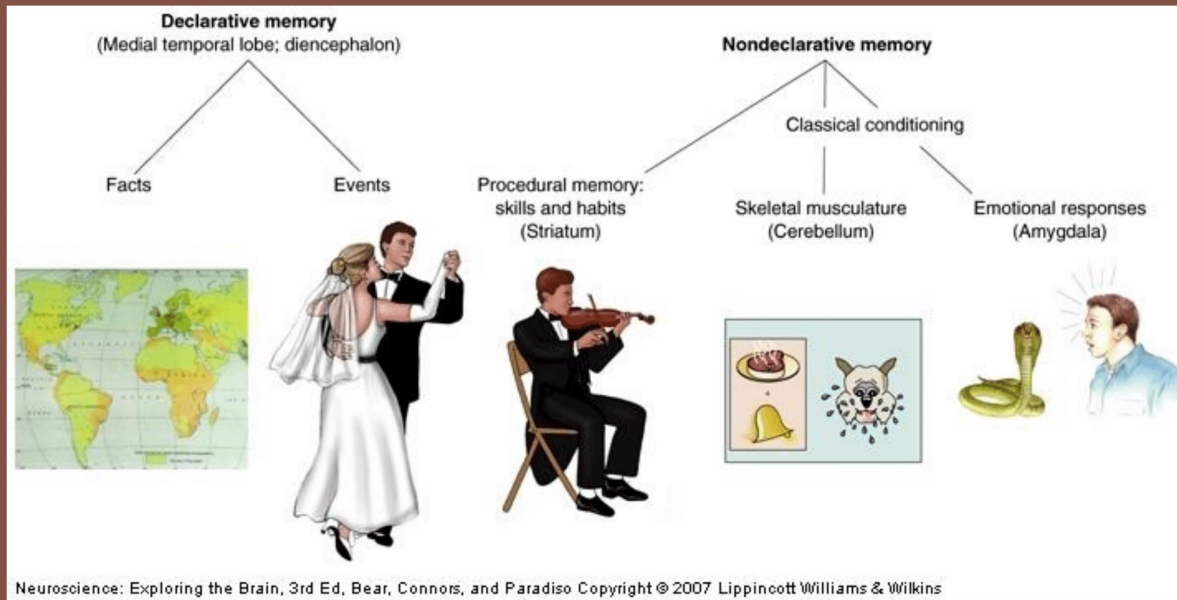
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Neuroscience Program

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What is memory?

Memory



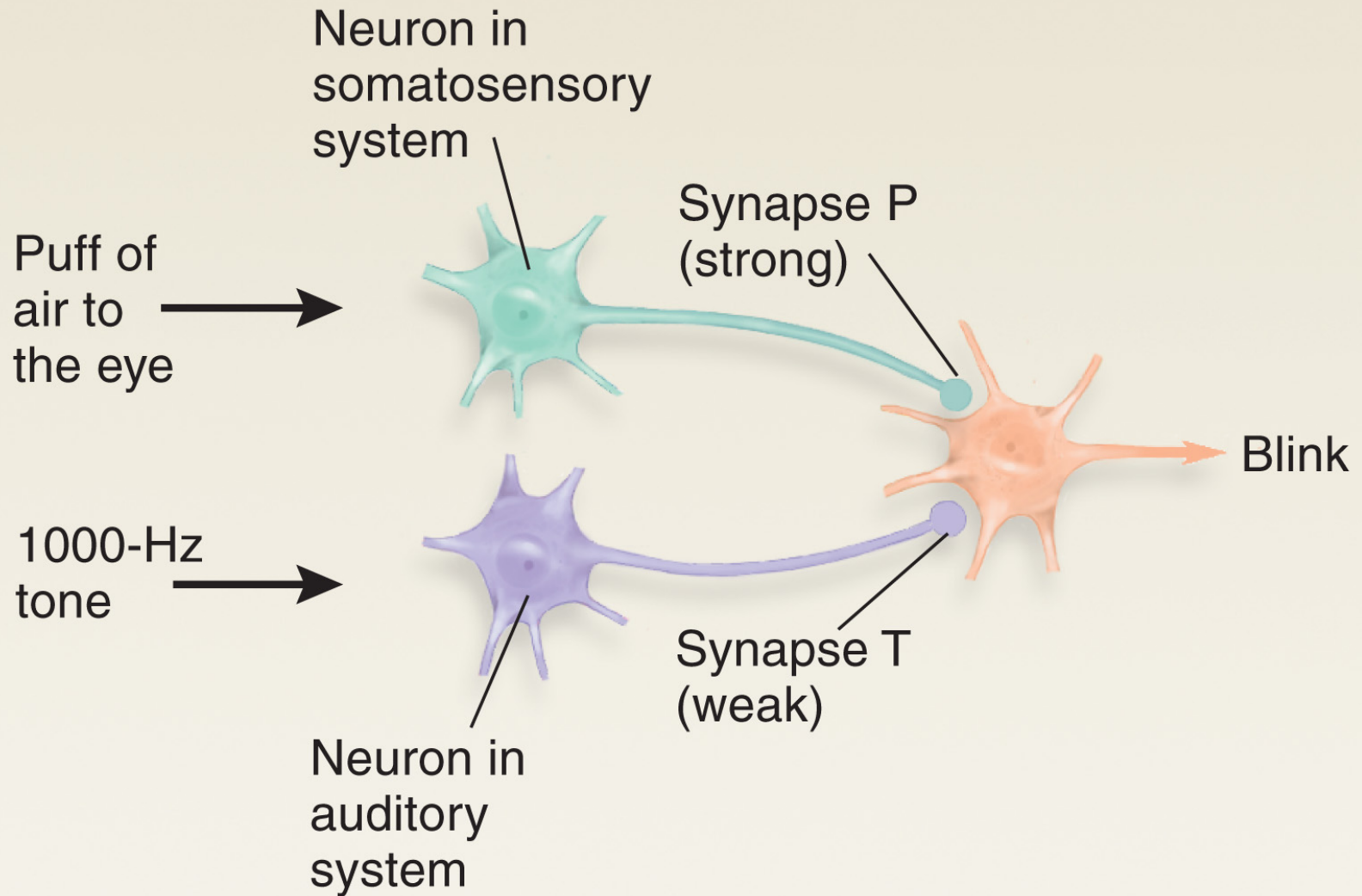
Learning

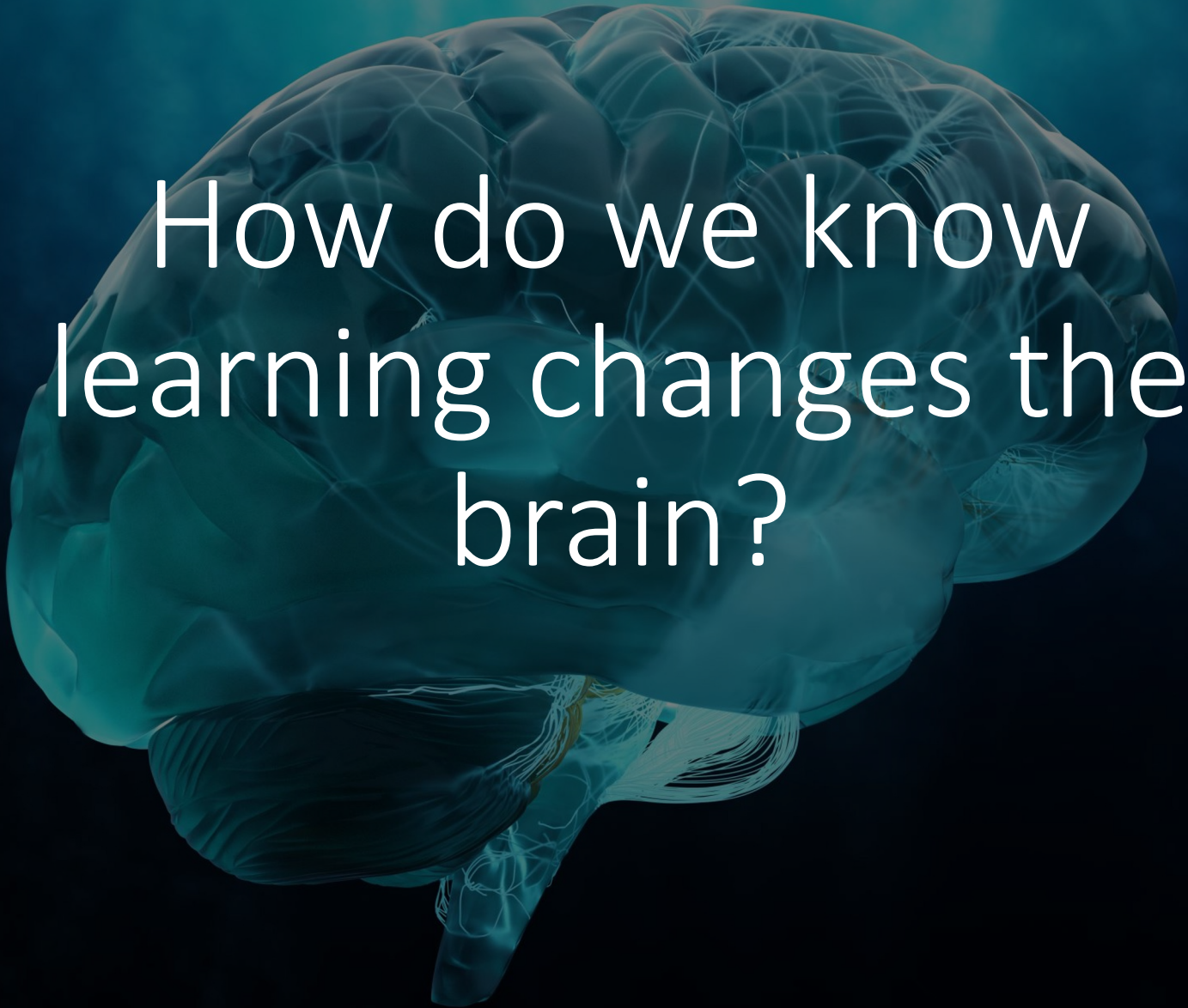
Learning refers to the process by which experiences change our nervous system and hence our behavior.

We refer to these changes as memories.

Experiences are not “stored”; rather, they change the way we perceive, perform, think, and plan.

They do so by physically changing the structure of the nervous system, altering neural circuits that participate in perceiving, performing, thinking, and planning.





How do we know
learning changes the
brain?

Experience Based Changes



Neurogenesis occurs in brain regions when songbirds learn new songs

Nottebohm, 1985

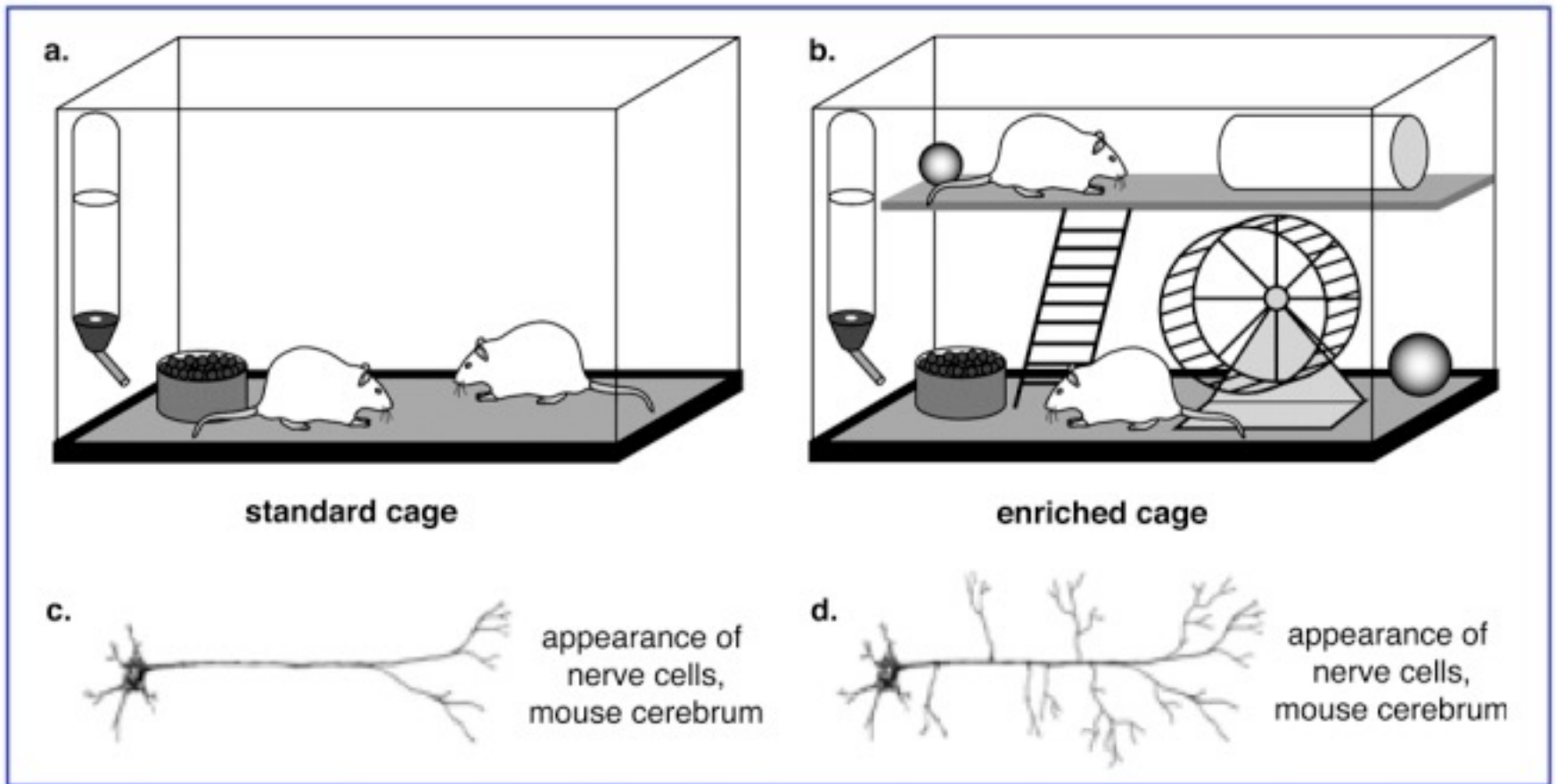
Experience Based Changes

Rats in enriched environments:

- *heavier brains with new granule cells
- *higher levels of some neurotransmitters
- *more nerve cell connections
- *increased neuronal branching
- *performed better on learning tasks

Kempermann, Kuhn, & Gage, 1997

Experience Based Changes



This was true compared to both animals in an impoverished environment and animals in a social environment

Kempermann, Kuhn, & Gage, 1997

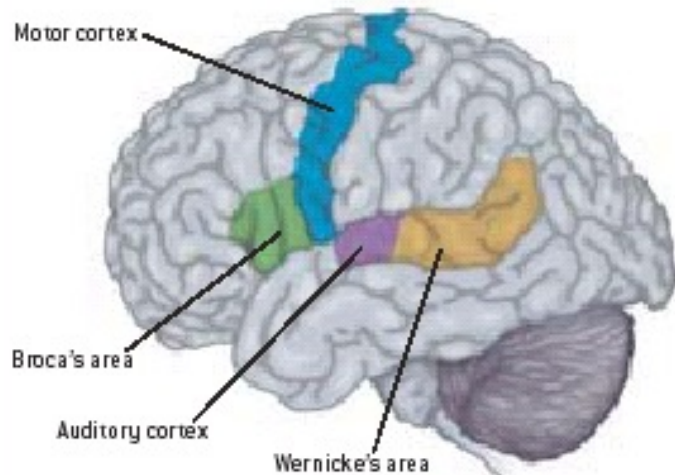
Cortical Plasticity

- Reorganization
 - Perceptual Reorganization has been shown in all sensory modalities
 - *Kaas, Merzenich, Killacky, 1983*

Sign Language

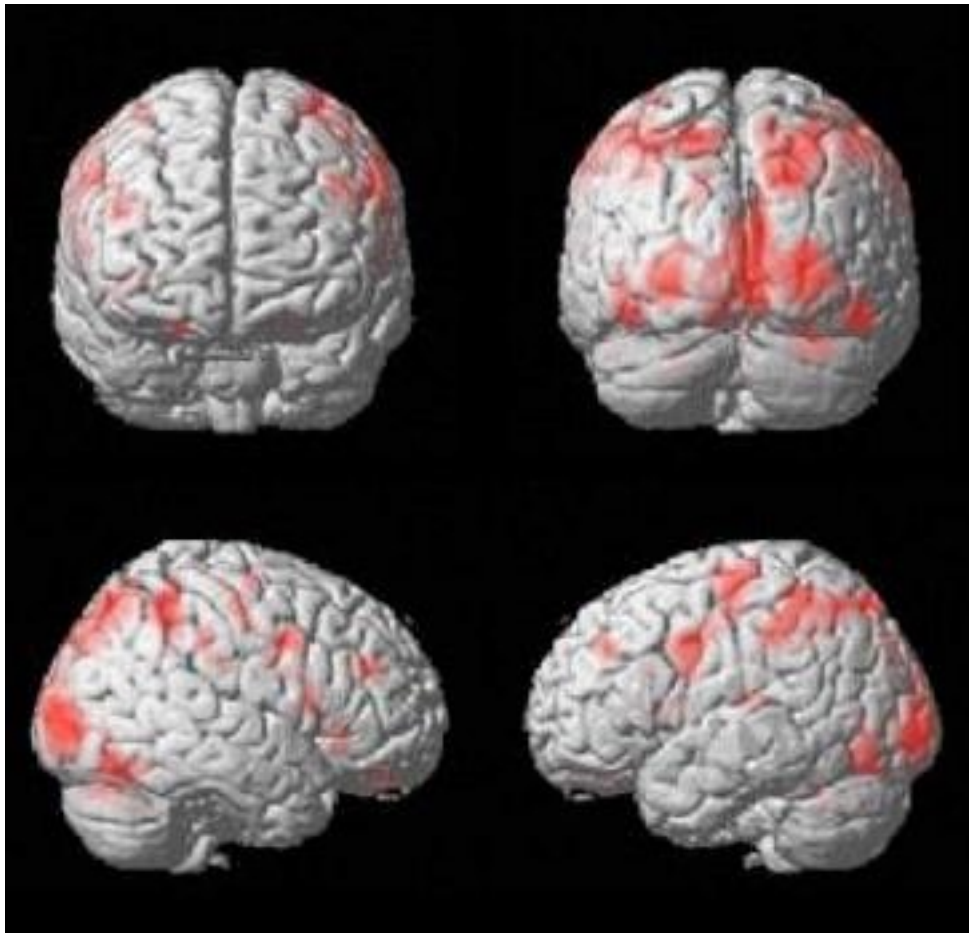
Where Language Lives

TWO OF THE REGIONS of the brain's left hemisphere that play important roles in language processing are Broca's area and Wernicke's area (there are several others). Broca's area is activated in hearing individuals when they are speaking and in deaf people when they are signing. Wernicke's area is involved in the comprehension of both speech and signs.



- Although sign language is a visual and motor process, it is processed in the same language areas used for speech in hearing individuals

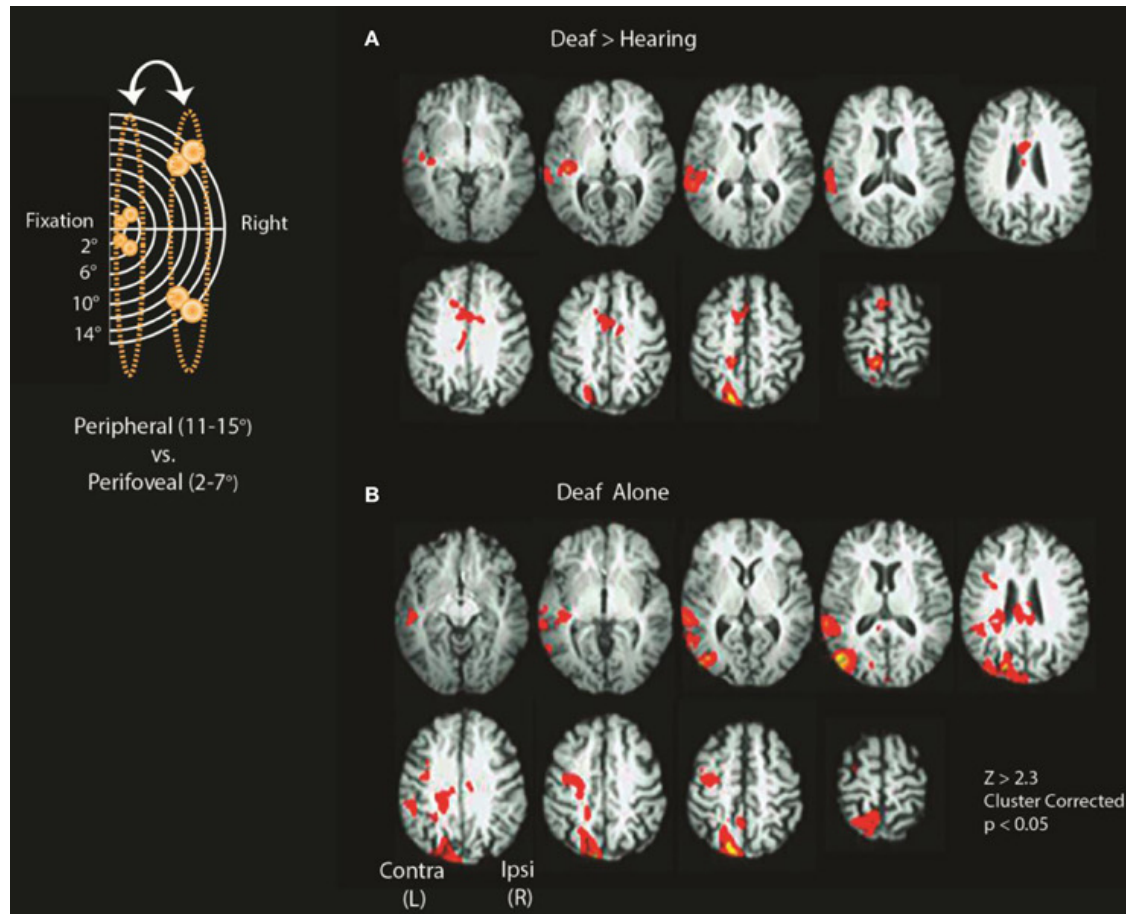
Braille Reading



Norihiro Sadato

Blind braille
readers are using
visual cortex

Individuals who are deaf looking at visual images in fovea and periphery show enhanced visual processing

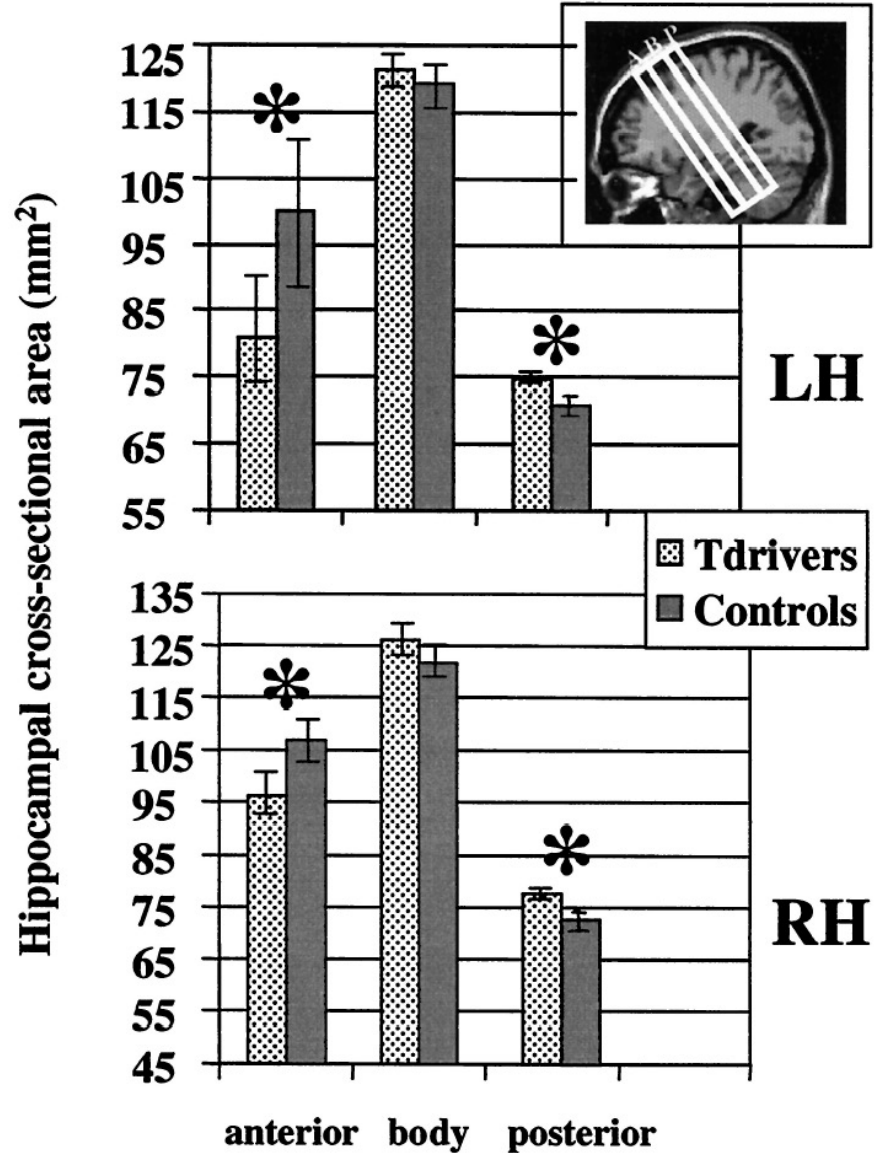


Helen Neville

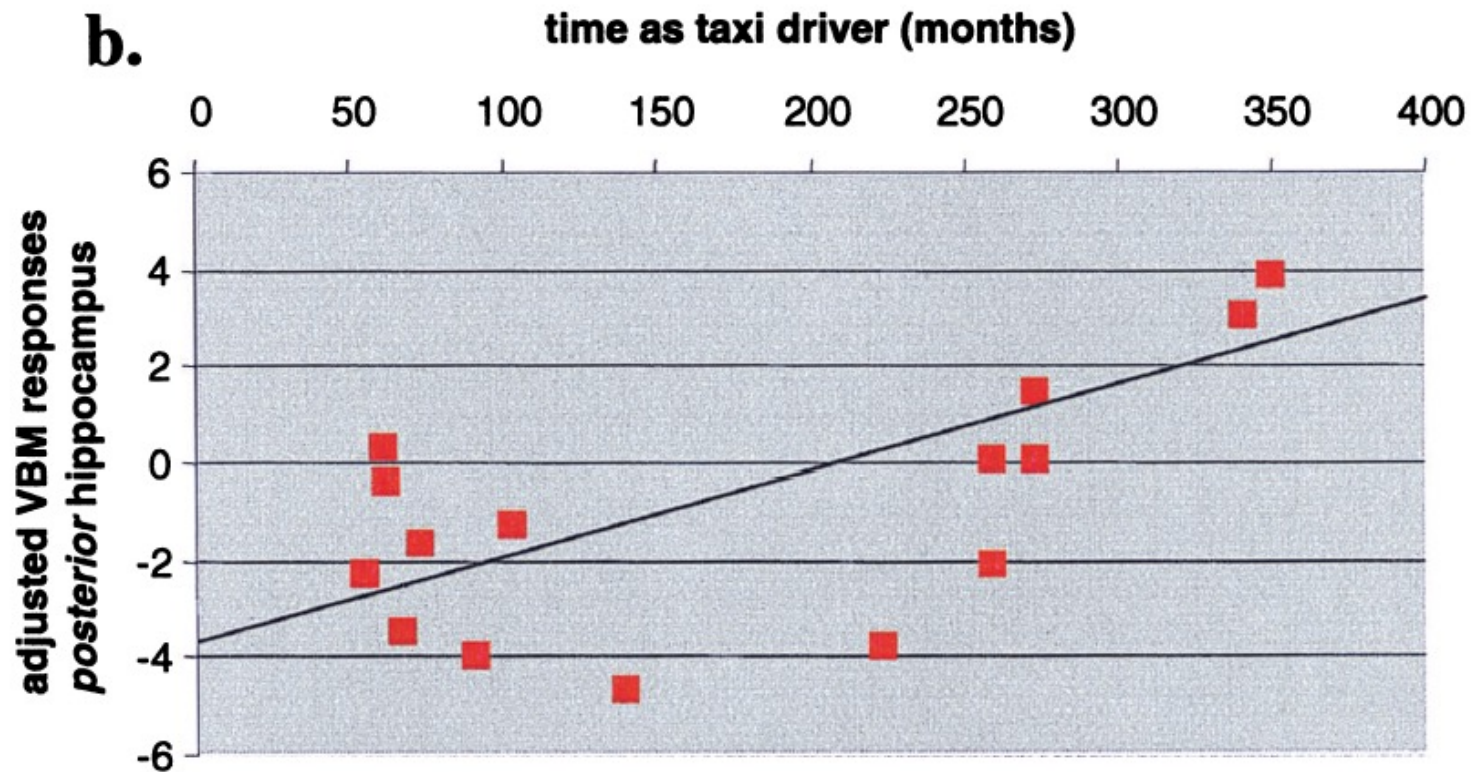
London Taxi Drivers and “The Knowledge”

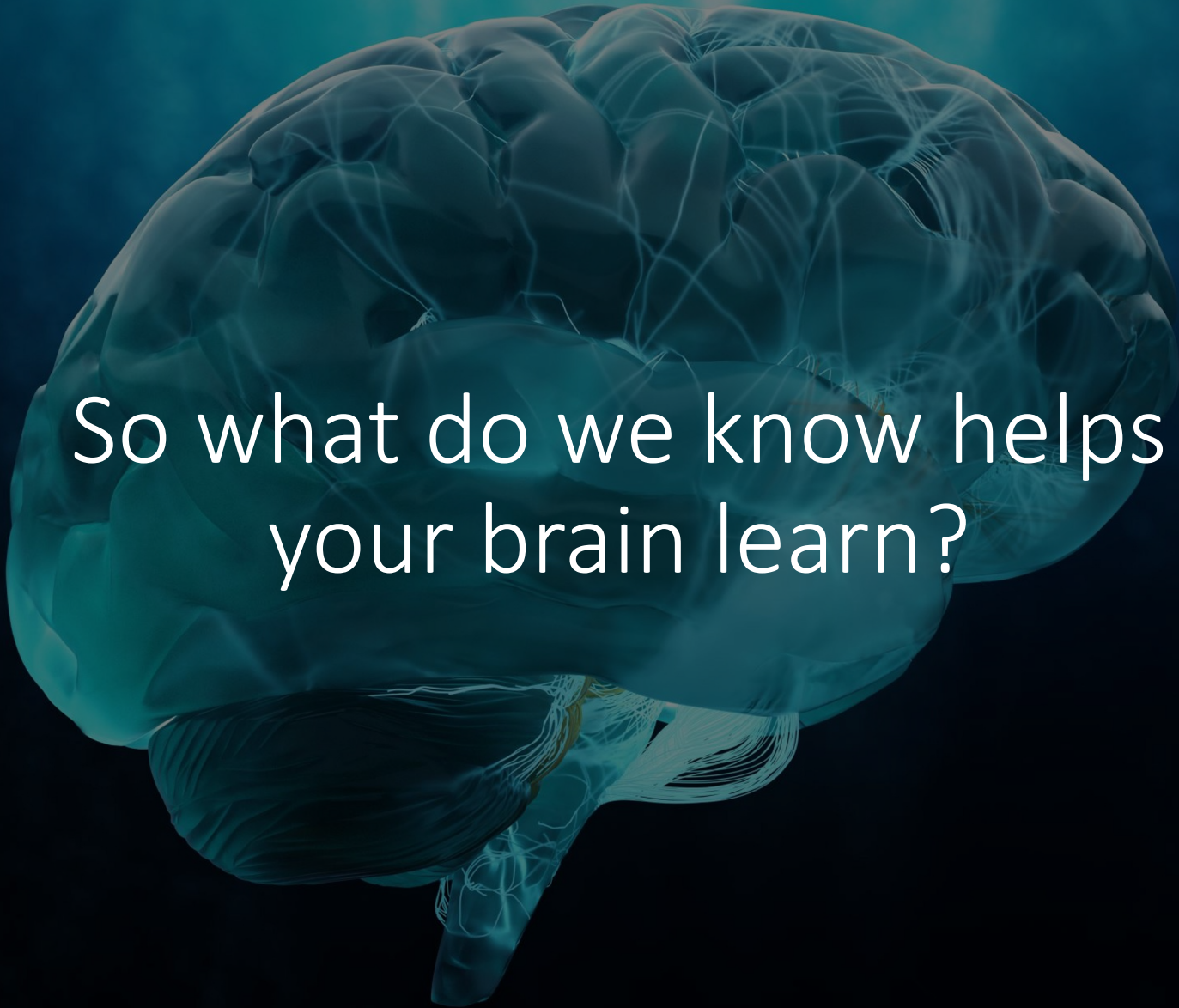


Changes in hippocampus in London taxi drivers



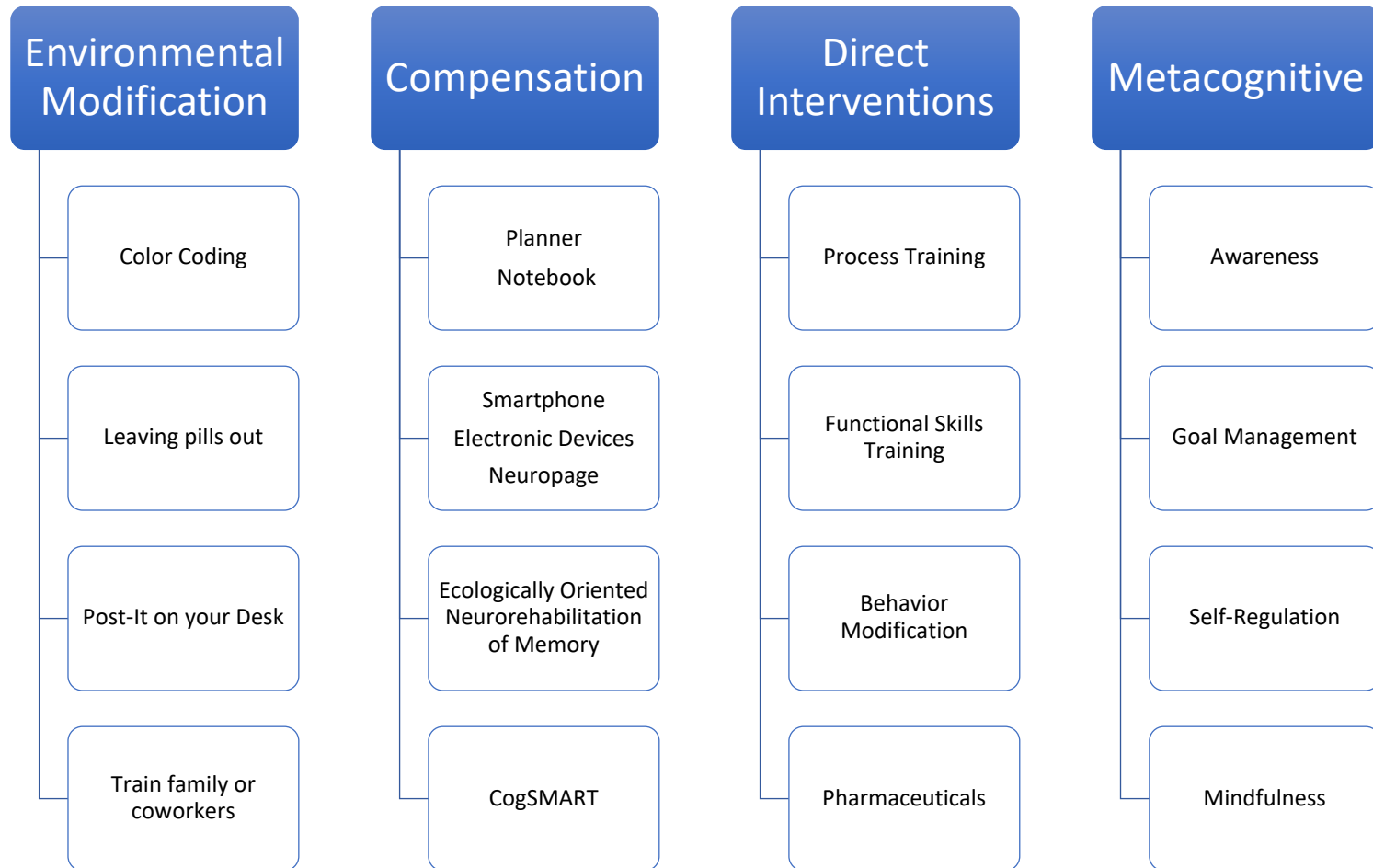
And the change correlates with time spent as taxi driver





So what do we know helps
your brain learn?

Approaches to Rehabilitation



I. Attention

We know that if
you aren't able
to pay attention,
you can't learn
new information

I. Attention

Work in a quiet
room

Limit distractions

I. Attention

Focus on one
task at a time

Avoid crowds

I. Attention



Limit fatigue

I. Attention



Avoid interruptions

I. Attention



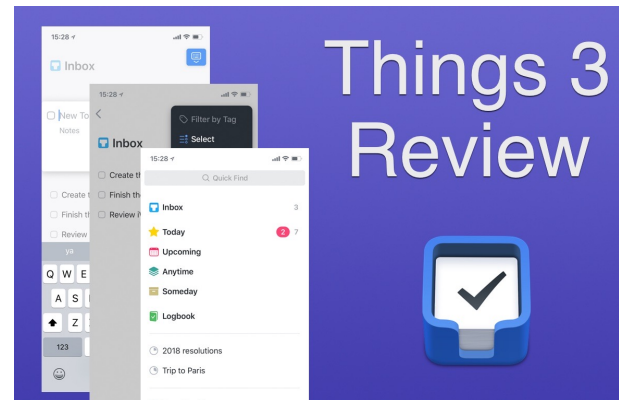
Move to a closer or more direct position

I. Attention



Use electronic organizers

I. Attention



I. Attention

Use spell
checkers,
grammar
programs

Tape record important information

I. Attention



I. Attention

Use cueing devices



I. Attention

Get notes from
peers in the
classroom or
meeting

-

Play brain games

I. Attention

- AARP has free ones on their website
- <https://games.aarp.org/>

I. Attention

ComCog: This computer-assisted cognitive training program

consists of 10 different attention tasks to train visual and auditory attention, vigilance, divided attention, and persistence, each of which had several subtasks with various levels of task difficulty

Kim, Y.-H., Yoo, W.-K., Ko, M.-H., Park, C., Tae, S., & Na, D. L. (2009).

Memory errors can have serious consequences in daily life



Memory in Context

THE E-I-E-I-O MODEL OF MEMORY HELPS CATEGORIZE DIFFERENT TYPES OF MEMORY AIDS

TYPE OF MEMORY	TYPE OF MEMORY AID	
	External	Internal
Explicit	Appointment book Grocery list	Mental imagery Rote rehearsal
Implicit	Color-coded maps Sandpaper letters	Spaced retrieval Conditioning
© 2015 Cengage Learning		

Memory in Context

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Explicit—you consciously decide to use it

Implicit—it happens automatically

External—involves external objects

Internal—only involves you and your brain

II. Memory

Use Implicit External devices

Examples of Environmental Modifications

Use Implicit External methods

II. Memory

Color code materials that belong together



II. Memory

Use Implicit External methods

Place things you need to bring with you in front of the door the night before, so you would have to trip over it to leave without it.



II. Memory

Use Explicit External devices

If you have specific tasks to do each day, like homework, set aside an hour that is only for that task and do it the same time every day.

Use Explicit External devices

Post a calendar in an obvious place you
can't miss to track dates

II. Memory



Use Explicit External devices

Use sticky notes to write notes for yourself and place them on objects you are exposed to daily.

II. Memory



II. Memory

Use Explicit External devices

Stay organized and put things back in the same place they are regularly found. For example, keep your keys on the hook by the door.



Use Explicit External devices

Make a schedule for the times at which you will accomplish a list of tasks.

II. Memory

Daily Planner DATE: 07/01/2021

SCHEDULE	
5 AM	
6 AM	Getting up
7 AM	
8 AM	Biology lecture
9 AM	
10 AM	
11 AM	Vet appointment
12 PM	
1 PM	Lunch with Amy
2 PM	Go to library
3 PM	
4 PM	
5 PM	
6 PM	Cook Dinner
7 PM	
8 PM	Call mom
9 PM	
10 PM	Sleep
11 PM	
12 AM	
1 AM	
2 AM	
3 AM	
4 AM	

PRIORITIES
◇ Biology lecture
◇ Prepare assignment
◇
◇

TO DO LIST
◇ Vet appointment
◇ Cook dinner
◇ Clean room
◇ Call mom
◇
◇
◇
◇

Notes:
I'm grateful for
The support from mom
My health

II. Memory

Explicit External devices

II. Memory

Written Notebooks:

Keep your notes in one place, like a bound notebook, to avoid losing many little pieces of paper.

II. Memory

Written Notebooks:

You can make different sections for better organization. For example,

Things I have to do
What I did today
Phone numbers and Addresses
Feelings
Ideas
Goals
Meal Log
What to do in an emergency
What happened to me

Try to link looking in your notebook to things you do each day, like whenever you eat a meal, check your notebook!

.

II. Memory

Written Notebooks:

Learning to use your notebook requires memory, too, so give it practice and time!

Some people forget to use it. Some people feel too dependent on their journal or notebook.

Also, there is a risk of losing all of your reminders if the notebook is lost. Try keeping it in the same spot everyday to avoid losing it.

II. Memory

Electronic Notebooks:

This method may be more convenient for people who always have their phone or tablet with them. Also, electronic devices can send you alerts when it is time to do a task, which is really helpful!

-

Electronic Notebooks:

II. Memory

Helpful applications include:

google calendar or iCalendar so that your reminders can be accessed from multiple devices.

Services that call or text you to help you complete your tasks.

key finder

vehicle locator

tape recording devices

Electronic Notebooks:

- They can be costly, both the device and then a wifi plan
- Some people may feel too dependent on them.
- It can also be stressful to receive notifications all the time.
- There is also a risk of losing access to your information if the internet is down, the device's battery dies, or if the device breaks, is stolen, or lost.
- If using an electronic device is too much for you, don't worry because there are still other ways to complete your daily tasks!

II. Memory

Memory in Context

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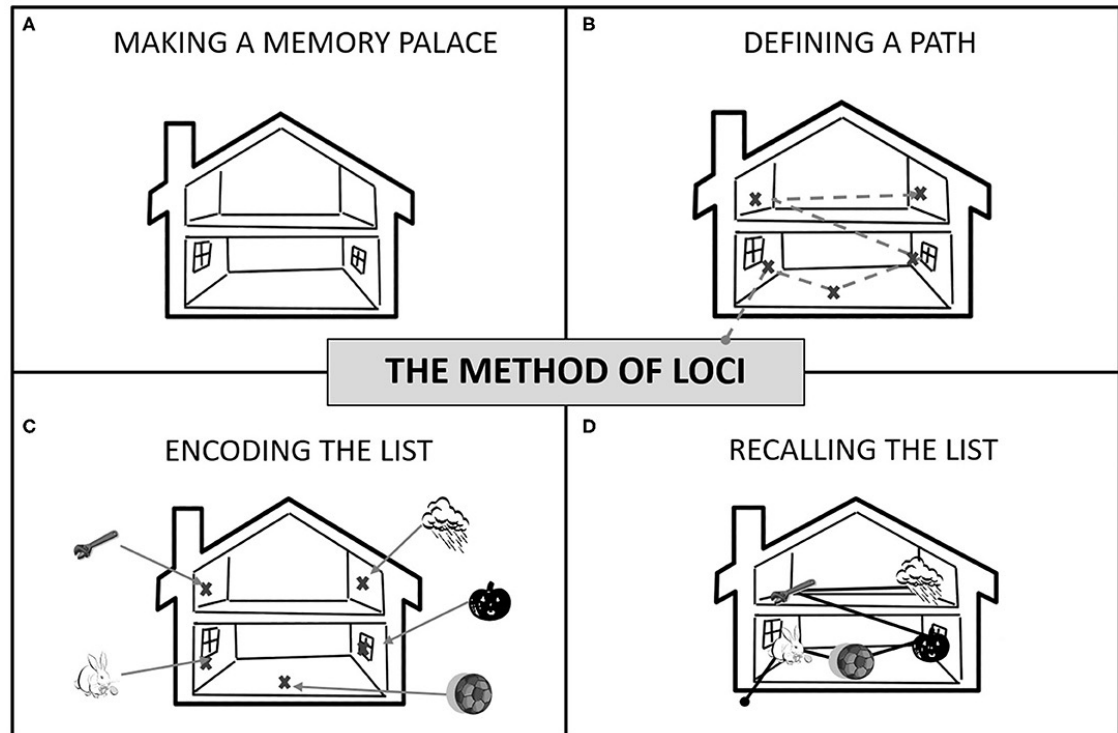
Internal—only involves you and your brain

Explicit Internal:

Mnemonic Devices:

ROYGBIV for the rainbow

II. Memory



Explicit Internal:

II. Memory



Explicit Internal:

II. Memory

Method of Vanishing Cues

- A sequence of characters enclosed in quotation marks is called a _____. (answer: STRING)
- 1st trial hints required: S, T, R, I, N
- 2nd trial hints given: STRI
- 3rd trial hints given: STR
- 4th trial hints given: ST
- 5th trial hints given: S
- 6th trial hints given: none

II. Memory

Explicit Internal:

Make Associations

How long could you remember the number 87?

But, what if you were 87 years old? Or, you were born in 1987? Or you lived at 87 Lincoln Street?

Explicit Internal:

Visual Imagery



II. Memory

“Imagine you are buying milk. Imagine with as much detail as possible-sights, sounds, smells, temperature. Describe all the details you can imagine.”

Explicit Internal:

Visual Imagery

Cognitive
Rehabilitation
Can Lead to
Plastic
Changes
II. Memory

Using visual imagery lead to improved memory
in people with brain injury

Raskin, S., Smith, M, Mills, G, Pedro, C., &
Zamroziewicz, M. (2017). Prospective memory
intervention using visual imagery In individuals
with brain injury. Neuropsychological
Rehabilitation, 12, 1-16.

Elaboration of Retrieval Cues

- **Imagining the cue occurring, what it would look or sound like, feelings associated with the cue**



II. Memory

Explicit Internal: Story Memory Technique

If you have a list of words to remember,
make up a story that links them together

II. Memory

Explicit Internal: Story Memory Technique

Milk, Broccoli, Salmon

The milky white stream was full of huge bright orange salmon swimming past a forest of underwater broccoli

Cognitive Rehabilitation Can Lead to Plastic Changes

II. Memory

modified Story Memory Technique (mSMT)

On fMRI significant differences in cerebral activation from before to after treatment were noted in regions belonging to the default mode network and executive control network in the treatment group only.

Chiaravalloti, N. D., Dobryakova, E., Wylie, G. R., & DeLuca, J. (2015).

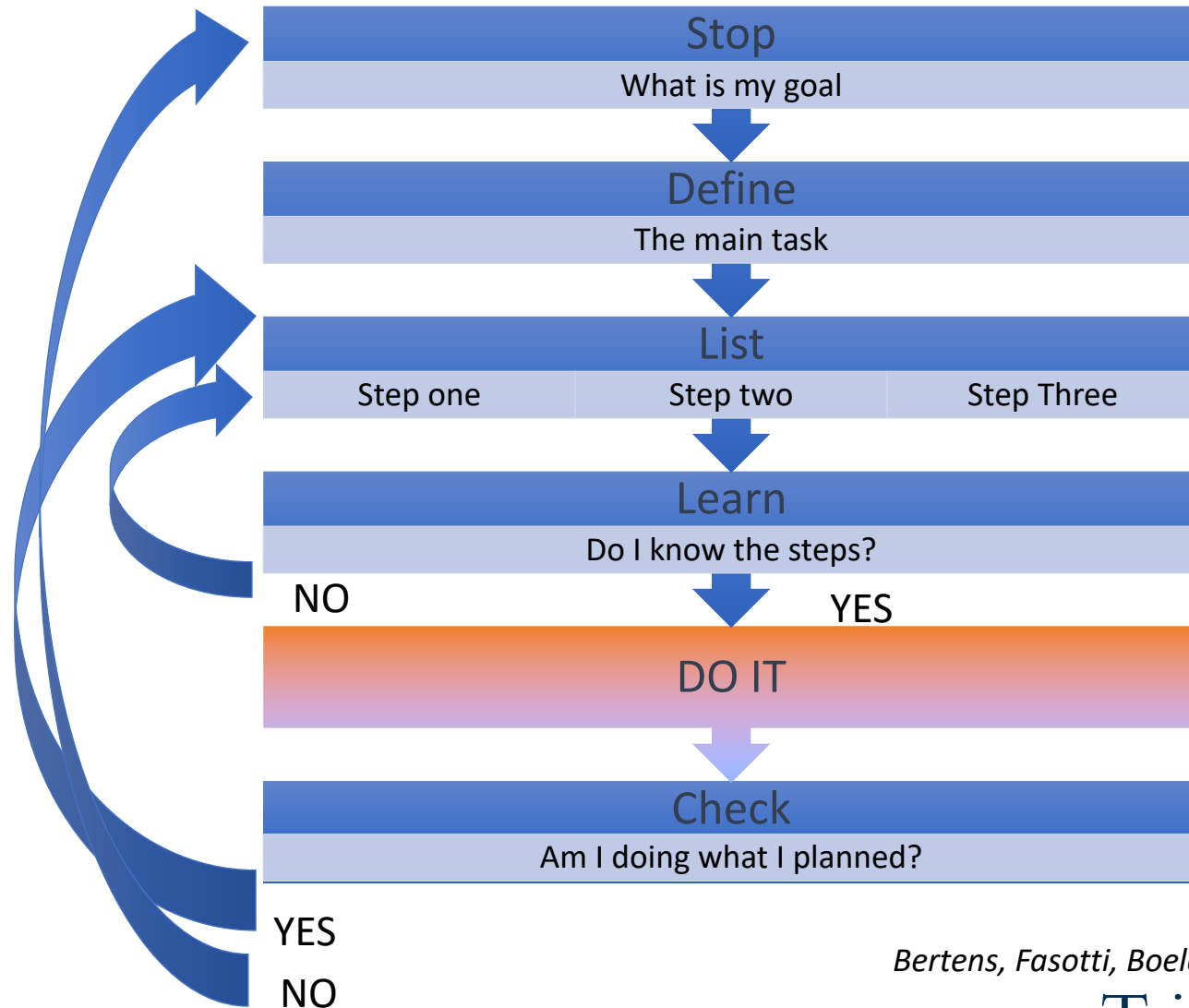
II. Memory

Explicit Internal:

Repetition, Repetition, Repetition

Raskin, S., Mills, G. and Garbarino, J. (2011).
Practice Related Changes in Brain Activity. In: S.
Raskin (ed). Neuroplasticity and Rehabilitation.
Guilford Press: New York.

Goal Management Training



Bertens, Fasotti, Boelen, & Kessels, 2013

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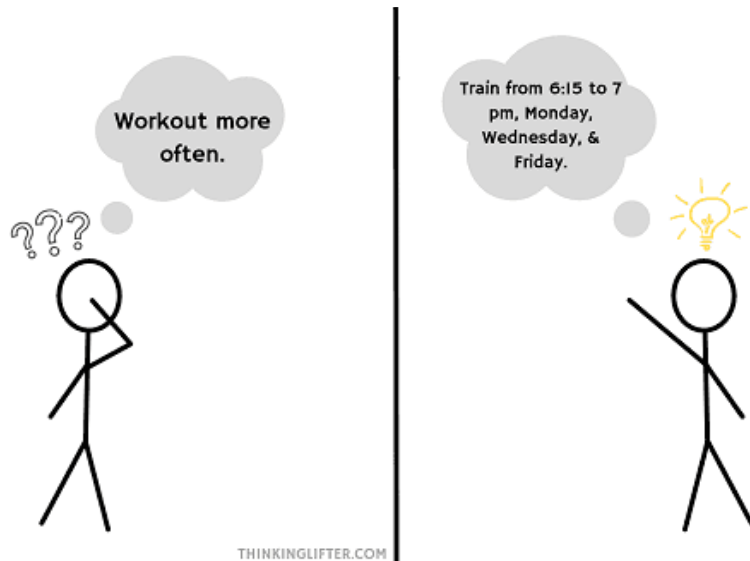
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Internal Implicit:

Implementation of Intentions

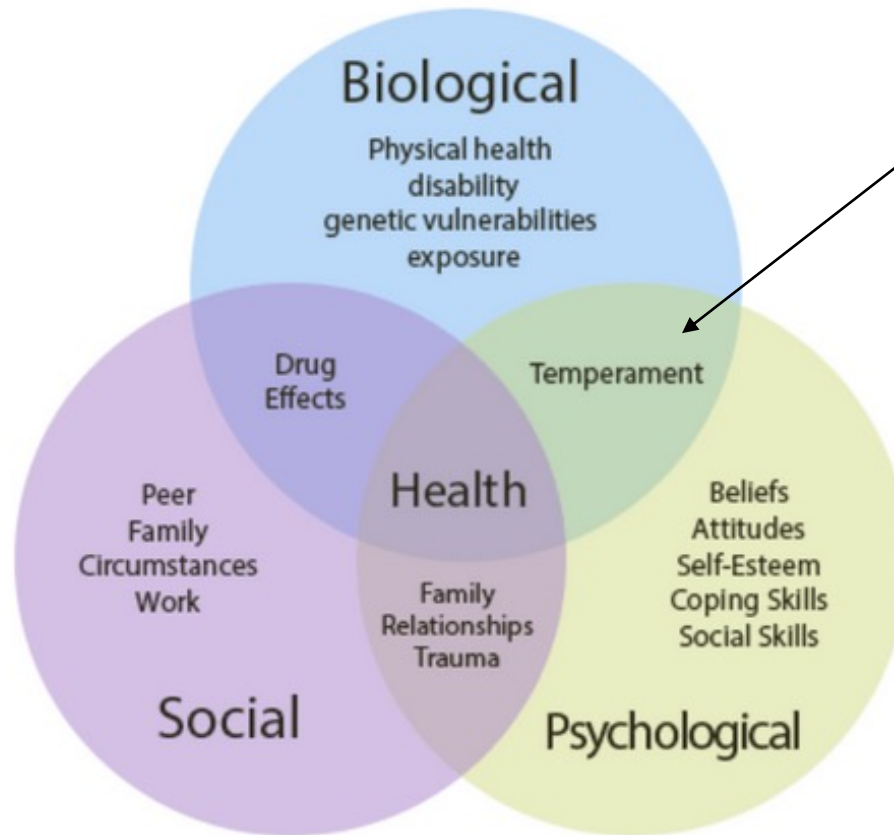


- Very specific plans with specific time and place are more successfully remembered and completed

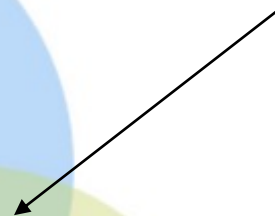
Internal Implicit: Spaced Retrieval

- Think of something you have to remember “The bus I take home is the 72 on Fern Street.”
- Read it out loud
- Put your paper away and quiz yourself immediately.
- If you get it right, wait five minutes and quiz yourself again
- If you get it right wait fifteen minutes, etc.
- Try not to make wrong guesses. If you are unsure look at the paper and start again.

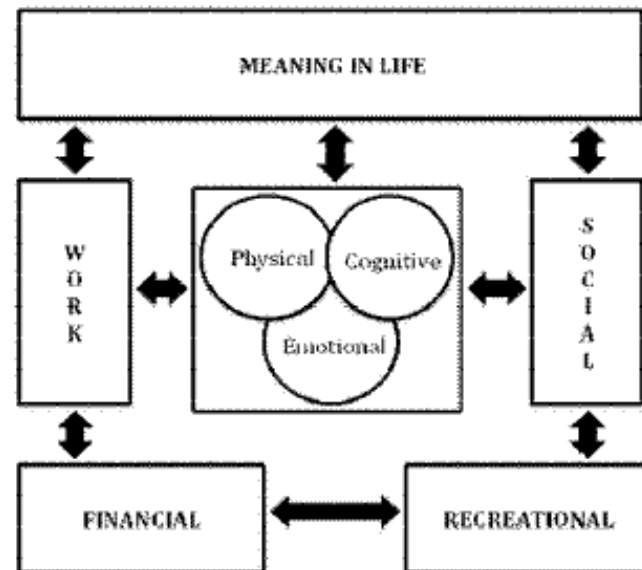
Biopsychosocial Model



Depression
Anxiety
Post traumatic stress
Irritability



Biopsychosocial model



Keeping Your Brain Healthy



PHYSICAL ACTIVITY



SOCIAL INTERACTION



MENTAL STIMULATION



DIET



REDUCE STRESS



SLEEP

Keeping Your Brain Healthy

- PHYSICAL ACTIVITY
 - Enhances memory and learning
 - Improves mood
 - Enlarges blood vessels and leads to more blood and oxygen to the brain
 - Increased brain-derived neurotrophic factor (BDNF)
 - May support neurogenesis in the hippocampus
 - Increases nerve cell firing

Keeping Your Brain Healthy

- HOW MUCH EXERCISE?
 - 30 minutes of moderate exercise (brisk walk)
 - Four days per week
- So: take the stairs over the elevator, park far from the door, pace while you watch TV or talk on the phone

Keeping Your Brain Healthy

- INTERACT SOCIALLY
 - Other people are unpredictable and keep us on our toes
 - Social networks reduce the effects of stress
 - Increases feelings of self-efficacy

Keeping Your Brain Healthy

- INTERACT SOCIALLY
 - Attend a talk or take a class
 - Volunteer in the community
 - Join a book club, garden club, professional association
 - Keep in touch with friends and family
 - If you work at home or spend significant time at home, bring your work to the local library

Keeping Your Brain Healthy

- MENTAL STIMULATION

- People who engage more frequently in activities like listening to the radio, reading newspapers, playing puzzle games, going to museums—had much lower incidence of Alzheimer's disease
- Doing brain training exercises lead to increases in memory functioning and these lasted after the training was finished

Keeping Your Brain Healthy

- MENTAL STIMULATION
 - Do something that you don't usually do—
balance your checkbook without a calculator
 - Learn a new hobby, a new language, learn
about a subject you never studied before
 - Use your nondominant hand to eat or brush
your teeth
 - Play scrabble, do crosswords or sudoku
 - Learn a new musical instrument, or new songs
on an old one
 - Travel or go to museums nearby

Online Brain Games

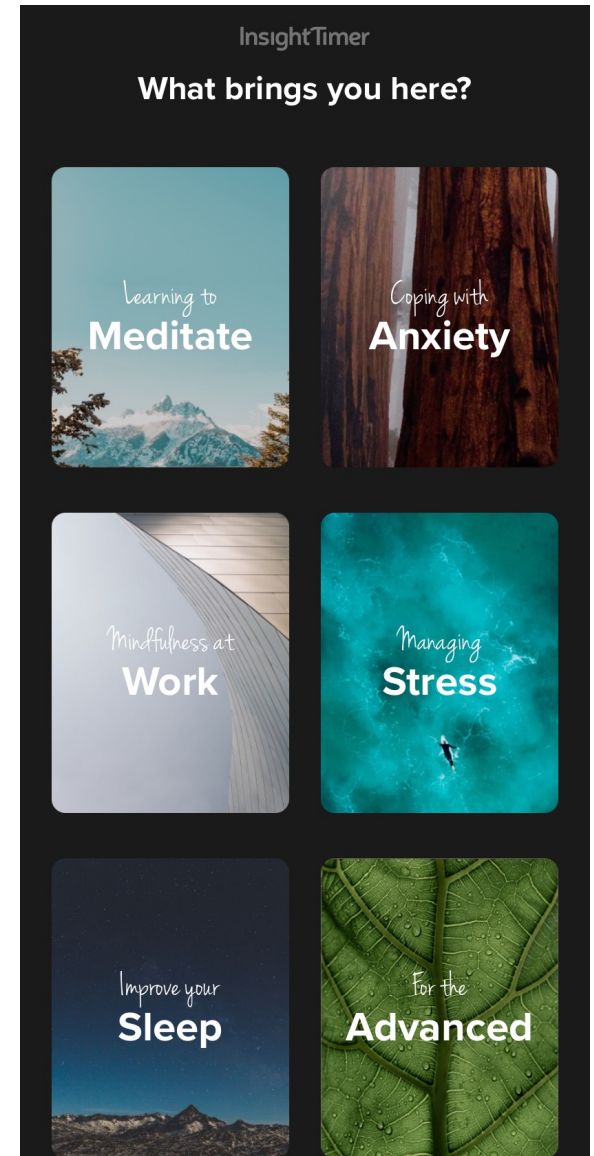
- Don't spend a lot of money!
- Try free games from AARP:
 - <http://games.aarp.org/category/allgames>
- <http://www.superteachertools.us/jeopardyx/jeopardy-review-game.php?gamefile=2235372>

Keeping Your Brain Healthy

- DIET
 - Women who eat green leafy and cruciferous vegetables (cauliflower, broccoli, cabbage) better on cognitive tests
 - Fatty fish lead to beneficial brain effects (salmon, tuna, mackerel)
 - Whole grains support cardiovascular health and brain health
 - Blueberries have antioxidants (walnuts, sunflower seeds, pomegranates, ginger, legumes, colorful vegetables, other berries)

Keeping Your Brain Healthy

- REDUCE STRESS
 - Meditation has been shown to improve memory, learning, attention and sensory processing



Keeping Your Brain Healthy

- REDUCE STRESS
 - Take deep breaths
 - Practice mindfulness
 - Listen to calming music
 - Avoid caffeine

Keeping Your Brain Healthy

- SLEEP
 - During sleep is when we store new memories
 - Insufficient sleep leads to poor memory performance and impairments in immune function

Keeping Your Brain Healthy

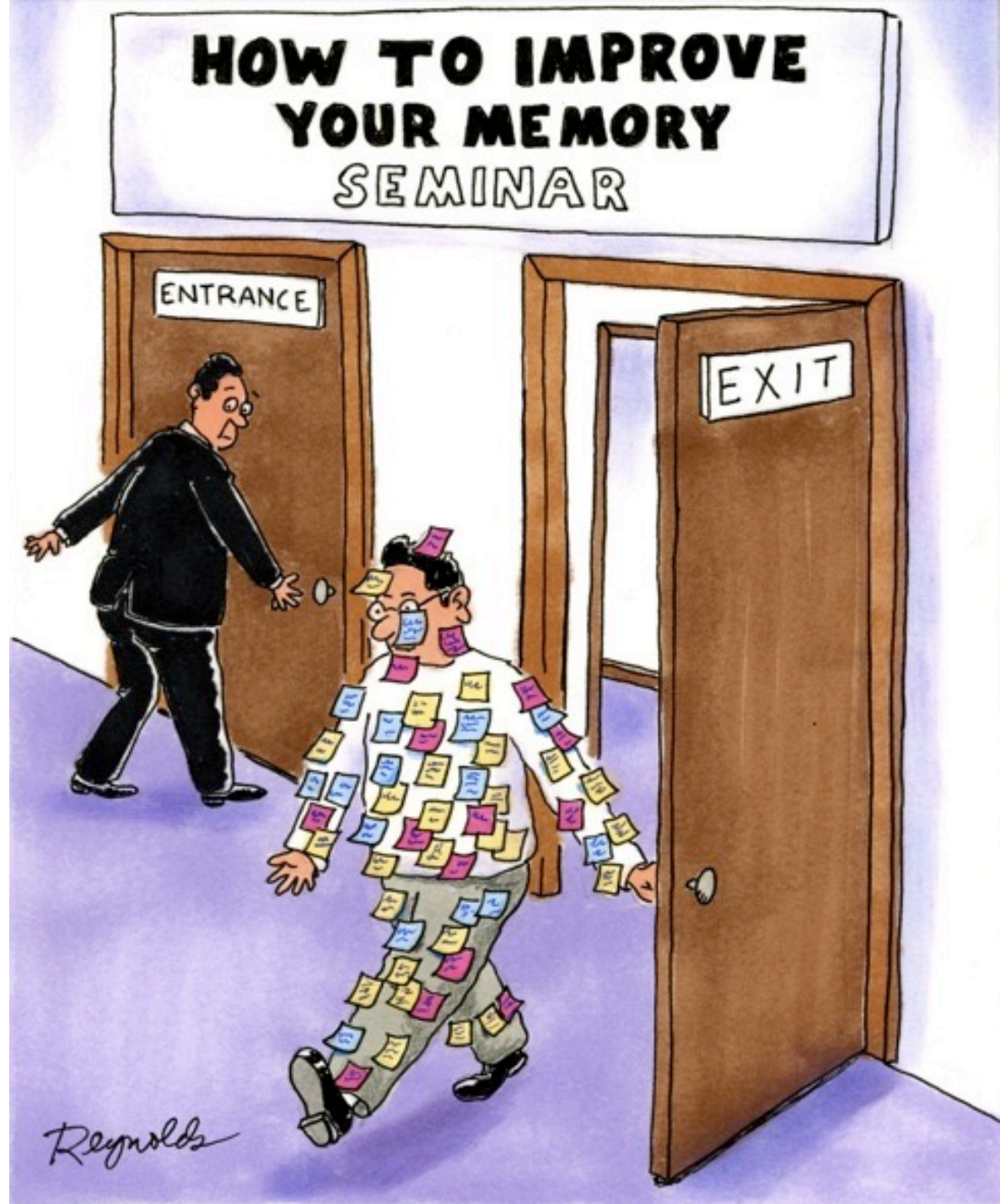
- SLEEP
 - Practice good sleep hygiene
 - Don't drink too much right before bed
 - Exercise
 - Avoid caffeine and nicotine
 - Avoid screens right before bed



Music

- Involves Three Domains
 - Cognitive
 - Psychomotor
 - Affective

Of course, the goal is quality of life



Thank you!

- And thanks to:
 - James McDonnell Foundation
 - Trinity College Faculty Research Committee



Research Assistants in ReMIND lab:

Ryan Werner
Jocelyn Moran
Alicia Camuy
Dorothy Anika
Blessing Njoku
Aspen Hawkins
Gabbrielle Christensen
Chloe Ouichida
Samantha McAward
Gianna Barbidillo
Alisha Rahman
Maddy Cassidy