THE RAYMOND NAFTALI CENTER

The Raymond Naftali Ambulatory Center For Rehabilitation, Inc.

Where did I put my keys? A Workshop on Memory

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Workshop Agenda

- Welcome
- Memory: The Basic Facts
- Five Types of Memory
- Causes for Memory Loss
- Lets play: Fact or Fiction
- Normal Aging
- Evaluation & Treatment
- Memory Tips and Compensatory Strategies
- Questions and Answers

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Memory: The Basic Facts

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Introduction to Memory

- Memory problems are common.
- Everyone's memory can fail them at one time or another.
- Have you ever...
  1. forgotten the name of someone you just met;
  2. been unable to put a name to the face of a friend or neighbor;
  3. failed to purchase the one item you actually went to the grocery store to buy;
  4. forgotten your new cell phone number;
  5. missed the birthday of someone for whom you already bought a card;
  6. forgotten where you parked the car;
  7. missed a doctor's appointment;
  8. or forgotten to take the 8 pm dose of medication?

If yes, don't feel bad - you are not alone.

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Introduction to Memory

- How common is memory loss?
  - For persons under 65 years of age, there is a low estimated prevalence between 0.5% and 1.0% (Rabins et al., 1999).
  - For persons over 65 years of age, the prevalence of memory loss is increases between 5.0% to 8.0% (American Psychiatric Association, 1997; Rabins et al., 1999).
  - After age 65, the prevalence of memory loss nearly doubles every five years.
    - Specifically, between 15.0% and 20.0% of individuals over 75 years of age experience memory loss, while for persons over 85 years of age the rate ranges from 25.0% to 50.0% (American Psychiatric Association, 1997).

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Dementia

- It should be noted that Alzheimer's disease is the most common cause of dementia in the US.
- Dementia is characterized by the development of severe multiple cognitive deficits that occur in the absence of delirium (i.e., disturbance of consciousness).
  - The deficits may include severely impaired memory, impaired language, impaired motor activities, and/or impaired facial recognition (American Psychiatric Association, 1994; National Institute on Aging, 2003).
- **The focus of today's discussion is on changes in memory as a function of aging and strategies to improve memory, not dementia of the Alzheimer's type.**

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What is memory loss?

- Memory loss is defined as *the loss or inability to access previously learned or acquired information over time.*
- Individuals with memory loss may also experience difficulties learning new material.
- Memory loss is sometimes referred to as other terms such as amnesia, forgetfulness, memory decay, memory decline, or memory impairment.

Source: Loring, 1999.

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Where memories are stored in the brain?

- Memory is a multifaceted, complex process that is localized in different structures in the brain.
  - Neocortex
  - Hippocampus
  - Basal ganglia
  - Hypothalamus
  - Primary motor cortex
  - Striatum
  - Amygdala
  - Fornix
  - Frontal, occipital and parietal lobes

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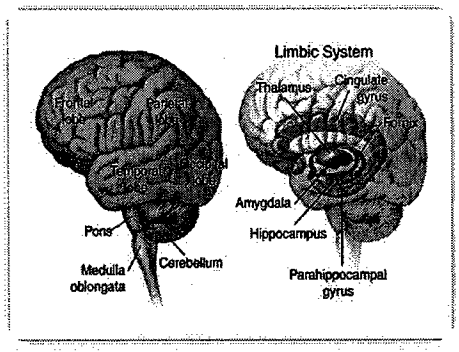
Neuroanatomical Structures



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How are memories encoded?

- Simply speaking, memories are made via a three step process.
  1. Information is received (input),
  2. Information is processed and analyzed (encoding),
  3. Information is recalled (retrieval).
- Any disruption in this **Information Processing Model** can result in impaired memory.

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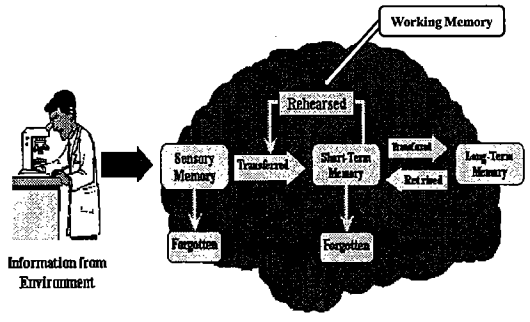
How memories are encoded?



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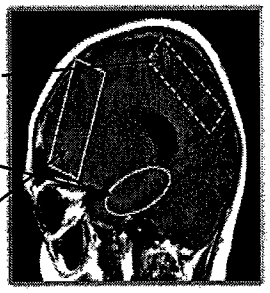
Simplified Memory Circuit

- Figure 2. Illustrates a simplified memory circuit including the posterior associational neocortex where memories are stored (dashed-line rectangle), the medial temporal lobe that consolidates memory storage (oval), and the prefrontal cortex that promotes memory retrieval (solid-line rectangle).



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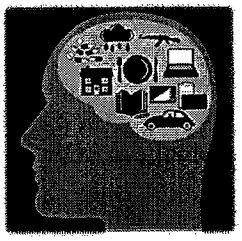
Five Types of Memory

Types of Memory

- Perceptual/Visual Memory
- Episodic Memory
- Procedural Memory
- Semantic Memory
- Executive Memory

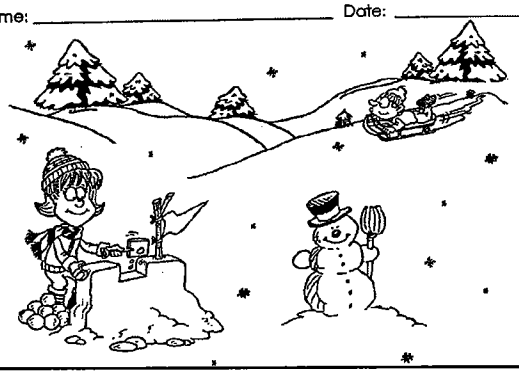


Perceptual Memory

- **Perceptual- memories acquired through the senses.**
  - **Visual/Iconic memory** - The ability to hold visual images.
  - **Acoustic memory** - The ability to hold sounds. Acoustic memory can be held longer than iconic memory.
  - Remembering feelings associated with sensory events.
    - Feelings you have when you think about your favorite desert, or happiest day of your life.

Visual Memory Task

Name: _____ Date: _____



Visual Memory Task

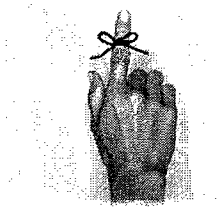
1. Are a few snowflakes still falling? **Yes!**
2. Do you see a snowman in the picture? **Yes!**
3. Is the snowman holding a rake? **Yes!**
4. Is the snowman wearing a scarf? **No!**
5. Is the girl using a big shovel? **No!**
6. Is the boy sliding on a sled? **Yes!**
7. Does the sled have runners? **Yes!**
8. Is it raining in the picture? **No!**
9. Is the girl's fort made of bricks? **No!**
10. Do you think the fort will melt when the sun comes out? **Yes!**

Episodic Memory

- **Episodic memory- memories related to temporally dated events.**
- Immediate memory- (IM) immediate application/recall of information.
- Working memory- (WM)is the temporary active retention of information for prospective action.
  - WM requires sustained attention & focus on an internal representation of information to be used in the near future.
  - It is essential for goal-directed behavior, speech, and reasoning.
  - Vulnerable to decline.
- Short-term memory- (STM) -Has a limited capacity of up to seven pieces of independent information lasting from 20 seconds to 15 minutes.
  - Interacts between WM and LTM.
  - Decay in STM appears to be the primary mechanism of memory loss.
  - STM is vulnerable to interruption or interference.
- Long-term memory- (LTM) relatively permanent storage. Information is stored on the basis of meaning and importance. LTM is typically persevered over time.

Episodic Memory Task

- Remember these four words:
  - Window
  - Ice cream
  - Bus driver
  - Cell phone



Procedural memory

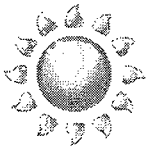
- **Procedural memory: memory for "how to" do things, the sequencing of events.**
  - Believed to be associated with long-term memory.
  - Recalling the steps necessary to... 1) brush your teeth, 2) scramble eggs, or 3) merge your car onto the highway.
  - Skipping a step in any one of these procedures will result in an undesirable outcome.
  - You must recall ALL steps in sequential order.

Semantic Memory

- **Semantic memory: memory for words and vocabulary.**
  - #1 age-related symptom reported in adults 60 +
  - Lexical retrieval or the ability to retrieve words has been the topic of investigation for nearly half a decade.
  - **Nouns** or content words (person, place or things) are most vulnerable compared to **functions** words (adjectives, adverbs)
  - In a classic study conducted by Albert, Heller and Milberg (1988), researchers concluded that naming abilities are relatively **subtle** and **stable** until approximately 70 years old.
  - It was determined that lexical representations of words most likely remain intact with aging, however, older individuals have more difficulty utilizing & accessing semantic information to retrieve words compared to you young adults.

Semantic Memory Task

- List as many items that are the color yellow in 30 seconds.
- In 15 seconds, list as many animals that you see in the zoo.



- Generate as many words that begin with the letter B in 45 seconds.

Executive Memory

- **Executive memory: memory of motor acts and behaviors.**
- Executive memory is unique because it has the largest network of storage structures.
  - spinal cord, the brainstem, and the cerebellum
- Examples: Muscle memory, memory to ride a bike, or roller skate, or recall dance steps from decades earlier.

Causes for Memory Loss

Causes for memory loss

- Memory deficits can occur due to:
  - ineffective encoding of information,
  - inadequate storage of information,
  - difficulty retrieving information,
  - the inability to suppress environmental distractions (i.e., background noise, competing talkers, etc.)
  - or external factors (medications).

- **Most commonly, memory loss is caused by:**
  - neurological disorders (e.g., Parkinson's disease, Pick's disease, Multiple Sclerosis, etc.),
  - cerebrovascular diseases (e.g., multiple cerebral infarcts/strokes, etc.),
  - infectious diseases (e.g., HIV, syphilis, etc.)
  - prescription medications
  - prion diseases (e.g., Creutzfeldt-Jakob disease, etc.),
  - anoxia/lack of oxygen to the brain
  - psychiatric disorders (e.g., Major Depressive Episode, etc.),
  - traumatic brain/head injuries,

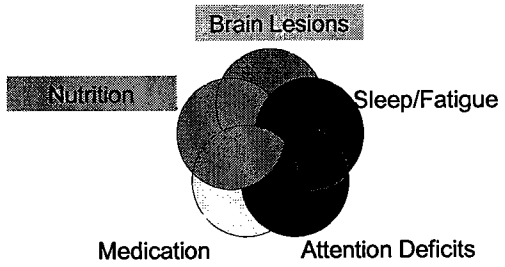
Most commonly, memory loss is caused by:

- vitamin deficiencies (e.g., Vitamin B12 deficiency, etc.)
- endocrine disorders (e.g., hyperthyroidism, hypothyroidism, etc.)
- brain tumors
- immune disorders (e.g., systemic lupus erythematosus, etc.)
- toxin and drug exposures (e.g., heavy metals, alcohol, etc.),
- fatigue/sleep disorders
- attention disorders

- Depending on the underlying cause of memory loss some conditions may remain relatively unchanged (i.e., static), or be reversible (i.e., remitting).

Source: American Psychiatric Association, 1994; Rabins et al., 1999

Factors that affect memory



Brain Lesions

- Tumors or brain lesions can cause pressure to build in the brain or disrupt the function of neurons, leading to memory loss.
- In the case of MS, three pathogenic factors that can cause memory loss include:
  1. Lesion load (# of lesions)
  2. The severity of the damage within individual lesions
  3. Lesion location
- For individuals who have suffered a stroke because of a burst blood vessel or blood clot , oxygen and nutrients can be blocked from getting to the nerve cells in the affected area of the brain.
- These nerve cells can die within minutes and cease to function. In many cases, this damage is permanent.

Sleep/Fatigue

- Some memory functions are significantly affected by fatigue and sleep deprivation than others.
- A recent study, found that visual memory for faces and lexical/word retrieval skills were was significantly impaired sleep individuals who are sleep deprived (less than 38 hours of sleep weekly or 5.4 hrs of daily sleep).
- Poor sleep patterns also reduces the rate in which information is processed and encoded into memories.

Attention/Distraction

- Poor attention and distractibility can reduce the successful encoding of information.
- If information is not properly encoded, it can not be transferred to STM or LTM for permanent storage.
- Environmental background noise can also inferfere with information processing which reduces the likelihood of information being encoded.

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Nutrition

- Poor nutrition, consumption of alcohol and a sedentary life style all contribute to memory decline.
- **Vitamins for Memory Loss**
  - Vitamin A combats toxins that damage brain cells.
  - Vitamin B1 is needed to produce the brain chemical acetylcholine, crucial for concentration levels and memory.
  - Vitamin B3 is essential for brain health.
  - Vitamin B6 improves nerve communication.
  - Vitamin B12 is needed to create the myelin sheath that protects nerves and speeds up the rate of electrical transmission.
  - Pantothenic acid is essential for the production of the brain chemical acetylcholine.
  - Folic acid seems to help guard against the risk of Alzheimer's disease.

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Medications

- Memory loss caused by medications that are supposed to help you can be distressing.
- Putting together a list of mediations with a side effect of memory loss is difficult because in the US, there is no standard way to describe/report memory loss.
- **See Handout:** All the drugs listed cause some degree of memory loss. The drugs listed in **bold print** indicates an incidence of memory loss in 3% or more of users. Where possible, the actual percentage of users who experience memory loss with each drug has been listed.
- Inclusion criteria: The list is composed only of those drugs that manufacturers acknowledge can cause memory loss. Additional medications such as Neurontin and "Statin" drugs have not been included despite strong antidotal reports because their manufacturers do not have indicant data to support the claim.
- Special attention should be paid to **Xanax**. It has **highest incidence of memory loss** in users ranging from 5% to 33%.

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Normal Aging

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Fact or Fiction?

- Forgetting things more often than I used to is normal now that I'm 57.
- Forgetting how to do things I've done many times before is ok because I am getting older.
- It is expected that I have trouble learning most new things.
- Repeating phrases or stories in the same conversation is part of being a "Senior".
- Being indecisive making choices or managing my money is a part of getting older.
- I frequently lose track of what happens each day.

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FACT or FICTION

- **All of the previously mentioned statements are <u>NOT</u> memory deficits associated with normal aging.**
- **They are signs and symptoms of serious cognitive decline that should be discussed with your doctor.**

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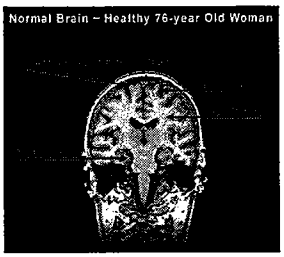
10 Signs of Serious Cognitive Decline

1. Severe laps in memory
2. Difficulty performing familiar tasks (e.g., difficulty preparing a meal, etc.)
3. Problems with language (e.g., word-finding difficulties, etc.)
4. Disorientation/confusion about time and place (e.g., forgetting where one lives, etc.)
5. Poor or decreased judgment (e.g., dressing inappropriately for the weather, etc.)
6. Problems with abstract thinking (e.g., difficulty balancing a checkbook, etc.)
7. Misplacing items;
8. Changes in mood or behavior (e.g., rapid mood swings, etc.)
9. Changes in personality (e.g., increased suspiciousness, fearfulness, etc.)
10. Loss of initiative (e.g., passivity, not performing usual activities, etc.)

Healthy Brain

- **This is a normal brain of a healthy 76-year old woman.**
- **Notice how both sides of the brain look symmetrical to each other.**
- **There is no discernable atrophy as there is very little space between the cortex and skull.**



- **No visible indication of significant atrophy in the hippocampli, which are thought to be responsible for consolidating memory.**

Disordered Brain

- **This is a brain of a 74-year old man with memory loss, hypertension and possibly dementia.**
- **Asymmetrical appearance**
- **Large space between the cortex and skull.**
- **Moderate atrophy in the hippocampli specifically, the right perirhinal cortex.**

Why does memory loss occur in normal aging?

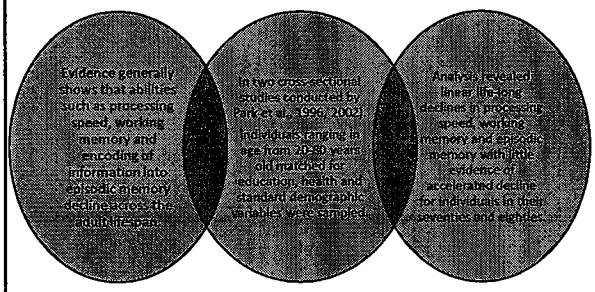
- Normal aging is not caused by the loss of neurons, but rather by decreases in the number of *synaptic connections* and in loss of *neuromodulation* that normally activates and coordinates processing in these brain areas, particularly involving pathways that use the neurotransmitter *acetylcholine.*
- What does this mean?
  - The way in which nerves communicate with one another in the brain changes during aging.

Memory Loss and Normal Aging

- As individuals reach middle age (60) and beyond, they often notice declines in their abilities to remember information; however, such declines are not necessarily abnormal.
- Clinically, memory loss may be broadly grouped into two categories:
  - Typical, age-related (or age-appropriate) memory declines and,
  - Atypical, (or age-inappropriate) memory declines

Source: Ratcliff & Saxton, 1998

Longitudinal Evidence



Longitudinal Evidence

- In the Seattle Longitudinal Study, linear age-related declines were observed for speed, episodic memory, spatial ability and reasoning.
- Across several longitudinal studies, age-related changes from ages 20 to 60 were observed to be minimal whereas changes after the age of 60 had a more dramatic slope.

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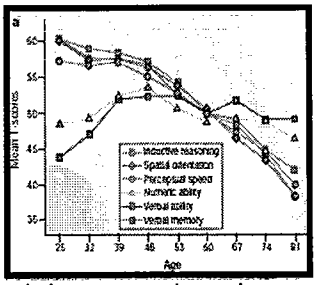
Seattle Longitudinal Study



- Overall, verbal memory and speech processing showed the greatest age-related change compared to other cognitive abilities.

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Key Points: Memory Loss & Normal Aging

- Some subtle changes in the ability to think are considered a normal part of the aging process.
- Researchers have found that healthy older adults experience mild decline in some areas of cognition.
- Mild decline is defined as no more than 1.5 standard deviations below the mean on standardized assessments.
  - These changes may occur in the areas of visual memory, immediate memory, semantic memory (or the ability to name objects).

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Evaluation & Treatment

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Evaluation

- Speak with your doctor.
- Obtain a referral to a speech-language pathologist and/or neuropsychologist.
- Have the evaluating clinician review your medical history and presenting complaints (e.g., memory/cognitive problems, etc.).
- Obtain a complete cognitive evaluation (e.g., attention/ concentration, language/verbal abilities, intellectual functioning, sensory-perceptual abilities, motor skills, complex cognitive processes/executive functioning, etc.).
- Most importantly, have memory skills evaluated via a series of standardized/objective verbal and nonverbal/visual memory tests that assess both immediate and delayed (e.g., after 20 to 30 minutes) recall.

Source: Lezak, 1995; Spreen & Strauss, 1998

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Treatment

- The treatment for memory loss depends on the cause.
- Sometimes it's as simple as treating an underlying disorder such as high blood pressure, diabetes, high cholesterol, depression, B12 deficiency or thyroid dysfunction.
- The treatment of "age-inappropriate" memory impairment include:
  - Cognitive training
  - Implementation of compensatory techniques
- The treatment of memory impairment due to brain dysfunction:
  - Cognitive training
  - Implementation of compensatory techniques
  - Use of prescription medications as recommended by your physician

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Benefits to Cognitive Training

- With the advent of improved assessment and evaluation of cognitive disorders in both normal and neurologically impaired populations, the development of cognitive training programs has gained popularity in the scientific community.
- In 2002, 2,832 individuals 70 and older where given 10 group training sessions for memory, reasoning, and speed of processing.

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Benefits of Cognitive Training

- Data analysis revealed that cognitive intervention improved the targeted cognitive ability when compared to baseline.
  - 87% of speed, 74% of reasoning, and 26% of memory-trained participants demonstrated consistent cognitive improvement **immediately after** the intervention.
  - No training effects were detected at 2 years post intervention, however, results illustrate and support the effectiveness of the cognitive training to improving targeted cognitive abilities.

Source: Ball et al., 2002

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Benefits to Computer Based Training

- Most recently, researchers investigated memory enhancement in healthy older adults using a brain plasticity computer- based training program.
- Participants received 8-10 weeks of computer-based training targeting auditory and language systems.
- Results revealed that the experimental group showed improvement on all directly trained tasks targeted by the computer program.
- Additionally, study subjects showed generalization of improved cognition on standardized measures of neuropsychological function, supporting the notion that brain plasticity training can significantly improve brain function in adults (Mahncke et al., 2006).

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Cognitive Training Demo

- Bungalow software
  - Functional Reading
  - Steps and Directions
  - Synonyms, Antonyms, and Homonyms

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Medications for memory impairment

- Currently, there is no approved prescription medication for treating normal age-related memory loss.
- For individuals diagnosed with memory loss associated with dementia, there are currently five FDA-approved medications.

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FDA Approved Medications

- The use of these drugs should be discussed with your physician as they all have associated side effects ranging from dry mouth to liver damage.
- Cholinesterase inhibitors
  - Rivastigmine (Exelon),
  - Galantamine (formerly Reminyl, renamed Razadyne),
  - Donepezil (Aricept),
  - Tacrine (Cognex).
- NMDA-receptor antagonist
  - Memantine (Namenda)

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Memory Tips & Compensatory Strategies

Memory Tips

- **Sleep.** Improving your sleep habits can help the physiological side of memory.
- **Relax.** Tension makes it more difficult for people to remember things. If you're about to take on a task that requires concentration, take a deep breath, hold it briefly, then breathe out. Repeat that pattern several times and feel yourself calming down.
- **Exercise.** Taking a 20- to 30-minute walk several times a week can improve high blood pressure, depression and diabetes, all of which can hamper memory (Check with your doctor before starting any vigorous fitness program).
- **Stay mentally active**. Take a class, play a challenging games like chess, or complete a word search or crossword puzzle. Research shows mental exercise may help preserve the mind and improve processing speed.

Memory Tips

- **Organization.** Organize your environment and personal effects to help you remember where things are located. Therefore, when you have difficulty remembering where you put something, you can close your eyes and visualize the item.
- **Set the alarm.** An alarm system (such the one found in your cell phone or palm pilots) can alert you to appointments and chores that would otherwise be forgotten, or remind you to take your medication.
- **Make lists**. Why try to remember when you can just write it down? Get in the habit of making lists of chores to do, phone calls to make and items to pick up at the store. Knowing that such things are written down will help you stay relaxed and free up your memory for other tasks.
- **Avoid excessive alcohol consumption.** Alcohol makes brain cells die off faster than they otherwise would. Men should drink no more than the equivalent of one or two glasses of wine a day. Women should have no more than one glass daily.

Memory Tips

- **Repeat new facts**. Repetition can aid memory. For example, when meeting someone for the first time, refer to him or her frequently by name during your conversation.
- **Practice makes perfect.** Practicing conversational skills can help to lessen social anxiety that can interfere with remembering names.
- **Establish a routine for daily activities.** For example, you might have breakfast, take your medication or vitamins, take a walk. Following your routine every morning will decrease the risk that you'll forget any of those important activities. Likewise, establish a routine for weekly tasks, such as paying bills every Monday after lunch.
- **Checklists.** Create checklists. Hang them up in a obvious place like the back of your front door. This will ensure that you see the checklist BEFORE you leave the house.
  - For example... Marissa do you have your wallet, cell phone, prescription to drop off at pharmacy, house keys?
  - Did you take your morning medications and call to make an appointment with Dr. Shabas?

Memory Tips

- **Give yourself a hint.** Two types of useful cues to improve semantic memory, or memory for word include phonemic cues (generating the first letter of the missing word) and categorical cues (thinking of the category the word belongs in. i.e., foods, places, things in the kitchen, etc.).
- **Visualization.** Close your eyes and try to envision where you parked the cars, or the place where you last left your cell phone.
- **Chaining.** When given a list of words or numbers chain or associate them to one another. Repeat the chain of words out loud. This helps encodes the information.
- **Mnemonics.** Mnemonic is another word for memory tool. Mnemonics are techniques for remembering information that is otherwise quite difficult to recall. Fundamental principles underlying the use of mnemonics are **imagination, association and location.**

Resources

- Books:
  - Improve Your Memory by Ron Fry
  - The Memory Book: The Classic Guide to Improving Your Memory at Work, at School, and at Play by Harry Lorayne and Jerry Lucas
  - Your Memory : How It Works and How to Improve It by Kenneth L. Higbee
  - Improving Your Memory for Dummies by John B. Arden PhD
  - Improve Your Memory Now: Tools & Exercises to Maximize Your Brain by Gary Small
- Websites:
  - http://www.lumosity.com/
  - http://www.mindtools.com/memory.html

Remember this...

- Forgetting things doesn't mean you're developing dementia...
- Talk to your doctor about memory concerns...
- Review your list of medications at home...
- Stay active and sharp...
- Support your memory in the ways discussed today and...
- Your are on the road to success!

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Contact Information

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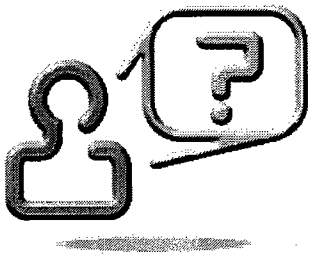
Questions and Answers



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