CREATIVE MEMORY

MIND DEVELOPMENT COURSE 6

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With Foreword & Appendices by Gregory Mitchell

https://mind-development.eu

The key to unlocking your personal genius is your incredible memory
Your personality, identity, what you do, what you say, your thoughts, feelings, knowledge and experience are all a function of your ability to remember. Yet for many of us, our minds are like a sieve and life passes us by - we miss the chance to develop our mind and accomplish more in life because our memory is letting us down. Yet our memory is capable of great things; it has simply not yet been trained properly.

Whether you have a poor or even a good memory, you will be astounded at the benefits that memory development with the Creative Memory course will have on your personal and professional life. Imagine having powerful memory skills that enable you to…

- Master the art of public speaking by memorizing your entire speech with ease
- Enhance your ability to concentrate and pay attention
- Remember the names of people introduced to you
- Improve your knowledge and skills of your job
- Become better at planning and organization
- Get more done by always remembering what you intended to do
- Remember stories and jokes, the books you have enjoyed and all you learned from them
- Save huge amounts of time from not having to look things up that you already 'know.'
- Enhance your interests and hobbies by quickly building a large fund of knowledge on the subject
- Never again forget the birthdays or anniversaries of your family and friends
- Impress friends, family and work colleagues by always being on the ball with the facts at your fingertips
- Improve your visualization skills and imagination, and be better able to create new ideas from your wider knowledge base
- Cut your study time by 50% or more and pass exams without effort
- Walk into any situation having the confidence that you will remember the event
- Increase your vocabulary, and learn foreign languages much more easily
- Dramatically boost your self-confidence and your intelligence!

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Foreword - by Gregory Mitchell

Does the world really need another memory course? I think maybe it does. I have taught a memory course several dozen times, using several different textbooks. The fact that I have used so many different texts reflects two things: currently available books on memory are at the same time satisfying and a bit wanting. All the books I have used have their strengths: discussion of principles, currency, real world examples and applications, good organization and student-friendly writing. The problem is, these texts all tend to be strong in two or three of these areas and not as strong in the other two or three. In this new course I am shooting for more.

As will be described in more detail in the course, Creative Memory, the effective methods for training memory have roots going back to ancient times. More advanced systems using memory codes themselves date back several hundred years. This is because the principles of memory training simply reflect the neural processes of the brain, which haven't changed. To remember some new information, we make associations with existing information stored in our Long-Term Memory. If we don't do that, the new information is quickly forgotten. The way we make those associations, however, can be improved. We need to access the normally under-used powers of the right brain.

In most civilized societies the development of language centers in the left hemisphere of the brain will produce dominance on that side, while spatial, visual and intuitive problem-solving skills, which are based on right-hemisphere relational processes, will be underdeveloped.

Though a highly developed memory and intuitive skills are not essential for life in modern society, they were important survival skills for primitive man who had no reference books to look up when he forgot something, no maps to guide him on long journeys, and was often in perilous situations where intuitive insight made the difference between life and death. To further evolve, we need to reclaim this heritage, which depends on the restoration and integration of our right-brain processes.

You will learn advanced memory techniques in Creative Memory that utilize the special powers of the right brain and left brain in synchronization. By applying various kinds of Memory Systems and Advanced Mnemonic Systems appropriate to the task in hand, and practicing them until they become second nature in your daily life, your original heritage of whole brain utilization can be recovered. This will enable you to "file away" any new piece of information in such a way that it is readily accessible for immediate future access. You were born with these abilities but were not trained to use them, hence they were unexploited and lay dormant; but now, with the techniques taught on this course, you can put the full potential power of your brain to good use.

The Importance of Memory

A good memory is truly important for anyone to possess. Your memory of faces, names, facts, information, dates, events, circumstances and other things concerning your everyday life is the measure of your ability to prevail in today's fast-paced, information-dependent society. With a good memory, you don't have to fear forgetting/misplacing important ideas and you are much better equipped to achieve success in your career and personal life.

Your memory is composed of complicated neural connections in your brain which are capable of holding incredible amounts of data. The ability of your mind to retain past experiences in a highly organized manner gives you the potential to learn and create new ideas of your own. Your experiences are the stepping stones to greater accomplishments and at the same time your guides and protectors from danger. If your memory serves you well in this respect, you are saved the agony of repeating the mistakes of the past. By remembering crucial lessons and circumstances, you avoid the mistakes and failures made by other people.

Unless you have an illness or handicap, a poor memory is often attributed to lack of attention or concentration, insufficient listening skills, and other inherent bad habits; however, it can be honed and developed using the right methods.

Many people believe that their memory gets worse as they get older. This is true only for those who do not use their memory properly. Memory is like a muscle - the more it is used, the better it gets. The more it is neglected, the worse it gets. This is the reason why older people have more trouble remembering than younger ones. However, people increasing in age can overcome this dilemma and can even further improve their memory by continuing their education, by refining their minds, by keeping themselves open to new experiences, and by keeping their imagination working. And especially: undertake a comprehensive memory training, such as this Creative Memory course.

An important factor to realize is that different people have various ways of learning. The way in which people learn is often a factor determining the subjects they choose to study, instructors they relate to, and careers they select. Memorization or retention of data operates by loading images, sounds, taste, smell, and sensation (touch) in a very organized and meaningful combination in our brain. There are various types of memory:

Short-Term Memory (STM) is characterized by 20 to 30 seconds of retention, involves a limited amount of information, and is necessary in traditional processing of experiences and ordinary data gathering (everyday sensation and perception). An image such as a picture in a magazine is held in the mind - i.e. in working memory - long enough for you to be able to recognize if you have a copy of it on your computer, for example. The image will be quickly replaced by another sensory memory unless you do something to retain it.

Medium-Term Memory (MTM) contains information, ideas and concepts with which we are working at the moment. This information may be held in the mind for an hour or two or up to several days. It may be held even longer in memory if it is continually referred to, and it may become familiar enough to be part of our permanent or Long-Term Memory. Alternatively our attention may move on and it may not be considered necessary information to hold in the conscious mind, though the traces of it remain and we may be easily reminded of it.

Long-Term Memory (LTM) involves consolidation and organization of complex knowledge and information for further reference and other cognitive (mental) processing such as the application of our understanding in work, study and play. Basic examples of information held in LTM would include your birthday, your father's name, and your home's appearance; however a developed and educated mind will have a vast storehouse of catalogued information, a knowledge network rather like the Internet, with which new ideas may be compared, related and better understood.

Long-Term Working Memory (LTWM) takes account of the large demands on working memory during text comprehension and expert performance in specific domains such as mental calculation, medical diagnosis and chess. In skilled activities, acquired memory skills allow the relevant contents of Long-Term Memory to be kept directly accessible.

Practices for developing your faculty of memory are concerned with how you continually organize data that are stored in your brain. In short, human memory is like a vast and complicated yet organized library, rather than a trash can or disordered store room. We will offer many ideas for making your retention practices more efficient and sharper.

Four types of remembering

Both knowledge and wisdom imply the ability to make use of past experience. When one studies the nature of learning it is found to be involved with remembering. We think and reason largely with remembered facts. We derive knowledge of ourselves and those around us from the continuity of both self-perceptions and objective experience which can be recalled to our consciousness. In this way man is able to deal with a concept of time as no other animal has yet been found able to, relating present to past and making predictions about the future - all this depends on the availability of our memories.

To remember means to keep in mind or to recall to mind. The recall of an event and the circumstances surrounding it depends upon using clues, or souvenirs, which remind one of a total experience. A few notes of a song will recall the whole memory, not only of the song, but also the pleasant events of the holiday when you first heard it. Particular words we hear stir up associations with our past life. A vast reconstruction of a past occasion, part of your personal autobiography, can result from quite such a simple stimuli.

Many traces of earlier experience lack this quality for reconstruction of the past. That is, they are not associative. For example, you may recall a poem as you recite it, even if you do not recall the circumstances under which you first memorized it. You can remember how to drive a car, ride a bicycle, or walk upstairs, without direct reference to the past.

A third kind remembering is by recognizing someone or something as familiar. One sees a picture and remembers that it is by a famous artist, though his name may elude you. A face in a crowd is suddenly familiar, but you don't recall the circumstances when you met this person last.

Finally you may find that you can re-learning something that you learned in the distant past, much more rapidly than you could if there were no retention of that previous learning.

Thus we have four types of remembering:

1 Remembering from souvenirs;

2 Recall by recitation, or performance;

3 Remembering by recognition;

4 Relearning more rapidly.

Let us examine the components of these type of memory. We shall see that both hemispheres of the brain are involved in various ways.

Studies have been carried out under hypnosis which show, for example, that a person prompted under powerful suggestion to bring back childhood experiences will do so more accurately than in the conscious, waking state. Extra details, such as the names of children in a class, details of the lessons and the names of teachers could be verified. This kind of study tends to prove the possibility of total recall from souvenirs if there is sufficient incentive. Similar detailed recall has also occurred during brain surgery when electrodes were placed in various parts of the temporal lobes of the brain.

In psychotherapy the recall of childhood memories can often be the basis for treatment and cure. The problem of childhood amnesia is difficult to understand, since at that time the child is having many new and exciting experiences. One explanation for this forgetting is that the child perceives the world so differently from the adult that the mature person's efforts to recall what seemed normal for the child fails because there is no logical connection of souvenirs with memories. This suggests that the adult storage of memory is related mainly to the development of linguistic ability. The souvenirs then used are words, and we have to put things into words to recall them. That for which there is no word is forgotten - and this relates to most of the emotions and body sensations one felt as a child.

Another theory relating to the loss of childhood memories is that it results from unbalanced activity between the hemispheres of the brain - that the brain

hemisphere which is under-used, the left one in the case of the child, emits a kind of electrical interference due to its boredom. This interference prevents the transfer of short-term memory into its long-term counterpart. The same thing can happen to an adult if the right brain is under-used.

There is another important factor which may make it difficult for an adult to access the memories of early childhood. The dominant brain wave activity of children under the age of six is in the four to eight hertz range associated with Theta in adults, the state of consciousness that an adult enters just prior to sleep. However, normal waking consciousness for an adult, who has a more developed brain, is dominated by the higher frequencies of the Beta state. It is therefore only possible for the adult to access the majority of childhood memories when in a controlled dream-like state, such as the reverie of hypnosis.

As regards the second type of recall by recitation, or the skillful performance of an action, this suggests a program in the brain that has developed as a result of frequent practice or over-learning. It becomes something we can now do without thinking, as a second nature.

Remembering by recognition is a common experience and takes place automatically and instantly, most commonly with images. It implies that we have access to a very extensive picture memory, but is largely an unconscious right-brain function - we may see a face and recognize it but it was not a face we would have been able to consciously recall had we not been reminded. Similarly, smell, taste, sound and music may be recognized.

The left-brain recognition of ideas is a more conscious function and not so automatic. But still, it has an unconscious component. Tests have shown that certain material which has been previously learned, even though it now appears to be completely forgotten, is in fact easier to re-learn a second time.

Sometimes we can learn something about memory by studying the ways in which we forget things. All of us have been in the situation where we were certain that we knew a particular name or word and yet were unable to recall it immediately. The word we wanted seemed to be 'on the tip of the tongue', and one feels in a state of torment until we have dredged through our memory and recalled it. In relation to this 'tip of the tongue' phenomenon it has been found that the words which came to mind when searching for our target word do have certain characteristics in common. Some would be similar in meaning, some have the same first letter, or the same stressed syllable. Thus it is apparent that recall in this case is not an all or nothing process, but we do not feel satisfaction until we consciously know the whole word.

This process of course has a parallel in the use of a computer, where a certain key word is required to recall a file from memory. The word must be correctly spelled before the file will open. As we get older, certain of these key words are lost to our physical computer memory due to random cell death. Along with the word we

perhaps lose access to certain associated memory files, so it is necessary for us to forge a new neural pathway to the word associations. The brain will go on looking for our lost word by other routes and finally the desired word springs into our mind perhaps an hour later. This illustrates the immense capacity and resilience of the physical brain.

The Stages of Mastery

Learning to master a new skill requires the following progressive stages:

1. Novice - Unconscious incompetence
The novice is blissfully ignorant of all that there is to learn in the subject. Initially, he is not conscious of the fact that he is as yet incompetent in the skills involved. This is usually a short stage if the person is motivated to learn the subject.

The advanced beginner has realized his ability is limited and that he therefore needs to practice to improve his skills. He is now conscious of what he doesn't know and what he needs to know. Often this means not succeeding straight away but rather, learning from one's mistakes in order to acquire an acceptable performance level. He can do OK when the situation matches previous examples, but still has much to learn in order to deal with novel situations. After a few days of formal training, it may take several months to acquire conscious competence.

3. Competent - Conscious competence
New skills and capabilities are being internalized with the ability to go beyond rule-bound procedures. When we know that we have acquired a skill, then we have become consciously competent. Our confidence increases with our ability, but we still have to concentrate on what we know. This stage may last over a year, with ongoing progress.

4. Proficient - Easygoing competence
Proficiency is gained from experience in diverse situations. Tools and concepts have been internalized and can be applied in a variety of situations without effort. The person has an intuitive, holistic grasp of each situation without having to take the components apart piece by piece, prior to determining a solution. Acquiring this degree of skills may take a year or several years.

5. Expert - Unconscious competence
Finally, the skills are fully internalized and they become habits - we can then do them while our mind is on other things. We have reached the expert stage of unconscious competence, which usually requires several years of practice and ongoing learning. Our confidence and ability have peaked to the degree that applying our expert skills is effortless and not even any longer a conscious matter.

6. Originator - Creative mastery
The expert may progress further, to become an originator in his field. He knows how to break the rules creatively and to discover new practical techniques. He may be capable of going further still, to make a paradigm shift in his own mind that

results in expanding the domain of expertise into new areas and directions, both in theory and practice, which effects the work of all the other practitioners in the field. By and large, a person is not capable of this degree of creativity until he or she has a degree level of education in the subject and has been immersed in the domain at work for seven to ten years.

Note that the time it takes to progress through each stage of mastery may be dramatically reduced through the practice of Mind Development skills, learned in the range of courses we offer. If these MD skills are mastered, with sufficient understanding and a great deal of practice, then all further life skills and new domains of expertise become far more accessible.

Memory Systems

What is a memory system? It is a short cut to remembering. Usually it is built upon a principle of association of ideas. You simply associate new and perhaps abstract information with something familiar to you. Then, by recalling the familiar item, you automatically bring the obscure one back into focus.

Most of the systems for training memory are as old as civilization itself, though many improvements have, of course, been introduced from time to time. Through the use of mnemonics technology (mnemonic devices for assisting the memory) in conjunction with a couple or three years of part-time study, we can gain the sort of data-base enjoyed by our forefathers, in an expanded and modern context, and along with it a greater sense of certainty and a greater security in our identity.

The key is the use of visual images in an ordered, spatial arrangement that relate to the abstract ideas and enable us to remember them. Human memory recalls concrete images far more easily than abstract ideas, especially images with an emotional charge, and it remembers an ordered chain of associations more accurately than a random assortment. By the use of mnemonics - using chains of association to connect one memory with another - new information is encoded in such a way that it is connected to previously stored data, such that it is not easily forgotten.

The wider the existing knowledge net, the easier it is to find such useful connections, so the process is cumulative and accelerating. However modern mnemonics technology works so much better than the old ways of rote memorization, that even a little experience with these techniques can make a startling difference. One is on the way to acquiring an excellent memory.

Creative Memory

Creative thought could not exist without memory. Though creativity is usually thought of as a spontaneous, original response, the ability to remember one's past experience is necessary - we use this as a springboard for new potentials! Without a clear understanding of what is already known, how would you know when you've

discovered something original? Both problem solving and artistic inspiration depend on remembered experience as basis for new creation.

As Mary Carruthers wrote in ‘The Craft of Thought’ 2000:

> Thus the orator’s ‘art of memory’ was not an art of recitation and reiteration but an art of invention, an art that made it possible for a person to act completely within the ‘arena’ of debate (a favorite commonplace), to respond to interruptions and questions, or to dilate upon the ideas that momentarily occurred to him, without becoming hopelessly distracted, or losing his place in the scheme of his basic speech. That was the elementary good of having an ‘artificial memory’.

By the use of memory systems, such as the Method of Loci, a person could create a form of Long Term Working Memory called a Memory Palace, with a capacity of 50 to 60 memories or Key Words. These ideas could be juxtaposed and permutated until, as Arthur Koestler said, through a process he called ‘bi-association,’ an insight or creative idea would arise, which in turn could be captured, then linked to a Loci in his Memory Palace. A person using a memory system could see as many as ten ideas at once, whereas, within the limited capacity of Short Term Working Memory he could only, at best, see five items with his mind's eye. Ideas that would fade in less than twenty seconds, if his attention was taken away because of some distraction.

This is why we call this course “Creative Memory,” presenting the very best techniques for acquiring a rich knowledge net that will transform your life. But it's more than that...

This memory course, if properly done, induces an altered and enhanced state of consciousness. The right brain becomes more dominant, there is access to the newly trained associative mode of thinking and divergent thinking starts to play a major role as a mental process; mnemonics require inventiveness. Increased right brain dominance facilitates visualization, an associative mode of thinking is more conducive to intuition, and divergent thinking is one of the corner stones of creativity.

Students experience an altered state of consciousness, because they have developed a Long-Term Working Memory. Have you ever observed a top, solo violinist when he is performing? He seems to enter another world and the score is effortlessly at his fingertips. We could say that any type of expert who has developed a Long-Term Working Memory operates in this altered state of consciousness in their particular domain. Here we go further to develop that altered state in a broader domain, that of the individual's entire knowledge network.

Without memory there is no knowledge, without knowledge there is no certainty and without certainty there is no will. To further evolve, we need to restore and reintegrate our mental processes of expert memorization.

1. Introduction to the Course

This is a home-study course for developing a perfect memory. You will learn how to remember anything quickly and easily!

No one forgets anything. We remember everything, but we cannot RECALL everything. These techniques show you how to recall anything with very little effort.

The results that can be achieved through Creative Memory sound fantastic, yet these remarkable effects are true and can be attained by anyone.

Creative Memory can:

- Give you a miraculous memory
- Improve your concentration, meditation and visualization
- Augment your intelligence
- Improve your health and longevity
- Improve your social life and help you on the road to enlightenment
- You can remember every card played in card game
- You can remember chemical formulae
- You can remember maps
- You can remember articles, magazine stories, even whole books
- You can remember anatomy,
- You can remember names and faces
- You can learn foreign languages in a fraction of the normal time
- You can remember long numbers
- You can remember facts and figures - such as sports information.

Almost all of the 'Memory Men' have claimed that what they do is not exceptional, but can be done by anyone with the appropriate short period of training. What appears outstanding is in reality a simple 'trick' that anyone can learn.

Because creative memory uses visualization, every time you use the 'substitution method', you are in fact concentrating on the material and visualizing - which means you are performing meditation. In the East, a Buddhist monk might visualize a Holy Person and concentrate on the image. What is being done is surprisingly similar to the techniques in Creative Memory.

There is evidence that the more mentally active a person is, the longer they live. Even at a late stage, old people taught techniques to improve their memory can enhance their lives, and, strangely, increase the time they live.

Creative memory can improve your social and professional life because it helps you remember names and faces and personal details.

Creative memory is fun: it is a kind of daydreaming. So it makes learning fun and easy. It also motivates you with subjects that are not very interesting!

Within all that is said above, there is a hidden power of creative memory. Most of us do not want to remember a pack of cards in the order dealt. But the simple trick used can be applied to other areas and give us confidence in our learning. And there are always those who want to make a fortune at, for example, the Black Jack tables!

Back to the secret.

Creative memory is important because it deals with memory as it works for us in everyday life. It begins to teach us about the mind.

Something is hard to remember because it is somewhat meaningless. For example:

I saw an old woman with a bucket of water in her left hand and a burning torch in her right hand.

'Why are you carrying a bucket of water and a burning torch,' I asked her.

'With this bucket of water, I am going to quench the fires of Hell. And with this burning torch I am going to burn Heaven.

'Because I would have everyone love God for what he is and not for the desire for Heaven or the fear of Hell.'

This is easy to remember because the words are concrete and the little story is logical. With the 'right' she would burn Heaven. The story is also a little shocking. So it something that is very easy to remember because it is easy to visualize and is notable.

Other example, especially facts and figures are not easy to remember because they are not concrete and they are hard to understand.

Creative memory makes difficult to remember and understand material easy to remember by making it concrete, notable and understandable.

At first creative memory was a secret art. It was too valuable to release to others. However, it became very popular in schools and much of teaching - especially in the 'best' schools used creative memory (or mnemonics) to help students remember facts and figures in various subjects.

About the middle of the 20th Century, however, it became unpopular. A strong force emerged in education claiming that facts and figures and details were not important. What was important was 'understanding'.

All this seems reasonable.

But the results were a drop in education standards.

There is no reason why there shouldn't be understanding and recall. (A fact the educators forgot!) And in some subjects, understanding is not important. For example, if you need to use pi in mathematics, you don't need to understand it. You

need to remember it! A doctor doesn't have to understand a drug. The doctor needs to remember it, its dose and its side effects, etc. Although understanding might be better, remembering is essential! But a doctor doesn't really need to know how the drug is made, what its chemical formula is, etc.

Furthermore, what does understanding mean other than remembering? If you cannot recall the facts about the American Civil War, can you really be said to understand it?

Creative memory is still a secret art. It is extremely powerful in every part of our lives and existence.

2. Improving Your Memory with the Link Method

The link method is the crux of Creative Memory. It is both profound and extremely simple.

First, spend a few minutes (five at the most) remembering the following ten items of a shopping list. Remember them in order.

1 book
2 margarine
3 potatoes
4 clock
5 door mat
6 chess set
7 milk
8 sheet
9 paper tissues
10 washing-up liquid

You might check yourself by writing them down (without looking at the list!) to see if you have remembered them.

Now try to remember them as follows…

Visualize the links - see them in your mind's eye. Use your own associations, not necessarily my examples. Choose whatever comes to mind first, if possible.

book

margarine -

Imagine opening a book and margarine seeps out. All over your clothes!

potatoes -

The margarine sprouts potato plants that grow incredibly fast and very big.

clock -

When you check the potatoes, they are all clocks. Ticking loud and noisily. How can this be?

door mat -

A clock becomes a flat doormat. The clock has a face like a human. It doesn't like being walked on.

chess set -

The door mat has chess set on it. It has squares and the large chess pieces are like people

milk -

The chess pieces become bottles of milk. Will you use the knight or the queen to pour your milk?

sheet -

The milkman comes and gives you your milk in bed sheets. He ran out of bottles! paper tissues

paper tissues -

Your bed has paper tissues instead of sheets.

washing-up liquid -

You open the box of tissues and it contains a lot of miniature washing-up liquid bottles. What will they think of next?

There are two difficulties that might occur with the list. First remembering the first item. And remembering when you have got to the end.

Another issue is that the words in the example above are readily visualized. In other lists, the words are not easily visualized. Here we need to substitute an object or objects that represent the word.

If the image is clear and powerful, you can remember items in just one go. However, on other occasions you might have to repeat the visualization several times.

3. Memory Substitution Method

How to make things easy to remember

The substitution method is one of the keys to memory improvement. It is learning how to substitute a hard-to-remember thing for something that reminds you of it and can be visualized.

When a word does not represent something that can be visualized, then we have to substitute something for the word. Something that will remind us of the word.

You may need to use a word that is similar but not the same as the parts of the word you are trying to make memorable (visualizable). Your true memory links the new syllable to the old one. When you do this, try to keep the consonants the same and vary the vowels, because more information about the word is carried by the consonants than by the vowels.

For example, we can imagine a submarine to represent substitution. The submarine reminds us of substitution. Of course, you would use your own word for this. For instance, you might use "sob" for "sub". Or even "soup", even though it has a "p" instead of a "b". Again, you could use "soap".

If we had to remember words like substitution, substantial, subliminal, etc, then we couldn't use the submarine (a sub) for them all! We might do the following, if we wanted to be precise (our true memory works to make us precise usually, but here we might want to 'spell out' the whole word in visual code, as best we can)…

substitution

> Imagine a submarine sitting (stit - sit) you down (u) and to watch a huge train shunting (tion) a little carriage.

substantial

> Imagine a sub' that looks like an old lady standing up and putting on a shawl.

subliminal

> Imagine a sub waving its arms (limbs) before a group of other subs, and saying 'There is a sub in all of us.'

It is often unnecessary to use a symbol to give more than the essential clue to the word you are looking for, but using Creative Memory, you can be very detailed.

The following words are more difficult to remember than a list of objects, because they are more general or abstract. Try to remember them:

1 excellent
2 interesting
3 economics
4 pointless
5 erratic
6 circumstantial
7 epitome
8 biology
9 premier
10 doting

Test how well you did. Then read the following and try again. Remember to use your own images rather than mine, if they seem more natural. Each word have either a practical (A) or a literal (B) connection to the next word in the list.

excellent

A. The key image is a big tick - excellent! The big tick grows some enormous eyes (which connects with the next word because the eyes are expressing interest).

B. Imagine **eggs sell**ing a giant **ant**. A policeman arrives and the ant screams, 'You **int arresting** me are you?'

interesting

A. The eyes are looking at a pile of money (economics).

B. The sound **echo**es so loudly, a pile of **comics** fall down onto the floor going everywhere.

economics

A. The money is looking miserable because it isn't square notes, but round coins. It is pointless.

B. An old man with a stick pokes at the comics, but they aren't pierced because the stick does not have a **point**. He jabs and jabs to no avail. It is pointless!

pointless

A. The money rolls after a rat that ticks (a rat tic) as it runs.

B. As he pokes one comic a **rat** pots up angrily and starts to **tick** (or tic) him off (a rat tick).

erratic

A. The rat that ticks puts on a suit of armor because it is being chased. It has a huge cucumber. (Sir Cucumber).

B. It turned into a knight (**Sir**) and is armed with a **cucumber** (Sir Cucumber). It **stands** up and is wearing a **shawl** (Sir Cucumber Stand Shawl).

circumstantial

A. The Knight steps back and falls in a hole. I am in the hole and I complain bitterly that he has landed in 'a pit of me'.

B. The Cucumber steps back and falls in a hole. I am in the hole and I complain bitterly that he has landed in '**a pit of me**'.

epitome

A. I look out of the pit and notice someone dissecting a frog.

B. I look out and notice someone dissecting a frog. An old man is selling logs. He says, '**Buy a loggy**' and the dissector buys a log.

biology

A. The person dissecting the frog looks around and sees the prime minister (the premier).

B. When the old man has gone, the dissector notices a '**pram** with a big **ear** (pram-ear). 'What is it listening for', the dissector thinks. And why is the prime minister (premier) in the 'pram?

premier

A. The prime minister kneels down before a young lady and looks at her dotingly.

B. The prime minister in the 'pram has a drawing book and he is putting enormous **dots** on it.

doting

You can add details as you like, to make the story. The A. descriptions use symbols, such as a tick for excellent, which are good enough for me to remember the words. The B. descriptions actually put almost everything into the story, so there are fewer demands on the 'true memory' to remember whether the word is, for example, 'premier' or 'prime minister'. The true memory usually makes the right distinction, however.

While you can quickly scan a mental image, it takes a lot of words to describe that image (or movie). When written down the method appears to be extremely complex when it is really very simple and fast.

If you hesitate as you try to recall the next part of the story, then strengthen your association. Make an image bigger or smaller, or give it more action.

4. Creative Memory Using Symbols

Some things are hard to remember because they are very difficult. The time-honored way of remembering these is to use symbols.

A symbol is a word or picture that does not look like the thing it represents, but is something we have learned to associate with that thing. Almost all words are symbols because they quite unlike what they refer to. A cat, for example, does not look like ‘C...A...T'. Nor does it sound like the word.

Sometimes symbols are used to represent things that we only vaguely understand.

Words such as 'Justice', 'Love', 'Right', 'Education', etc. cannot be defined clearly and precisely in words, let alone shown in a picture. Human beings have only a limited idea of what these words represent, or what they mean. This gives a clue why Creative Memory is an important part of enlightenment.

We sometimes use commonly-agreed symbols to represent certain concepts. We might associate 'Uncle Sam' with the USA or 'John Bull' with England. We might associate 'Justice' with the blind goddess holding a pair of scales and a sword.

In addition to these commonly held symbols, we may have our own images which put us in mind of something, usually abstract. For example…

Admiration: Staring up at a statue
Art: A statue, painting of Mona Lisa
Enlightenment
Buddha sitting and meditating
Evil: A devil, demon
Education: A mortarboard, blackboard
Goodness: Angel, Mother Teresa
Government: Crown, bowler hat
Heat: A fire, a stove
Health: An apple, muscle man or woman, yogi
Honesty: George Washington/Abraham Lincoln
Cold: A block of ice
Justice: Blind virgin with sword and scales
Law: A policeman, handcuffs
Love: Venus, the lovers, a heart
Lying: Pinocchio
Medicine: A stethoscope, doctor
Right: A tick, pleased teacher
Sport: Ball
Stop, Go: Traffic lights, hand signal
Thinking: A comic book balloon, computer
Time: Old Father Time, a clock
Wrong: An 'X', angry teacher

None of these are like the thing represented, but they put us in mind of the thing represented. If you have different ideas, on this, then use your own symbols.

Whatever comes to mind first is preferable in memory, because next time you think of the thing, you are likely to think of this first association.

We can use symbols to put us in mind of thing we want to remember.

Remember!

> “ ‘All right,’ said the Cat; and this time it vanished quite slowly, beginning with the end of the tail, and ending with the grin, which remained some time after the rest of it had gone. ‘Well! I've often seen a cat without a grin,’ thought Alice, ‘but a grin without a cat! It's the most curious thing I ever saw in my life!’ ” ~ Lewis Carroll

So what is a grin without a cat? Or without lips, cheeks, etc for that matter?

In a similar way, what is laughter without someone laughing? What is green without a green thing? What is education apart from someone teaching someone?

It is the people, creatures and objects that give meaning to abstract and general ideas.

When remembering something abstract we need to make it in some way concrete.

A grin without a cat is no cat at all, and no grin either, because a grin cannot exist apart from at least some lips or some physical thing. So search for the person, animal or thing that gives the substance to your image so you can make meaningful what isn't meaningful, and remember it much faster.

5. Psychology of Memory: Remembering

It is generally believed that we do not forget. We cannot recall the memory. The information is there but we cannot get at it. Psychologists and others believe that we remember everything (or a massive amount of) our experience because:

1. Hypnotized subjects can recall information that is not normally available to them, such as a witness seeing a car number plate in trance. The subjects did have the memory, but they could not recall it.

2. Traumatic memories - memories of accidents, etc - may not be normally available, but become available in therapy. These memories were always present, but they were blocked by emotion.

3. Our common experience tells us that we sometimes cannot remember something, say a name, but later it comes back to us. We knew it after all. We couldn't recall it at the time

4. In countless experiments, different groups of subjects differ in what they can recall depending on the way they are asked to recall the information. They all have the same memory, but some are induced to recall memories in a different way.

These points tell us that we can have a 'super memory' if we can learn to recall better. And point 4 tells us that there are ways to improve recall.

In the psychology of remembering there are three issues

1. You are aware of something
2. You code it in some way
3. You recall it later

Clearly if you do not notice something or are not aware of it, you are unlikely to remember it. Although this is obvious, when stated, it is important. Someone who was paying attention to what was happening around them will remember more about this than another person who was busy listening to the conversation.

However, hypnotized subjects can remember things they thought they hadn't noticed, so conscious awareness might not be necessary.

And some subjects undergoing operations have accurately reported seeing and hearing things which they could not normally see.

Whether or not these facts are taken into account, it is clear that we can recall only a fraction of what we know!

And the person who was listening to the conversation will remember more than the person who was observing what was happening around them.

When we are aware of something, we code this information in some way…

1. We make a mental picture
2. We associate it in sound
3. We relate it to what we already know.

We may code the information in this way deliberately or unconsciously.

When we come to recall the information - picture, sound, etc. - we might find the memory floods in when we experience something…

> We see a young man. He reminds us of a friend. And we remember we should be meeting them in 10 minutes.
>
> We visit our old school and memories flood in.

Other times, for example, in an exam, we try to retrieve a memory ourselves. Our cue is the exam question. But the answer does not flood in so we begin a mental search to try to find it.

When we try to remember something, we find it easier to answer some questions than others.

For example:

> 'Who did you meet at the reunion?'

is much harder to answer than:

> 'Did you meet Tom at the reunion?'

If we can recall an image or a sound then our recall may be successful.

On other occasions, when we go back (in mind) to the place we learned the information, we can recall better.

We have three different types types of memory:

- Episodic
- Semantic
- Procedural

Episodic memory is memory for things that occurred at a particular time and in a particular place. These are our life experiences - the meeting we had with people, the dramatic changes, etc.

Semantic memory refers to the facts of our lives. We remember (or have forgotten) the multiplication tables, but we cannot remember when we first learned that 7 x 8 was 56! Semantic memory is memory for facts that are separated from time and place (and appear universal!).

Procedural memory is memory for skills. Our memories for how to drive a car, for example, or how to use a knife and fork, are quite different from our memory for facts and for episodes in our lives.

Put imprecisely, episodic memory may normally be largely visual. Semantic memory may be auditory. And skill memory is kinesthetic.

Retrieval can be improved by work during the encoding stage of memory. There are three areas:

1. Elaboration
2. Organization
3. Context

We can elaborate by:

- Relating new knowledge to old
- Asking questions
- Uses causes and effects
- Closure

Elaborate means to add details to something or to work it out in detail. When we have something to remember, we can visualize it. Visual, concrete images are easier to recall.

Another way to elaborate is to relate what we are learning to what we already know. Hund, in German means dog in English. Hunt sounds like English 'hunt' and hunting may involve dogs. Also, Hund is a bit like 'hound' which is a dog used in hunting. In this way we are elaborating the new information by relating it to what we already know. In this case, we are not using our knowledge of German, but associations which pop up when we think about the word.

Another way to elaborate is to ask questions about the new information and answer them.

> The occipital bone is the saucer-shaped bone that forms the back part of the skull and part of its base.

If we wished to learn the above we might elaborate it with questions and answers:

> Name a saucer-shaped bone?
> What bone forms the back part of the skull?
> Name one bone that forms part of the base of the skull?
> What is the occipital bone?

And so on.

We can also elaborate using causes, effects, results and consequences.

> What protects the back of the brain?
> What does the occipital bone do?

Suppose you had to remember:

> Vitamins are a group of substances essential, in small quantities, for the normal functioning of body metabolism. They cannot usually be synthesized in the body but occur naturally in food. Lack of vitamins results in deficiency disease.

You could elaborate, using causes, effects, etc as follows:

> What causes vitamin deficiency disease? Lack of vitamins.
> What happens to the body if there is insufficiency of a vitamin? The metabolism doesn't function properly.
> What could cause the metabolism to malfunction?

And so on.

Elaboration of meaning is mentioned later.

We can also use closure or information gap to increase our memory. This technique involves omitting parts of the original information and filling in the gaps. Suppose you had to remember:

The cerebrum is the anterior part of the brain of vertebrates: two lateral hemispheres joined by a thick band of fibers. In humans, it is the dominant part of the brain and is associated with intellect, emotion, and personality.

In remembering the above, it is worth jumping back to elaboration and mentioning elaboration in terms of meaning. We may not know the meaning of some of the words in the passage, so we might check them in a dictionary. In learning any material similar to the above, you would be advised to use a dictionary to help you understand the meaning. On other occasions, you might use diagrams or maps to elaborate on meaning. A picture is truly worth a 1000 words!

Back to closure.

We might blot out certain words in the passage and try to recall it. This can sometimes be done by cutting out words and phrases and then trying to recall the missing parts while reading the whole. See an example here…

Organization helps to improve recall. If we organize the information in some way so that it is easier to recall, then our memory of it improves.

Consider the following list. Although it contains concrete items, few people could remember it easily.

1 cheese
2 peas
3 cabbage
4 nails
5 butter
6 tomatoes
7 saw
8 cotton wool
9 aspirin
10 wood
11 antiseptic
12 lettuce
13 bandage
14 necklace
15 potatoes
16 hammer
17 clock
18 bracelet
19 ring
20 milk

By organizing the list by shops, the list is much easier to remember. The greatest number of items in a column is 5, so remembering the stuff at the green grocers might be the hardest! Even if you use a memory technique, where appropriate, it might be a good idea to order the information in some way.

Dairy	**Hardware**	**Vegetables**	**Pharmacy**	**Jewelry**
milk cheese butter	nails hammer wood saw	tomatoes lettuce potatoes cabbage peas	cotton wool aspirin antiseptic bandage	necklace clock bracelet ring

The context in which we recall something affects our memory. If we go to the place where our memories are associated, then we can recall the information better. Visiting the town where we spent our childhood might bring back a flood of information about this time which we thought we had forgotten.

We can revisit places in our memory too, to increase recall.

6. Psychology - Part 2

This page is a quick summary of the traditional psychology related to memory. It includes these topics:

1. Repetition
2. Memory Decay
3. Rehearsal
4. Revision
5. Meaningfulness
6. Whole versus Part Learning

Much of this information is based on the work of Hermann Ebbinghaus (1850–1909).

Repetition

In order to remember anything we need to have encountered it at least once. You cannot remember something you have never clearly and accurately perceived. You need at least one trial to remember anything. You might need several trials or even hundreds to remember some things without mnemonics. For instance, learning pi to many decimal places would take many trials by pure rote

It is better to spread the learning or the repetitions over a period of time than to attempt to do it all in one go. That is, it is better to spread some learning over a week than to try to do it all in one night. This does, of course depend on the amount to be learned. So in some cases, it is better to spread the learning over 5 years, than try to do it all in a few months.

Memory Decay

If you learn a list of items or facts so you can recall them accurately, then you may find that tomorrow you have forgotten some of them. And in a week or months, you will have forgotten them all, unless you practice the list.

Reciting

After each reading of the material, recalling it (reciting it) helps to put it into memory. This is true even in the first trial, when you have not yet learned the material and you are actually guessing. Merely reading or listening to information without reciting it is not as effective as reciting it. When you recite information, you could do so by writing it down, speaking it, drawing a diagram or just do it in your head. You could do a number of these, of course.

It is sometimes better to recite something silently in your head rather than to speak it. Research isn't definite on this, but speaking while remembering can sometimes interfere with the memorizing process.

The important thing is reciting. And you need to judge the circumstances when speaking out loud is suitable and when doing it silently is better.

However, you will find it easier to recall information which you have learned under the same circumstances in which you need to recall it. So, if you are learning in order to write an essay in an exam, it is better to write the information down, in the way you will use it in the examination. If you did your studying in the exam room, your recall would be better. That is the more similar the circumstances in which you learn something are to the circumstances in which you recall it, the more retention of memory.

If you were learning facts for a speech, you would remember them better if you actually rehearse them by speaking than by doing so silently.

This even works in that if you learn something after drinking alcohol, you will recall it better after drinking alcohol than otherwise. This actually means that usually you will avoid alcohol when studying (or other drugs).

Revision

If information is learned so that is error free, later on, the information will begin to be lost. If the information is revised over a period then it can become part of long-term memory and no longer be subject to forgetting.

Roughly, if something is learned, then it should be revised the next day. And then revised a week later. And then perhaps after a month. That is, of course, if you wish to place the information in long-term memory.

Meaningfulness

Meaningful information can be learned up to ten times faster than meaningless information. For instance, the words in a new language might be effectively meaningless to the student. By making the words meaningful, as by using mnemonics, the rate of learning can be considerably increased.

Whole versus Part Learning

In general, it is more efficient to learn the whole rather than the part. So in learning a poem, it is better to learn the poem as a whole rather than to try to learn it bit by bit. This is somewhat surprising.

If the amount to learn is extremely great, it might be better to learn it in smaller parts. So a text book might be better learned chapter by chapter rather than all in one. If the information is extremely difficult then, again, it might be better to learn it in much smaller parts.

However. it seems that whole-learning is more efficient than part learning. The reason for this might be that when we learn information in bits, we have an additional task of learning to link the bits together to make the whole. Whole-

learning might impose an organization on the parts so they become easier to learn than when learning them as isolated units.

Learning and Performance

When you are studying something you are continually learning. However, it might not be obvious. Performance, such as your success at remembering what you have learned can vary and goes up and down. Sometimes you can think you have learned nothing because you have forgotten a lot. But the truth is you continue to learn, and variations in performance are normal and should be expected.

For instance, a golf player plays golf quite well. He takes advice from a golf pro. His golf is now worse than it was before, because he is learning new techniques. But later he gets much better than he was before he received the new learning. This great increase in ability can occur quite suddenly. If the learner were to give up before this occurs, he would have lost all the benefits.

Therefore, do understand that learning goes on all the time, but performance may go up and down. So do not get discouraged when your success in study doesn't seem to go very well. You are always learning, and you need to continue until you get the new increase in ability (performance).

Another example is learning to type. When students learn to type they seem to make constant progress as they learn to type the letters. Then they do not seem to improve and might get worse. What is happening they are learning to type words, and this may even interfere with their previously learning to type letters. And then, their performance increases and they get better and better.

Their performance varies, but their learning continues the whole time.

So you are always learning, but you do not always see the results of your learning (performance) until later.

7. Alphabet Peg System

The alphabet system has peg words for each of the letters. Generally, the word is chosen because it has the same sound as the letter. So, as the letter F has the sound "eff", I have used effigy as the peg. In some cases, where a suitable word wasn't found, as in the case of Y (which sounds like "why"), I have used the the peg "yacht"; that is, just using the first letter. Words such as "wine" and "wife" contain the sound of "Y", but might be confused with the peg for W, especially because this peg, too doesn't have the actual sound "double-u". For this W, I simply used the first letter and the peg is wall. You could, of course, use your own peg words, and even use a different theory. You could simply choose concrete and memorable words which begin with the letter.

A Ape	**B** Bee	**C** Sea	**D** DDT	**E** Ear	**F** Effigy	**G** Jeans
H H-bomb	**I** Eye	**J** Jail	**K** Cake	**L** Elastic	**M** Embers	**N** Hen
O Oak	P **Pea**	**Q** Cute	**R** Arch	**S** Eskimo	**T** Tea	**U** Ewe
V Vehicle	**W** Wall	**X** X-ray	**Y** Yacht	**Z** Zebra		

For DDT, I imagine a bug spray. An effigy is imagined as a straw doll. Jeans are a pair of jeans. Embers are the last bit of a fire. An oak is just a tree, unless you know what an oak looks like! For Cute, I imagine a cute child (or animal). For Vehicle, I imagine a car, but you can imagine what you think a vehicle is ... a lorry, van, etc.

8. Feinaigle System: Number Letter Code

When you have to remember a large number, you can translate the number into letters and find keywords which you can visualize to remember the number. When you wish to recall the number, then you translate back from the images to the number. In this way, (just a few!) people have learned the value of pi to many decimal places.

For instance, after you have learned the code, the phrase moderately pendulum (pronounced pendulum) gives 3141592653, which you can use to remember pi (3.141592653) to 9 decimal places.

Most of the codes in existence today were invented 100 or more years ago. The actual codes are arbitrary and they are chosen for ease of remembering or because, like the Miles System, relate to language. Most of the systems use the consonants and ignore the vowels, although there are systems that use the vowels.

The system can be used to create a peg word system for lists of any size, but usually about a hundred. The peg words can be linked together to remember longer numbers (or even numbers of great length).

The system can also be used to remember foreign language vocabulary.

Feinaigle System

This is mentioned for historical reasons, and the system we shall use is the modified Miles System.

In the early 1800s a man named Gregor von Feinaigle, devised a system which related numbers to letters so they could be more easily remembered, in such subjects as history, geography, foreign languages, etc. The Fenaigle system looked like this:

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**
t	n	m	r	l	d	k g q hard c	b w v h	p f	s x z soft c

The above system was modified by an American, Pliny Miles, who in 1849 produced a system with slight variations, and that is widely used nowadays.

The Miles System

0	1	2	3	4	5	6	7	8	9
s z c (soft)	t d th	n (nasal) ing ang ung	m	r	l	sh ch j (as in judge)	k (hard) c q g (hard)	f v ph	p b

This system is mostly based on sound, so:

0 - Change to letters having the "ssss!" sound or the "zzzz!" sound, which are soft c (as in ace), s (as in soft) and z (as in zebra). The word 'mast" represents 301, because "st" has the two sounds "s" and "t".

1 - Change to letters "t" or "d".So the number one could be represented by "tie". The letters "t" and "d" have one downstroke.

2 - Change to letter "n". The letter "n" has two downstrokes. Two could be represented by "Noah" ... a bearded man in a boat. The words "knee" and "gnaw" also represent 2, because the "k" and the "g" are silent.

3 - Change to the letter "m". This letter has 3 downstrokes. It also looks like a 3 that has fallen down to the left. It could be represented by the word, "home".

4 - Change to the letter "r". The last letter of four is "r". "oar" represents the number 4. I suggest that if there is an "r" in a word, it is counted as the number 4, even if it isn't pronounced. For instance, the word "hard" is often pronounced without an "r" sound in Standard English, but pronounced in other varieties of English. You can, of course, make your own rule on this.

5 - Change to the letter "l". We are told that this letter represents the number 50 in the Latin system. The five fingers with the thumb sticking out (left hand) look like an L. Five could be represented by "law", or an image of a policeman.

6 - Change to "sh", "ch", "j". Shoe represents the number 6. The word "judge" is 66 because the "dg" sound is "j".

7 - Change to a "k" sound. "Key" represents this number. The word "knee" is considered to represent 2, because the "k" is silent. And "gnaw" also represents 2, because the "g" is silent.

8 - Change to "f" or "v". The handwritten "f" is shaped like this number. The word "ivy" represents the number 8.

9 - Change to "b" or "p". The word "bee" represents 9 in this system.

Words such as "highway", have no values. The "h" and "w" are filler consonants.

PI

The following value can be translated into words in a series of steps:

3.14159265358979323846264338 3

3.14 = amateur

1592 = dolloping

6 = eyewash

535 = lamely

897 = phobic

932 = bowmen

38 = mafia

462 = urchin

6433 = chromium

83 = fame

If you have learned the above code, then you can learn the following nonsense sentence:

> amateur dolloping eyewash lamely (on) phobic bowmen mafia urchin (with) chromium fame

This converts back to PI: 3.14159265358979323846264338 3

It is easier to remember the sentence than it is to remember the number. Don't forget tos use the link method!

Making the system effective

I will try to say this several times on different pages…

If you learn the system like this:

Mmm! 4. Now let me think... ah it is four. It ends in "R" So the key for 4 is "R"

Or

Mmm! "R", that's...er...last letter of four... so it's 4

While this is slow, the system will still be useful for many applications. However, to use the system really effectively you need to translate instantly. So when you see (hear) 4, you think "R"!

Mnemonics help you remember things so you can recall them, perhaps after some thought, but for some applications you need to rehearse the relationships so they are instant. In this example, with the letter code, you might find it helpful to see two pictures. One is the letter or syllable and the other is the number. Look at the letter and think the number. Look at the number and think the letter.

For example, you can recall the letter by thinking of the number 0 and then of "zero" (begins with a "z") so 0 is "z" (or "s"). You can then make up the two pictures and switch quickly between them and practice the link while doing other things, such as walking along the street.

Practice this often enough until you see the number when you see the letter, and you see the letter when you see the number. You need to be able to do it both ways, and continue practicing until you have an unconscious proficiency - i.e you don’t have to think about it!

9. Peg Words in the Letter-Number Code

The peg words that follow for the numbers 1-100 are largely based on pronunciation and not on spelling, however the "r" always counts as the number 4. Double letters are counted as single letters, unless they have two really distinct sounds.

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
tie	Noah	home	oar	law	shoe	cow	ivy	bee	daisy
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
tot	tin	tomb	tyre	tail	dish	tack	toffee	tub	nose
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
gnat	nun	gnome	Nero	nail	winch	nag	knife	knob	mouse
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
mat	moon	mummy	mower	mule	match	mac	muff	mop	rose
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
rat	rain	ram	warrior	roll	rack	rock	roof	harp	louse
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
lid	lion	lamb	lorry	lilly	leech	lock	loaf	elbow	cheese
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
jet	chain	jam	chair	jewel	judge	shack	chef	ship	case
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
cat	coin	comb	car	coal	cosh	cake	cave	cab	fez
81	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
vet	fan	foam	fairy	fool	fish	fig	fife	fob	bus
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
bat	bin	bomb	boar	ball	bush	pack	puff	pipe	diosese

Making the peg system effective

If you learn the system like this:

> Mm! 72. Now let me think... 7 is ... mm!.. "k" ("k" is partly like a 7) .. and what was the other number.. yes.. it was 2. And 2 is.. two strokes.. that's an "n". So 72 is "coin".
>
> Or
>
> Mm! "fairy".. what are the letter? FR.. Yes.. And "f" is.. 8, and "r" is... mm 4. So fairy stands for.. er 84

While this is slow, the system will still be useful for many applications. However, to use the system really effectively you need to translate instantly. So when you see (hear) 72, you think (see/hear) "coin"! And vice versa too.

Mnemonics help you remember things so you can recall them, perhaps after some thought, but for some applications you need to rehearse the relationships so they are instant. In this example, with the peg system, you might find it helpful to see two pictures. One is the word and the other is the number. Look at the word and think the number. Look at the number and think (see/hear) the word. Do this often until you see the number when you see the word, and you see the word when you see the number. You need to be able to do it both ways.

Because you can recall the "rain" by thinking of the number 42 you can then make up two pictures and switch quickly between them and practice the link while doing other things, such as walking along the street. In this way, you may notice the two pictures, one of the number and the other of the word, begin to merge so you instantly see rain when you see 42 and instantly see 42 when you think of rain.

10. Foreign Language Vocabulary

When we use a system to translate numbers into memorable words, we are making something, numbers, which is not easy to remember into something that is easier or easy to remember.

With foreign language vocabulary, we are trying to remember what is not meaningful and to link it to something that is meaningful. This is similar to the task of memorizing numbers.

Translation

Define the English word

When we want to link a foreign word to an English word, we should firstly ensure we understand the English word, and ensure that we can define that word. That is, look the English word up in an English dictionary and understand its meaning. For instance, when translating "perplexed" into a foreign language, you need to be able to clearly state in English words what the word "perplexed" means. Sometimes it is surprising when we think about the meaning of an English word and find we cannot produce a clear, accurate definition.

if you associate a foreign word with an English word, even though you do not completely understand the English word, then you will not really understand the foreign word. So do define the English words, using a dictionary if necessary.

Define the foreign word

As soon as you are able, define the foreign word in its own language, using simple words. For instance:

> A dog is an animal that barks.
>
> Ein Hund ist ein Tier, das bellt (German)
> Un chien est un animal qui corce (French)
> Un perro es un animal que raspa (Spanish)

And:

> Today means "this day".
>
> Significa hoy "este d a" (Spanish)
> Signifie aujourd'hui "ce jour” (French)
> Heute bedeutet "diesen Tag” (German)

The words used in the definitions are words on a level of difficulty less than or equal to that of the original word. So it isn't so difficult to make up definitions in a foreign language because they often use words you have learned earlier or are currently learning along with the new word.

The reason for defining words is to help you think and communicate more fluently in the language.

Thinking in a foreign language

You can very quickly begin to think in a foreign language. Thinking in a foreign language means that you do not think in English and then try to translate, but you think in the foreign language. For instance, if you cannot remember the foreign word for "dog", then, if you have defined it in the foreign language, you can say what you mean ("An animal that barks"). I know you can just go "woof woof" but this is just a simple example. If you couldn't remember the foreign word for "today", then you could say "this day". In this example, you couldn't go "woof woof", and it is hard to say how you could act out "today" in a foreign language without words.

Building Concepts in the New Language

As you get more involved in the language, you can think about the new word (and old words, if you didn't do it before) in the foreign language. For instance an apple:

> It is a fruit.
> It is red.
> It grows in the Summer.
> It has skin, a core, pips a stalk...

Also:

> You peel an apple.
> You bite an apple (but drink soup!)

While the example of the apple is mundane, you can build up concepts of the words in the foreign language so you can think about them in that language.

By having several ways to say the same thing, we aren't stopped when we can't think of the exact word. This is also true of our native language when we cannot think of a word, and use an alternative (synonym) or say what we mean (define).

Two-way Communication

If you learn to translate an English word into the new language, it doesn't mean you can translate the foreign word into English. Unless you learn both to translate the English word into the foreign language, and the foreign word into English, you might not be able to translate from and to the new language.

Learning Lists

You can learn foreign vocabulary using flashcards or using a list. Have a list of Foreign words in one column and the English words in another. It is better for you to write these words yourself rather than to use a book, because it gives you practice writing the words and might make you more aware of the word and not misread it.

When learning the foreign words, cover the English words with a bit of paper. Try to translate the first word, and lower the paper to reveal the correct answer. Go down the list and translate each word from the the foreign language to English. At the bottom, start again moving the covering-paper up this time to reveal the correct answer.

Use a list of about 7 words for this. When you can move through the list twice without any errors, then use the same procedure to learn to translate the English words into the new language.

You may find it easier to begin translating the foreign words into English first, because it is easier to guess the English word than it is to guess the word in the foreign language. When you move on to translate the English words into the foreign language it may be easier than doing it the other way round.

You can make up mnemonics to help you remember the words.

11. Foreign Language Vocabulary using Mnemonics

The German word for "dog" is "Der Hund". And the German word for "cat" is "Die Katze". I never had to learn the word for cat, and I probably just thought "hound dog", or "hunting dog" for "Hund".

Some words in a foreign language are so similar to the English words, that with a few steps in thought we can get from one to the other.

Freebees: Instant Vocabulary of Thousands of Words

There are thousands of freebee words in European Languages. For instance, concentration (English), Konzentration (German), conentration (French), concentrazione (Italian), concentraci n (Spanish).

You just speak the English word with a foreign accent! There are literally thousands of these freebees in Latin languages, so you get an automatic vocabulary of thousands of words, as soon as you learn the pronunciation of the language!

Remembering Objects

Objects that can be visualized are easier to remember than those which aren't.

The German word for "rat" is "die Ratte", which isn't difficult to remember anyway. However, "der Rat" means the advice. This is easier to remember, because it is instantly funny. You can imagine going to a big rat and asking him for advice, which he, wearing a white coat, and spectacles on his nose, gives you serious advice (even though it is funny to get it from a rat).

While the English word "advice" isn't easy to visualize, the German equivalent, "der Rat" is easy to visualize. If you wanted to visualize advice, you could of course make up a story where someone is giving you advice. Or you could think of "advice.. a vice" and imagine a carpenter's vice in the story or link.

In English, the word "dog" is easy to visualize, but the French "le chien" is not easy. One way is to use a substitute word, such as "shin". You can imagine a dog biting at your shin. You could also be saying "Shoo!" to strengthen the association.

Abstract Words

When neither word can be visualized, we need to seek substitute words or phrases that make them visualizable. The English word "perplexed" means that we do not know what to do or cannot think quickly or clearly, because of contradictory facts, etc. It isn't a word we can instantly visualize. We could, however, imagine a person looking very perplexed.

In German, "perplexed" means "ratlos". If we remember that "Rat" means advice, we can see clearly how the two words link up.

> perplexed... do not know what to do... no advice ... advice is "Rat"... ratlos means no advice... ratlos means perplexed.

On the other hand, we could note that "perplexed" in English is "perplex" in German, so we could use the freebee!

Or again, we could imagine someone who was very perplexed (see his face?) because he had lost his rat... ratlos!

We could imagine "perplexed" as "purple specs (spectacles)" and the man who has lost his rat is wearing giant purple spectacles.

Notice how the picture contains all the information relating "perlexed" and "ratlos".

When both words are abstract

Actually, one English word that I thought of as an example, was "mandatory". This means you are required by law to do it (or not do it, I suppose). The French word for this is "obligatoire", which seems easier to understand than the English word! The French word is so similar to "obligatory", which is another way to say "mandatory". We can imagine a gateau hobbling in and saying, "You must do this". Or "Man you must dart this bottle of rye!"

obli (hobbling) -gatoire (gateax) - man (man) -dat (dart) -ory (of rye)

Make up an image using cues similar to the example, or some others you dreamed up yourself.

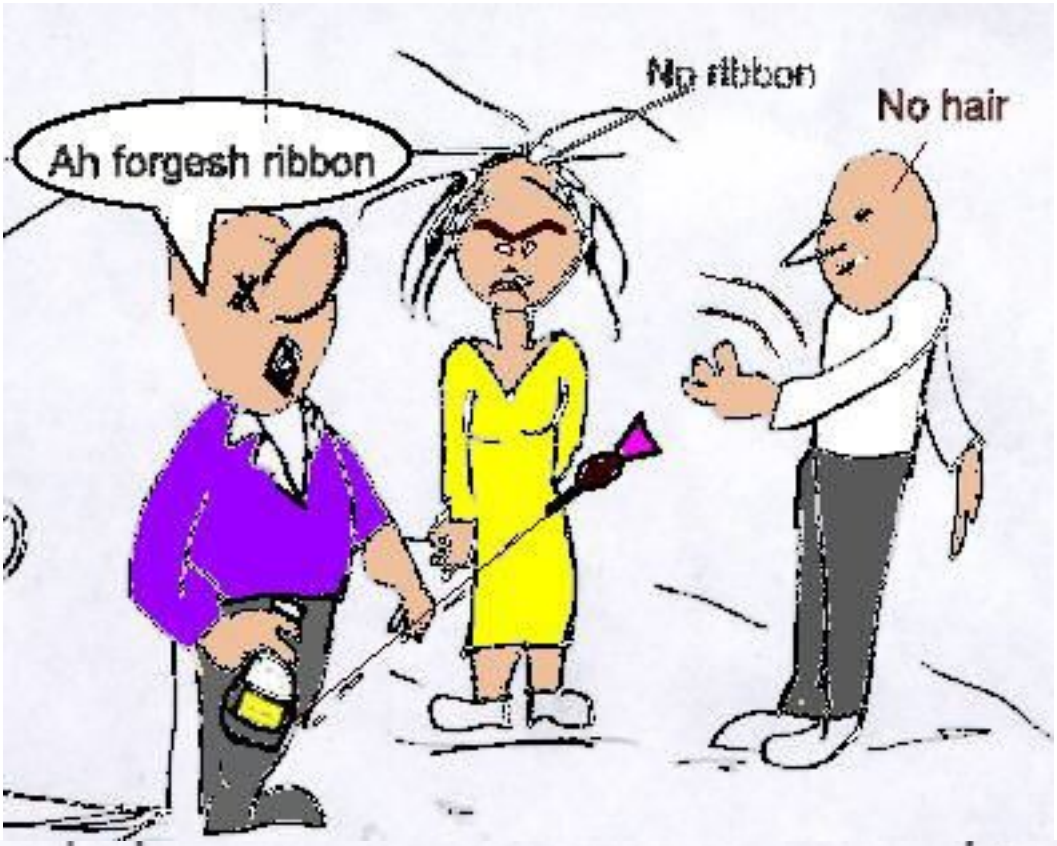
Whilst we had a freebee in French, in German, alta vista says the word for mandatory is "vorgeschrieben". The German word sounds a bit to me like "forget ribbon". You can imagine an old man who has forgotten to get a ribbon (perhaps he is a little drunk because he says forgesh and not forget!). His wife is furious at him and tells him, "He mustn't forget the ribbon".

forget (vorgesch) ribbon (rieben)... woman tells him what to do (madatory)

Another way is to imagine a man staggers in with a bottle or rye whiskey and says, "Forgesh the ribbon (vorgeschrieben)" and a man throws a dart at his bottle of rye (man dart rye).

Be reasonable

That is, use reason. The word "vorgeschrieben" in German, literally means "vor" (before, "geschrieben" (written). You can imagine someone saying, "It is written, thou shalt not do that", and this gives us the idea of obligatory, mandatory, etc.



In French, reasonable is "raisonnable", yet another freebee. You just say the English word with a French accent. You can, of course, imagine talking to a raison and asking it to be reasonable and give you the apple (-able).

In german, one word for "reasonable" is "angemessen". This could make a phrase, "an gem he sent". Clearly, we would think of someone who sent us a gem was a reasonable person. We could imagine opening a letter with a big gem in it and thinking "Very reasonable!".

Another phrase that comes to mind for angemessen, is "anger mice". Pronouncing "mice" as "meece" makes it go better! You see yourself confronted by these enormouse angry mice, and you say, "Be reasonable", as you race on a bell (reasonable).

The English word "reasonable" can be changed to "rice table", or "race on a bell", also.

12. Irrational Ideas about Creative Memory

There has long been a tradition of secrecy in self development work. The main reason was and is that there are always those who will try to devalue what you are doing. For example, if you are interested in improving your memory, you must have a good memory and be able to remember everything and anything - or so some will say.

It is important to define your purpose. For example, I use creative memory techniques to remember data. When I study a new subject, there is often a lot of information which, quite frankly, needs to be learned.

By using creative memory techniques, or mnemonics, I can learn this information in a fraction of the time it would take by mere repetition.

However, I am less concerned about remembering other material. For example, I am not interested in learning to remember a pack of cards in any order.

I don't remember the name of the film I have just seen or the names of the actors.

This is quite different from what one is ABLE to remember.

For some learning to recall anything and everything can be a goal of learning about memory, and this is achievable. For example memory entertainers often try to remember all sorts of things to demonstrate their great ability. (And it is a great ability).

Few memory performers (if any) actually become traditional experts in something. This may well be because they don't want to be experts in some traditional field. They memorize all sorts of things that enable them to demonstrate and entertain with memory.

Some people who study memory might want to emulate the memory 'men' in entertainment.

Others might wish to remember information in their chosen field. For example, medical students need to remember anatomy, and mnemonic techniques have been used here for hundreds of years!

Others might want to improve their memory for everyday things because as they get older their ability to remember seems to decline. In some of these cases creative memory can help people to maintain their contact with reality by remembering everyday things.

So we all have different agendas for learning to improve our memory. Used appropriately, creative memory can greatly enhance your life, your ability to learn, and improve your self confidence.

Because mnemonics is so effective, does not mean that you have to use it all the time for all memory tasks.

One technique which is extremely effective is elaboration. For example, it helps to check on the meaning of words in the material you are studying if you are in any way unsure of the meaning or are not able to define that word.

It is also helpful, although not essential to know some Latin and Greek words that are used in English. This can make a new word meaningful. It can also help you visualize the word.

For example, the word concise comes from the Latin *concisus*, which means to cut up. And the meaning of concise is brevity and shortness. The image is of cutting out a lot of words from a big document to make something shorter. Using word origins in this way does increase understanding more than using mnemonics. And remembering something which you do not understand might be of little value. (However, many pass examinations using remembered information that they do not understand).

Also rehearsal is important in memory. After learning some facts, we might then try to recall them **in the way we want to recall them** without the aid of the original information.

If we learn the English meanings of a number of Spanish words, we might have trouble doing it the opposite way - when trying to give the Spanish words for the English ones. Memory is sometimes directional so if we learn something in one way, we might find it hard when trying to recall it in another way. We should learn material in the way we want to recall it. So to pass an exam requiring essay writing we should practice learning the material by writing essays (or even better - answering dummy exam questions with essays!).

13. Rules of Association

To make an image memorable you can:

1. Visualize in Color
2. Distortion
3. Rhyme and Rhythm
4. Action
5. The sense
6. Emotion
7. Sequencing and Ordering
8. Numbering

What makes a mental image memorable is the same as what makes a film or television program memorable, or what makes life events memorable. What follows is mere suggestions on what makes an image more powerful.

Visualize in Color

Color television is more popular than black and white. And color is particularly powerful in creating an impression. So try to imagine in color rather than in drab grays.

A bright object is more memorable than a dark object. If you put objects in dark places, you might find it hard to find them when you try to remember.

Distortion

This means extremely big or small or out of proportion. It means a cartoon rather than a life-like picture. It includes, of course, exaggeration. So we think of "millions" of items, or an "enormouse" object.

Not a man who is strong, but who is immensely strong. Not a cry that makes your blood curdle, but one that bursts your ear drums.

A man with a distinguished nose is made more memorable by giving him an absolutely huge conk in your imagination.

Rhyme and Rhythm

Consider how rhythm might be applied in your images. Something throbbing, for instance is more memorable than an immovable object. Singing what you have to remember to a well-known song is another way to memorize something. Many religious works are memorized by chanting or singing, because this aids the memory.

Rhyme is a traditional way in which people have made information more memorable. It relates to rhythm, of course, and is the basis of some mnemonic

systems. Substitute words can be words that rhyme with the word-to-remember. And there is a sound system for relating words to numbers

Action

Just as a moving picture is more memorable and attracts more attention than a photograph, so active images are more memorable than inactive ones.

The sense

In remembering something try to use many senses, such as what the thing looks like, what it sounds like and what it is like to touch. There are also smells and tastes which can evoke memories.

Emotion

Something learned under strong emotion is more likely to be remembered than something remembered with less emotion. At least this is true for phobias, where one experience creates a life-long, never-forgotten habit in relation to the feared object.

It is possible that horrific thoughts might not be good for images to remember things. They might induce forgetting or repression.

Certain strong emotions might be counter-productive. And sexual imagery may be one of these. Bawdy humor might be better here.

The best emotion is probably humor.

Sequencing, Ordering and Numbering

It is easier to remember a list of items that are put into some order than otherwise. It helps to remember, for instance, there are 3 reasons, 12 nerves, 14 main philosophies, etc.

Consider the following list:

table, apple, fear, orange, chair, laughter, sadness, carpet, banana, elephant.

If you notice there are three items of furniture: table, chair, carpet; three fruits: apple, orange, banana; three emotions: fear, laughter, sadness; and one animal: elephant, then the list is much easier to remember.

14. One-Trial and Several-Trials Learning

Learning is often thought of a gradual process whereby the learner through much practice and repetition eventually learns something. By practicing more times than it is necessary to learn the material, the learner over-learns the material, making it less subject to forgetting.

On other occasions, we learn in one trial. Sometimes this one experience is enough to establish the learning for the rest of the person's life. This is often the case with phobias.

The once-burned child always fears fire.

On other occasions we learn in one-trial without any stress. For instance, someone says to you, "See you later at 8 o'clock" and we remember this with no practice. We learn it in one-trial.

15. Understanding Vs Remembering

Memorizing is often criticized because educators want their students to understand. This article is not particularly about understanding or philosophy, but is one approach to understanding the concept of "understanding".

Mathematics

Let us begin with an example from mathematics...

Students in mathematics classes might need the following equation for some quadratic equations:

x=-(b+/- (b2-4ac))/2a

You could memorize this equation, but have no idea what to do with it. This is better than not knowing it at all.

You could know how to use it to solve any quadratic equation, whether you memorize it or just refer to it. This is a higher level of understanding.

You could be able to do all the above (or at least know how to use the equation) and also be able to derive it and to prove it. If you could, then you might be said to understand the equation.

Now let's look at an example from chemistry.

Chemistry

In chemistry there is something called the Periodic Table, which is a neat organization of the chemical elements.

If you memorized the Periodic Table, then there would be no indication from mere memorization that you understood it.

If you could give some indication why different elements were placed in the table where they are placed, then you would indicate greater understanding. (This would not require that you had memorized the table). Having some knowledge of how the elements are placed according to their atomic number, and how this affects their properties, would indicate some degree of understanding rather than of memorization.

History

History may appear to be mere memorization in that the facts of history do not appear to follow some law or principle, but are purely by chance (this isn't true, however).

For instance, all the facts of history could have been otherwise. So that Henry I succeeded William II as king of England does not follow any pattern in that Beryl

the Mighty could have succeeded Henry I. And the fact that Thomas Jefferson succeed John Adams as president of the United States, similarly, could have been otherwise.

That is, the lists of kings and queens or presidents is somewhat arbitrary in the sense it could have been otherwise. There appears to be no way to figure out which one followed which.

A knowledge of the kings and queens of England or the presidents of the United States does not especially indicate understanding.

If someone knows both lists, and the can say who the king or queen of England was when Martin Van Buren was president of the United States, then this indicates a greater understanding. The information in the two lists has been linked in some way. For instance, Martin Van Buren was president from 1836-1840. William IV was King of England from (1830-1837). In 1837, Victoria became queen.

By knowing various historical facts, the historical information becomes logical and interrelated, so you can sometimes figure out a date, if you know certain facts. For instance:

If someone can say who the king or queen of England was at the time of the "Showdown at the OK Coral", and who was the president, and what was going on in England at the time... then the more links there are, the more understanding of world history is shown. The Wyatt Earp's Showdown occurred on October 26, 1881. At this time, Victoria was Queen of England (1837-1901). Also, in this year, the British were involved in the first Boer War (Transvaal). Earlier in this year, Disraeli died. Shortly before this date, on September 19th, President James Garfield died, having been shot by an assassin some months earlier. At the time of the Showdown, Chester Alan Arthur was president (he served until 1885, having succeed Garfield) was president .

If you are unsure of the year Garfield was assassinated, and you know the date of the Showdown, then you can figure the year out. Similarly, you can figure out the year Arthur became president. I am not saying this is a way to learn history. I am saying that having learned certain facts, then other facts become less arbitrary and more rational. That is, there is more understanding.

Of course, if you couldn't remember the date of a famous battle, but could remember something else that happened at the same time, or a year earlier, then you could figure out the date of the famous battle. The Battle of Waterloo occurred in 1815. The President of USA was James Madison (1809-1817). In 1815 the Whitehouse was rebuilt, after being burned by British soldiers during the War of 1812.

What has happened here is that dates become more things that can be figured out rather than random. In this way, subjects such as history become more logical and somewhat more like science and mathematics.

So what is understanding?

This is more an exploration of the concept of "understanding", and is rather my opinion. It seems that understanding is more than just learning or memorizing. When we have memorized something we can produce what we have learned. When we understand something, we can produce novel responses of material we haven't learned.

We have learned to relate the information we have memorized in our heads so that there is new learning.

Essentially, new links are formed between what we have learned (memorized) and so we produce new knowledge... knowledge we have not memorized but have developed by seeing links between what we have memorized which form new relationships.

Understanding also means that we can use or apply what we have learned to achieve goals, such as solving quadratic equations, and to link different facts together in our heads, so as to see new relationships.

16. Substitution

Using the Number Code for Vocabulary

You can use the number code to help you with creating substitute words for vocabulary. As mentioned elsewhere, the consonants are the letters that carry the most information about a word. The vowels can change without losing too much of the meaning.

However, sometimes we might need to change the consonants to create a substitute word. This means we lose a lot of information about the word and have to rely more on our true memory.

Consider the example with the abstract words in our first page on substitution. The first word was "excellent". We substituted "eggs sell ant" as a more visualizable phrase.

The word excellent represents the following number using our code: 70521. We could use this number to find a new substitute word, which will be somewhat similar in sound to "excellent".

Of course, we could also drop all the vowels and try to find meaningful words that fit. However, the letter-number code has been devised so the numbers are represented by broadly similar consonants. For instance, "0" is represented by "s" or "z". These are consonants that are broadly similar. Also, "9" is represented by "p" or "b", which are also similar.

Actually, there isn't another common English word that represents 70521, so we need to break it up. There are a number of words which can represent 70. For instance, keys, hags, wigs, hacksaw, oaks, axes, etc, as well as eggs. These are visualizable words.

Also, there are a number of words which can represent 521. For instance: land, lined, lint, walnut, etc. The phrase "hacksaw lint" could be a memorizable form of "excellent". If you say "It was a hacksaw lint day", then the phrase sounds like "excellent".

17. Devising Substitute Words

Naturally, a substitute word is normally different from the word you need to remember. A substitute word is meant to get to nearer to the actual word you want to remember.

Sometimes when trying to remember a word, we might say or think:

- It begins with a "t"
- It sounds like...
- It's a small word
- It means the same as...

Even with a very slight link, we get nearer to the word we are seeking.

Substitute words are words that get us nearer to the word we want so as to remind us of the actual word.

Words such as "backgammon" **contain words that could be substitute words**. So we could imagine here some gammon (pig meat) on our back. "Shakespeare" is a name that gives us "shake" and "spear". So we can make a substitute phrase of shaking a spear. This could be a preferred technique when we can find such words within the word we want to remember.

Normally, however, we need to find a substitute word that is similar to the word or parts of the word we want to remember.

Sometimes a word contains the **sound of another word** which is meaningful. For instance, "Polk", as a surname might be pronounced the same as "poke". "Taylor" sounds like "tailor".

We can **add letters** or syllables to part or whole of a word to make substitute words or phrases. So "Garfield" can become "ci**gar field**". and "Grant" can become "**grani**t**e**".

We can also remove syllables or letters. "**Ad**eno**sine**" could be remembered as "ad sign," a substitute phrase where some sounds are left out.

18. Number-Shape System

These are mnemonics based on the form of written numbers…

0 - round shape: an orange, a ball, tyre

1 - a candle, a pencil, a staff, a dart

2 - a swan, a duck, a goose, a serpent

3 - a triangle, a trident, clover, stool

4 - a square, a dice, table,

5 - human foot, a hand, a glove, a sickle, a hook

6 - a tobacco pipe, elephant's trunk, hockey stick

7 - a carpenter's iron square, a cutthroat razor

8 - a pair of spectacles, hour glass, woman

9 - a magnifying glass, a riding stick, tennis racket

19. The Mnemonicless Mnemonic

This is a fast method of learning text by heart without using a formal mnemonic. It works on the following basis. Part of the text to be memorized is written out, preferably in a word processor on your computer, since the exercise is much easier to do using the ‘Find & Replace’ function of a word processor.

Next, the paragraph is rewritten omitting the letter ‘E’, replacing it with an ‘X’. Then the paragraph is read.

This paragraph is again rewritten, replacing also the ‘T’ letter with an ‘X’. Now this new paragraph is read.

This process is repeated by rewriting the paragraph replacing the letter ‘A’; then ‘0’, then ‘I’, then ‘N’ and so on, until you end up with a text by the twelfth rewriting in which the letters ‘E, T, A, 0, I, N, S, R, H, L, D, U’ have been removed. These twelve letters are the twelve most frequent letters of the English written language in decreasing order of frequency of usage. Punctuation and the remaining letters are retained.

With some of the more complex passages you may find you have lost the drift by the time you have removed the first six letters: E, T, A, 0, I, N. If this happens, return to the last passage you could read easily and go forward from that point.

Easier passages should not present this problem. By the time of the tenth to the twelfth rewriting you will find you are reading a passage which in many cases has no letters at all, so by reading it you are in fact recalling it from memory.

The only time this method fails is if some of the words are unfamiliar to you before you start to remove the letters, so be sure you know the meanings of all the words.

Below is an example of a passage treated in the manner of this memory method:

The first problem of empiricism, if empiricism is believed, concerns the nature of ‘substance’. If all our knowledge comes from sensory data, what exactly is this substance which is supposed to give off the sensory data itself. If you try to image what this substance is, apart from what is sensed, you will find yourself thinking about nothing whatsoever.

With the Letter ‘E’ removed:

Thx first problxm of xmpiricism, if xmpiricism is bxlixvxd, concxrns thx naturx of ‘substancx’. If all our knowlxdgx comxs from sxnsory data, what xxactly is this substancx which is supposxd to givx off thx sxnsory data itsxlf. If you try to imagx what this substancx is, apart from what is sxnsxd, you will find yoursxlf thinking about nothing whatsoxvxr.

With the Letters ‘E and T’ removed:

Xhx firsx problxm of xmpiricism, if xmpiricism is bxlixvxd, concxrns xhx naxurx of ‘subsxancx’. If all our knowlxdgx comxs from sxnsory daxa, whax xxacxly is xhis subsxancx which is supposxd xo givx off xhx sxnsory daxa ixsxlf. If you xry xo imagx whax xhis subsxancx is, aparx from whax is sxnsxd, you will find yoursxlf xhinking aboux noxhing whaxsoxvxr.

With the letters ‘E, T, A’ removed:

Xhx firsx problxm of xmpiricism, if xmpiricism is bxlixvxd, concxrns xhx nxxurx of ‘subsxxncx’. If xll our knowlxdgx comxs from sxnsory dxxx, whxx xxxcxly is xhis subsxxncx which is supposxd xo givx off xhx sxnsory dxxx ixsxlf. If you xry xo imxgx whxx xhis subsxxncx is, xpxrx from whxx is sxnsxd, you will find yoursxlf xhinking xboux noxhing whxxsoxvxr.

With the letters ‘E, T, A, O’ removed:

Xhx firsx prxblxm xf xmpiricism, if xmpiricism is bxlixvxd, cxncxrns xhx nxxurx xf ‘subsxxncx’. If xll xur knxwlxdgx cxmxs frxm sxnsxry dxxx, whxx xxxcxly is xhis subsxxncx which is suppxsxd xx givx xff xhx sxnsxry dxxx ixsxlf. If yxu xry xx imxgx whxx xhis subsxxncx is, xpxrx frxm whxx is sxnsxd, yxu will find yxursxlf xhinking xbxux nxxhing whxxsxxvxr.

With the letters ‘E, T, A, O, I’ removed.

Xhx fxrsx prxblxm xf xmpxrxcxsm, xf xmpxrxcxsm xs bxlxxvxd, cxncxrns xhx nxxurx xf ‘subsxxncx’. Xf xll xur knxwlxdgx cxmxs frxm sxnsxry dxxx, whxx xxxcxly xs xhxs subsxxncx whxch xs suppxsxd xx gxvx xff xhx sxnsxry dxxx xxsxlf. Xf yxu xry xx xmxgx whxx xhxs subsxxncx xs, xpxrx frxm whxx xs sxnsxd, yxu wxll fxnd yxursxlf xhxnkxng xbxux nxxhxng whxxsxxvxr.

With the letters ‘E, T, A, O, I, N’ removed.

Xhx fxrsx prxblxm xf xmpxrxcxsm, xf xmpxrxcxsm xs bxlxxvxd, cxxcxrxs xhx xxxurx xf ‘subsxxxcx’. Xf xll xur kxxwlxdgx cxmxs frxm sxxsxry dxxx, whxx xxxcxly xs xhxs subsxxxcx whxch xs suppxsxd xx gxvx xff xhx sxxsxry dxxx xxsxlf. Xf yxu xry xx xmxgx whxx xhxs subsxxxcx xs, xpxrx frxm whxx xs sxxsxd, yxu wxll fxxd yxursxlf xhxxkxxg xbxux xxxhxxg whxxsxxvxr.

With the letters ‘E, T, A, O, I, N, S’ removed.

Xhx fxrxx prxblxm xf xmpxrxcxxm, xf xmpxrxcxxm xx bxlxxvxd, cxxcxrxx xhx xxxurx xf ‘xubxxxxcx’. Xf xll xur kxxwlxdgx cxmxx frxm xxxxxry dxxx, whxx xxxcxly xx xhxx xubxxxxcx whxch xx xuppxxxd xx gxvx xff xhx xxxxxry dxxx xxxxlf. Xf yxu xry xx xmxgx whxx xhxx xubxxxxcx xx, xpxrx frxm whxx xx xxxxxd, yxu wxll fxxd yxurxxlf xhxxkxxg xbxux xxxhxxg whxxxxxvxr.

With the letters ‘E, T, A, O, I, N, S, R’ removed.

Xhx fxxxx pxxblxm xf xmpxxxcxxm, xf xmpxxxcxxm xx bxlxxvxd, cxxcxxxx xhx xxxuxx xf ‘xubxxxxcx’. Xf xll xux kxxwlxdgx cxmxx fxxm xxxxxxy dxxx, whxx xxxcxly xx xhxx xubxxxxcx whxch xx xuppxxxd xx gxvx xff xhx xxxxxxy dxxx xxxxlf. Xf yxu xxy xx xmxgx whxx xhxx xubxxxxcx xx, xpxxx fxxm whxx xx xxxxxd, yxu wxll fxxd yxuxxxlf xhxxkxxg xbxux xxxhxxg whxxxxxvxx.

With the letters ‘E, T, A, O, I, N, S, R, H’ removed.

Xxx fxxxx pxxblxm xf xmpxxxcxxm, xf xmpxxxcxxm xx bxlxxvxd, cxxcxxxx xxx xxxuxx xf ‘xubxxxxcx’. Xf xll xux kxxwlxdgx cxmxx fxxm xxxxxxy dxxx, wxxx xxxcxly xx xxxx xubxxxxcx wxxcx xx xuppxxxd xx gxvx xff xxx xxxxxxy dxxx xxxxlf. Xf yxu xxy xx xmxgx wxxx xxxx xubxxxxcx xx, xpxxx fxxm wxxx xx xxxxxd, yxu wxll fxxd yxuxxxlf xxxxkxxg xbxux xxxxxxg wxxxxxxvxx.

20. Peg System & Method of Loci Extra

Thoughts form undoubtedly a large part of our mental experience, the part most important for the rational life of knowledge. There seem to be many kinds of thoughts. Complex structures are built upon them, just as upon sensation or images and feelings. One thing, however, seems fairly clear: memory for thoughts is much better than memory for trains of words or images.

A series of twenty well-marked ideas - for instance, striking proverbs or maxims - will be retained to some extent even after just one reading. Of course, the whole series could not then be repeated spontaneously, but the mention of some decisive word from each proverb, or of another proverb with a similar meaning, will suffice to recall any given one immediately. Of a series of thirty such proverbs, read aloud once, with a short pause for reflection after each, a good memory can reproduce correctly the main thought, and perhaps even the exact words of as many as twenty-seven. The same holds good for thoughts which are elaborated by the hearer with the help of suggestive phrases, which are to be remembered.

If we construct a long series of pairs of such phrases - e.g., Homer and the Bible, the unity of mankind; supreme genius; gentlest modesty; nationalization of art, patriotism run wild, etc.- and read these slowly to a listener, allowing him time to form a link of thought between the members of each pair, we shall find that, on naming the first member of each pair, to him in haphazard order, he will reproduce the thought or the words of the other members correctly in most cases. Out of twenty such pairs, seventeen to eighteen can usually be recalled correctly. But if we read once twenty words from a strange language, with their meaning in English, we should with difficulty remember even a small fraction of them.

So far as I know, memory for thought has not been the focus of much research since the days of the Introspectionists. For example, to investigate the relation between thoughts more systematically, Bühler (1908) added a series of experiments on "memory for thoughts." It is not clear how exactly how one would go about doing research on the subject, but it is an intriguing subject nonetheless. These kinds of difficulties aside, the evidence is not very compelling that people are good at explaining their own thought processes after the fact, and this limits their mental capacities.

Hammersley (1994) has reviewed characteristics of memory that can lead to inaccurate self-reporting. In my own experience, a student can only recall a sequence of about five or six thoughts at most (about 30 words) without external prompts, as described above, in which case he can recall as many as twenty-five or thirty thoughts (about 150 words), so our potential capacity for recall is much greater than our actual capacity for recall. Mnemonics can be used to exploit this fact, and create a larger thinking space, so much more complex thoughts are possible.

Much of our previous thinking is lost, due to the limitations of Short-Term Working Memory to five or six chunks at best. That is a pretty limited capacity, given the importance of Working Memory for thinking, learning, and problem solving. This is a problem, when a student is thinking deeply on a subject, because important conclusions, decisions and insights, which could be needed in later stages of his thinking cannot be retrieved. Of course, a student could try and write down these important thoughts, as they occur, but if there is a delay of more than about thirty seconds, this becomes like recalling a dream - so a student will have to write rapidly, otherwise few of these thoughts are recovered. This often happens to me when I'm in the bath or bed! So these days, I always use Mnemonics.

Brewer (1988) has shown that personal memory for actions, which is a distinct form of Episodic Memory, is far better than Personal Memory for thoughts, which tend to decay faster, and with the passage of time need more reconstruction. A considerable body of research has established that memory for action words or phrases is substantially higher when the actions are enacted during encoding compared to when they are verbally rehearsed or observed (e.g. Hubert D. Zimmer, 1994 & Freeman & Ellis, 2003). I have observed this phenomena when I was in stage school. People's memory for thoughts, feelings and events is imperfect, and the reconstructive nature of memory can introduce systematic biases in thought.

The best solution to the problems described above is to use Mnemonics. Both the System of Loci (Roman Room) and the Peg System (Major System) are ideal for this purpose. By using the Basic Peg System, a student can store more than one hundred past thoughts, and, if needs be, the system can be extended by various means, to accommodate more than 1,000 thoughts. In addition a student can retrieve many of the thoughts that led up to them. Sometimes more than two thousand words can be stored on the Basic Peg System, and many more if it is extended. (The method used for recording thoughts is similar to the Mnemonic Method used for recalling dreams or recalling scenes from a movie).

The Peg System or the System of Loci will give a student Random Access to his past thoughts, whereas the Link System will not, so the Peg or Loci Mnemonics Systems should be used. The capacity of the Peg System can be multiplied tenfold, if needs be, by using Short Chains with up to ten Links, or simple Thought Maps. There are also other methods of increasing the capacity of a Peg System described earlier in this course. NB Fluency with the Peg System or the System of Loci is a prerequisite of the procedure described below:

As soon as a student has an insight, conclusion or whatever, that is important to his further thinking, on a particular subject, he should Link this with a Peg or Location. Conjectures, partial plans, images, and various kinds of reasoning can easily be Linked to Pegs or Locations. At first, this will be slow to do, and will take several seconds for each item, as initially a student will frequently need to use Substitute Images and Substitute Words for abstract concepts, but with sufficient practice, a thought can be linked to a Peg or Location in less than a second, then a student

can easily return to his thinking, as little memory decay will have occurred over this short interval. The process of Linking will have become semi-automatic and the need to use Substitute Images and Substitute Words will have passed away - all a student will need to do is hold a thought in conjunction with a Peg or Location for a moment, then the thought and Peg will be Linked. Then, at a convenient time in the future, when a student retrieves the insights and conclusions, etc. stored on the Pegs, he will find that he can also retrieve many of the thoughts that led up to them.

The use of Mnemonics will also reduce the effects of Cognitive Bias. Without Mnemonics, most people (unless they are experts, who have developed a Long-Term Working Memory in specific domains), use their Short-Term Working Memory for thinking, so they can only think of a few ideas simultaneously. The reward from using the Mnemonic procedure described above is a much greater mental capacity: The Soft Breakthrough.

Recalling by way of Mnemonics is a brain activity with a heavy burden, almost the whole cerebrum activates simultaneously, thus it is a very effective method for integrating the various and several memory systems in the brain. By retrieving material from the Peg System, a student can think of more ideas simultaneously within a specific domain, sometimes more than ten, thus he has much greater power in thought, speech and writing. However, using Memory to Reflect; we sometimes substitute memory for thinking. If memory takes the place of thought, clear perceptions, and the observation of the essence of the thought, which has been memorized, this is a major flaw. This phenomenon is observed in many students, and it should be avoided. "Never confuse memory for thinking."

In my personal system, I have 125 Pegs. I have combined the 100 Pegs of the Fenaigle System with 25 of the Pegs from the Alphabet System, and formed this into a cube (five on a side), with five layers of 25 Pegs, like five simple Memory Graphs, one on top of the other, to give a total of 125 Pegs. As the system is in the form of a cube, this makes the system about 30% faster, and much more flexible than a linear system. By using this cubic system in combination with simple Thought Maps and Short Chains, I have been able to store between 12,000 and 15,000 words, then decode the Mnemonics stored in the system at 150 words per minute, to give a 90 minute lecture. The philosopher Bertrand Russell used a similar but somewhat simpler method to the one described above, one with only 50 Pegs, to aid him in his philosophical thinking. I know this from a conversation I had with him in my father's garden when I was a schoolboy, on the eve of his ninetieth birthday.

What's Next?

Well, that completes your first run through Creative Memory. Remember that the 'cyclic' approach to study is a good one - if you go back to earlier exercises now, you'll see them in a new light and get much more out of them. It's a good idea to choose a particular lesson and concentrate on practicing its principles in your life for a few days, until it is completely mastered and assimilated. For each exercise, consider: How can I use this for work/rest/play?

Ken Ward has written a great deal on his site **Freeing the Mind** about understanding and manipulating numbers. Mastering numbers is the next key stage in your mind development, so we suggest you check out these pages online:

- **Speed Arithmetic**
- **Ken Ward's Mathematics Pages**

In addition, Trans4mind offers further free resources and also online interactive video workshops to radically boost your progress on your path of personal and spiritual development. You can learn how to meet all of the challenges that life presents, obtain a new clarity of your purpose and identity, plus tremendous inner peace and enlightenment, if you choose to really follow through on these courses! Check out Trans4mind's **Personal Development Courses**

Read on to learn about the further **Mind Development Courses** that are available…

Super Student - Mind Development Course 1

Many people have bad experiences at school and perhaps later in life, when attempting to study a new subject. It is easy to quickly get bogged down with new terminology, and often, new concepts and procedures seem unclear. This situation can quickly get out of hand as the student gets left behind and the subject either becomes an ongoing struggle or it is abandoned. But none of that is necessary; it is possible to succeed with the study of any subject.

With this course you will learn how to study a subject with maximum comprehension, with excellent recall, and with the ability to apply what you have learned effectively.

You will also learn how to take notes at rapid pace from books or live lectures, and how best to represent that information with key words, mind maps and flow charts that aid memory and understanding.

These abilities will be useful for your home studies, at college or work, and for your study of further Mind Development courses. You will indeed be able to succeed at studying effectively those subjects you are interested in, even those that were difficult before. The course is available freely online...

Click here to start the Super Student Course...

Super Vision - Mind Development Course 2

The first course in the Mind Development system is "Super Vision," a home-study course to improve the mind's capacity for visualization and integration between left and right brain, boosting memory, creativity, natural eyesight and drawing ability. This is a new way of seeing - and being.

The practical exercises offered in this course help to develop visual perception, which is one branch of non-verbal communication, and address the subject of breathing and relaxation. Adequate oxygenation of the brain and a relaxed state of being is necessary for further developing the mind.

The eyes and the ears are the main channels through which one gains information about the world. As with listening skills, training in visualization and looking makes you more aware. When you are more aware, the subconscious mind has less influence. This means you are more relaxed, less anxious, less easily upset, a better memorizer - and your vision is improved.

Click here to learn more about the Super Vision course

Effective Communication - Mind Development Course 3

This course teaches powerful communication skills that enable you to be more effective at work and in those situations of everyday life where better communication can make all the difference.

The Effective Communication course offers a series of practical exercises which develop the skills of communication and help the student to apply the fruits of his or her learning here and now - both to his or her personal growth and to the practical issues of personal relationships and business.

By doing the exercises thoroughly, the student can bring both halves of the brain into mutual communication, so that he or she is freer to think holistically and experience the world from an expanded point of view.

Communication is the vehicle for all further techniques, so communications skills are a vital aspect of Mind Development. The Effective Communication course includes practical exercises to enhance the person's capacity to listen attentively and comprehend. Following that, questioning skills are practiced, which have relevance to communication, memory and understanding. This will help the student to maintain control of communication in practical, social and business situations. You will also learn about practical problem solving and how to achieve your goals in life.

Click here to learn more about the Effective Communication course

Educating the Will - Mind Development Course 4

This course teaches the skills of concentration as a means of educating the will. Often, when we put our mind on something, we think of something else and this, in turn, reminds us of something else. The mind wanders from one thing to another by associations, until the original thing is forgotten. 'Concentration' means putting all one's attention on something, and keeping it there for as long as one wishes to. So if you concentrate on a book, you are aware of the book and you are not thinking, looking or listening to anything else.

If you are concentrating you are awake and aware. We all need to learn the mood of concentration - of actually BEING in the Here-and-Now, noticing and observing, and focused on our actions.

Concentration is a means to develop the will, so that life may be lived purposely and creatively, rather than as a reaction to the flow of sensations. Because you will not flit from one thing to another, like a butterfly, you will be able to choose to focus your mind on things, e.g., study or work, and will increase your skills and knowledge in these areas. Most importantly, you will be able to focus more clearly on your vision of what you want to achieve.

In short, your mental life is both intensified and broadened. The ability to concentrate is, therefore, a valuable skill which will enhance all other skills. Almost all the drills and exercises of Mind Development help develop your ability to concentrate. But are there are ways to improve your concentration directly? Yes, and this course teaches the best of them.

Click here to learn more about Concentration: Educating the Will

Power Reading - Mind Development Course 5

This home study course can double your reading speed and supercharge your brain's capacity to digest, remember and implement huge amounts of information... essential ingredients to success in your professional and personal life.

We all learn to read at school, after a fashion. But for most of us, this is not an optimal use of our brain power. In this course you will learn to better use the left brain's focused attention combined with the right brain's peripheral attention, in close harmony. Good communication between the brain hemispheres is a prerequisite for creative thinking and also a sense of well-being, where thoughts and feelings are integrated.

By using appropriate techniques, the limitations of early education can be overcome and reading ability improved by 500% or more.

The course teaches in-depth reading techniques that greatly improve literary intelligence, so that you can clearly perceive the ideas and values that the writer is expressing and relate them to those of other authors and so be better able to make objective conclusions.

Click here to learn more about the Power Reading Course

Appendices

1. PRACTICAL DEMONSTRATION AS A MEMORY AID

Einstein said… "If you can't explain it to a six year old, you don't understand it yourself."

Similarly, if you really understand a principle, then you can demonstrate it practically in a clear and straightforward way that a child could comprehend. It may take a while to develop your understanding, by trying different ways of connecting and labelling the items involved, but having done so and demonstrated it well, you'll never forget.

We highly recommend students of Mind Development to own their own demonstration kit and use it continually throughout their studies.

A 'demo kit' is a bunch of rubber bands, batteries, fuses, corks, caps, paper clips, coins… whatever will do. These are kept in a handy small box, tin or container. A demo kit is to be used for all study. It is to be used frequently while reading or listening to information. A demo kit adds mass, reality and doingness to the significance of the written or spoken word. The pieces of the kit represent the things one is demonstrating. It helps hold concepts and ideas in place.

Demo kits are for use. They will get you much better results.

In my experience there is no advantage in having more than 36 items in a demo kit. If there are too many items, performance deteriorates. Long-term working memory span for a person of average intelligence is 36 items and for superior intelligence (IQ 125) is about 40; it doesn't get much better than that even with a high IQ. A chess game has 32 pieces, so even people than an IQ of 90 can play it.

These are items I like to include:

1. A pair of small dice that can be used to represent 36 different thoughts (up to 6x6).

2. A ten sided dice from a game shop, that permits me to generate random numbers, useful in creativity and mathematics.

3. A mirror shard the size of a postage stamp to show a mirror image of the demonstration - like a doll's house mirror.

4. A small compass, because with certain technical writing it is a good idea to know where north is.

5. In my own box I added ten strips of thick paper, ¾ x 2 inch, a small pencil, and the numbers 0 to 9 taken from some game like Scrabble. This all fitted into a small tin.

This is a good game that may be played with the contents of the demo kit to enhance memory…

Collect on a tray a number of articles - knives, spoons, pencil, pen, stones, book and so on - not more than about fifteen for the first few games, and cover the whole over with a cloth. Then invite others to sit around, so they can see the tray, and uncover it for one minute. Then each person writes down a list of all the articles they can remember... The one who remembers most wins the game.

2. THE KNOWLEDGE NET

About sixty years ago educators came to the conclusion that rote learning was not a very efficient way of instructing a student. Rote learning was phased out and replaced with the modern method of instruction. Since the middle ages until about 1945, education was near synonymous with rote learning. Students may have gained something from the modern liberal approach, if they are fortunate to have excellent teachers, but all too often they have also lost something important, because the modern methods usually do not include adequate means for clarifying and memorizing information - all too often it is half understood and (post the exam) almost immediately forgotten.

Many of our parents went through the earlier strict type of education. As adults, they were able to quote verbatim from the Iliad, American and British Literature, History, Geography and General Science. This gave them in many cases a certain charisma; they could speak and write with impact and most importantly, they had a sense of certainty in a troubled and changing world. Later generations, to a significant extent, have lost this sense of certainty, achieved through having a wide and well-connected structure of knowledge.

Memory & Identity

Global structures of meaning play a primary role in the cognitive processes behind discourse. Furthermore, without a large body of secure data, individuals frequently have identity problems. Long term memory content therefore plays a crucial role in creating our identity. In short, without the capital of stable data standing behind us, in everything we are and do, we have a shaky sense of our identity and very little certainty.

According to Hunter in his classic book on memory, people with a poor long term memory are very easily socially conditioned. In modern terms, they are field-dependent and other-directed. To be Self Directed one needs a strong sense of identity, and memory is a crucial factor in this. We need to remember our beliefs and values; our methods for doing many tasks and learned solutions; our likes and dislikes; who we know and what we think of them; our personal history; and our learning of all subjects including our career skills. So a person's entire knowledge net is largely the structure of their character.

All memory is important, especially long term memory, and the most important part of long term memory is our knowledge net. Our knowledge net starts to expand from shortly after birth and in ideal cases continues to expand until shortly before death. An evolved knowledge net is a context in which all new information can be compared and evaluated, and hence valued and understood. Wisdom and charisma, through insight and certainty, result.

A minimal knowledge net results in a person who is like reeds in the wind, swaying in whatever directions the influences upon him dictate. Without our knowledge net,

we would be like a goldfish; we would be nothing. Almost every facet of personality and consciousness stems from our knowledge net. Our character, the capacity to keep our head in a sea of troubles, the capacity to express ourselves and understand language, our identity and the well springs of Ego itself, stem from the knowledge net.

Most systems of brainwashing work at trying to break down this structure, so a person loses sight of who he is. A person with a poorly formed knowledge net, with only a limited content, has a weak Ego. He lacks presence and charisma. This may call to mind the type of school teacher who tries to give a lecture whilst he faces toward the blackboard. People with a limited data base are often full of opinions but unfounded ones, because they lack stable and well-connected data. An extreme example is that of a famous idiot savant who was taken to see a play. He was able to count the number of words spoken but the play went straight over his head. Without a significant and relevant data base he was unable to relate to the content of the play.

Self-Directed Education

Before Malcolm X went into prison he was street-wise and a natural leader. However, as he began to write letters to a wide variety of people, he became frustrated with the fact that he could not communicate with them as he wanted to. "It was because of these letters that I happened to stumble upon, that I started to acquire some kind of homemade education." He was frustrated because he had been the most articulate hustler on the streets of Harlem, and could get anyone's attention with his words. He was not used to being ignored but now it was hard for him to communicate.

It was equally hard for him to keep up with events because he could never fully understand what he was reading. So he decided that he needed to learn how to read and write properly and that the best way to go about it would be to get a hold of a copy of a dictionary and study it. He decided that the best place to start would be at the beginning, with the A's. So he just started copying. He copied every word and punctuation mark on the first page. It took him the entire day, and when he finished he read aloud what he had written, over and over again. The next day he woke up thinking about the words that he had written and to his surprise, he even remembered what some of them meant. As his word-base broadened he was able to pick up a book and read it all the way through.

He went on to spend all of his free time reading, and acquired a much wider knowledge base. As he later said, "I had never been so truly free in my life." As a result he also became an articulate writer and was able to obtain a much greater world-wide influence, even from within prison, as a result of his own writing.

By the mid-twentieth century, scientific and technological knowledge far outstripped the ability of most people, even the moderately well informed, to comprehend it. The aim of most specialists is to know ever more about their own specific niche.

However the corollary to a small minority knowing more and more about less and less, is a large majority knowing less and less about more and more. It becomes overwhelming to the average person and even the specialist may know little about his own colleagues' work. To turn this around we need an ongoing self-directed education, not attempting to know everything but to understand very clearly the basic principles of a wide range of subjects, so that the detailed information can be placed in a reasonable context.

It is only in the context of a wide knowledge net that intelligent and creative connections may be made between disparate information, and so we have the challenge of developing an encyclopedic knowledge that covers enough bases with sufficient depth, to be able to make sense of new information and to perceive the opportunities that arise thereby. The immense and ever-growing resources of literature and the Internet are only valuable to the degree that their data can be related to the knowledge net that already exists within our own minds.

The human brain has immense capacity for interconnectedness, far more than any supercomputer. It's pattern recognition capability enables us to perceive the connections between ideas, people and events - all the contents of our knowledge net - and to be able to know what is relevant and important in any particular context. That process, however, depends on our ability to remember.

Knowledge Itself Promotes Memory

Significant evidence demonstrates a superior memory in those experts and individuals who know a great deal about a specific domain of knowledge. Memory for a certain type of material improves with practice, such as with naturally reoccurring situations. To take a simple example, the amount of knowledge of soccer was found to be a powerful determinant of subjects' recall of newly presented scores for recent soccer matches. This can be attributed to improved organizational processing with a wider and more detailed context, and also to better recognition of the similarities and differences between the items in question.

Mnemonics

Through the use of mnemonics technology (devices for assisting the memory), in conjunction with a couple or three years of part-time study, we can gain the sort of data base enjoyed by our forefathers, in an expanded and modern context, and along with it a greater sense of certainty and a greater security in our identity.

The key is the use of visual images in an ordered, spatial arrangement that relate to the abstract ideas and enable us to remember them. Human memory recalls concrete images far more easily than abstract ideas, especially images with an emotional endowment, and it remembers an ordered chain of associations more accurately than a random assortment. By the use of mnemonics - using chains of association to connect one memory with another - new information is encoded in such a way that it is connected to previously stored data, such that it is not easily forgotten.

The wider the existing knowledge net, the easier it is to find such useful connections, so the process is cumulative and accelerating. However, modern mnemonics technology works so much better than the old ways of rote memorization, that even a little experience with these techniques can make a startling difference. One is on the way to acquiring a greater state of memory. The knowledge net is effectively a crystallized intelligence that acts as an expansive resource for the fluid intelligence of one's working memory.

3. MEDIUM-TERM MEMORY

Today, a major goal of Mind Development is the creation and installation of an artificially internalized Medium Term Memory to extend the Working Memory function and to provide a more effective interface than normally obtains between the Long and the Short Term Memory. Creation of a highly developed Medium Term Memory function is a major part of establishing the primary goal of the Memory Course: The Remedy of Inner Space.

Before, however, I go on to describe what Medium Term Memory is, it is necessary to expand on the subject of Long Term and Short Term Memory, and the question of why a Medium Term Memory Function needs to be installed.

In common with the higher animals and our recent forebears, we have two natural memory functions: Short Term Memory and Long Term Memory. Adults in primitive cultures and many children in advanced cultures have a Short Term Memory that can retain a detailed image or sensory representation without degradation for about ten to fifteen seconds. During this ten to fifteen second period, the stored mental image may be accessed serially, in parallel, or randomly, and it may be modified in various ways in Working Memory before a problem is solved, a decision is made or an action is taken.

Natural Long Term Memory is also mainly an Iconic Store, in which past experiences are stored in the form of multi-sensory representations. Three billion moments of one second each can be stored in an average lifetime. Much of the content of Short Term Memory and observations are refiled in Long Term memory in iconic form, but only a tiny proportion of this content is available to voluntary recall. Furthermore, the iconic content of the Long Term Memory cannot be modified consciously, unless it is recalled to Working Memory and combined with Immediate Memory content or new observations.

These two natural memory functions were sufficient for our primitive forebears and probably suffice for certain primitive people still living today. For us, however, much of our thinking is verbal and symbolic, and the recently acquired skills of symbolic thinking have distorted the natural iconic functions of both Long and Short Term Memory. Our memory as a result is poor in comparison with primitive peoples.

At the end of the 1960s, I had the opportunity to interview a large number of people in Africa about their mental processes. Nigeria was at war at that time and many tribal people were being pushed into military service. These tribesmen were being interviewed for a different purpose, but I was able to exercise the role of psychologist. I asked many detailed questions through an interpreter, and I was surprised at the high level of introspective awareness possessed by these people. A large percentage of the subjects, who were interviewed at the time had experienced little of Western culture, and most of the subjects were illiterate. Many, however, had an undistorted natural memory.

By and large, the mental processes of these people were sensory based, rather than symbolic. Short Term Memory content was either like a short clip from a movie, with all the senses represented and lasting for about ten to fifteen seconds, or the capacity to recall between five and seven still pictures in great detail, after one presentation. Usually these images could not be manipulated internally to find solutions to the problems typically found in their culture. [It is my opinion that intuition played a much greater role and that the means by which their visio-spatial intelligence operated was through haptic and motor imagery]. Many children in our culture, who are eidetic imagers have a Short Term Memory similar to that of primitive people, but the Long Term Memory of eidetic imagers is similar to ours when we are adults. However the capacity to experience eidetic images is lost, at the latest, by the age of fourteen. We have a great deal of information stored in Long Term Memory in the form of dates, facts, formulas, etc. that are no longer connected to Personal Memory or Episodic Memory. We have both Semantic Memory, i.e. a memory for information only, whereas for tribesmen memory is almost entirely episodic.

The primitive person's subjective experience of Long Term Memory would be similar in some ways to our experience of a dream.The Australian Aborigines have a term for this: "Dream Time." It is similar to a dreaming, because Long Term Recall would be experienced as having a high level of concordance with external reality. Working in this way, Long Term Memory would provide a powerful support to the limited capacity of the Short Term Memory, by calling up icons and movies of past experience. For the primitive, Long Term Recall is almost equivalent to re-living the original experience: Long Term Memory and Short Term Memory appearing to blend into one unified system. A European or an educated African would only experience Long Term Recall in this way when in a relatively Ego-less state, such as lucid dreaming, or during an hypnotic trance when hypnosis is used to recover buried memories.

Working in this way, Long Term Memory provides a powerful support to the limited capacity of the Shot Term Memory by integrating icons and movies of past experience. Long Term Memory may be much slower to access than Short, but a much greater amount of data may be interchanged between the systems in the form of icons than we are able to achieve when we are using Semantic Memory. For us, Short and Long Term Memory act as almost separate systems. When the capacity of Short Term Memory has been exceeded due to input overload, data exits the Short Term Memory. This data is lost and cannot easily be retrieved again from Long Term Memory. In our type of consciousness, Long Term Memory provides much less support to Short Term Memory than it does for the tribesman. In contrast, most of the tribesman's semantic content is intimately bound up with the Episodic Memory of the original learning experience, so when this information exits Short Term Memory, due to overload, it is much more easily retrieved.

Since the appearance of Modern Man, at about the end of the last Ice Age, evolution has been primarily cultural rather than genetic - our brain structure has

hardly changed. Cultural evolution is many times as fast as genetic evolution, so the software, the content of our thinking and the programs we use to manipulate it have changed vastly, whereas the hardware of the brain has changed but little. One of the negative consequences of this vastly increased speed of evolution is that the relationship between the part of the brain that controls Short Term Memory and the part that controls Long Term Memory has changed. This relationship has changed because new mental functions have been superimposed on the old.

People living in pre-literate cultures have have successfully accommodated to the distorted relationship between the memory systems caused by the cultural invention of language - we have not. Our memories are relatively poor. The further invention of symbolic systems of representation, especially writing, has accelerated the rate of cultural evolution beyond our capacity to accommodate, imposing a new layer of semantic functions on the software of our mind. This change in our thinking has been particularly rapid since the invention of the printing press and the development of modern arithmetic.

Reading, writing and arithmetic have changed the mental software for almost everybody living in a modern culture. A further new layer of semantic processes has been superimposed on the older layer created by language, in the context of an already distorted relationship between Short and Long Term Memory. Most people in this culture have been unable to make a positive adjustment to these rapid changes, so distortion between memory systems has become disruption.

In the current culture, both Short and Long Term Memory are largely symbolic in their operation. Most of our thinking is either in words, concepts or numbers or in 'second order' images, such as maps, diagrams or minimalist, two-dimensional images that are closer to cartoons than the underlying, iconic primary images. In advanced cultures, we have all but ceased using iconic representation, thus the natural pre-linguistic relationship between Short and Long Term Memory has been disrupted.

This final stage of cultural evolution has been very recent, it has occurred within the last 500 years. As a consequence of the disruption between the Long and the Short Term Memory Systems, most people today have a much poorer memory than they had only 500 years ago, that is since the invention of the printing press. It is this disruption between Short and Long Term Memory that has caused a collapse of inner space. Repairing this disruption and remedying this collapse of inner space is an essential step in Mind Development.

Many children in this culture have aspects of memory that are similar to those of primitive people, but a qualitative change is experienced by most of these children during their early teens; this is when concrete memory becomes predominantly abstract. A few children in the higher intelligence ranges gain the capacity for abstract thought, without losing their childhood capacities of Iconic Memory, but more than a few children are unable to make this transition from concrete to abstract thought, because the disruption in the relationship between Short and

Long Term Memory is too great. Often, there are the children who were close to the top of the class in Junior School, but were found to have fallen close to the bottom of the class within the first couple of years in Senior School.

Soon after the invention of writing, memory deterioration was apparent to the wise but the cultural solution to this was to create an external Medium Term Working Memory, by using more of the same cultural inventions that unfortunately caused the memory deterioration in the first place. An external Medium Term Working Memory is created by using different forms of external representation to build a two way bridge between Short and Long Term Memory and to increase mental capacity for certain types of symbolic operations.

The long term consequences of creating a Medium Term Working Memory are that the memory processes of modern man, whether they concern semantic or episodic memory, short term or long, is that they are largely symbolic low definition, second order imagery, lacking many of the sensory modalities or informative descriptions. The mental content of modern man reflects the content of external memory. With the exception of the artistically trained, iconic Short Term Memory vanishes in about a second, leaving mostly symbols, and most of the information transferred from Long Term Memory to Short is in the form of concepts and words, backed up from time to time by flashes of iconic imagery in one sensory modality or another. Although modern man still has an iconic store in Long Term Memory this is seldom tapped, unless the mind is specially trained or there are extreme, emotional states of mind, or if special methods such as hypnosis are used.

Initially, external memory consisted of writing, drawing simple pictures, maps, diagrams, and simple devices such as the abacus to extend the powers of calculation. Since that time, these basic processes have been supplemented by printed books, libraries, tape recorders, photographs, movies, calculators, and recently the personal computer. One the one hand, all these different cultural inventions have increased the range, scope, capacity and speed of access to our External Medium Term Working Memory, thus bringing the present culture rapidly into being. On the other hand, the abundant creation of an External Medium Term Working Memory has conflicted with the natural process of mental development, during childhood and early adult life, both causing and fueling many types of neurosis and psychotic illnesses. These are mental illnesses of modern man. When primitive men and women come into contact with the modern culture, and to a degree are educated within it, they manifest similar psychological problems as suffered by modern man.

According to the developmental psychologists Lev Vigotski and Jean Piaget, natural mental development and the growth of intelligence is essentially the successive internalization of mental operations that were once external, thereby building up mental models of increasing sophistication, e.g. counting on one's fingers during infancy becomes mental arithmetic at a later stage of childhood. Likewise, a trainee chef learns, by experiments performed externally, to build an internal model of cooking that gives him the power to create new dishes, through experiments in the

realm of thought. In contrast, making mental processes external has uncreated internal memory, thus opposing the natural direction of mental development, namely the internalization of external models. As a result, we are seriously hindered if we wish to be an advanced student of Mind Development.

Since the invention of the printing press, our memories have seriously deteriorated - and to a large extent there has been a collapse of inner space. But, until recently our powers of reasoning, calculation and imagination have remained relatively intact. However, since the invention of the computer about 50 years ago, and as a consequence of the easy availability of the pocket calculator, we have also started losing many of the powers of thinking. Moreover, we are doing so at an ever increasing rate; we are now starting to reap the bitter fruit of externalizing the thinking processes, rather than internalizing them, resulting in a drop in IQ of more than 10% in a single generation.

Over the last 30 years that I have been running Mind Development Courses, I have noticed an increasing tendency for students to externalize mental operations. In the early days, such students were only a small minority, but today this minority is approaching 50% and the average IQ of the students of the students has fallen. This is in contrast to the 1% or so of the most highly creative scientists and artists, who have a vast store of general knowledge both of principles and facts, from which they can mentally fashion new creative combinations. In addition, they usually have many mental skills including a high level of crystalized intelligence and they are considerably higher than average capacity in most types of memory. These artists and scientists have this expanded capacity because they have spent a large part of their life internalizing mental processes and thereby increasing their capacity to perform thought experiments, not because they are made from superior clay.

In the early days of Mind Development, we could see the problems that lay ahead through reading science fiction that dealt with the near future - books that had been written by authors who had in the past made accurate predictions - and through observation, as the rot had already started with a minority of students. Consequently, using slide rules was banned in the course room. Some years later, this ban extended to calculators and any other form of mental amplifier. Students were also asked to refrain from using such devices for trivial purposes in their daily life. These rules stand firm to this day.

This solution was not sufficient of itself. At best it could only halt the process of externalization; for the most part it could not turn back the clock and reverse the process. This did not provide a solution to the problem of restoring iconic memory power and correcting the relationship between Short and Long Term Memory Systems.

Iconic recall has a similarity to hypnotically guided recall, so during the late 60s and the early 70s, we explored a number of hypnotic solutions to the problem of the disrupted relationship between the Long and the Short Term Memory and the collapse of Inner Space, which obtains from that. This approach was not fully

successful and in many cases caused new problems. Although hypnotically induced Iconic Recall was similar to that of primitive consciousness and it could be restored by the use of hypnosis, the resulting state of consciousness was not stable, and in many cases the normal abstract, symbolic form of thinking required in a modern culture was disrupted instead of developing the iconic memory system. It would appear that in many cases, hypnosis returned a student to a pre-symbolic mode of memory function with Iconic Recall, but the student's mind was overwhelmed with detail, so abstract thinking was almost impossible. One student's IQ fell from 151 to 112, although his memory was almost perfect, and it took 6 weeks for his normal mode of mental functioning to re-assert itself. He was not best pleased.

The above situation describes an extreme case but not the only case. Many students retained their capacity for abstract thought, but in these cases there was often a weakening of the Ego. In fact, in some cases hypnotic techniques led to a state similar to that of the early stages of a psychosis. As a consequence of the above the use of hypnosis was withdrawn in 1972, except for parts of the highest level of Mind Development in which hypnosis was used for a different purpose than restoring iconic memory and the remedy of inner space. There was no problem using hypnosis in these applications, because the work done on the levels below the highest level precluded such problems.

Our solution for today's student is for the student, through the use of Mnemonic Systems, to install an internal Medium Term Working Memory. This is the major action of the Memory Course (currently being revised before issue in Spring 2015), leading to a state of mind we call the Soft Breakthrough. Medium Term Memory in this context may be defined as a Medium Term Memory System, overlapping both Short and Long Term Memory, and possessing some of the qualities of both.

The system we are teaching today is based on a user friendly version of the Automatic Memory System taught to the 20% most able students in the old days. The Artificial Medium Term Working Memory used in Mind Development is a creative combination of several Artificial Mnemonic Systems, used in combination with a number of effective methods of memorization plus some special additions of our own. We have found that no problems have occurred using the above method. The Mnemonic Medium Term Working Memory solution will effective bridge the gap between Long and Short Term Memory; continued work with this system will awaken partial Iconic Memory and remedy the loss of Inner Space, leading to the Soft Breakthrough, after which the new memory system becomes all but automatic. This state of consciousness or state of mind will occur without the danger of collapsing abstract thinking processes. In fact, abstract thinking will be enhanced by the techniques used on the Memory Course. A major ability arises - the ability to switch from one hemisphere of the brain to the other.

This system, once internalized and drilled to the point of automatic operation, will provide 100 memory addresses, each capable of holding up to 3 digits or ten words. This is equivalent to a Short Term Memory span for 30 symbols or 1,000 words, or if you wish, 1,000 key words, and this is equivalent to 20,000 words of

running text or more. Put another way, by using key words at the rate of one to two per paragraph, a reasonable sized book could be encoded into your Mnemonic System, and recalled with more than 90% certainty of recall.

Access would be serial, random or parallel, although parallel access would be limited to 5 to 7 items at a time, but access time for a particular symbol or symbol group would be short. Typically, access time is between 20 and 500 milliseconds, in the case of a practiced student; a student who has achieved the Soft Breakthrough. This speed of access is faster than that of Long Term Memory, but slower in the case of Short Term Memory. The content of Medium Term Memory can reliably be retrieved after several hours, rather than seconds or minutes, and in some cases after several days. This will occur because much of the Medium Term Memory content will refile as Long Term Memory content, increasing learning capacity by several hundred percent. Unlike Short Term Memory, this system can easily be added to once it has been fully installed. In the Advanced Course, this system is expanded to ten fields of 100 memory addresses, in short 1,000 memory addresses.

As the speed of access of the Medium Term Memory is closer to that of Short Term Memory, it will back it up, and it will also extend the range and capacity of Working Memory. Although the field of Working Memory will only double (much more on the Advanced Levels), it will have expanded to a size that will encompass a significant portion of the Medium Term Memory, at any one time, and it will be able to move from any one part of the Medium Term Memory Field to any other part in a few hundred milliseconds. So there is a very intimate relationship between the two systems. The implication of this relationship is that the entire capacity of the Medium Term Memory is accessible, although only about 8% can be viewed at the same time and the remaining 92% is not open to introspection, so that Medium Term Memory can be used as an extended Working Memory, if a slower speed (half) of access can be accepted.

Medium Term Memory resembles a sheet of paper or a blackboard. If Short Term Memory is in danger of being overloaded by the partial products of reasoning and calculation, and these partial products cannot be erased and thrown away as Exformation (unneeded information), this content can be dumped into Medium Term Memory for subsequent retrieval at a later stage of calculating or reasoning. Or, with practice, you can learn to use the extended working field of the Medium Term Memory as an external thinking aid, such as a piece of paper or a whiteboard. Used in this way, the Artificial Medium Term Memory could be considered as a Medium Term Working Memory. Likewise in creative thinking, 50 to more than 100 pieces of information, either data or instructions or a mixture of the two ,can be assembled from Long Term Memory and brought together in close proximity, then combined with new information from the content of the Short Term Memory, before starting work on this combined information.

Continued practice will eventually integrate the Medium Term Memory System until it seems natural, then a degree of Iconic Recall becomes possible. Once this stage

(the Soft Breakthrough) has been reached, a student will have the Episodic/Iconic memory advantages of the primitive, combined with an expanded power of abstract thought. Semantic Short Term Working Memory and Semantic Long Term Memory will act as one. After this stage has been reached, a student will be able to use the entire working field of the Medium Term Memory and internalize many mental operations that previously were only possible with a pencil and paper or a sophisticated pocket calculator. This will open the door to the more advanced courses.

In the Mind Development Memory Course, a student is taught a wide range of applications for his/her newly expanded memory capacities and encouraged to work things out in their head, rather than reaching for a piece of paper, calculator, organizer or some other reasoning machine to be invented in the future, further dumbing people down. In addition to raising their IQ, they will function better in real life outside of the educational system, and be affected less by any psychoneurosis he or she may suffer from. The effect of internalizing these sophisticated tools is to establish a new and further layer to the thinking process - a Meta-Level, making a student more able to think about his thinking, be better at reflection and have increased powers of introspection. A new Meta-Level acts as an intelligence multiplier, enhancing a student's capacity to perceive, pose and resolve problems. A student's level of performance - their intelligence, creative capacity and capacity for intuition - becomes equivalent to their IQ times the multiplication factor of the Meta-Level. Finally, a student will experience extended states of No-Mind, during which time their intuition, a form of mature intuition, will have its full sway.

4. THE ARCHITECTURE OF MEMORY

In Mind Development we recognize the process of memorization has several sequential stages: Sensory Memory; Short Term Memory; Medium Term Memory; and Long Term Memory - with further sub-categories of memory described. This understanding opens many doorways both to improved memorization techniques and to enhanced awareness of our mental processes, and hence the possibility of meta-cognitive control.

All incoming information is held briefly (1/2 to 2 seconds) in Sensory Memory as a primitive and unanalyzed copy of the actual sensory information. This storage takes place in the Primary Sensory Cortex, which is why this type of memory is so vivid and lifelike, whilst it lasts.

Auditory (hearing) information is held in 'echoic' memory. To understand echoic memory, imagine someone rattling off a string of numbers, then stopping suddenly and asking you what were the last 5 numbers he or she said. To answer the question, you would have to 'replay' what you had heard. Fortunately, the last few numbers would probably still be in your echoic memory, and most likely you could answer the question correctly. If the person had stopped and waited a few seconds before asking the question, however, probably you would not remember any of the numbers - you could not 'replay the tape.' Echoic memories fade after a few seconds.

Visual information is held in 'iconic' memory. To understand iconic memory, look around you and then shut your eyes. For a short time, you retain a vivid image of everything you just saw. However, as you try to analyze the details, the image fades very rapidly, within 1/2 of a second.

If most of the information in sensory memory fades away and does not get processed further, what determines which information is selected for further processing? Considerable evidence from research suggests that it is the information that we pay attention to that moves on for further processing.

Short Term Memory

The sensory information's next port of call is the forebrain. It then becomes Short Term Memory. The duration of Short Term Memory depends upon the type of material being stored. Without active rehearsal, numbers are stored for 10 to 15 seconds, but colors are stored for up to 3 minutes.

When you are talking or answering questions on an exam, the information must be brought into Working Memory for you to manipulate, and your words and answers come out of Working Memory. As you try to understand the words on this page, your ability to understand these concepts depends on your Working Memory and also to some extent - when contextual information needs to be retrieved - from your Long Term Memory.

Short Term Memory is limited in terms of the both its capacity (amount of information it can hold) and its duration (length of time it can hold information). It is fluid and ever-changing - the focus of our consciousness.

Imagine that you are asked to remember a telephone number that is new to you. You could probably keep it in your memory for more than 30 seconds, but only by saying it over and over again 'in your head.' This is called 'rote rehearsal' or 'maintenance rehearsal.' This can help you to keep information in Short Term Memory for more than 30 seconds but if anything happens to interrupt your rote rehearsal, the information will be lost, unless you have already succeeded through an effort of memorization to move the information into Medium or Long Term Memory. You can probably think of real life examples where this has happened: you were trying to keep a telephone number in your head, but someone interrupted your thoughts and you lost the number forever. Or a number where you made an effort to remember it; in our course, we have many methods to help you do this easily.

People with an apparent Short Term Memory deficit may in fact have a well functioning memory except that they are failing to filter useful information from bad. To use a computer analogy, their "spam filter" is not as good, therefore they fill up their working memory with background information, most of which is noise. For example, a person telling a joke may provide lots of contextual description; however those with good filters will be able to recognize and separate the actual storyline and save it in Short Term Memory. They quickly discard the non-relevant bits of information and are left with the skeleton of the story story that fits within the available working memory; thus the relationship of the important parts of the story is clear - the person can "get the joke" and be able to repeat it to himself and then later his friend if required. A person who does not filter the story for its essentials may not remember the beginning of the joke when it's only half way told, and then certainly won't be able to get the point of the joke at its conclusion, nor be able to repeat it.

Latent inhibition is a preconscious filtering mechanism that allows people to ignore stimuli previously experienced as irrelevant. To repair inadequate filtering and to learn to inhibit the passing to working memory of unnecessary information (i.e. increasing latent inhibition) concentration exercises are effective, such as those included in the Mind Development Concentration Course.

Working Memory

Working Memory is the active system that temporarily stores and manipulates information that is needed in the execution of complex cognitive tasks, such as learning, reasoning and comprehension. Working Memory is all that is currently in view. There are two types of components: storage and central executive functions. The four storage systems within the model are the Articulatory Loop and Semantic Buffer (which are responsible for the temporary storage of verbal and semantic information respectively) and the Visuo-Spatial Sketch Pad and Episodic Buffer (which are responsible for the temporary storage of visual and sensory information).

Our Short Term Memory at any time contains the information with which we reason. Working Memory is that part of Short Term Memory that contains the information we use for thinking: visually, verbally and numerically.

The main functions of Working Memory can be itemized as follows:

1 The Articulatory Loop

2 The Visuo-Spatial Sketch Pad

3 The Central Executive

4 Episodic & Semantic Buffers

There are many other subsidiary functions but these are the ones that should be readily accessible and whose function can be improved.

Not everybody has developed this range of functions to the limit of his ability. Circumstances may have resulted in your developing one faculty at the expense of the others. Development of all these functions, some of which reside in the Left and some in the Right hemispheres of the brain, means that we have to become specialized in these areas. Lack of specialized centers in the brain is called Bicamerality (two cameras), because the functions of the left and right hemispheres are the same and duplicate each other. This results in indecision and other problems of dual personality. Thus there is inefficiency, not only in executive action but in the duplication of information left and right. The primary objective of the Mind Development exercises at this level is to get rid of this Bicamerality, so that your will can be united and your brain becomes a more effective instrument.

1. The Articulatory Loop

The function of the Articulatory Loop is to rehearse speech sub-vocally, that is silently. This is necessary in order to maintain a memory trace as an electrical vibration in the Short Term Memory. A process of sub-vocal rehearsal is used to refresh a fading memory trace before it decays into inaccessibility. The evidence for the existence of this loop is as follows:

A. Errors in speech often have an acoustic or phonemic similarity, for example F instead of S, B instead of G. It is harder to remember passages with similar speech sounds - the letter sequence of DBCTPG is harder to remember than KWYLRQ, test this for yourself.

B. The effect of articulatory suppression, that is, for example, forcing someone to repeat a common word like 'the' while they are trying to remember a series of digits. This has the effect of reducing the number of digits that can be recalled, i.e. the 'digit span'. These two factors mean that the length and accuracy of the digit span depends upon the ability to rehearse the material sub-vocally.

C. It is easier to remember short words than long ones. Short syllable words like 'bishop' or 'rivet' are easier to remember than words with long vowel sounds like

'harpoon' or 'Friday'. Slowly spoken words are not well remembered. It has been found that digit span levels for Welsh-speaking children are less than those for English-speaking children. Welsh schoolchildren are one year behind their English counterparts in mathematics when they are instructed in Welsh (Baddeley and Graham Hitch 1974). This is because the time required to read digits in Welsh is longer. The difference disappears when English numbers are used, and proves that English and Welsh speakers are intellectually equal. In contrast, Cantonese school children are better at mathematics than English schoolchildren, because they have a digit span of ten; the words for numbers in Cantonese are shorter than the number words in English, this gives Cantonese schoolchildren a numerical IQ advantage of about 20 points.

Thus one can say that the efficiency of the Articulatory Loop depends critically on the time taken to say the message, i.e. fast talkers remember better. In short, you can remember as much as you can say in 3 seconds, which is typically the length of the loop. (Our findings are that a child of 8 years speaks at 1.5 words per second and a child of 12 years speaks at 2.5 words per second. The child of 8 has a digit span of approx. 4 and the child of 12 has a digit span of about 7, so this indicates that 3 seconds is about the right figure.)

If I gave you a series of letters to remember, your ability to remember the series correctly would probably depend on the number of letters in the series, which you could 'fit into' the 3 seconds of the Articulatory Loop. Most people can remember a series of letters correctly if there are only 3 or 5 letters in the series. About half the people asked to remember a seven-letter series have difficulty. Relatively few people can remember a series consisting of 9 or 11 letters correctly. This finding, that the limit on Short Term Memory is typically around 7 items, is one of the most consistent findings in all of psychology. George Miller, a very famous cognitive psychologist, coined the phrase “the magical number seven, plus or minus two,” to describe the capacity of Working Memory.

Working Memory is clearly essential if we are trying to understand a spoken sentence, or remember a string of digits. Working Memory is an active process where the goal is not necessarily to move the information into permanent storage, but to keep it available until it is put to use - think of a phone number you'll repeat to yourself until you can dial it on the phone.

We essentially 'think' out of our working memory, but the capacity of Working Memory is only seven (plus or minus two) items. If the limit on working memory was literally 7 letters, I could not write my own name, much less form a complete sentence. It is true that Short Term memory has a capacity of 7 somethings, but the limit is not necessarily 7 letters. We can increase the working capacity of Short Term Memory by combining bits of information into meaningful units, or chunks.

So the memory span of young adults is typically around seven elements, called chunks, regardless whether the elements are digits, letters, words, or other units. However that span does depend on the category of chunks used (e.g., span is

around seven for digits, around six for letters, and around 5 for words), and even on features of the chunks within a category. For instance, span is lower for long than for short words. In general, memory span for verbal contents (digits, letters, words, etc.) strongly depends on the time it takes to speak the contents aloud, and on the lexical status of the contents (i.e., whether the contents are words known to the person or not).

A new piece of information may be connected by association with things that we already know or will readily be reminded of, or which are typically linked by logic or character. This connection then forms a single chunk in our symbol space. Many memorization techniques take advantage of this to effectively expand Working Memory.

Focusing on meaning therefore helps with chunking. Understanding the meaning of information to be learned involves understanding how new information relates to other new information or to information you already know.

Focusing on meaning not only helps with chunking, it also helps you to get information into and out of Long Term Memory in the most efficient way. Repetition in itself is not a very efficient strategy for moving information from Short Term to Long Term Memory, but if we focus on the meaning of information to be learned and try to relate it to information that is already in our Long Term Memory, this seems to help the new information to be effectively filed away. Since Long Term Memory appears to 'file' information according to meaning, this will also help you to be able to find that information when you need quick access to it in the future.

The Articulatory Loop also appears to be a useful checking mechanism which is good at preserving the order in which information is to be given out. This is particularly noticeable when one is asked to suppress sub-vocalization by saying a word repeatedly under your breath. If two words of a given passage were then reversed, one would be less likely to notice whilst suppressing sub-vocalization. Thus one would use sub-vocalization when reading difficult prose, e.g. a legal document where meticulously accurate comprehension is necessary. But one might not sub-vocalize very much when reading a novel, since the concepts are easy to understand. What one does experience while reading romantic fiction, however, is a mental image of the sound of the characters speaking, as well as a visualization of their surroundings. These 'voices' are not the function of the Articulatory Loop, but of another system which produces auditory and visual imagery...

2. The Visuo-Spatial Sketch Pad

Visuo-Spatial perception refers to our ability to process and interpret visual information about where objects are in space. This is an important aspect of cognitive functioning because it is responsible for a wide range of activities of daily living. For instance, it underlies our ability to move around in an environment and orient ourselves appropriately. Visuo-Spatial perception is also involved in our

ability to accurately reach for objects in our visual field and our ability to shift our gaze to different points in space.

The Visuo-Spatial Sketch Pad is used in the temporary storage and manipulation of spatial and visual information, such as remembering shapes and colors, or the location or speed of objects in space. It is also involved in tasks which involve planning of spatial movements, like planning one's way through a complex building.

To achieve this functionality, the association areas of the visual cortex in humans are separated into two major component pathways, which are believed to mediate the different aspects of visual cognition...

1. The inferotemporal region of the brain is believed to mediate our ability to process visual information about the shape, color and texture of objects. This may be called the "visual cache" and can be used, for example, for constructing and manipulating visual images, and for the representation of mental maps.

2. The parieto-occipital region is believed to process Visuo-Spatial and Visuo-Motor types of information that deal with location, i.e. spatial and movement (kinaesthetic) information. It may be called the "inner scribe." It also rehearses information in the visual cache and transfers information to the central executive.

Try multiplying 8 x 13 in your head. You will find that to perform this calculation mentally you will need to 'carry' digits which have to be held over in the memory. To do this you may imagine a blackboard on which you chalk the figures; this then we can define as the Visuo-Spatial Sketch Pad. It is a specialized visualization function that involves both left and right hemispheres working in combination.

Three main findings provide evidence for the distinction between visual and spatial parts of the Visuo-Spatial Sketch Pad:

1. There is less interference between visual and spatial tasks than between two visual tasks or two spatial tasks.

2. Brain damage can influence one of the components without influencing the other.

3. Results from brain-imaging show that working memory tasks with visual objects activate mostly areas in the left hemisphere, whereas tasks with spatial information activate more areas in the right hemisphere.

In addition to the visualization faculty there appears to be the ability to hold spatial recording in memory. Blind people are able to find their way about, bats can navigate in the dark by the reflections of the high-frequency sounds they emit, one can learn to touch type without seeing the keyboard.

Words which can be visualized are more easily memorized than those which cannot. It is therefore possible to use visual imagery as a mnemonic system for the purpose of remembering random sequences of numbers and words.

There is evidence that images are stored directly in the brain, which means that information can be accessed rapidly if it is linked to an image, or ideogram, and if perceived material is reduced to these ideograms. This probably does not apply to long-term memory; for reasons of data space the images are converted into an abstract code as they would be in a computer's memory. In order to display and operate upon various images stored in Long Term Memory we need to have a recall system functioning through codes or keywords. Once the image is recalled to Short Term Memory it can then run as a program would in a computer, creating the image in the mind's eye and operate upon it.

The ability to visualize is reduced if the subject is asked to point to something while seeing a picture, but heavy verbal tasks, such as grammatical analysis of sentences, do not interfere with the image. If you have ever tried to form a mental picture while driving a car you will realize how dangerous this can be. Nevertheless it is possible to hold conversations with other passengers or listen to the radio without danger. Visual imagery can also be affected by heavy demands upon one's mathematical and logical faculties. Being called upon to make a difficult decision seems to affect the area of executive control necessary to maintain the image.

Spatial memory is an essential part of our ability to function as an individual within our environment. For instance, if I were to walk into a darkened room that was very familiar to me, I would have a good idea where all the individual items in the room were so that I didn't walk into them. In order for me to be able to do this, I need to be able to remember what is in the room and where they all are in relation to my entry point, the door. In short, I need an internal map of the room. The map consists of three elements; what items are present, where they are in relation to each other and where I am, in relation to both those items and the room in general.

The generation and operation of such maps require the integration of multiple neural systems. In order to recognize and recall what is present in the room, two neural systems come into operation. A recognition system based in the Perirhinal Cortex tells me that the items present are familiar to me. A second system that deals with the arrangements of individual items based in the Hippocampus tells me how these items are arranged in relation to each other.

3. The Central Executive

When a person needs to simultaneously perform mental tasks such holding and manipulating data and images, and reasoning with that information, Working Memory must allocate available cognitive resources. Working Memory is like the control tower of a major airport, responsible for scheduling and coordinating all incoming and outgoing flights. To achieve this, there are the two 'slave systems' described above, the Articulatory Loop and the Visuo-Spatial Sketch Pad

responsible for short-term maintenance of information, and a Central Executive responsible for the supervision of integrating the information and for coordinating the slave systems.

The Central Executive is, among other things, responsible for directing attention to relevant information, suppressing irrelevant information and inappropriate actions, and for coordinating cognitive processes when more than one task must be done at the same time.

Working Memory operations are both conscious and unconscious. Working Memory theories and research have focussed mainly on reportable, conscious functioning. However, we must acknowledge that a myriad of unconscious specialized operations carry out detailed Working Memory functions (Baars & Franklin 2003). Unconscious Working Memory is not subject to the capacity limitations of Conscious Working Memory, i.e. about three to six chunks. Anderson (1983) found that Unconscious Working memory can sometimes contain over 20 units at one time. To reconcile such a large capacity of Working Memory with the much smaller capacity of Short Term Memory, Anderson argued as follows: The activation of elements decays very rapidly. For this reason the number of units that can be actively maintained long enough to be included in immediate recall is much less than all of the information activated at the start of recall.

Working Memory functions are able to operate below the level of consciousness because they have become automated. Unconscious automated processing is crucial to successful Working Memory performance, because it is believed that automated processing, such as Intuition, does not draw on the measurable capacity of Working Memory. Automated processes operating below the level of awareness tend to be readily accessible, being called into consciousness whenever effortful processing is required. Operations that were once conscious, but became unconscious as their function became automated are the most accessible. When Working Memory operations are brought into awareness, executive processes within and outside of Working Memory are usually called into play simultaneously.

4. Episodic & Semantic Buffers

Baddeley (2002) has postulated a fourth component in the Working Memory, in addition to the Articulatory Loop, the Sketch Pad and the Central Executive. There is a temporary store for information, with a limited capacity, from which material can be recalled with 90 to 100% accuracy, that Baddeley calls the Episodic Buffer. The Episodic Buffer holds representations that integrate episodic information (concrete, experiential data) into a unitary episodic representation. This information would include phonological, visual, and spatial information and data retrieved from Long Term Memory.

The Episodic Buffer, then, is dedicated to linking information across domains to form integrated units of visual, spatial and verbal information with time sequencing (or chronological ordering), such as the memory of a story or a movie scene. The

Episodic Buffer is also assumed to have links to Long Term Memory and semantical meaning. The main motivation for introducing this component was the observation that some (in particular, highly intelligent) patients with amnesia, who presumably have no ability to encode new information in Long Term Memory, nevertheless have good short term recall of stories, recalling much more information than could be held in the Articulatory Loop. A small number of densely amnesic patients could perform at a normal level on immediate recall of a prose passage, containing some 20 or more idea units, and hence considerably beyond verbal or spatial span. Such a passage would be approximately 100 words.

Recent research has found that some densely amnesic individuals could remember considerable information (up to 25 idea units) for up to an hour in the absence of any interference (in a quiet, dark room), even on trials in which they slept during the retention interval. This suggests that they must have used some sort of storage mechanism outside of the focus of attention that does not depend on Long Term Memory, at least not as we normally describe it. This would be the function of an Episodic Buffer.

As yet, the storage location of the Episodic Buffer is not certain, but it is surmised that it may be the Frontal Lobes, as this would explain a lot of phenomena. In my opinion, the Episodic Buffer acts as a bridge between Short Term Working Memory and the locations of Medium Term Memory and Intermediate Term Working Memory (readily accessible expert information). Medium Term Memory is, for the most part, episodic and temporary, though some of its contents may be stored in Long Term memory if they need to be. Intermediate Term Working Memory is a temporary store of expert knowledge retrieved from Long Term Memory for the task at hand. As Intermediate Term Working Memory, in the case of experts, is nearly as fast and accurate as Short Term Working Memory, and has much more in common with Medium Term Memory than Long Term Memory, I prefer to use the expression Intermediate Term Working Memory rather than Medium Term Working Memory or Long Term Working Memory. In my opinion, Intermediate Term Working Memory is a very much expanded Episodic Buffer that operates in a specific domain.

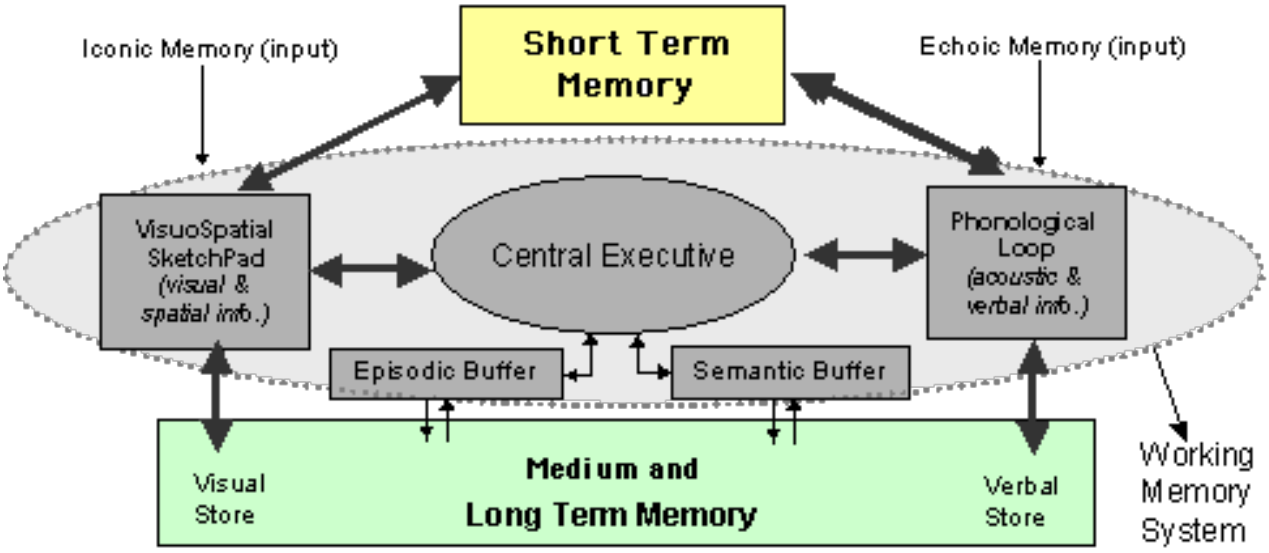
An Intermediate Term Working Memory lasting for minutes to hours has recently been demonstrated, and even longer time intervals are expected to be documented in the future (see Dr. Merlin Donald's book, A Mind So Rare - 2001). Donald maintains that too much of the focus in consciousness research has been in exploring phenomena associated with Short Term Memory. He maintains that Intermediate Term Working Memory is the key to understanding how meta-awareness is maintained over the long term. As species become more complex, brains develop Short Term memory, and later, Intermediate (or Medium Term) control. The key to consciousness in humans is the huge growth in the tertiary or association areas of the cortex.

Semantic Buffer

Further research is supporting the existence of a Semantic Buffer, filling a similar role to the Episodic Buffer but for semantic material. The Semantic Buffer is a Working Memory center that stores meaning(s), rather then the surface features of words and phrases. In the Kintsch and van Dijk (1978) model and its successors, a limited-capacity, Short Term Memory Buffer plays an important role in comprehension. By maintaining information in Working Memory, the Short Term Memory Buffer facilitates the construction of a coherent textbase. A small number of propositions are selected at the end of each processing cycle and carried over in a buffer to be reprocessed with the input propositions from the next processing cycle. In this way, the theme or topic of an entire discourse may be held in mind, and one may paraphrase or translate to an alternative language. In short, there is a storage buffer for the lexical context of discourse. Current experimental work has suggested that such global structures of meaning play an important part in the cognitive processing of discourse, e.g. in comprehension and recall.

The Central Executive is very active in Working Memory and is responsible for the selection, initiation and termination of processing routines (e.g. encoding, storing, and retrieving). Encoding refers to the processes of placing items into memory. Retrieval refers to the processes through which we recover items from memory.

The Structure of Working Memory



The Central Executive is a limited capacity system used for a variety of purposes, including tasks that involve planning or decision making; trouble shooting in situations in which the automatic processes appear to be running into difficulty; novel situations; dangerous or technically difficult situations; and situations where strong habitual responses or temptations are involved.

The Frontal Lobes are probably the location of the Central Executive of Working Memory. Extensive damage to the frontal lobes such as lobotomy would result in severe impairment in Central Executive functioning. The classic frontal syndrome is characterized by “disturbed attention, increased distractibility, a difficultly in grasping the whole of a complicated state of affairs... well able to work along old routines but cannot learn to master new types of task, in new situations.”

Intelligence

An important function of the Working Memory is the ability to store and manipulate numbers. We can recognize similarities, like an 'And' function, we can add, subtract, multiply and divide. Our arithmetical digit span seems to depend upon speed - the faster one can operate with the information stored in Working Memory, the greater the span and accuracy.

Until recently, a person's IQ - a measure of all kinds of mental problem-solving abilities, including spatial skills, memory and verbal reasoning - was thought to be a fixed commodity largely determined by genetics. But recent modern research demonstrates that the very basic brain function called Working Memory in fact underlies our general intelligence, in particular our Fluid Intelligence, opening up the intriguing possibility that if you improve your Working Memory, you would boost your IQ too. This is what Mind Development has found to be the case, over many years experience.

Reasoning ability is central to intelligence. Fluid Intelligence relates to our ability to solve novel problems. Although many different cognitive processes may be executed in the solution of a task, individual differences in Working Memory efficiency, skills and resources play a crucial role in determining the speed and correctness of the results obtained.

Measures of Working Memory capacity are strongly related to performance in other complex cognitive tasks such as reading comprehension and problem solving skills, and with measures of the intelligence quotient. Some researchers have argued that working memory capacity reflects the efficiency of executive functions, most notably the ability to maintain a few task-relevant representations in the face of distracting irrelevant information. The tasks seem to reflect individual differences in ability to focus and maintain attention, particularly when other events are serving to capture attention. These effects seem to be a function of frontal brain areas.

Working Memory is the brain's short-term information storage system. It's a workbench for solving mental problems. For example if you calculate 71 - 7 + 6, your Working Memory will store the intermediate steps necessary to work out the answer. And the amount of information that the Working Memory can hold is strongly related to general intelligence. Of course, writing things down is an important way of extending Working Memory, and this enables organization of information and calculations to be accomplished that would not be possible for most people with information held within the mental space alone. However using notes to

extend Working Memory does not exercise and improve the mental ability to hold and juggle a large number of items in the mind, with instant random access to each, as is needed for maximum fluid intelligence.

Recent studies suggest that Working Memory can be improved by training and that a period of such training increases a range of cognitive abilities and increases IQ test score, and indeed that working memory underlies general intelligence. It has been shown that, after training, measured brain activity related to working memory increased in the prefrontal cortex, an area that many researchers have associated with working memory functions. In 2009, it was reported in Science that working memory training led to measurable density changes for cortical dopamine neuroreceptors in test persons. Perhaps of greater importance, another study has found a period of Working Memory training increases a range of cognitive abilities and increases IQ test scores. Working Memory training is therefore key to unlocking brain power.

5. Global Workspace Theory

Recent studies have led to the proposal that Working Memory operates not as a gateway between sensory input and Long Term Memory but as a Global Workspace. Access to acquired knowledge and prior learning in Medium and Long Term Memory occurs and is integrated in the Episodic Buffer with current sensory input before that complex of information becomes available to Working Memory.

The Episodic Buffer is assumed to be attentionally controlled by the Central Executive and to be accessible to conscious awareness. Baddeley regards the Episodic Buffer as a crucial feature of the capacity of Working Memory to act as a Global Workspace that is accessed by conscious awareness. According to this model, when Working Memory requires information from long-term storage, it may be downloaded into the Episodic Buffer, rather than simply activated within Long Term Memory.

Global Workspace Theory was proposed by Bernard Baars in 1983. The function resembles the concept of Working Memory, especially the Episodic Buffer as described by Baddeley. The Global Workspace corresponds to subjective experience in the context of Working Memory, the inner domain in which we carry on the narrative of our lives, including our inner speech and visual imagery. Ideas and symbols remain in the Global Workspace for as long as the individual is working with them.

The easiest way to think about the Global Workspace is in terms of a the metaphor, "theater of consciousness." The entire stage of the theatre corresponds to Working Memory, in which we talk to ourselves, visualize places and people, and plan actions. The stage is illuminated by a spotlight of selective attention, revealing the contents of consciousness - actors moving in and out, making speeches or interacting with each other. The bright spot is further surrounded by a periphery of significant but vaguely conscious events. The audience remains in the dark,

watching the play. Behind the scenes, also in the dark, are the director (the Central Executive processes), stage hands, script writers, scene designers and the like (corresponding to the Visuo-Spatial Sketch Pad, Phonological Loop and Episodic and Semantic Buffers) that shape the visible activities in the spotlight, but are themselves invisible.

The illuminated stage of of the Global Workspace corresponds to what we are conscious of, and this information is broadcast to a multitude of unconscious cognitive brain processes, which may be called receiving processes. Other unconscious processes, operating in parallel with limited communication between them, can form coalitions which act as input processes to the Global Workspace. Since globally broadcast messages can evoke actions in receiving processes throughout the brain, the Global Workspace may be used to exercise executive control to perform the voluntary actions of conscious experience.

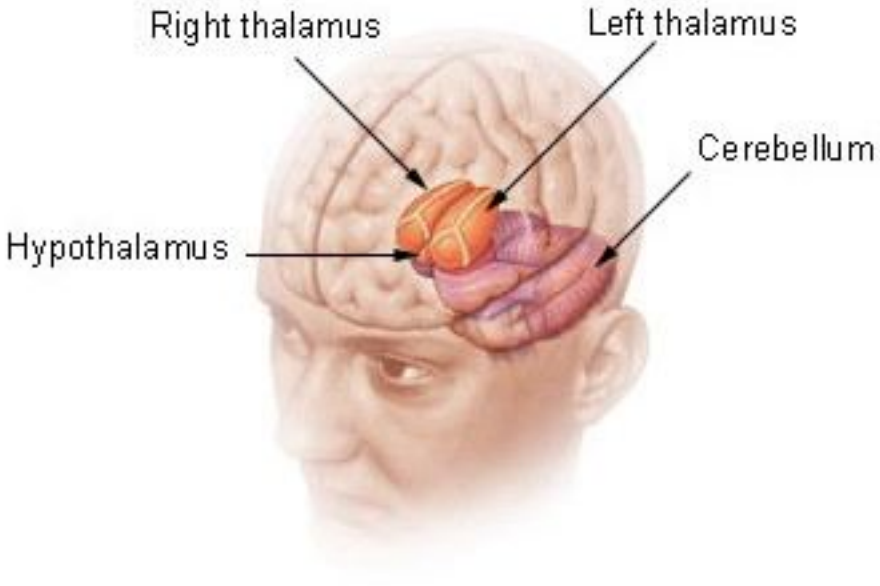
The continuity of the "stream of consciousness" may in fact be illusory, just as the continuity of a movie is illusory. Nevertheless, the seriality of mutually incompatible conscious events is well supported by objective research over some two centuries of experimental work. A simple illustration would be to try to be conscious of two interpretations of an ambiguous figure or word at the same time. When timing is precisely controlled, as in the case of the audio and video tracks of the same movie, seriality appears to be compulsory for potentially conscious events presented within the same 100 msec. interval. The 100 ms time domain corresponds closely with the known brain physiology of consciousness, including brain rhythms in the alpha-theta-gamma domain, and event-related potentials in the 200-300 ms domain.

Consciousness

The Global Workspace allows for cooperative problem-solving by large collections of specialized programs; therefore the brain can be perceived as a "society of mind." Our knowledge of the cortex, in particular, is consistent with the hypothesis that much of the brain consists of highly specialized regions. Detailed cortical processing of visual information, for example, is largely unconscious, but the outcome of visual processes is a conscious experience of objects and scenes. As predicted by Global Workspace Theory, there is evidence that visual contents evoke highly distributed activity in non-visual regions of the brain. In Global Workspace Theory, this is called "broadcasting" of global messages to multiple target functions.

The idea that consciousness has an integrative function has a long history. The brain may be viewed as a massive parallel distributed system of highly specialized processors. In such a system coordination and control may take place by way of a central information exchange, allowing some specialized processors - such as sensory systems in the brain - to distribute information to the system as a whole. A sizable body of evidence suggests that consciousness is the primary agent of such a global access function and there is evidence to suggest that all the separate

strands of consciousness in the Global Workspace come together in the thalamus. It is posited that this global control is effected via cortical 'gating' of a strategic thalamic nucleus. Gamma wave synchrony controls access to the content of consciousness. Synchronization of remote areas implicates the thalamus, and the thalamus represents a hub from which any site in the cerebral cortex can communicate with any other such site or sites.



The thalamus is located deep within the cerebrum. It is an egg-shaped structure lying at the very top of the brain stem, above the hypothalamus. Almost all of the messages that are received by the cerebral cortex from the environment or from the body's internal receptors come through the thalamus and much current thought about perceptual processing is based on sensory pathways that relay in the thalamus. Recent research also suggests that the thalamus regulates the electrical rhythms that parts of the brain use to communicate with each other. It has been speculated that tips of the tongue experiences (when only part of a memory is recalled) may occur when the rhythms don't synchronize with the regions properly - which would put these memory failures at the door of the thalamus.

The thalamus is much like a brain within the brain... it is approximately brain shaped and has interconnecting tissue between its two lobes just like the corpus callosum. It shares the most central, most protected part of the brain with the hypothalamus and the third ventricle. The thalamus is tucked under the corpus callosum and it is cushioned by the third ventricle of the brain, where it sits on either side. The thalamus connects the optic, acoustic and bodily sensors with the appropriate areas of the cortex and serves as a central relay station for all the main sensory systems except for the olfactory system. Additionally it connects to the cerebellum and the hypothalamus, next to it.

It is postulated that in the thalamus, consciousness (the Ego) experiences the results of brain processes (not the processes themselves) and is able to control

attention, thought and motor processes. Without input from the thalamus, consciousness is not maintained, but the final seat of consciousness may lie in the limbic system - not the frontal lobes, as people who have had a lobotomy still have some sort of Ego, and people with massive damage to the cortex do not lose consciousness. Currently, there is much debate as to which part of the brain is the center of consciousness. It is suggested the hypothalamus, particularly the posterior hypothalamus, which plays a critical role in the maintenance of consciousness or wakefulness, is the center of consciousness.

The thalamus has massive connections with the frontal lobes, the limbic system and the activating reticular formation of the brainstem. Recent theories have posited that the hippocampus and thalamus serve distinct, yet related, roles in episodic memory. Whereas the hippocampus has been implicated in Long Term Memory encoding and storage, the thalamus, as a whole, has been implicated in the selection of items for subsequent encoding and the use of retrieval strategies. Scans reveal that introverts have more activity in the frontal lobes of the brain and anterior, or front, thalamus. Damage to the dorsomedial thalamus can impair memory formation, but the thalamus is not, however, a memory store; the thalamus is the Screen of Consciousness.

A higher-level consciousness (awareness of being aware), probably unique to humans, is possible if the brain is also capable of abstracting the relationship between the self and the non-self, and this can only happen through social interaction. This leads naturally to the development of linguistic faculties. Garald Edelman (in *The Remembered Present*, 1989) identifies the regions that are assigned to define self within a species (the amygdala, the hippocampus, the limbic system, the hypothalamus) and those that operate to define the non-self (the cortex, the thalamus and the cerebellum).

Note that, according to Edelman, concept-formation preceded language. Language was enabled by anatomical changes. What changed with the advent of language is that concepts became independent of time, i.e. permanent. And semantics preceded syntax: acquiring phonological capacities provided the means for linking the preexisting conceptual operations with the emerging lexical operations.

Piero Scaruffi, in his book *The Nature of Consciousness*, summarized our human makeup as follows: "Consciousness is the awareness of existing. Self is the awareness of lasting in space and time (of being an "I"). Sensations are bodily feelings such as pain, red, warmth. Emotions are non-bodily feelings such as anger, happiness, fear. Cognition encompasses the processes of reasoning, memory, learning, speaking, etc. Perception is the physical process of perceiving the world. Thought is the act of being conscious over an extended period of time."

Consciousness is actually the only thing we can be sure of. We are sure that "we" exist, and "we" doesn't mean our bodies, it means our consciousness. Everything else could be an illusion, but consciousness is what allows us to even think that everything else could be an illusion. It is the one thing that we cannot reject.

In Edelman's picture, human consciousness includes a liberation from the present moment. Animals tend to live in the present, simply reacting to stimuli. Only conscious animals can think about the past and about the future. Indeed humans have tended to take this too far and rarely remain mindful in the present. We need our past experience for the learning it offers; we don't need it to cling on to regrets or blame, that changes nothing. We need our future to make plans; we don't need it to worry about what might happen, that changes nothing. Like an artist creating a painting, we put our life together in the present moment, in the context of the wisdom that obtains from being also conscious of the past and future.

Mnemonics

The Ancient Greeks first outlined the practice of memory and their simple rules are still used today in modern memory systems; however they used a flat model of memory, such as associating the items to be remembered with locations on a route. In contrast, advanced systems, such as the Memory Cube (which is taught in our forthcoming Memory Course) is architecturally hierarchical, with nested Thought Maps and Chains. This is truly a "Thought Engine*," with fast access to up to 15,000 items - think Mega Memory! Such a thought engine can can extend the Global Workspace, because it is possible to overcome Short Term Working Memory Limitations by setting up a Virtual Short Term Memory with almost unlimited capacity. By using Fenaigle chains, Virtual Short Term Memory can be increased to several hundred digits. The World record using this method is 400 digits in something like five minutes. With the exception of special applications like the Pixel method, which requires several hundred digits, a Virtual Short Term Memory of 20 to 30 items is sufficient for most applications. In effect one has greatly expanded the stage upon the theater of consciousness. This has implications for consciousness. See the sections on Intermediate Term Working Memory and Global Workspace Theory.

*Note: A Thought Engine enables users to input, store, search, navigate and output concepts (and their semantic relationships) within the Mnemonic System; as well as link to information stored elsewhere within memory or databases.

Mnemonics have a general application; all spheres of knowledge may be temporarily added to the Working Memory, creating an artificial Intermediate Term Working Memory - for which we use the computing term "High Memory" because of its fast random access - that is available for any subject, not just for the domain-specific expert's use. I have chosen to reserve the term "High Memory" for the Artificial Intermediate Term Memory created through the use of Mnemonics, whereas I reserve the term Intermediate Term Working Memory for Natural Memory. For example, a person who is an expert on football would have developed an Intermediate Term Working Memory for football facts, but his memory for cricket would probably be not much more than average. One solution is for him to develop a superordinate Intermediate Term Working Memory for sport in which case he would have an expert memory for both football and cricket. Most students will eventually develop an Intermediate Term Working Memory for several domains, but

a Mnemonic System is the superordinate system par excellence, as this can cover most topics.

Intermediate Term Working Memory

In unskilled people the Working Memory is a function of Short Term Memory and as such it is domain general. Long Term Memory may also impact on Working Memory in a domain-specific manner. It is generally observed that memory performance increases after an individual practices on memory tasks involving specific types of materials and that an individual's familiarity with a given type of material is related to the amount of material recalled. With more familiarity and experience with a particular type of stimulus material, subjects acquire over time a set of complex patterns in Long Term Memory that allows them to represent subsequently presented information in terms of already acquired patterns (chunks) of elements rather than individual stimulus elements.

In the case of experts such as mathematicians, chess masters, physicists and people of that ilk, part of the Long Term Memory has been recruited to create a virtual center that we call Intermediate Term Working Memory (sometimes referred to as Long Term Working Memory). By and large, this type of working memory is domain specific, in short it has a limited range of transfer. In contrast to the Short Term Working Memory we cannot view the content all at once; however, if the material is repeatedly recalled, it can be stored indefinitely in Long Term Memory. We have an attention window that permits us to perceive 6-10 items or chunks at the same time. The Intermediate Term Working Memory is like a spreadsheet and the window of attention is a parasitic function of the Short Term Working Memory.

Intermediate Term Working Memory is a faculty enjoyed by experts in many fields. Recent research on memory performance shows that with practice and the acquisition of memory skills, subjects can improve their recall performance on a specific memory task with a particular type of stimulus material by 100% to 1,000%. In short, the capacity of Intermediate Term Working Memory is up to ten times that of Short Term Working Memory. Conscious retrieval from Long Term Memory typically takes from 1 to 2 seconds, but an expert's direct retrieval takes only 400 milliseconds, because the expert is able to bypass Long Term Memory limitations.

Intermediate Term Working Memory vastly increases the expert's symbol field. It comes into being because the Forebrain parasites on the Parietal Lobes, thus the capacity of Short Term Memory is enhanced. This is so, because Intermediate Term Working Memory uses a relevant, fast access area of Long Term Memory. The capacity of Intermediate Term Working Memory may be vast, but it is domain specific. There is little transfer to related skills, such as typing and playing the piano; or from playing chess to playing dominoes.

An expert in a given domain of activity, such as medicine, chess, music or golf, is “one, who has acquired special skill in or knowledge about a particular subject through professional training and practical experience” (Webster's, 1976, p. 800).

Experts will therefore, by definition, have a greater body of knowledge about their domain of expertise than other individuals.

More remarkable is the expert's accurate memory for new experiences in his or her domain. An elite athlete can, after a sports event, discuss the play-by-play action. Expert chess players can readily recall details of chess positions from their matches in recent tournaments. Early in the twentieth century it was believed that experts were innately talented with a superior ability to store information in memory. Numerous anecdotes were collected as evidence of an unusual ability to store presented information rapidly. For example, Mozart was supposed to be able to reproduce a presented piece of music after hearing it a single time. However, more recent research has rejected the hypothesis of a generally superior memory in experts and has demonstrated that their superior memory is limited to their domains of expertise and can be viewed as the result of acquired skills and knowledge relevant to each specific domain. Although, experienced chess players are better at remembering the positions of the balls on a pool table than novices, so there is a small measure of transfer to related tasks.

The key seems to be the use of mnemonic devices and other methods of imposing some sort of order or meaning on the information involved, such as chunking or grouping into patterns and hierarchies. To illustrate, a chess master can usually recall the positions of all the pieces on a chessboard after a quick glance. But if the chessmen are arranged randomly and meaninglessly, his memory is reduced to near-normal. The gist is that long practice and the application of mnemonic devices can vastly improve anyone's memory and, in consequence, memory prodigies are not really so anomalous.

The Peg System of mnemonics, for example, has much in common with the Intermediate Term Working Memory system. Material encoded on Pegs is invulnerable to distraction, it may be stored and retrieved, after several hours, with random access and 100% accuracy. A Peg System opens up the possibility of reflecting on a hundred or more ideas, rather than the three to five that you can reflect on in Short Term Working Memory. When Pegs are combined with Short Chains, to make a network of data encoded into mnemonics, their potential for advanced thinking is almost limitless.

Note: Short Term Working Memory can import ideas (data), three to five at a time, from the Peg System and, in turn, the Short Term Working Memory can export ideas (data), one by one, to the Peg System.

Intermediate Term Working Memory is developed as a virtual center by mnemonics experts. Although Intermediate Term Working Memory is domain specific - a memory expert only has a Intermediate Term Working Memory for mnemonics - the application of mnemonics is more or less domain-general, so a mnemonics expert gets the best of both worlds.

Intuition is not based on Intermediate Term Working Memory. With Intuition, you are tapping some sub-cognitive area of the brain, possibly the cerebellum, in which case, you do not know that you know until the answer to your query becomes visible: then you know.

In the case of Intermediate Term Working Memory, you know already that you know. You know that you have certain items in store, and that you could retrieve them if you wished, and you also know that certain items are not in store, so you can't, in which case, you know you don't know. This is Metacognition. The only content you can actually see is the part that has been imported into Short Term Memory. At a maximum, only about nine items of data or perhaps two or three patterns can be imported into Short Term Memory from Long Term Memory at any one time. Not only do you know what is being stored in Intermediate Term Working Memory, at any given time, you know, also, where to find any particular item, so you can import any item or collection of items into Short Term Memory, within Short Term Memory capacity limitations. Once these items have been imported into Short Term Memory - but not before - they become visible.

To draw an analogy, Intermediate Term Working Memory is like a spread-sheet, only part of which is visible at any one time. It is like looking at the spread-sheet through the center of a toilet roll. If you wish to see another area, you have to shift the toilet roll, then you cannot see the area that you were looking at before, but you know it is there and you can return to it any time you want. This is the introspective experience.

In my opinion, little or nothing can be transferred to Long Term Memory in the waking state, but material from Long Term Memory can be retrieved in the waking state, and recalled rapidly when the subject has an expert memory in a specific domain of knowledge; so the storage site of Intermediate Term Working Memory cannot be a department of Long Term Memory, if the content is to be recalled after a short period: it must be stored in Medium Term Memory.

Intermediate Term Working Memory can only store information for a day or two, so it has much more in common with Medium Term Memory than Long Term Memory proper; like Medium Term Memory it functions through the the Frontal Lobes, the Hippocampus and the Parietal Lobes. The Medium Term Memory acts as a mixing pot: material from Long Term Memory is contrasted and compared with information from Short Term Memory.

Contrary to some popular views, Intermediate Term Working Memory is not infinite in its capacity. Although it has a greater storage capacity than Short Term Working Memory, it is very rigid and the speed of access is only about half of that of Short Term Memory. There are also certain things that Intermediate Term Working Memory cannot do, that Short Term Working Memory can. Content can only be manipulated once it has been transferred from Intermediate Term Working Memory to Short. From my introspective experience, the Intermediate Term Working

Memory stores patterns, rather than words and images. Words and images are constructed after the fact.

What one starts with is a sense of knowing. If what it has to show you cannot be put into some meaningful pattern, it will not be available for recall. Because the capacity of Intermediate Term Working Memory is tied to the recall of accepted and meaningful patterns, it does not much amplify the capacity for creative thinking. On the other hand, Short Term Working Memory is not subject to these limitations, so anything that can extend the capacity of Short Term Memory must amplify the capacity both for reasoning and for creative thought.

How long does it take to gain an Intermediate Term Working Memory? This depends on the domain in question. In the case of a very narrow domain, such as understanding and remembering the weather forecast, this may only take a few weeks. Most intelligent people can already do this, so they already have an Intermediate Term Working Memory for weather forecasts. But in the case of broad domains, such as becoming an architect, a bishop or a research chemist - or indeed, the meteorologist who prepares weather forecasts - it could take five to ten years. It all depends on the breadth of the domain and the frequency with which Long Term Memory is accessed in that domain, integrated and used constructively, alongside Short Term Memory in the Working Memory.

I-tags

Within the mind, visual experiences can be distinguished from auditory experiences and from experiences of other sensory modalities. In turn, perceptual experiences can be distinguished from memories, emotions, thoughts, etc. This universal ability implies that certain features of data coming into the field of consciousness can be consciously noted and marked or 'tagged' as such.

Tags are thus seen to form the basis both of phenomenal consciousness and the self. Recently the concept of tagging has been recognized as a fundamental aspect of the creation of memories. Brian Lancaster (in *Mind, Brain and Human Potential*) explains the continuity of the self by means of 'I-tags.' These are the basic data from which our sense of identity is constructed. He proposed that when an event is consciously experienced, its representation in memory includes a reference to the 'I' which actually experienced the event. There is a personal connection and identification with the experienced perception. Subsequent voluntary recall consists of making a connection to the appropriate I-tag. When an I-tag exists there is no effort required to 'find the memory.'

At any given moment, a number of such I-tags are activated, as sensory systems interact with memory. We may intentionally evoke an I-tag or similarity of circumstances may remind us of stored I-tags. Thus I may be using a mouse which triggers one I-tag, sitting at my desk, which includes memories of its purchase, another I-tag, listening to favorite music, another I-tag, and so on. Each I-tag

embodies my past identity state when the given entity was experienced previously. The 'I' is continually constructed from an endless flux of I-tags.

Each individual I-tag is the basis of meaning since it embodies the individual's involvement with some specific object or event in the past. It is this 'involvement' - of making an impression with the current sense of self - which makes the difference between experience passing by as a stream, and it's incorporation into our memory storage.

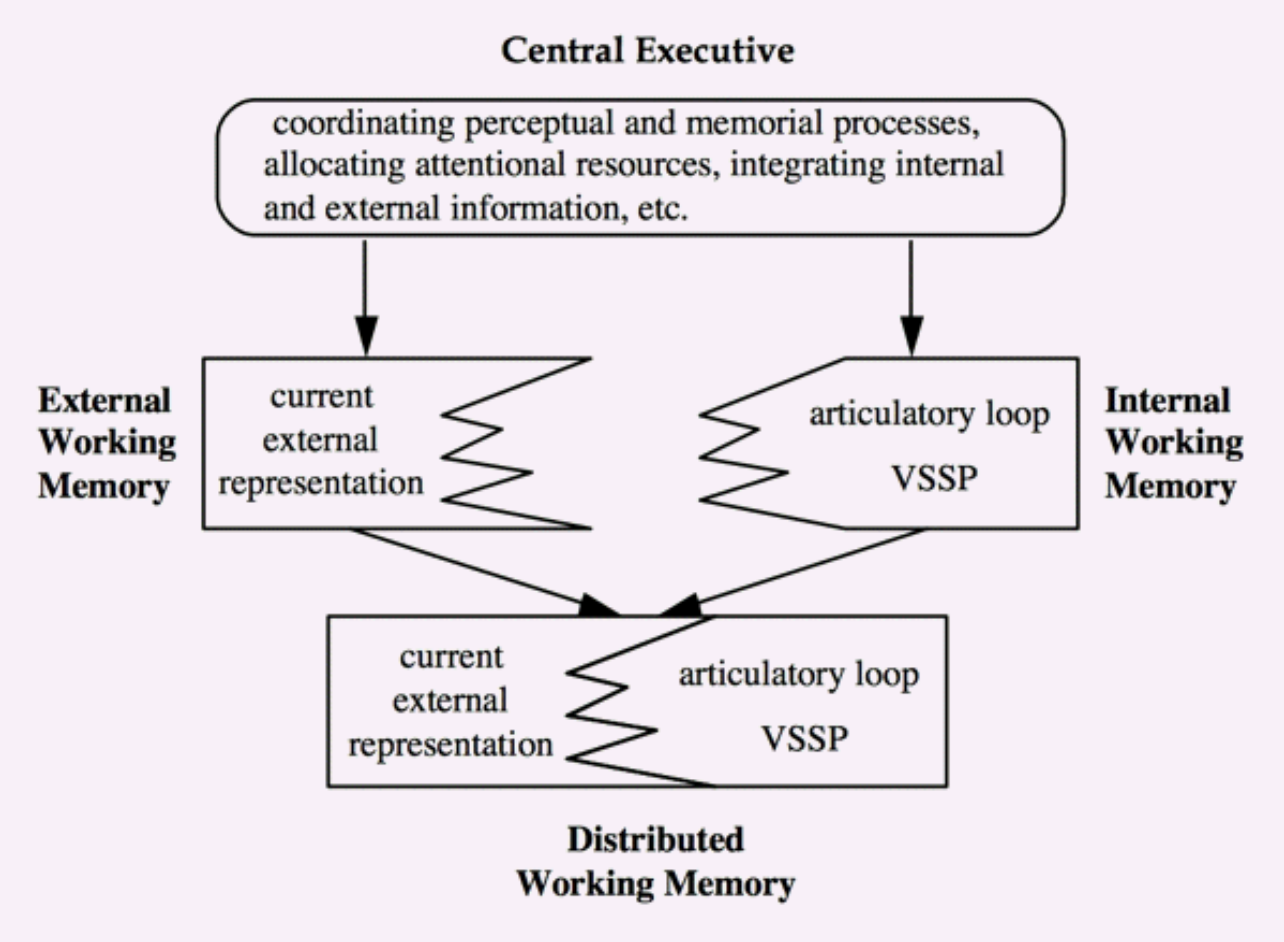
Unless a memory is I-tagged when it is transferred from Short Term to Medium Term Memory it cannot usually be recalled and it is filed directly into Trash files. Recall will then only occur in the presence of an appropriate environmental trigger (souvenir), or through retrieval by hypnosis. In short, we have to have an I-tag to retrieve something. Mnemonics provide such a tag.

6. External Working Memory

External Working Memory is an important further dimension, relating to practical representation of concepts and information with representative objects or graphical images. Examples of this method include demo kits, mind maps, the Roman Rooms loci system, the use of blackboards in a physicist's lab, and so on. These external representations are utilized as mnemonics, and this occurs naturally, to some extent, with those who are using their minds. However, conscious and extensive use of such methods can increase Natural Working Memory dramatically and raise IQ (which is highly, positively correlated with Working Memory) by 20 to 30 points, as well as enhancing lateral thinking and hence creativity. External Working Memory may be regarded as an extension of Natural Working Memory that preserves the capacity of random access in a way that Long Term Working Memory does not. This is especially the case in the dimensions of certainty, flexibility and the essential speed.

Until about three or four hundred years ago, actors would memorize the theater they were going to act in and theaters were designed with this goal in mind. This gave an actor presence and provided him with a system of Loci. In the Middle Ages, this Memory Theater method was used as an External Working Memory System for the purposes of creativity, bringing the Renaissance more rapidly into being. A large Working Memory with random access is a primary requirement in the area of creativity.

The addition of External Working Memory to Internal Working Memory, under the direction of a Central Executive, results in a framework of Distributed Working Memory...



Medium Term Memory

There are three major types of memory storage filing systems: Short Term Memory (also called Working Memory or Immediate Memory); Medium Term Memory (also called Intermediate Memory); and Long Term Memory (also called Permanent Memory). Successful memory retrieval relies on a combination of all three memory storage systems at any given time.

Inability to recall information that is stored in the memory is called amnesia. When the Short Term Memory is affected the person will have difficulty recalling the events that occurred in the preceding few seconds. Medium Term Memory is affected when a person cannot recall events that happened from within a few seconds to a few days prior to the cause of the amnesia. With Long Term Memory loss a person will be unable to recall events that occurred further back in time.

Medium Term Memory covers the time span between a few seconds in the past and extending backward for 24 to 48 hours. This information is available in a "medium term" memory store that involves the Long Term Memory system, but does not necessarily require consolidation into Permanent Memory, if it is not sufficiently salient or fails to be repeatedly recalled. It is much easier to recall what we had for dinner yesterday and the day before, but the memory of what we ate for dinner 3 weeks ago is gone.

Often when lay people speak of Short Term Memory, they are referring to Medium Term Memory (Intermediate Memory). Medium Term Memory occurs once the information has been processed. It can be viewed as the part of memory which holds and mixes information from the different parts of the memory architecture. This will determine how we feel and what we will do about a given situation. It defines our ability to express actions.

Medium Term Memory is used to transfer information from Short Term Memory to Long Term Memory. Material that has been I-tagged according to its type of information (semantic or episodic - data and concepts or sounds, sights, tastes, smells, etc.) is transferred to the hippocampus where the consolidation of the material in preparation for sending to Long Term Memory takes place. The brain is generally thought to do all of this during sleep, specifically slow-wave sleep, when the brain is not busy with processing real-time inputs. The hippocampus is the storage site of Medium Term Memory, which is stored for 24 to 48 hours. Medium Term Memory is a separate system, intermediating between Short Term Memory and Long Term Memory. Short Term storage is electrical, Medium Term storage is chemical and Long Term storage is protein based.

The main thrust of modern memory research, then, suggests that there are three types of biological memory, namely electrical, structural (protein based) and "calcium-sensitized" (chemical). The electrical type supports the span of immediate consciousness, the structural type supports permanent memory, and the calcium-sensitized type provides a means of the former "tagging" the latter with things which have just been accessed and might be needed again within the next hour or so - in other words the function of Medium Term Memory. It is also the physiological mechanism which underlies the phenomenon of memory consolidation. It is the calcium-sensitized memory variant which allows direct access to items within Long Term Memory, provided only that they are in the necessary state of heightened excitation.

Medium Term Memory does not contain any knowledge at all, but rather maintains pointers (sometimes called "tags") to recently activated points within Long Term Memory. Biologically this "touch-and-glow" ability derives from synaptic sensitization processes such as "calcium switching" and "second messenger" neurotransmission, and psychologically it is the key to interfacing the electrical and the structural aspects of memory, and thus maintaining the continuity and coherence of thought. Retrieving memory objects via Medium Term Memory is easier and quicker than obtaining them from Long Term Memory. After some hours the mental objects in this Intermediate Memory are typically no longer available, but must be retrieved from Long Term Memory if we want to access them again. Long Term Memory sensitization as Medium Term Memory has an important role to play in understanding complex or prolonged items of communication.

Medium Term Memory is a way station and sorting house where information is stored for a few hours up to 48 hours, in case it is useful. Most of this data is eventually classed as not useful and discarded; the remainder of this Hippocampal

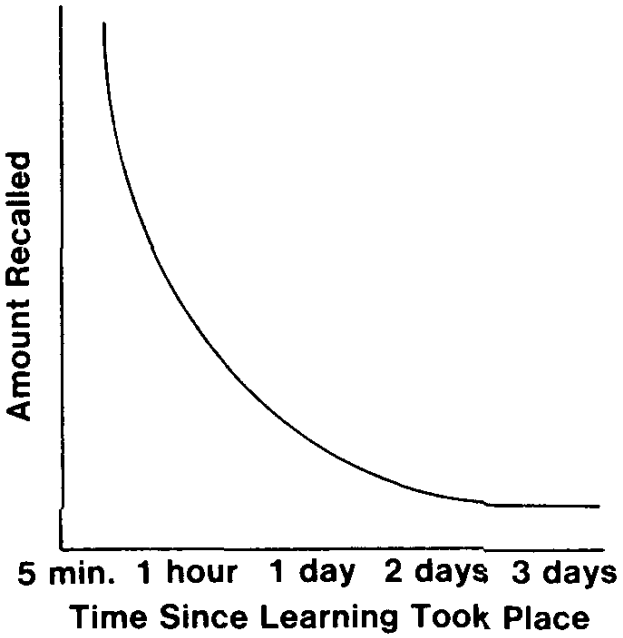
content is consolidated and passed on to Long Term Memory. If we only had a Short Term Memory and a Long Term Memory, most of what we have learned would be forgotten in the first two minutes, not over a period of 48 hours or so, where it can be used and evaluated, and the most useful stored for later re-use.

Without Medium Term Memory, we would not be able to find the car in the evening that we parked in the morning, before we started work. And we would not be able to enjoy a novel, because we would have forgotten the beginning of the page long before we got to the end; we would no longer have a global grasp of the story. Medium Term Memory enables us to quickly identify our surroundings without having to constantly visually scan our environment, since information about previous visual fixations is retained long enough to build up rich the phenomenological experience of a detailed scene. Many phenomena are explained by reference to Medium Term Memory. One researcher suggests that dreams are forgotten within a minute because there is no Medium Term store, only a Short Term store, and that unless information is stored first in Medium Term Memory and reviewed several times, it will not re-file as Long Term Memory.

Note that Medium Term Memory capacity can be increased by intensive practice over a long period, for example learning the intricate maps of London if you wish to be a taxi driver, or spending 10 hours every day memorizing the Koran. The hippocampus has the capacity to grow new cells, if it is used extensively, so the size of the hippocampus is increased in size, especially the posterior hippocampus.

The major difference between Short Term Memory and Medium Term Memory is that Short Term Memory content is lost if we switch our attention to another task, but Medium Term Memory content is not. It is still there when we return to it - material stored at this level is stored for hours. How long it is retained and whether it is then stored for long-term retrieval, depends on how actively we review and refer to the information.

No matter how diligently one studies, no matter how well material seems to have been learned a few minutes after completing the task, it is not long before time begins to erode our memory. An hour later, it may be possible to recall little more than half or even a quarter of what was committed to memory (and far less if no effort was made to pay attention to the material, understand its meanings and inter-relationships, and compare it to existing knowledge). A day later, almost everything seems to have evaporated from the mind, except perhaps for the most stand-out or impressive facts. People forget what they had tried so hard to remember at a rate corresponding to the following graph:



Passive Storage

The curve that represents the rate of forgetting sweeps swiftly downward, showing that only 30 minutes after information has been acquired, a significant amount of the new knowledge is already being lost. For the first 30 minutes, a lot of what we have learned may be retrieved from Medium Term Memory, but after about 30 minutes, the first stage of consolidation begins so the rate of forgetting becomes rapid. Memory continues to suffer a rapid decline and after 4 hours about 50% of the content has been forgotten, and 90% has been forgotten after 24 hours - or even more if the material had not been properly paid attention to in the first place. Which means we retain at most about 10 percent of the information we hoped to commit to memory - unless a more active process of remembering is adopted.

Active Storage

Material that is rehearsed, because we are actively working on it (e.g. using the information at work) will be reliably stored for several hours and some residue will remain for several days. In the case of Active Storage, approximately 20% to 30% of the material being worked on is transferred to Long Term Memory. It is impossible to give an exact figure; this depends on how impressionable is the data - its relative importance and emotional coloring.

Even more effective is a regular schedule of review, incorporating key words and key images, to retain 50% or more of the information.

Mnemonic Storage

When Mnemonics using powerful associations and images are made, Medium Term Memory is 100% reliable for about 4 to 6 hours and about 90% reliable after 24 hours, if there has been no rehearsal of the encoded material. If material is to be available for a longer period and to be 100% accurate, rehearsal must take place. Unless the material in Medium Term Memory is rehearsed or reviewed several times it will eventually be forgotten. In contrast, if Mnemonics have been used in conjunction with rehearsal - i.e. the information has been recalled, reviewed, actively used, thought about and integrated - most, if not all, of this encoded material is transferred to Long Term Memory, in which case recall is nearly 100% even after several years.

Mnemonics enhance Medium Term Memory, so unless the material that has been recoded in mnemonic form is reviewed three or four times it will, for the most part, be forgotten. Mnemonics enhance our capacity to duplicate; once we have duplicated a passage or whatever, we can play with it mentally. This mental play, a combination of comparing and contrasting will lead to understanding and once the material is understood it will become part of Permanent Memory.

Our potential for memorization is much greater than our usual practical ability. When the time of exposure to the source material and the time of recall is after only a short delay our recall of the material is almost as great as our full potential, but the gap starts to widen rapidly after as little as half an hour. With suitable prompts, most of the material could be recovered from potential Medium Term Memory even after several days, although not much longer than that, because true forgetfulness has started to occur - much of the material in Medium Term Memory is erased after a few days. This is why our recognition span is so good. When we recognize something the thing itself is the prompt. Mnemonics are a special kind of prompt. When we use the formal mnemonic systems to encode material, this material can be recovered even after several days, because the mnemonics act as a series of recognition prompts so the original memory is retrieved. Key Words behave in a similar manner; Key Words act as prompts or triggers, so the original wording of the passage can be retrieved from potential memory.

Why use Mnemonics if, by and large, storage is at the level of the Medium Term Memory and forgetfulness will occur in three or four days? When used correctly Mnemonics can reduce learning time to about a third. To give you an example, there are forty and some American Presidents since the time of George Washington. Without Mnemonics you would have to rehearse this list of Presidents about 100 times to make a permanent memory. Learning the same list in conjunction with mnemonics would probably take less than half an hour. A memory expert could do something similar in about ten minutes. Okay, you may say, but I will forget this list in about three or four days, because this material is not actually in Long Term Memory. This is true unless you use rehearsal and connection of the information with your wider knowledge base. If the material is already in Medium Term Memory, however, you will only have to review it about four to six times to

make the memory permanent, so there is a considerable saving in the time taken to learn the list and make it part of Permanent Memory.

Unless you are using mnemonics there is a bottleneck between Short Term Memory and Medium Term Memory: many repetitions are required to get the information into Medium Term Memory. Mnemonics allow a person to overcome this.

Once material is in Medium Term Memory you will have an illusion that you have learned it; this is not true, it will be forgotten in a few days at most, very little will have entered Long Term Memory. To transfer material from Medium Term Memory to Long Term Memory involves over-learning: it must be repeated several times to make it important enough to transfer to Long Term Memory and integrated with the existing knowledge base. The important dimension in Medium Term Memory is how many times have you recalled the material in a meaningful context, not just the number of times you have been exposed to it. If something is recalled several times it becomes sufficiently important to be stored in Long Term Memory.

Many students cram just before an exam. When they do this, they only have the material stored at the level of Medium Term Memory. They believe they have learned the material, but they forget what they have crammed soon after the examination.

Mnemonics should not replace understanding unless you are doing party tricks, otherwise there will be little storage in Long Term Memory. Long Term Memory operates best with meaningful material.

Prospective Memory

Prospective Memory consists of recalling an action or an intention, triggered by either a stimulus or event or a time. Common examples are setting an alarm, making a shopping list or a to-do list. More subtly, you know you need to call your wife before leaving work, and the stimulus of the clock nearing the designated hour reminds you of the task. Meeting a friend (the cue) might remind you to pass on a message (the intention). Prospective Memory is one area where Mnemonics are very useful, and have a wide range of application. An image represents the cue (a predicted stimulus), and when that arises it immediately reminds you of an associated image or chain or images, representing the intended action.

Semantic & Episodic Memory

Material in Medium Term Memory is sorted into three categories: Semantic Memory (meaningful information and concepts), Episodic Memory (episodes of life experience) and Trash. The Trash memory is forgotten as far as the conscious mind is concerned, although some of this content may continue to be stored in Implicit long-term storage and have subconscious effects. It may possibly be retrieved by a hypnotist and is the basis for Recognition memory (these mechanisms will be described in more detail later).

Medium Term Memory is sometimes called Transient Episodic Memory in the literature; this is in fact a good definition, because Medium Term Memory has a high imagery content, whereas, in contrast, Permanent Memory or Long Term Memory proper has a large Semantic (conceptual) dimension. For example if you were to go to a lecture, then recall it in the bus on the way home, in most cases this recall would be accompanied by imagery of the lecture, whereas if you were to try to recall the lecture a month later, for the most part your recall would be Semantic: most of the perceptual details will have been forgotten. Contrary to popular belief much of our autobiographical memory is Semantic; we tend to create imagery after the fact, little of the accompanying perceptual imagery is the original perceptions. One exception for many people, however, is the auditory imagery of music. Songs and music, in common with Episodic memory, are stored in the right hemisphere, whereas Semantic memories are stored in the left.

Until the age of about 14, Episodic Memory (memory for events) is predominant. From the age of 14, Semantic Memory (memory for information) starts to play a larger role and by the age of 18 at the latest, Semantic Memory plays the predominant role. During childhood the right hemisphere dominates in most case, but after the age of 18 the left hemisphere is the dominant hemisphere for 90% of the population.

Most adults may have a good recall of events of the last couple of days, because most of the content of Medium Term Memory is Episodic, but they will tend to have a poor recall of events from last week or last year, because they tend to rely on longer-term Semantic Memory stored in the left hemisphere. They may know that they went to Brighton the week before and they may know they went by train, because this is the usual way to get to Brighton, but they may have little or no memory of the train journey itself, because they are using the more abstract Semantic Memory to reconstruct the episode of going to Brighton, instead of getting in the right-brain mode to relive the experience.

In terms of general intelligence, researchers often differentiate between fluid and crystallized intelligence. Fluid intelligence relates to our ability to solve novel problems and is intrinsic to the functioning of Working Memory. Crystallized intelligence, on the other hand, refers to our accumulated knowledge and experiences and how well we can access and use these, as well as practical intelligence, or the ability to solve to deal with everyday problems and situations. Semantic Memory stored in the left hemisphere is the basis of Crystallized intelligence. Fluid intelligence tends to be negatively affected by age, although this varies among individuals. Crystallized intelligence is generally well preserved and may even improve in some areas in old age, which supports the idea that wisdom comes with age and experience. In my opinion, increases in Crystallized intelligence across the life-span more than compensate for the decrements in Fluid intelligence that occur after the age of forty. The secret of making large increases in Crystallized intelligence is to continue to study until we are on our death bed!

The Locale and the Taxon Memory Systems

There are two fundamental systems for acquiring memories in the process of learning:

1. The locale memory system is that which we use for memorizing location and scenarios. Locale memory is a form of episodic memory, capable of storing semantic type information, as there is a gradient between locale and semantic memory; however, it stores information in context. Consider arriving in a new town and wandering around its streets to familiarize yourself with it. You do not consciously learn anything, yet as you visualize the town and use your imagination with the scenarios in your Short Term Memory, you start to memorize that city's layout very quickly - it becomes part of Medium Term Memory and the highlights are passed to Long Term Memory. This is the locale memory system in operation, utilizing right-brain storage, and it works seemingly without effort. The locale system evolved so that we could quickly update where we are in our surroundings so that when danger threatens we can instantly know which way to move to get away. Since it is vital to survival that this memory be constantly updated as we move around, this system is easily accessed and revised.

2. The taxon memory system is the form of semantic memory used for rote learning a list of facts or words (as in a definition or piece of poetry for example), or a sequence of actions, such as those we use to play tennis or drive a car, or to solve a specific problem. In contrast to semantic memory, it can also store meaningless information, such as a list of nonsense syllables, in which case there is no need for understanding. To compare this process with the locale memory system, consider arriving in a town, as above, but this time instead of walking around and taking in your surroundings, you try to learn the names of the shops and offices, the street names and so on, using only written lists and directions. Using this left-brain analytical method, it takes a considerable effort of repetition to establish anything in memory, but still, the taxon memory system is of great value. Understanding is not required; it is repetition that is key. The taxon system evolved so that we could memorize courses of action needed frequently for our survival. In particular, those actions that are often repeated are the ones that are stored in Long Term Memory, rather than the million and one things we might do that are of lesser importance.

Note: It is now known that much language and memory retention, in particular taxon memory, is stored in the left part of the brain, whereas locale memory is stored in the right. There are many memory systems, each dealing with a different kind of cognitive learning. Until puberty the corpus callosum connecting the two hemispheres of the brain is not fully developed, so children have trouble gathering information in the right side of their brains and accessing the answer in the left side, where mathematical facts, the spelling of words, vocabulary lists and phone numbers are stored.

People who are intrinsically motivated, engaging in a task for its enjoyment value, have a better memory than people who are extrinsically motivated, doing tasks

because they are told to do so. Intrinsic motivation is associated with enhanced performance, improved conceptual and creative thinking, and superior memory recall. Field-Independents tend to be intrinsically motivated. The acquisition of locale memory, with its use of visualization and imagination, and real-world involvement, tends to be associated with intrinsic motivation, or self-directed learning. The acquisition of learning by the taxon memory system tends to be extrinsically motivated, part of required education, and may be resisted because of the need for boring repetition. Therefore effective learning methods do well to incorporate use of right-brain visualization and imagination techniques, alongside the rote learning that is required, so learning is both more enjoyable and more effective. The use of mnemonics, i.e. making visual associations that assist in remembering, with their corresponding application of imagination and visualization, is an example of rote learning made both easier and more effective.

Autobiographical Memory

Semantic Memory, because it contains general information such as facts, names, and important historical dates, could be described as a person's knowledge of the world. Episodic Memory refers to a person's memory of events. Autobiographical Memory is a large and important subset of episodic memory containing those events that constitute the story of one's life. It exists as an integrated system that also contains elements of Semantic Memory to describe the autobiographical facts, names, dates and accompanying interpretation of events.

People recall few personal events from the first years of their lives. The loss of these first events is called infantile amnesia, caused by the immature brain development of infancy, and the preponderance of delta, theta and alpha waves in infancy in comparison to the mature adult's preponderance of beta frequencies during wakefulness. In contrast, people tend to recall many personal events from adolescence and early adulthood. This effect is called the reminiscence bump. Finally, people recall many personal events from the last few years. This is called the recency effect. For adolescents and young adults the reminiscence bump and the recency effect coincide. This is an ideal time to do Mind Development!

Autobiographical Memory is constructed as an evolving record of one's past history. A person's autobiographical memory is fairly reliable, although distortions may occur when memories are suppressed or elaborated upon. It provides an important component of one's identity and sense of self. The milestones in one's life are most prominent in Autobiographical Memory. If the first meeting with a loved one involves going to a movie, that event stands a good chance of becoming part of Autobiographical Memory. Other occasions on which movies are attended, however, will be remembered for a short time but probably will not become part of Autobiographical Memory. Instead, those events will contribute to generic memory. Generic memory contains memory for frequently occurring events such as brushing teeth or climbing the stairs. When asked about such events, it is unlikely that a specific instance of toothbrushing or climbing the stairs will be remembered.

Remembering an autobiographical event usually involves both retrieving the content of the event (remembering what) and placing it in time (remembering when). Of course, memory for both fades over time. Autobiographical Memory can be either reproductive or reconstructive. When it is reproductive, virtually all the details are retrieved from memory. When it is reconstructive, a few major points are retrieved from memory and the rest is constructed from generic memory. People are very good at reconstructing memory from generic events, and they are usually not aware that they are doing so. One of the consequences is that memory for old events is often distorted. Sometimes the error is minor and sometimes it is not. Memory researchers have shown that memory for the content of the event gradually changes from being almost entirely reproductive to being, after about a year, almost entirely reconstructive. By contrast, memory for when an event occurred is almost always entirely reproductive.

Experts learn new material in their field much faster than novices, and they retain that material much better as well. The reason for their outstanding performance in learning and memory is that they have a highly organized and detailed memory for their area of expertise. This allows them to relate new material to one or more pieces of information that they already know. Metaphorically speaking, they have many potential pegs on which they can hang new information. When they have to retrieve the new information, they can follow a well-beaten path to that information. Autobiographical Memory is also a highly organized and detailed memory. When it is possible to relate new information to life events, Autobiographical Memory functions in the same way as an expert system. The new information will be learned faster and remembered better than information that cannot be related to life events.

Functional neuroimaging studies of episodic memory have provided extensive evidence suggesting that regions of the prefrontal cortex (PFC) play a role in episodic memory retrieval. A review of PFC activations reported in imaging studies of Autobiographical Memory and generic Episodic Memory reveals patterns of similarity but also substantial differences. Episodic Memory studies often report activations in the right mid-dorsolateral PFC, but such activations are absent in Autobiographical Memory studies. Additionally, activations in the ventromedial PFC, primarily on the left, are almost invariably found in Autobiographical Memory studies, but rarely occur in studies of Episodic Memory.

It is suggested that these two regions mediate different modes of post-retrieval monitoring and verification. Autobiographical Memory relies on quick intuitive 'feeling of rightness' to monitor the veracity and cohesiveness of retrieved memories in relation to an activated self-schema. Episodic Memory for generic events requires more conscious elaborate monitoring to avoid omissions, commissions and repetitions.

Verbatim Memory & Gist Memory

Real, accurate, memory lasts for about 45 minutes. After that memories are filtered through the 'program' of beliefs and experiences that we have built up from earliest childhood. Often we 'remember' things that never happened, or seek explanations and contexts for fragments of 'memory' for which we have none. While material is in the Episodic Buffer, it can be recalled with nearly 100% accuracy, and it is retained for 30 to 45 minutes without rehearsal, so there is Pure Memory for a short period. However, once the material has moved on to Medium Term Memory proper forgetting occurs, then the material is colored by beliefs held in Long Term Memory. Of course, if the material in the Episodic Buffer is recalled repeatedly, it can be stored indefinitely. Mnemonics help to maintain a Pure Memory.

In the 1930s, the psychologist Bartlett performed recall experiments using material such as stories about Red Indians. He would read a short story of about 100 words to a student; then after various delays he would ask the student to recall the story. If there was only a short delay, say five minutes, the student could recall the story with nearly 100% accuracy, but if the delay was greater than about 30 to 45 minutes, confabulation would occur - there was a failure to recall unfamiliar details, and material would be added through rationalization that was not in the original story but in line with the student's cultural expectations, so the story read more like a typical English story.

The psychologist Valerie Reyna has concluded there are two distinct types of Episodic Memory: Verbatim, which allows us to recall what specifically happened at any given moment, and Gist, which enables us to put the event in context and give it meaning. When an event occurs, Verbatim Memory records an accurate representation. But even as it is doing so, Gist Memory begins processing the information and determining how it fits into our existing storehouse of knowledge. Information is paraphrased and summarized and put into a meaningful pattern. Accurate solutions to reasoning problems depend primarily on Gist Memory abilities (extracting the correct gist from problem information, focusing on that gist during reasoning, and accessing reasoning operations that process that gist).

In normal people, Verbatim memories generally die away within a day or two, as they are probably only stored in Medium Term Memory leaving only the Gist Memory, which records the event as we interpreted it. Gist Memory also enables a Pure Memory to be revised. For example, a bird-watcher remembers seeing a lapwing last week though he only later looked up the appearance in a book and learned how to identify lapwings. Another case is the lady who remembers that her childhood home faced west even though as a girl she merely noticed that it faced the setting sun. The re-interpretation is an impure factual memory: a compound of pure factual memory and further inference or realization. Later knowledge or inference is mixed with the memory proper. We can only attend to so much while perceiving. Our ability to replay old experiences lets us add further meaning to them in the future.

When creating a Gist Memory, the mind simplifies or generalizes the Pure Memory, whereby only significant and basic characteristics are remembered clearly, giving a "fuzzy" memory trace of the full event. Pure Memory, i.e. the Verbatim Memory only lasts for about thirty minutes or so, then details start to be lost, and there is a process of reevaluation and revision that gives rise to Impure Memory or Gist Memory, and before long the neocortex spins its web of memories of associations of connotations of the experience. After a couple of days, many of the perceptual details of a Verbatim Memory are lost, and the mind relies on the Gist Memory.

There is a continuum in memory between completely context dependent episodes to truly general knowledge. This fuzzy boundary between Episodic and Semantic Memory is particularly illustrated in the cases of spatial memory and remote memory for personal events. Therefore the distinction between Episodic and Semantic Memory is more complex than classic memory models suggest. In real life, most of our episodic recall is Gist Memory, and most often the recollection is an Impure Memory containing some comforting descriptions that match our aspirations. Gist Memory, then, is an Episodic Memory for an event that is tinged by Semantic Memory, yet it is not Semantic Memory, in the sense of memory of a fact or knowing something, in an abstract sense without a location in time and space. The boundaries of the Episodic and Semantic Memory systems overlap, and the processes of these systems interact.

Long Term Memory

The brain needs to organize complex information in Working Memory before it can be encoded into Long Term Memory. In this process of organization, the meaningfulness or emotional content of an item may play a role in its retention into Long Term Memory. If it is considered important, the information will be held temporarily in Medium Term Memory, particularly if one has used memorization techniques such as chunking or mnemonics, and if repeatedly accessed there it will be transferred to Long Term Memory.

The process of further consolidation in Medium Term Memory starts after about 30 minutes. From the Hippocampus, the selected memories are passed on to the Parietal Lobes. Semantic Memory to the Left Parietal Lobe and Episodic to the Right Parietal Lobe. During our waking hours some information can be transferred from the Hippocampus to the Parietal Lobes (the first stage of consolidation), but there is little or no transfer from the Parietal Lobes to the Temporal Lobes of the Cortex during the waking state. Further transfer to the Temporal Lobes occurs during sleep. The Temporal Lobes are the true site of Long Term Memory.

Note that the digit span of Long Term Memory storage without repetition or rehearsal is only between three and four digits. If you were to give me a three digit or four digit number, I would remember this easily a few days later, but if you gave me five digits, I would only remember it 50% of the time, which indicates that five digits is beyond the Long Term Memory Span, for most people. Typically, the true span for Long Term Memory is one Chunk consisting of three or four digits. This

explains why many senile people can remember a short string of digits, or a sentence, retrieved from Long Term Memory, even though their Short Term Memory Span has now effectively been reduced to zero. As a consequence of Long Term Memory Span, many senile people can learn new material if it is presented slowly enough, perhaps one item of data every ten seconds, and most senile people can hold a conversation of some sort of the other.

When material is stored in Long Term Memory, the rate of forgetting drastically slows down; it is as though the information is no longer fluid but has become crystallized. Perhaps 10% of the content is lost in a year and many memories endure for a lifetime. It is the basis of our knowledge base.

For the most part, transfer from the Hippocampus to the Cortex occurs during sleep, and particularly the REM periods. Zhang (2004) proposed that sleep has two different stages: NREM (non-rapid-eye-movement) sleep for processing the Declarative (conscious, recallable) memory, and REM sleep for processing the Implicit (subconscious, unrecallable) memories. He further suggested that there are two types of dreams. The type I dream, a thought-like dream, is the result of the memory replay when the Declarative memory is transferred from the Medium Term Memory to the Long Term Memory during NREM sleep. The type II dream, a more 'dream-like' dream, mainly occurs when the Implicit, subconscious memories are transferred from the Medium Term Memory to the Long Term Memory during REM sleep.

The capacity of the Medium Term Memory is finite, it can only store a few days experience at most. Sleep deprivation for as little as four nights is enough to turn some people insane and eight days deprivation will turn most people insane. In addition, recent studies provide compelling evidence that the Amygdala is critically involved in modulating the consolidation of Long Term memories, and particularly of emotional experiences.

Long Term Memory stores our knowledge about the world. This in turn affects our perceptions of the world, and influences what information in the environment we attend to. Long Term Memory provides the framework to which we attach new knowledge - it allows retrieval of information decades after it is stored, and it appears to be essentially unlimited in its capacity.

Schemas are mental models of the world. Psychologists believe that information in Long Term Memory is stored in large, interrelated networks of these schemas, which form intricate an knowledge network. Related schemas are linked together, and information that activates one schema also activates ones that are closely linked. This allows relevant knowledge to be called up when information is presented.

Long Term Memory influences what aspects of a situation we pay attention to, allowing us to focus on relevant information and disregard what is not important, which allows our senses to function efficiently.

Recent Long Term Memory and Remote Long Term Memory

Recently, experts have made a distinction between Recent Long Term Memory and Remote Long Term Memory. The latter are core memories that are so deeply etched into your being that they are a part of you, information such as what a cookie is, how to put on a shoe, the words to a childhood prayer, or lullaby that you pass on to your own children, and the name of your country, your mother, or your first dog. They give continuity to your life and help form your unique personality. Who we are is laid down in layers of memory and experience, both real and imagined.

The normal memory loss that accompanies aging usually affects Recent Long Term Memory, but not Short Term or Remote Long Term Memory. This is called Ecmnesia: a loss of memory for recent events that does not extend to more remote ones, a common symptom of old age. Very recent memory is stored in neurotransmitters, but the older and better learned the memory, the more it resides in the protein-synthesised brain structure.

Patients with schizophrenia have significant reductions in measures of Short Term Memory and Recent Long Term Memory, but Remote Long Term Memory remain substantially intact. In contrast, patients with Huntington's disease have impaired Remote Long Term Memory. Recent Long Term Memory is relatively unimpaired, events of up to a few years or so ago can be remembered, but many events of earlier life are lost, indicating that there are at least two layers of Long Term Memory.

Recent Long Term Memory and Medium Term Memory should not be confused. Medium Term Memory stores information for a day or two at most, whereas Recent Long Term Memory is used to store information that occurred in the close past - it includes information stored for days, weeks or months, such as what you ate for breakfast yesterday, who you visited two weeks ago, or the events of last Christmas.

Research is pointing towards the idea that Long Term Memory is structured like an onion with several distinct layers, and that knowledge is processed with respect to its surrounding context; each layer represents a different context and keeps related knowledge. Transfer of information into a permanent Long Term Memory store may entail multiple-stage consolidation processes rather than a single-stage, unitary consolidation process.

Long Term Memory includes both our memory of recent facts, which is often quite fragile, as well as our memory of older facts, which has become more consolidated. A gradual transition takes place from Episodic to Semantic Memory. In this process, Episodic Memory reduces its sensitivity to particular events, so that the information about them can be generalized.

Recent Long Term Memory material is stored in the hippocampus for one to five years, over which time it is gradually transferred to cortical storage. To achieve this,

the hippocampus operates at six to seven times the normal speed during sleep, as it educates the cortex. When information is in Recent Long Term Memory, there is considerable forgetting over a period of several years, especially of information that is not accessed nor revised, then what remains is transferred to Remote Long Term Memory, which is independent of the hippocampus. The memories that remain are very stable and very little further forgetting occurs, and this material can often be retained for a lifetime.

Very Remote Long Term Memory

Very Remote Long Term Memory is a form of implicit, unconscious memory that was acquired early in life, or as a consequence of overlearning. Since this becomes the foundation for new memories and may be linked to many further more recent memories, such memory is less subject to change and/or loss. As the Hippocampus does not come on line until a child is two or three, storage is probably cerebellar and to a large extent preverbal, so the memory is implicit. There is some evidence, however, to suggest that this layer of memory can be retrieved by hypnosis or by using depth psychoanalysis and the memories converted to hippocampal episodic memories through a process of reconsolidation.

The cerebellum plays a role in both Episodic and Semantic Memory. Research results suggest that besides its known role in verbal working memory, the cerebellum contributes to episodic long-term encoding. Also recent evidence suggests the cerebellum may subserve cognition, including the search or retrieval of lexical and semantic knowledge. The role of the cerebellum in these human functions has tended to be obscured by the traditional preoccupation with the motor functions of the cerebellum. In addition to being the site of early childhood memory, cerebellar storage may represent a third and final stage of Long Term Memory consolidation for sufficiently overlearned material, such as a familiar song, in which Implicit Memory ("knowing how") and Explicit Memory ("knowing that") are connected with each other via the cerebellum, blurring the distinction between Implicit and Explicit Memory.

The cerebellum is more than a backup system for brain programs, the cerebellum creates shadow models of other parts of the brain. Once material has been sufficiently overlearned, the cerebrum delegates responsibility to the cerebellum, as the cerebellum is about ten times as fast as the cerebrum; then recall becomes effortless and automatic. For decades researchers have known that the cerebellum houses procedural memory - what is sometimes called "muscle memory." Essentially this is our "how to" learning. How to ride a bike, how to drive a car, how to jump rope, how to swim, and so forth... are stored as memories in the cerebellum. Scientists have also discovered that the cerebellum is the site of memories of many learned situations that have become automatic, but not necessarily associated with muscles. For instance, the cerebellum stores the alphabet after we learn it. A role in a play, multiplication tables, the skill of decoding words, and the stimulus-response effects, such as knowing opposites (I say "hot" and you automatically say "cold"), are probably also stored here. The cerebellum

therefore plays an important role in cognition and psychiatric disorders; immediate and recent memory loss and poor mental arithmetic have been associated with cerebellar dysfunction.

Note: One's memory of experience as an infant before the acquisition of language is in images and kinesthetic 'body memory.' This is true also for much of traumatic experience. Verbal probes of nonverbal memory yield fragmentary results. We can help people draw out those memories by teaching them that "the hand remembers what the head forgets." Finally those unfinished traumatic experiences become comprehended in verbal narrative and become history.

Permanent Memory

Permanent Memory stores information for up to a lifetime. Once material is in Permanent Memory the rate of forgetting is negligible.

It is beneficial for memorization to connect the items to be remembered to other related information (e.g., elaborating on sentences to be remembered, mnemonic systems, or rhyming). In studying new materials it is best to:

1. Preview the material
2. Make up questions that you will look for answers to
3. Read, trying to answer the questions
4. Reflect while you read. Think of examples, relate it to what you know.
5. Recite or write a synopsis of the information in each section after you've read it. Re-read what you can't recall.
6. Review the major points and the answers to your questions at the end.

In other words, the few minutes that it takes for you to review and think about what you are trying to learn is the minimum length of time that is necessary to allow thought to become a lasting, more easily retrievable memory.

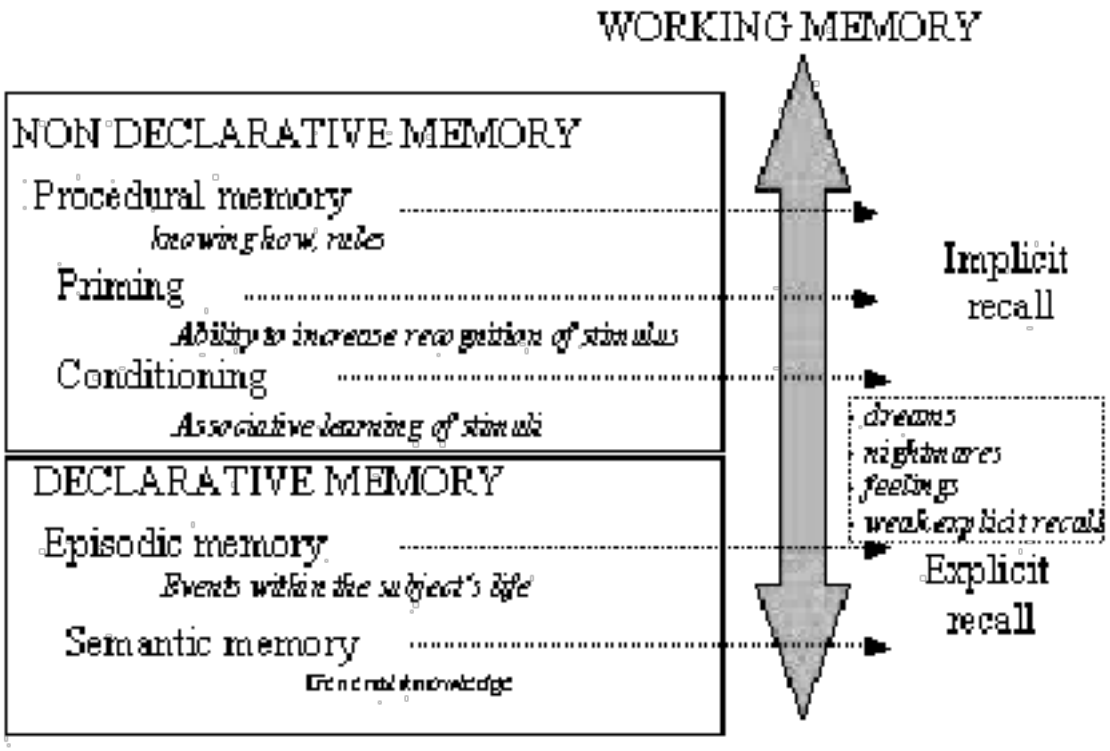
Reading, observing and listening are good methods for absorbing data and information into Working Memory. However, this information does not instantly become knowledge once we have absorbed it since it has not been encoded for long-term storage. It can easily become forgotten if it is not accessed for some time or if new information, using the same stimuli and associations, replaces the old. To help make it part of one's permanent knowledge base, one needs to take it through a 'learning cycle' which may include:

- Comprehending and reflecting.
- Forming concepts (models, frameworks, generalizations).
- Fitting it in with previous experience and knowledge.
- Testing in new situations.
- Gaining experience in application.

Recent research has demonstrated that 7-10% of what we study is typically retained in Long Term Memory, subject to it being studied with attention and interest, but this figure may be increased greatly if mnemonics and other aids to memory such as periodic revision are utilized.

The speed of recall of information from Long Term Memory depends in part on how recently that information has been activated and it also depends on the amount of practice, i.e. the frequency and durations of reviews. A well known psychologist and researcher, Ebbinghaus, has reported that each additional recitation (after you have become familiar with the material) engraves the mental trace deeper and deeper, thus establishing a base for long-term retention. For many people over-learning is difficult to practice because, by the time they achieve bare mastery, there is little time left and they are eager to drop the subject and go on to something else. But reciting the material even just one more time significantly increases retention, so try to remember this and utilize the technique when you can.

Several different types of memory are included in Long Term Memory. One way to divide up Long Term Memory is into Explicit memory, Implicit memory and Automatic Memory...



Explicit Memory

Explicit memories are memories that we can consciously remember or 'declare' - they are declarative and can readily be restored to Working Memory, i.e. they are consciously available. Most of what we commonly consider 'memory' is explicit memory. Answers you give on an exam are a product of explicit memory. Everything you 'know' you remember is explicit memory.

Episodic and semantic memories are explicit. Episodic memories (stored in right brain for the most part) are personal, autobiographic memories of experience, such as what your first day of school was like, or what you did on your last vacation - it is memory for specific events in time, and may include emotional and multi-sensory data. Medium Term Memory may also be called, Temporary Episodic Memory.

Semantic memories (stored in left brain for the most part) are facts or meanings, such as names and dates or ideas and concepts. They are fast changing: quick to acquire but also quick to be lost, if unused for a period of time. Semantic Memory is, by and large a product of a literate culture, thus of recent evolutionary origin, whereas in contrast the other types of memory have an evolutionary history of millions of years.

Implicit Memory

Implicit memories are non-declarative - memories that we do not consciously remember, which nonetheless can be shown to influence our behavior. For example, the process of conditioning. You may have been exposed to many adverts of a particular brand and taken little notice, but when visiting a supermarket, this exposure may affect your purchasing decision. This is an example of memories that we are not aware of influencing our daily behavior as a result of conditioning.

The Implicit memory system is common to all vertebrates and accounts for associative learning; the Explicit memory system is unique to humans and requires language. The association between a subject and a predicate in language is structurally different from the associations that animals are capable of. Animals can learn associations between stimuli, but cannot infer subject-predicate associations, and that is the prerequisite to acquiring a language. Language allows humans to think in terms of “representations”, of “aboutness”. Animals, who are not endowed with language, cannot grasp this “aboutness”. The “aboutness” relationship is the fundamental grammatical requirement for language.

Implicit Memory is much larger than Explicit or Declarative Memory. These are further examples of Implicit Memory...

Procedural Memory represents motor or skill learning, which is memory without verbal mediation. This type of memory is encoded and probably stored by the cerebellum. It includes learning how to drive a car or tie your shoelace. Such memories are slow to acquire but more resistant to change or loss. Initial storage of Procedural Memory may be in the motor cortex and there is evidence that this storage may last for up to half an hour. The maximum rate of forgetting takes place during this period. Finally, the memory content is transferred from the motor cortex to the cerebellum. When the content has been over-learned it may be stored for a lifetime. One never forgets how to ride a bike.

Very Remote Memory simply refers to memories that were acquired early on. Since early acquired information is the foundation for new memories and may be linked to many further more recent memories, such memory is less subject to change and/or

loss. We have little or no conscious memory of events before the age of two. During the sensory-motor phase of development, between shortly after birth and the age of about two, memory is almost entirely procedural, hence the site of memory storage at that age is the cerebellum. This is why most traumatic material is also stored in the cerebellum: most traumatic events occur before the age of two.

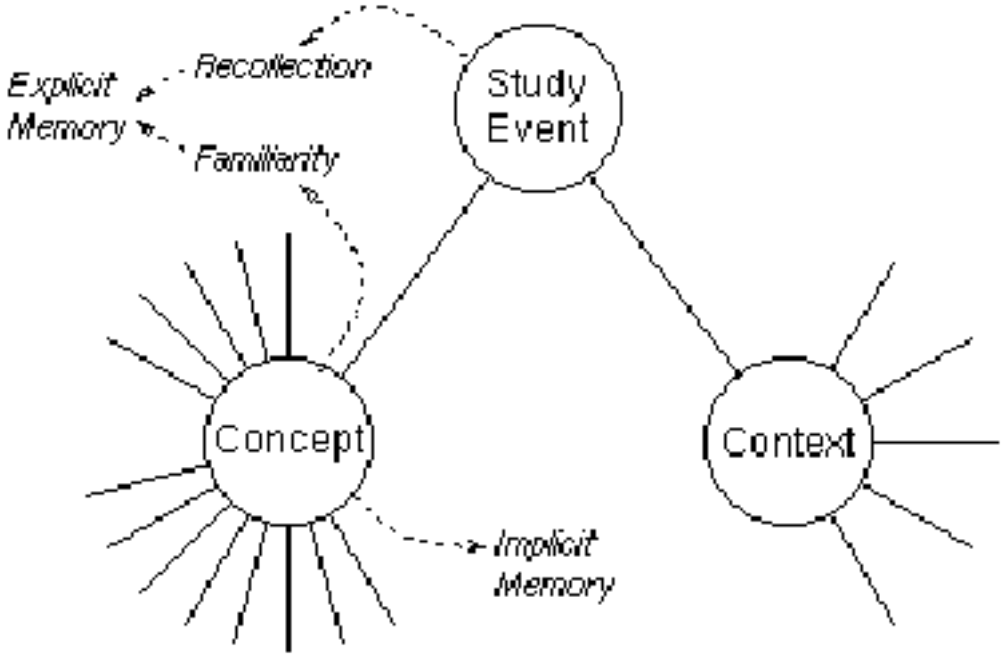
Trash Memories contain information of an episodic nature that was held and used in Working Memory but not noticed significantly enough to tag it for long-term storage. It is not lost, as may appear to be the case, but is passed on to the Implicit storage of Long Term Memory. It is the basis for Recognition Memory. The Trash file content is not open to introspection except under special circumstances, such as external triggers (e.g. a diary entry, a photograph, hypnosis or deep psychoanalysis) but it has a vast if not unlimited capacity. In addition to the Declarative and Procedural memory systems, the Trashfile/Recognition Memory system represents a third route to Long Term Memory.

Years ago Dr. Wilder Penfield found that while using an electric probe on the brain cortex to find epileptigenic foci, patients would bring forth vivid, buried memories when the cortical probe was stimulated. Now comes a report from Dr. Lozano, a neurosurgeon in Toronto, Canada, that while using experimental deep brain stimulation to try to decrease an obese man's appetite as a last resort treatment endeavor, a surprising 'accidental' finding emerged. While using deep brain stimulation to identify potential appetite suppressant points in the hypothalamus, the patient was suddenly bombarded with accurate, vivid recall of events of 30 years earlier that he had completely 'forgotten,' or at least so he thought. The more intense the stimulation, the more copious and vivid the memories. This effort is similar to Penfield's earlier findings, although this experiment's probing is at a much deeper level in the brain. Maybe we do all have a continuous tape of life events deeply buried!

Memory can be categorized in many different ways. One such way to look at your new memories is in terms of recognition and recall (or declarative) memory. These two types of memory simply represent the depth with which you remember the new material. Recognition memory is a superficial memory - if you have this type of memory for a concept, you will recognize the concept when you encounter it and may be able to generate some of the material on your own if you are prompted or given clues. Recall memory is a much deeper level of memory. If you have this type of memory for a concept, you should be able to generate the concept at any time, without any prompting or clues.

Recognition Memory takes effect because of the large implicit recorded memory storage that cannot be recalled voluntarily, but with the correct stimulus it becomes available. This process is called Priming. People can recognize the faces of people shown in pictures if they have seen them before, even if they were long 'forgotten.'

When there is an appropriate trigger, implicit recall may be strong enough to break into conscious awareness and take on the character of Explicit Memory.



Recognition memory can be a trap. This can occur in the area of study among other things. When you come to revise some materials, often you will recognize what you are reading and think that you already know it when actually you do not. The truth is you do not know it and would not be able to answer questions about it, because the information has not been sufficiently deeply processed for encoding to Long Term Memory to have occurred.

Without recognition memory life would be extremely difficult, as much of what we do depends upon it. Recollection, as defined by memory specialists, is the ability to call up specific details about an encounter when one is reminded about it, while familiarity is simply knowing that someone or something has been encountered before. Both are elements of recognition memory and both, new research suggests, are functions of the brain's Perirhinal Cortex. You won't run out of space because that organ is estimated to have a capacity of at least 100 billion images!

Automatic Memory

Automatic Memory - identified just recently - is often referred to as conditioned response memory. Certain stimuli automatically trigger the information or memory. After you hear the first few words of a song from years past, you might remember all the words of that song. Using flashcards or songs in order to learn facts are ways of putting information into this system.

Automatic Memory is found in the cerebellum. Automatic Memory, as far as the cognitive dimension is concerned, is much more than Procedural Memory. The cerebellum is viewed as making an essential contribution to automatic behavioral control. It accomplishes this by copying and rehearsing or 'practicing' the contents

of Working Memory; a third stage of Long Term Memory consolidation. In Mind Development, this principle is applied to the concepts of expertise and giftedness. Familiar songs, frequently recalled information, the multiplication tables, the alphabet, frequently used words and decoding skills are stored in Automatic Memory; these are not Procedural Memory.

It also appears that the cerebellum is involved in word association and puzzle solving. Recall from the cerebellum has a shorter communication lag than recall from Working Memory, because the cerebellum is much faster than the cortex, and the operation of the cerebellum is not so much constrained by Working Memory limitations. Proof of this is that expert calculators, who have a digit span of between twelve and twenty, have a much faster response than untrained persons. This is demonstrated in experiments conducted by Mind Development, first commenced 30 years ago, in which communication lag was averaged over 100 responses to stimuli.

The cerebellum is a remarkable co-processor in its own right. It manages all motor activity that is "overlearned" - that is, so well learned that it no longer needs conscious attention. Walking, talking, speaking, and reciting familiar information are handled by the cerebellum, leaving the cerebrum free to manage other, more complex activities.

More than a backup system for brain programs, the cerebellum creates shadow models of other parts of the brain, opening possibilities of its managing the interweaving of explicit and implicit memory, parsing the domains and structures of Freud's topographic and structural systems, and directing limbic emotion toward meaningful actions.

The cerebellum learns to handle coordinated motor activities by mimicking the electrical patterns that occur in the cerebral cortex as you learn to serve a tennis ball, play a guitar chord, or sing a song. Once you've learned the procedure thoroughly, the cerebral cortex "delegates" the task to the cerebellum, which usually handles it afterward.

Problems can arise when you become anxious about your performance, as with a critical point in a tennis match or presenting detailed data from memory. Under anxiety, the cerebral cortex tries to take over the activity, not trusting the cerebellum to carry it out expertly. Bad tennis serves, bad golf shots, forgotten words to songs, missed comedy lines, and many other "flubs" occur at this instant of conflict between the cerebrum and the cerebellum.

Transactive Memory

Individuals do not stand alone, they work with others in groups and share information. Individual thoughts may be shared with others and distributed by various means. Whereas intelligence is based on the knowledge and cognitive processes within the brain, extelligence is based on the information, skills and understanding that one can readily access from external sources, the pooled sum

of human knowledge. There is distributed cognition within the group, between its members.

Extelligence requires a transactive memory system, through which groups collectively encode, store, and retrieve knowledge. According to Daniel M. Wegner, who coined the term, a "transactive" memory system consists of the knowledge stored in each individual's memory combined with metadata describing each participant's domains of expertise. This ranges from couples in close relationships and families, who need to coordinate information and tasks at home, through teams, to larger groups and organizations who develop their "group mind" utilizing a memory system that is more complex and potentially more effective than that of any of the individuals that comprise it. Complementing the brain power of individuals, computer storage and communication networks come to our aid, most notably corporate Intranets and the Internet. In this way, a transactive memory system can provide the group members with more and better knowledge than any individual could access on his own.

Bonus…

TRINITY

Although this is a bonus chapter in the course, it is perhaps one of the most important.

The three meditations that I shall shortly describe have cognitive implications with particular reference to memory.

In my younger days, I was making a study of Zen techniques and their relevance to the development of the mind. About half way through my studies I met a self-styled Professor and Master of Zen. He taught me three meditations that have served me well for more than 40 years…

Meditation 1
This meditation is very simple: every 5 minutes spend 5-10 seconds **reflecting on the events of the past 5 minutes**; then once an hour spend a slightly longer period **reflecting on the content of the last 60 minutes**.

Note: this exercise is contraindicated if its performance is dangerous either socially or physically.

It's a good idea to set up a smartphone timed reminder system to keep you on track. You will find after a month or two that you will have an immediate sense of 5 minutes and 1 hour, and the exercise of this meditation will become automatic, as it has done for me.

Meditation 2
The second meditation is performed in bed during the period it normally takes you to get to sleep. There are two parts to the second meditation:

a) 5-10 minutes should be spent **reflecting on the events of the day**, starting from when you got up until the moment you start this meditation.

b) The second part of this meditation is to **go through the events of the previous week in reverse order**. By this, I mean each day should start from the time you went to bed and end with when you got up in the morning and brushed your teeth and likewise, the days should be dealt with in reserve order. In short, if today is Friday then the sequence would be Friday, Thursday, Wednesday and so on until you reach the pervious Friday, then stop. Each day should take about a minute.

Meditation 3
For the final 5 minutes before you sleep, **ask yourself to recall something and ask this once every 5-10 second**s. Items of content will come from both semantic (conceptual) and episodic (experiential) memory. This does not matter. Do not strain for something, just except what comes up. You will become better at this in time.

Because Meditations 2 and 3 are done just before you fall asleep, there will be no interruptions caused by new content, so when you wake up in the morning you will find that you will have a much clearer memory of yesterday and the week of events that led up to it. An added bonus will be that some semantic memory is rehabilitated also.

Good luck with it!