YOUR BRAIN AND MEMORY

THE STRUCTURE OF THE BRAIN

The brain can be broken down into the following:

- Forebrain or cerebrum (around 85% of the brain’s mass).
- Midbrain (around 2% of the brain’s mass).
- Hindbrain (13% of the brain’s mass), consists of the cerebellum, pons and medulla. Functions to coordinate balance, physical coordination, posture, equilibrium and motor activity. It also manages sleep patterns and regulates unconscious functions such as breathing and blood circulation.

CEREBELLUM:

- The cerebellum is sometimes called "little brain" because it looks like a mini-brain inside the brain.
- Cerebellum is the area of the brain most associated with balance, coordination, posture and motor control. The cerebellum is also important for procedural memory, such as knowing how to ride a bike. It also processes much of the learning and is involved in the coordination of cognitive processes.
- Cerebellum takes up one-tenth of the brain by volume, but contains nearly half of all the neurons in the brain. The neurons in the cerebellum can form an immense number of connections.

BRAINSTEM:

- If you take the pons, medulla and the midbrain, together they are called the "brainstem".
- This is the stalk-like part of the brain connecting the spinal cord and the forebrain.
- The brainstem is really important as every nerve impulse that passes between the brain and the spinal cord has to go through the brainstem.
- The brainstem is sometimes called the “old brain” (as this is the oldest part of our brain) or the “reptilian brain” (this is because an entire reptile brain looks like just this bit of our brain).
- The brainstem is responsible for basic vital life and body functions such as breathing, heartbeat, body temperature, digestion and blood pressure.
- This is where instincts like "flight or fight" come from.

Hemispheres of the Brain:

In the 1960s a researcher Roger Sperry concluded that the two hemispheres of the brain deal dominantly with different types of mental activity. This led to the idea (still popular today!) that people were either "right-brained" (creative) or "left-brained" (logical) and that the brain was completely specialised with the different hemispheres doing unique and specific functions.

Professor Zaidel of the University of California continued Sperry's work and found that each hemisphere contains many more of the "other" side's abilities than was previously thought and that each hemisphere is capable of a much wider and much more subtle range of mental activities. Now we know that the idea of "right-brained" and "left-brained" people is a bit flawed. So this is what we DO know.

Instead of "specialisation", we now say "lateralization", where the activity in the brain is MAINLY limited to one hemisphere. We are all whole-brained, it is an oversimplification to say an individual is left-brained or right-brained.

The left side of the brain has more "grey" matter which is associated with processing. Because of the more tightly packed neurons, the left side of the brain is better able to handle intense detailed work. The right side of the brain has more "white" matter which is associated with communication. As these neurons have longer axons that can connect with modules farther away, these long range connections help the right side of the brain to come up with broad but rather vague concepts.

The more you use both sides of your brain together, the more each side benefits the other. Effective memory and learning involves both sides of the brain at the same time. This is known as "global learning". For optimal learning, we want to facilitate learning activities that include the strengths of both hemispheres.
Looking closer at the Cerebrum:

LIMBIC SYSTEM

The limbic system (the inside bit of the Cerebrum), sometimes called the "emotional" brain or the "old mammalian" brain, is buried deep within the cerebrum, and has several components:

- **THALAMUS**: All incoming sensory info (except smell) comes here first. Acts as a relay station to the cerebral cortex.

- **AMYGDALA**: Is associated with memory and emotions. Amygdala is Greek for "almond". Smell and taste are inextricably linked and, because we often have a conditioned response to a smell or taste (e.g., we may really love or hate it), memories associated with these are processed and formed here. Decides the emotional value of the information coming into the brain (is it important?).

- **HIPPOCAMPUS**: Is a seahorse shaped structure in the brain located across both hemispheres. Hippocampus is actually the Greek word for "seahorse". Helps convert short-term memories into long-term memories with lots of cells particularly designed to aid in memory functions. Also has the incredible ability to create new brain cells. The hippocampus works sort of like a mail processing centre, with everything coming in and then deciding where it is sent. So the hippocampus is not where memories are stored (because they are stored all over the brain), instead it is a processing centre that decides where and how information is stored in your brain. It also "cleans up" the memory a bit before it gets stored, removing unnecessary, non-essential bits. (But sometimes the clean-up doesn’t happen properly, click here to read about "lightbulb" or "flashbulb" memory.)

- **MAMILLARY BODY**: Helps to recall memories, especially smells. Other components of the limbic system are responsible for functions including hormone production and regulation of sleep, and will not be covered in this unit.

CEREBRAL CORTEX

The cerebral cortex (the outside bits) is the wrinkly looking outer bit of the brain where higher order thinking takes place (cortex is Latin for "tree bark" or "rind"). Both the left and right sides of the cerebral cortex can be broken down into 4 distinct areas or lobes:

- **FRONTAL (front) LOBE** is associated with: higher mental functions (such as reasoning, planning, thinking, problem solving, memory and emotions, judgment, creativity, parts of speech, movement, regulating the excesses of the emotional system, self-will), activating muscles, most of our working memory is located here, the part just behind the forehead is called the prefrontal cortex.

- **PARietal (top centre) LOBE** is associated with: physical sensations and movement, orientation, recognition, perception of stimuli, spatial orientation, also important for aspects of working memory.

- **TEMPORAL (side) LOBE** is associated with: hearing and sound and music, face and object recognition, memory, speech, also important for aspects of long-term memory.

- **OCCIPITAL (rear) LOBE** is associated with: vision and sight, visual processing.

Plasticity of the brain:

There was a time when scientists believed that the brain’s cells (neurons) and neural connections were fixed, and stopped changing, when the human body stopped growing after adolescence. They thought it only started to change again in the decline of old age. This would mean that intelligence was fixed. Whatever your mental ability was by the end of adolescence, that was about as smart as you could possibly get.

But here’s some good news! Today, it is known that our brains are constantly changing throughout our whole lives, every day and every hour, as new neural connections are being made every time we have a thought or feel an emotion. Further, the brain has the ability to rewire itself and, where damage has been caused, create new connections in order to keep the mind and body operating. Each new experience causes changes in the neural connections which means the brain slightly rewires its physical structure. This means you can build your brain and intelligence simply by using it.
MAKING MEMORIES

Making memories. The memory process is as follows:

- SENSES: Information comes in through your senses.

- SENT: The info is sent simultaneously to the thalamus for initial processing, to the cortex for further processing in short term memory and to the amygdala to decide what to do with the info long term.

- EMOTIONAL VALUE: The amygdala (part of the limbic system deep in the cerebrum) decides if the info is important to you based on the emotions attached to this info. If it seems to be an emergency, the amygdala immediately recruits other parts of the brain to help.

- EVALUATION: Based on how the amygdala has reacted about the importance of the info, and what sort of emotional tag it has labeled the memory with, the hippocampus then evaluates the tag and uses this to decide where (and if) to put the information for long-term storage.

- STORAGE: If the amygdala tells the hippocampus the info is worth remembering, the hippocampus will send the info back to the cortex (the outer layer of the cerebrum). The hippocampus has to keep track of where it sends the important bits of info so it can retrieve it again if needed. Over time the hippocampus will organise, distribute and connect the memories with the appropriate areas of the cortex for long-term storage. So most of our memories are well distributed throughout the cortex. Basically the hippocampus acts sort of like a switchboard connecting short term memory and long term memory, constantly communicating between the two.

- ORGANISATION: Once info has been deemed worth retaining and sent to the cortex by the hippocampus, the job of the cortex is to package the memory into a coherent whole. While the hippocampus might be able to access little pieces, for example, things you have rote learnt, the cortex finds patterns, integrates information and attempts to give structure to information. The frontal cortex organises the information into a chronological and meaningful story.

Think of it like a party. The amygdala are the emotional friends who insist on certain people either being invited or not invited. The hippocampus is the organiser of the guest list, the person that looks at these emotional requests from the amygdala friends and decides who is coming to the party (ie being sent to the cortex so they can be remembered) or who is off the guest list (ie not important info so forgotten). The cortex is the party planner, it's the smart one that will make sure the whole thing comes together.

Retrieving memories:

- HIPPOCAMPUS: When you try to remember something, the hippocampus kicks into gear. It is not a storage mechanism remember, it doesn't actually keep the memories, it is a super efficient assembly line that will go out and get the bits needed from the cortex and construct memories as required.

- SEARCH AND FIND: So when you try to remember something, the hippocampus goes looking for the pieces in the cortex that it needs to pull the memory together. It can't just go to one part of the cortex that is called "memories" unfortunately, because memory is not stored in one place.

- CONSTRUCT MEMORY: Instead it retrieves info from "convergence zones" all over the brain. Convergence zones are the areas physically near the brain cells (neurons) that first registered the events and most of these are well distributed throughout the cortex. The brain packages up all these bits and pieces to make the memory. So rather than saying that memories are retrieved, it is more accurate to say that memories are re-constructed as needed.

- LASTING MEMORY: This pattern of reconstruction is strengthened by repetition to form lasting memories. This is where the phrase "use it or lose it" comes from.
NEURONS: OUR BRAIN CELLS

Role of neurons:

- Your brain has 100 billion BRAIN CELLS which are called NEURONS.
- The cerebral cortex is rich in neurons, has a layer of neurons 4mm thick.
- Neurons are the key to your brain and memory. Each neuron may have up to 100 000 connections with other neurons. That's a million billion connections between cells.

The brain is really composed of two types of cells. "Neurons" which are nerve or brain cells (about 10% of cells in the brain) and “Glial” cells (about 90% of cells in the brain). Glial cells are really like glue (Glial is Latin for glue) that binds all the cells together although they do have a multi-faceted role. They used to be thought of as just support cells, filtering harmful substances out of the neurons, but now we know they may be equal to neurons in their capacity, function and importance. Neurons are the cells we are concerned with here as they are the body's communicators.

A NEURON (which is Greek for "sinew" or "bowstring") consists of:
- CELL BODY (soma)
- DENDRITES (which is Greek for "tree") which are like tentacles used to receive information from other neurons
- AXON (nerve fibre, Greek for "axis") where electrical signals travel down
- AXON TERMINALS which is where the axon transmits information to other neurons.

So a thought is really just a pathway through the brain passing through a whole heap of connected neurons. Each time that thought happens the connections between the neurons becomes stronger making the pathway more permanent and easier to recall the information later. This is why review and repetition are so important if you want to remember what you are studying.

"NEURONS THAT FIRE TOGETHER WIRE TOGETHER."

- Just think, when you have a simple thought like 'school' there is an explosion of neural circuits or pathways being activated as the brain finds all the associations and experiences you have which relate to school.
- Neurons don't just join up with another single neuron in one a big long line. A single neuron has many dendrites and many axon terminals, and thus can connect with many other neurons at the same time.
- So each time you have a new experience, a new thought or learn something new another connection is made.
- It is the connections between neurons that form the memory and provide the pathways for it to be retrieved. That's important to know, and worth repeating: it is the neuron CONNECTIONS that are the actual memory.
- The more neural connections there are, the stronger your memory is, and thus the more likely you are to be able to retrieve the information in this memory on demand.
- As you study, and repeatedly review the information you want to remember, new neuron connections are formed, and strengthen the memory.

To improve memory, you want to make as many neural connections to a piece of information, or an event, as you can. Every time you recall the information or event and refresh your memory, it creates new neural connections and further strengthens your memory. This is good for later memory retrieval, because your brain has lots more ways to access the information.

This is why we always encourage students to use a WIDE RANGE OF STUDY TECHNIQUES and lots of REPETITION. If they just use one or two techniques there are only a few paths in the brain to access the information. The more different study techniques you use (and the more often you do them) the more pathways in the brain to access or re-create the memory.
SHORT AND LONG TERM MEMORY

Sensory filter:
As we go about our day, a large percentage of information processed by our five senses is automatically filtered out. If the information becomes important to you to remember, it has more chance of getting through this filter. And if the information gets through this filter, it will make it into your short term memory.

Short term memory:

- When information first comes in through the senses the frontal lobes hold much of the data in short term memory for around 5-20 seconds before the brain decides what to do with the info (ie before the amygdala and hippocampus kick into gear).
- Short term memory has a limited capacity to handle around 5-7 items of information, for 5-20 seconds.
- Information in short term memory is easily lost (ie. forgotten) due to distractions such as conversation or moving your attention away from the information to something different, such as the song that’s just started on the radio.
- Short term memory is like an inbox for the brain before you decide whether to move it to long term memory (which is more like a filing cabinet).
- You may also find it difficult to keep information in your short term memory if you’re tired or stressed.
- Short term memory is sometimes called your working memory, because it may hold information temporarily in order to complete a particular task, such as solving a problem.
- Short term memories are stored in the frontal lobe and parietal lobe (refer back to earlier diagram) of the forebrain, or cerebrum.
- Short term memory includes immediate memory and working memory. Immediate memory is like a clipboard where we put info briefly before deciding what to do with it. Working memory is like a work table, a space of limited capacity where we can rework ideas briefly before sending them off for storage.
- In 1956 psychologist George Miller published a paper ‘The magical number 7, plus or minus 2’. He showed that working memory can only handle a certain number of items at once. In pre-school you can only deal with about 2 items at once but this increases up to 5-9 items.

Moving info from short term memory to long term memory:
So once the info has made it through the sensory filter of the brain (remember the role of the amygdala and the hippocampus?) and into short term memory then two things can happen.
1. Either you forget the information so it just fades away.
2. Or it is moved to your long term memory.

More on this later, but information is more likely to be moved to your long term memory in the following situations:

- INTEREST LEVEL: If you are interested in what you are learning you find it easier to retain the information. Notice how people with a hobby or passion never have any problems remembering every little detail about it, or how subjects you like or are interested in are easier to study for. When you can try and relate what you are learning to your own personal life.
- EMOTION: If the emotion created by the learning experience is strong enough to make an impact on you the brain marks this as important stuff that must not be forgotten so it is pushed to long term memory. That is why anything that generates a strong reaction tends to stay with you. Always try and think about your feelings and emotions about what you are learning.
- **ENJOYMENT:** If you are enjoying what you are learning, again the brain flags this as worthwhile stuff.
- **UNUSUAL:** If the information is quirky or unusual, the brain tends to think it is important to retain it.
- **INTENTION:** So what happens if you are doing a subject at school that you aren't really interested in, that doesn't provoke any strong reactions in you and that you don't enjoy? Let's be realistic, not everyone loves every single subject! Well the good news is that despite all of this, if you have a strong intention or desire to remember something it is more likely to become part of your long term memory than to be forgotten. So if you say to yourself 'well I don't like this subject but I still want to get a decent overall mark so I want to do well in it' this is the sort of attitude that will help you retain the information. If you say 'I hate this subject and I don't care', well you are in charge and your brain will take you literally and not bother retaining the information!

**So the key thing for you to remember about moving info towards long term memory is:**

*To try and find ways to make what you are learning INTERESTING to you, EMOTIONAL, ENJOYABLE and if you can't do this then at least create the firm INTENTION to remember the information.*

**Long term memory:**

Long term memory can be broken down as follows:

**CONSCIOUS MEMORY**

Conscious (or Declarative, or Explicit) Memory - these are memories that you consciously need to think about in order to recall.

- **EPISODIC MEMORY:** These are episodes or events from your life, which you personally experienced. It could be locations, events or circumstances. For example, your 21st birthday party, a wedding that you attended, a family holiday you enjoyed. This type of memory forms quickly without any effort on your part, is easily updated and happens naturally for everyone. Episodic memories are stored in the frontal lobe and temporal lobe (see earlier diagrams) of the forebrain, or cerebrum.

- **SEMANTIC MEMORY:** These are detached facts and general knowledge, not related to you personally. For example, facts and dates relating to European settlement of Australia, words, symbols, textbook and school facts. This type of memory is usually derived from reading and studying, rote learning and repetition. This type of memory does not form as naturally as episodic memory, instead it requires practice and effort. Semantic memories are stored in the frontal lobe and temporal lobe (see earlier diagrams) of the forebrain, or cerebrum.

**NON-CONSCIOUS MEMORY**

Non-Conscious (or Non-Declarative, or Implicit) Memory - these are memories of skills and knowledge that you access subconsciously and apply without thinking about it.

- **PROCEDURAL MEMORY:** These are skills or learned actions that you just know how to do without even thinking about it. For example, how to ride a bike, how to jump a skipping rope. Procedural memories are stored in the cerebellum (see earlier diagrams), which is part of the hindbrain.

- **EMOTIONAL CONDITIONING AND BELIEFS:** Each of us has unique beliefs that are part of our implicit memory, and affect us unconsciously, without our awareness, even though we may have no idea how they came to exist.
ENCODING, STORING AND RETRIEVING MEMORIES

So far we've covered how the brain works, and how different parts of the brain are involved with different types of memories, according to the senses involved or whether the memory is conscious (episodic or semantic) or non-conscious (procedural).

We've also looked at what is happening at a cellular level when a memory is processed, but how can we more easily access the information in our long-term memory when we want to?

There are three stages of the memory process that we can influence. If anything goes wrong at any stage, the result is that the information will be lost, and you will forget it.

The three stages are:
- ENCODING
- STORING
- RETRIEVING

Importantly, there are strategies you can use to create optimal conditions at each stage of the process, to strengthen the memory and increase the likelihood that you'll be able to retrieve it when you wish.

STAGE 1: ENCODING MEMORIES

To create a memory, the first step is for information to be encoded or processed by the brain.

The short-term memory can only handle 5-7 items of information. So in order for a piece of information to have a chance to become a long-term memory, it must be strong enough to create an impact on you so the brain sends it off to be stored. For example, if the information is unusual, or funny, or is of an emotional nature, or simply because you've designated that the information is important to you.

Strategies for improving the encoding process:

CONCENTRATION AND FOCUS:

The most obvious tip is to be alert and pay attention to the details of things you want to remember. You won't be able to recall information if it doesn't make it through the first step of the memory process. Some things you can try:

- Make notes.
- Learn using your learning style.
- Study in an area free of distractions; consider the location before you start.
- Become aware of your body’s biorhythms, and the times when you’re most alert.
- Before you begin to study, you spend a few minutes to take some slow, deep breaths and put yourself in a more relaxed mode.
- Before you start a study session, you set an intention that you will concentrate for the next 45 minutes.
- Get regular exercise. Physical exercise each day has also been found to keep you mentally alert, as it improves circulation of oxygen.
- Only listen to the type of music that helps the brain. Music may enhance your concentration and improve results. Studies have shown that the ideal music for learning and studying is music with a slow tempo of just sixty beats per minute (BPM). For example, classical music from the Baroque period, by composers such as Bach, Vivaldi or Handel.

ORGANISATION OF MATERIAL:

If you are learning new material, organise it in such a way to enable your brain to process it more easily.

- Use lists and bullet points to summarise large amounts of information.
• Use a coloured highlighter to mark the key points – the colour will pull your eye to that place on the page.
• Categorise the information in a relevant way, such as in alphabetical order.
• Group information together to create chunks of data, instead of having large numbers of individual points. This is covered in more detail in the next section.
• Use your imagination to create symbols or images to engage the right side of the brain. If you can incorporate both logic and imagination in your study, you create more pathways (ie. neuron connections) for the brain to later access the information.
• There are several memory techniques that involve the imagination, and these will be covered in detail in a later section. Examples include acrostics, rhymes, the story method, the method of loci (sometimes called the mental journey), and mind mapping.

ASSOCIATIONS AND LINKS:

Your brain will automatically try and create its own associations and links between information, and file it together accordingly.

• You can actively create associations or links for the brain to process information more easily. In fact, this is a common technique in remembering the names of people when you meet them for the first time.
• You can also apply this information about the brain making associations for when you are learning or studying new material.
• If you are reading reports or book chapters, read the synopsis/summary and conclusions first. This gives your brain an overview of the information you’re about to read, and it can start thinking about associations. Also, reading the overview first will help you link information together as you read it.
• Try and associate what you are learning to anything else related to it that you have studied previously.

STAGE 2: STORING MEMORIES

Storage of memories occurs on a subconscious level. The hippocampus, which is part of the brain’s limbic system (see earlier diagrams), is responsible for converting short-term memories into long-term memories, and storing them.

Strategies for improving the storage process:

TAKE SHORT STUDY PERIODS AND SHORT BREAKS:

It’s been proven that regular short study periods of 15-45 minutes, broken up by short study breaks of 5-10 minutes, are a very effective way of learning. The regular breaks allow the brain to continue to make associations and links between new information and information already stored in the brain, even when you’ve stopped studying. Regular short breaks also give you a mental break and allow you to physically relax between study periods, so that you typically feel refreshed and ready to start anew.

CHUNK DOWN INFO:

Chunking is when a lot of individual facts and information are grouped together in chunks that the brain can process more easily. Chunking is a very useful technique in improving memory.

GET ENOUGH SLEEP:

It is believed that sleep plays an important role in the consolidation of memories of the day’s events, especially when new information and/or new tasks have been learned during that day. During sleep the brain does “housekeeping” it rearranges neural pathways, cleans up memories and processes emotional events.
Further, it's possible that Rapid Eye Movement (REM) sleep is what triggers the hippocampus to direct storage of long-term memories. Getting a good night's sleep suddenly becomes more important – especially for students. Find out more about the importance of sleep in the Lifestyle and Balance unit.

**REVIEW MATERIAL FREQUENTLY:**

It is the connections between neurons that form the memory and provide the pathways for it to be retrieved. As you repeatedly review the information you want to remember, existing neuron connections are strengthened, and new connections are created – and thus the memory becomes stronger. Find out more about review and repetition below.

**REPETITION TECHNIQUES**

It is significantly more effective to learn material over a period of time, than to cram at the last minute. Different studies have shown the impact of forgetting information over time, if no effort is made to review it on a periodic basis. It takes a relatively small amount of time to review the information over a period of a few days, but the pay-off will be huge, and you'll retain a high percentage of the material.

**STAGE 3: RETRIEVING MEMORIES**

Assuming the memory encoding and storage processes have been successful, the final step is the ability to retrieve the memory at will.

But remember the “Garbage In, Garbage Out” example – if there has been any sloppiness in the first two stages, it will not be possible to retrieve a “correct” memory of the required information. And the better you do the first two stages, the easier it will be to retrieve the memory.

When you try to remember something, what happens is the brain goes searching to retrieve all the parts and re-create the memory.

**Strategies for improving the retrieving process in a test or exam:**

**SKIM THROUGH EXAM PAPERS BEFORE PICKING UP YOUR PEN**

This technique is to skim through the entire exam paper before you start – this is to ‘cue’ your brain as to what information you will need to access, and allow the brain to start associating information in the background, so it’s readily available when you need to answer each question.

**ANSWER EXAM QUESTIONS BEFORE MULTIPLE CHOICE QUESTIONS**

This tip is useful for exams that are structured with say 20 multiple choice questions, followed by several long answer/essay questions. If you’re allowed to answer the questions in any order, choose your best essay question, where you’re confident that you know the material very well. When you’re finished the first essay, then return to the multiple choice questions. By now, you’ll be ‘warmed up’ and your brain will have the information on this subject all cued and ready to be recalled. You will be surprised at how quickly and confidently you can move through the multiple choice questions. Then return to your final essays.

**DEAL WITH MENTAL BLANKS**

The key is to not become stressed or upset about it – that will make it worse, and only delay the information in coming to you. Try and relax, and move on to the next question – let your brain work in the background at following the neuron pathways, and chances are the information will suddenly pop into your head while you’re answering other questions.
TECHNIQUES FOR IMPROVING MEMORY

1. ACROSTICS

This method is useful for remembering a list of items, whether in a random or particular order. You take the first letter of each word you want to remember, and try to make up a sentence of words starting with these letters.

For example, to remember all the planets in our solar system, in order, starting from the planet closest to the sun:
The order of planets is: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto (we'll include Pluto in this exercise, although it has recently been reclassified and downgraded from a 'regular' planet to a 'dwarf' planet).
Using the initials of each planet, the following acrostic sentence is created:
My View Eventually Might Just See Up Near Pluto

2. CHUNKING INFORMATION

Chunking is simply grouping data together to create a block of information that the brain can more easily digest and remember.

Chunking allows the brain to remember more information, more easily. In the telephone number example above, your brain is not remembering 9 individual pieces of information – instead, it's only remembering 3 pieces of information, as it treats the group of '0583' as a single item, instead of four.

3. RHYMES

If you love music, or are a high auditory learner (ie. one who learns effectively by listening), it may be fun to make up a rhyme to the beat of your favourite song. Using the beat to a catchy jingle can work just as well – for example, set your words to the tune of 'row, row, row your boat'.

4. REMEMBERING NUMBERS

This system is based on creating an image for each digit based on the shape of the written digit. You can choose whichever images work best for you. For example: 0 an egg, or ball, or sun, or ring

Once you’ve chosen and memorised a single symbol for each of these digits, you can substitute them in place of numbers, and use the symbols to tell a story that is memorable.

5. THE STORY METHOD

Your imagination is a powerful tool, and has the ability to create vivid and colourful images and stories, with unusual and absurd characters and actions. Such stories are infinitely more memorable than bland, boring tales. And so you can create such a story to remember information.

6. METHOD OF LOCI OR MENTAL JOURNEY

This next method takes the Story Method from the previous section one step further. In the Method of Locci, you'll use a set of locations that you decide in advance, and use these as a framework for your imagination to create a vivid image at each point to remember the information. What you do is imagine placing a piece of information at each stage of the journey (so it needs to be a journey you know well, like walking to school or around your house). Then when you mentally walk through that journey, you 'pick up' each piece of information along the way. Roman orators used to use this to help them remember speeches.
MIND MAPS

A mind map is an expression of an idea, which is visually represented in the same way that the brain works with ideas branching out from a central theme, and connecting with others. Our cortex is really good at detecting and creating patterns of meaning, so presenting information to the brain in this way (through a mind map) makes it easier for the cortex to process.

Mind mapping involves the whole brain:

It uses the left brain by:

- using key words to express ideas
- allowing order and analysis
- grouping ideas
- structured approach

It uses the right brain by:

- using images, symbols, curved lines and colour
- seeing the big picture, and how different items relate to each other
- encouraging creativity and artistry

Hints for mind mapping:

- Draw an image or symbol of your initial idea/topic in the middle of the page (landscape orientation).
- Use single key words to add main branches to your central idea, which will then break into sub-branches as other ideas occur to you.
- Use curved lines that are only as long as each key word. The main branch lines will be thicker than the sub-branch lines.
- Use lots of colour and shapes/symbols/images, to engage your right brain.
- For more about creating a mind map visit the Summarising Unit.

Mind maps can be used by:

- Businesses - to map processes, and brainstorm new ideas.
- Students - to organise material for studying. For example, you could mind map each topic in a subject, such as biology. Each branch of the mind map represents a chunk of information associated with the central theme.
- And we already know from an earlier section that the mind likes you to chunk things down so it can process and remember them more easily.
- With both sides of the brain being engaged, you are more likely to remember the mind map and recall the information at a later stage.
- Anyone preparing for a speech, or presentation.
BARRIERS TO DEVELOPING A GOOD MEMORY

1. NEGATIVE MINDSET / ATTITUDE

Henry Ford once famously said, “whether you believe you can, or you can't, you are right”. This refers to your mindset or mental attitude, and the concept that your mind is powerful enough to enable your thoughts to create your reality.

In other words, what you think or say about yourself has the potential to become true. This is great news if you talk yourself up… but not so good news if you tend to put yourself down.

If you have a negative attitude to your memory, it will likely reduce your chance of developing and maintaining a good memory. Further, if you expect your memory to worsen as you get older, it will.

If you regularly express negative thoughts about yourself in general (ie. your looks, your weight, your worthiness, your intelligence), and are ready to change this, there are many resources available. Any library or bookstore will have a positive psychology (or ‘self-help’) section, and there are hundreds of great books that will help you to think more positively about yourself. Learning to feel good about yourself is the greatest gift you can give to you.

If you have negative thoughts about yourself with regards to your memory, there are some simple steps you can take to start making some changes.

Firstly, be aware that these thoughts are just a habit. And habits can be changed – although it does take a little effort.

Awareness is the key to changing a habit, as you need to consciously be aware of the current habit before you can change it – so start catching yourself in the act of making these statements.

But don’t beat yourself up when you catch yourself – it’s simply a habit, and you won’t change overnight. Instead, congratulate yourself for becoming aware, and affirm that it’s your intention to improve the way you think. Then correct the negative statement you just made, and make it into a more positive one.

2. ABSENTMINDEDNESS / NOT PAYING ATTENTION

The first stage of the memory process is encoding the information that is to be remembered – thus the brain uses the senses and emotions to process the information, and form a memory.

You may be familiar with the saying, "garbage in, garbage out" which, whilst coined in terms of computer programming, is also appropriate when referring to the memory. That is, if you don’t pay attention to details, and thus don’t encode data with accuracy [garbage in], then you have no hope of later retrieving the true details [garbage out].

Here are some ways in which you can be less absentminded:

- Setting an intention to become more attentive.
- Practising noticing details – making it a game. For example, study a particular scene, and find five unusual things about it, or ten things you like about it.
- Sitting up the front where there are less things to distract you, especially if you have difficulty paying attention in class or lectures.
- Taking notes in class to ensure you listen.
3. STRESS / ANXIETY

Stress and anxiety can impact memory detrimentally in several ways.

Encoding process: Stress will increase the likelihood of being distracted, resulting in low concentration. This means that information may not be encoded accurately – and thus cannot be later retrieved.

Retrieval process: Stress may result in mental blanks. For example, if you’re stressed before an exam, you may not be able to think clearly and access the information you need. The best thing to do is to take ten deep breaths and calm down to allow your mind to focus.

4. DEHYDRATION / FATIGUE

The cells of your body require water to function effectively.

Ideally, adults should drink around 8 glasses (2 litres) of water a day, to replace fluids lost through urine and sweat. Dehydration may result in problems with short-term memory – as well as other health issues. Also, it causes you to lose concentration and focus – which, as we now know, is critical to encoding information accurately in our memory, so it may be later retrieved.

Fatigue, or tiredness, may also result in problems with short-term memory and loss of concentration.

Interestingly, dehydration is a common source of fatigue – so drinking lots of water may fix several problems at the same time.

5. DEPRESSION

Depression is more than just a low mood swing; it is a debilitating disease, and affects sufferers mentally, physically and emotionally. Sufferers feel a sense of helplessness, low self-worth, and unhappiness. As a result, there is often little motivation to eat well, and exercise, and sickness may result.

Other side effects of depression may be sleeping difficulties, tiredness, and difficulty concentrating. Not surprisingly, people who are depressed often have poor short-term memories.

If you are depressed, or think you may be (but are not sure), the non-profit organisation Beyond Blue (www.beyondblue.org.au) provides a range of resources that may help you. The best thing you can do if you are depressed is to talk to someone you trust who can help you find help - a parent, teacher, doctor, school counsellor.

6. SUBSTANCE ABUSE - DRUGS / ALCOHOL

Many drugs act on the body in different ways – however it’s clear that harmful drugs disrupt normal communication between the neurons in the brain, which effectively form memories – not to mention a whole range of other important tasks to ensure the body functions properly.

Further, drugs create an artificial state of mind, and users cannot encode accurate memories – and thus cannot later retrieve them.

If a person drinks too much alcohol, they become intoxicated, and their mental abilities are impaired. Too much alcohol in the brain will also disrupt normal communication between the neurons.

For example, a person who is drunk may not be able to walk properly because the brain’s neurons cannot successfully send signals to the body’s muscles and limbs, telling them to walk upright. In such a state, it’s pretty clear that a person who is intoxicated will not be able to encode information in an accurate way – and thus their memory will be affected.