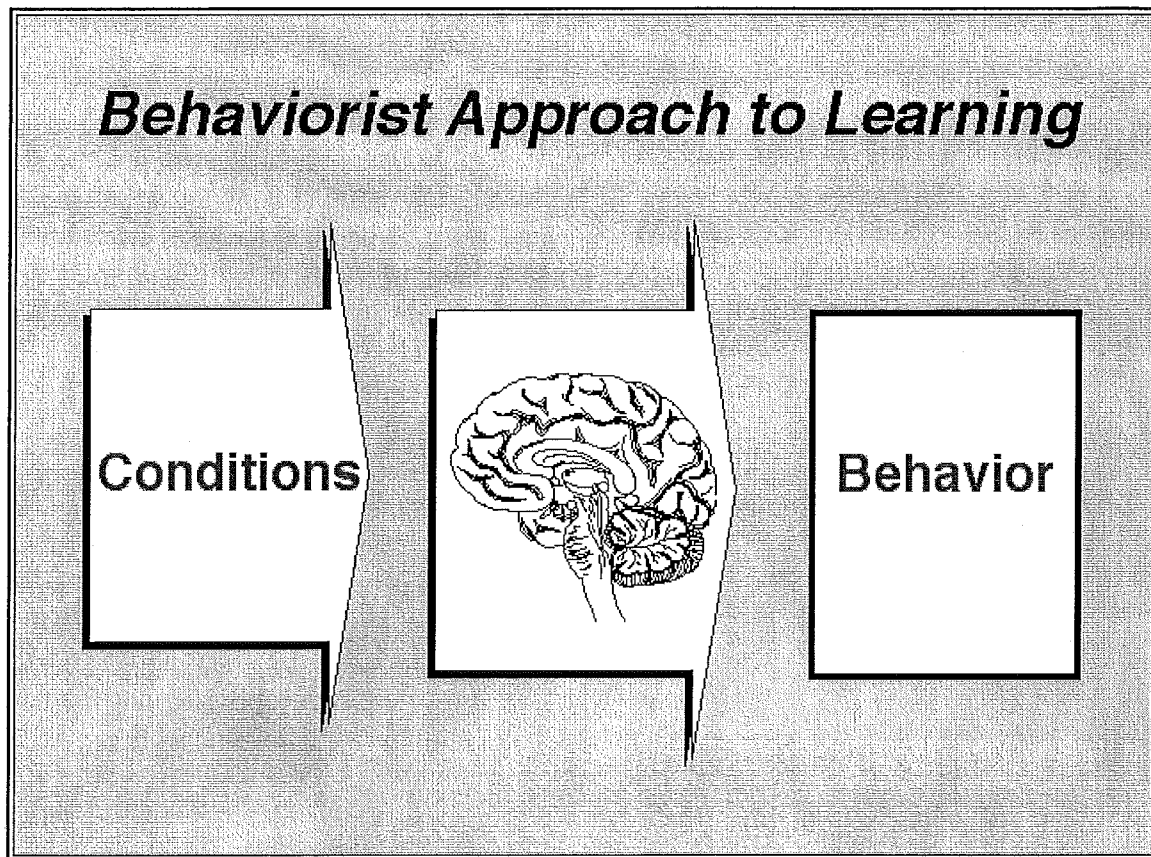


# **Leading Change With The Brain In Mind**



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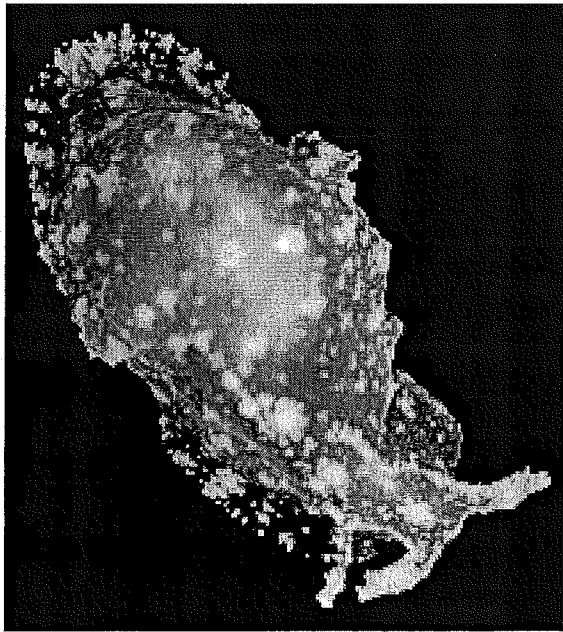
Leadership and teaching have been folklore professions. We knew certain things seemed to work better than others but we didn't have a clue why. We learned from Watson and Skinner that if we set up certain conditions, something happens in the brain and at the other end we get behaviour. We didn't have a clue what went on in the brain but we knew that if we changed the conditions, we got a change in behaviour. The good news is that with all of the brain research being conducted today, we are developing a scientific basis for the art of leadership, teaching and parenting. We now understand why certain things work and other things don't work. Dr. Max Cynider from the UBC Brain Research Centre says that "About 90% of what we know about the human brain has been discovered in the last 3 years."

Imagine what will be happening in the next 5 or 10 years!

You have approximately 100 billion neurons in your brain. Each of these neurons has between 5,000 and 50,000 connections to other neurons. (We have one quadrillion connections among neurons in the brain.)

Mounting evidence suggests that glial cells, overlooked for half a century, may be as critical to thinking and learning as neurons are. The brain has 8 times as many glial cells as neurons. They are the catering service for the neurons and they seem to be the cells that help neurons migrate to where they are supposed to be. Neurons are formed in the base of the brain and migrate up to where they will spend the rest of their lives.

# Types of Brain Research Useful To Leaders



## *Aplysia*

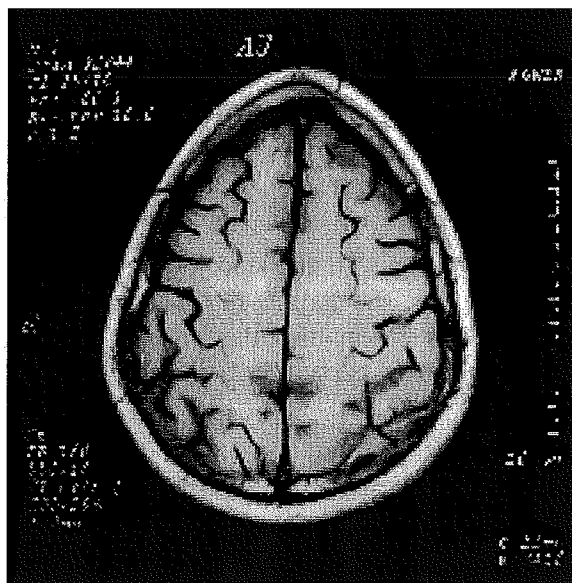
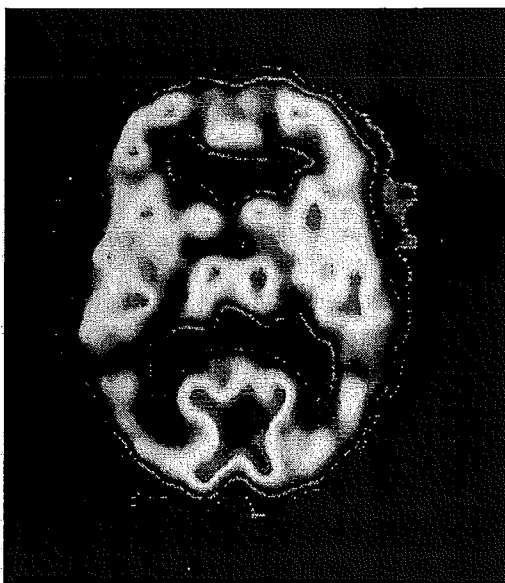
Dr. Eric Kandel studied this sea slug to see what happens as we learn something. He won the Nobel prize in 2001 for his work on memory.

## Single Cell Research

Scientists are very interested in knowing what goes on in the brain as we learn, remember, forget something. What happens in the neurons? It was very difficult to study a human brain as it learns, so scientists looked around the animal kingdom for a less complicated brain. The *Aplysia* sea slug was an ideal animal to study. It had only 20,000 neurons and they were huge. Each sea slug's brain is almost identical to every other sea slug's brain - probably because they have a rather limited culture. Human brains are all very different. The scientists taught the sea slug something, dissected its brain, compared it to other sea slugs brains that had not been taught the new skill to see what happens as the brain learns. What they found was that as we learn, we grow new connections among the neurons. A newborn baby has relatively few connections. An adult has an incredible number.

## Brain Imaging Research

The incredible increase in our knowledge of the brain recently has come about largely because of the new technologies that allow scientists to study the brain using brain imaging technologies including the following: PET - Positron Emission Tomography, MRI - Magnetic Resonance Imaging, SQUID Superconducting Quantum Interference Device, SPECT - Single-photon Emission Computerized Tomography, BEAM - Brain Electrical Activity Mapping and others.

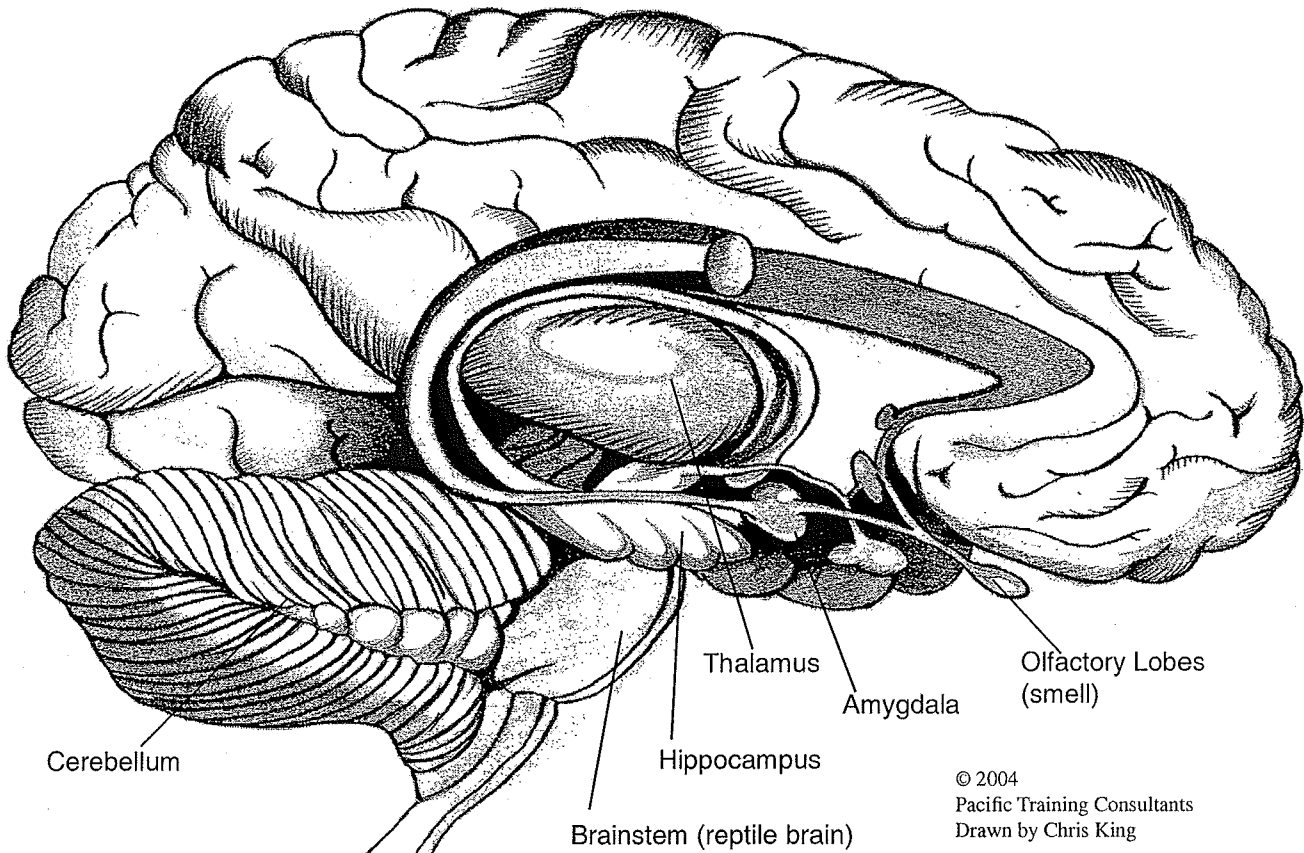


# Serious Brain Injury Research

Phineas Gage and Henry M. are two people who have helped scientists learn a great deal about what happens when we damage parts of the brain.

Henry M. had the hippocampus removed from each side of his brain. He lost the ability to put things into long term memory. Until his death in December 2008, he lived in a world of 18 seconds to 10 minutes. From his operation scientists learned about one of the functions of the hippocampus — memory formation.

The amygdala is involved in memory formation and our emotions. This is why our memories and emotions are so interconnected. When you want to learn things, get emotionally involved. Where were you September 5, 2001? Where were you September 11, 2001? (Flashbulb Memories)



We like to think we are very logical. However, we have an emotional brain that may hijack the thinking brain. The amygdala is the seat of emotion. When you buy a lottery ticket, it is not your frontal lobes that buy the lottery ticket. It is your amygdala. The frontal lobes can be quite disgusted with your choice. They are saying to you, “What is the matter with you? One chance in 14 million means lousy odds. Save your money”. However, your amygdala is saying, “Somebody’s got to win. Just imagine what you could do with all that money!” So your logical brain is hijacked by the emotional brain and you buy the ticket. You console yourself by thinking, “Where else can I get that much fantasy for \$2.00?”

When you are managing people, never forget that they are much more than logical creatures. They are also emotional beings. They are well equipped to pick up how you feel about them.

# Why Is Change So Hard For People?

In the last 20 years scientists have moved beyond the behaviourist model and the humanistic model of leadership to a new, far more accurate view of human nature and behaviour change which is based on an understanding of psychology (study of human behaviour) and neuroscience (study of the anatomy and chemistry of the brain).

The old reward and punishment approach (behaviourism) or the person-centred (humanistic) approach have not been very reliable in producing lasting changes in behaviour in high-functioning, smart employees. The new insights gained from neuroscience are capable of helping employees change behaviour more effectively than the old approaches.

In business, industry and government we all need to be able to bring about change in our organizations and in our own lives. We need to help our staff to change their behaviours to meet new situations. But changing behaviour is hard for people, even when their lives depend upon it. A 45 old man had a lung removed as a result of cancer. Two weeks after he was out of the hospital, he went back to smoking and died 2 years later when his only remaining lung also developed cancer. Have you ever been told by your doctor to lose weight, change your diet or exercise? Did you do it?

Many research studies on people who have undergone coronary bypass surgery found that only one in nine of these people, on average, chooses to adopt a healthier lifestyle. All of them are told they must change their lifestyles - lose weight, change diet, stop smoking, exercise, etc. or their lives will be at greater risk. But eight out of nine even though they clearly see the value of the changes, don't follow through. (Alan Deutschman, *Change or Die*) Eighty percent of the health care budget in the United States (and probably Canada as well) is consumed by five behavioural issues — too much smoking, drinking, eating and stress, and not enough exercise. Why do people find change so difficult even when their lives depend upon making the changes?

Leading change, whether you are in a education, health care, business, industry or government is a tremendous challenge. John Kotter, Harvard Business School professor, says that when organizations want to bring about change, "The central issue is never strategy, structure, culture or systems. The core of the matter is always about changing the behaviour or people."

Kotter believes that "Behaviour change happens mostly by speaking to people's feelings. This is true even in organizations that are very focused on analysis and quantitative measurement, even among people who think of themselves as smart in an MBA sense. In highly successful change efforts, people find ways to help others see the problems or solutions in ways that influence emotions, not just thought."

Howard Gardner in *Leading Minds: An Anatomy of Leadership* writes "A leader is an individual (or, rarely, a set of individuals) who significantly affects the thoughts, feelings, and/or behaviors of a significant number of individuals. Most acknowledged leaders are 'direct.' They address their public face-to-face. But I have called attention to an unrecognized phenomenon: indirect leadership. In this variety of leading, individuals exert impact through the works that they create. Whether direct or indirect, leaders fashion stories: principally stories of identity. It is important that a leader be a good storyteller, but equally crucial that the leader embody that story in his or her life. When a leader tells stories to experts, the stories can be quite sophisticated; but when the leader is dealing

with a diverse, heterogeneous group, the story must be sufficiently elemental to be understood by the untutored, or 'unschooled,' mind." (Howard Gardner, *Leading Minds*)

When we look at great leaders, they all had a story. Martin Luther King said, "I have a dream". John Kennedy said "Ask not what your country can do for you. Ask what you can do for your country." They all inspired us with a story that we could relate to and which involved our emotions.

When we are learning new habits, skills or attitudes, the prefrontal cortex of the brain is engaged. When you are asked to do something a little different at work, it is this prefrontal cortex that is activated. It takes this new information, policy, procedure and matches it against the old way of doing it.

For things that you have been doing the same way for a long time, the basal ganglia is activated. You hardly pay attention to this routine activity. However, when we are asked to change something, this new information is placed into working memory which is processed in the prefrontal cortex. It can only hold a certain amount of information and it tires easily. Therefore, things that you do over and over again, are pushed down into the basal ganglia the habit-centre of the brain. This allows your prefrontal cortex to process new information more efficiently.

When managers want to bring about a change in the organization, they have to realize that much of what they do is so routine that the basal ganglia is taking care of it. Trying to change a routine, habit, behaviour in employees requires a lot of work for the prefrontal cortex. It requires the person who is making the change to pay attention to the new procedure or behaviour. This often makes people feel uncomfortable and they prefer to avoid change if they can.

There is a second reason that change is difficult for people. Our brains are very good at detecting "errors" — changes in the normal way of doing things. The area of the brain that detects these errors is the orbital frontal cortex which is found just above your eyes. The orbital frontal cortex has strong connections to the emotional brain. When these errors are detected, the orbital frontal cortex can activate the fear centre in the amygdala which can cause people to act emotionally and impulsively.

## How Can We Lead Change?

Neuroscientists know that whether or not a person changes behaviour has a lot to do with where the person focuses his or her attention.

If you took psychology classes a few years ago, you were probably taught that we lose about 100,000 neurons a day throughout our adult life. These neurons die off all the time. You also were taught that you can't grow any new neurons during your lifetime. Both of these ideas are false. You do lose some neurons but not that many. The good news is that you grow new neurons as well. Some researchers estimate that you grow about 10,000 a day. Each of these neurons grows about 10,000 new connections to other neurons over the course of about four months. What these neurons are used for depends on what we focus on. If you focus on fear, anger, etc. these neurons are used to reinforce these feelings. If you focus on learning new skills, these neurons help you adapt and learn the new skills, knowledge or attitudes. So what you focus on becomes very important over a lifetime. If you are an accountant and you focus on finances all day, your brain is wired up to see the world in

a certain way. However, if you are a safety trainer, your brain focuses on issues related to safety and you see the world through very different eyes than the accountant, a college dean, a person in human relations, a maintenance engineer or a lawyer would see it.

We all have mental maps of how we see the world. If a manager sees employees as lazy, incompetent people who need threats in order to produce good work, this view or mental map of the situation will shape his or her approach to leadership. In order to change behaviour we need to deliberately try to create moments of insight where people can see things differently. When we reach a new insight, a new way of seeing the world, we create new connections in the brain. We rewire our brains to allow us to try new behaviours. If a customer service representative seems customers as a pain in the neck, but suddenly has an insight that these people really just want to solve problems and need information to do so, they can use this new mental map to change their behaviour very quickly. So as leaders, we need to work on helping people gain insights which create new mental maps.

When people attend courses, they may become excited about new ideas but when they go back to the job, relatively few things may be translated into action. However, with follow up coaching, researchers have been able to show that there can be dramatic changes in people's behaviour. Researchers often talk about *attention density*. When we are studying for an exam, we are often better off to spend 30 minutes a day over 5 days prior to the exam, rather than spend 150 minutes the night before the exam. In the long run, we remember more when we pay attention to what we are trying to learn over a period of time, rather than cramming it into one period.

Mindful learning takes place when we try to deeply understand a new idea. When we pay attention to it and try to understand it at a deep level, we create rich connections in the brain that help us to use the new information and see connections to other ideas.

There are three tasks that leaders have which are among the most important things they do.

1. Hire well
2. Manage performance well
3. Help employees with their careers and learning plans.

To bring about change, you have to attend to the work of the employee, not as a cop trying to catch them doing something bad, but as a cheerleader, a nurturer of champions. By paying attention to their work, you put attention on the things you expect them to do and this "attention density" helps bring about the changes you need in the organization.

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# Stress

Stress can kill neurons in the hippocampus by releasing cortisol which in normal quantities assists memory. In too heavy a dose, it kills the neurons. Three or more stressful incidents in a year (being fired, divorced, financial, etc.) triple the death rate of socially isolated middle-aged men. However, they have no impact whatsoever on the death rate of men who cultivate many close relationships.

Many studies have shown that people in groups often “catch” feelings from one another. The more cohesive the group, the stronger the sharing of moods, emotional history and even hot buttons. Cardiac care units where the nurses’ general mood was “depressed” had a death rate among patients four times higher than on comparable units. (Schneider, 1995)

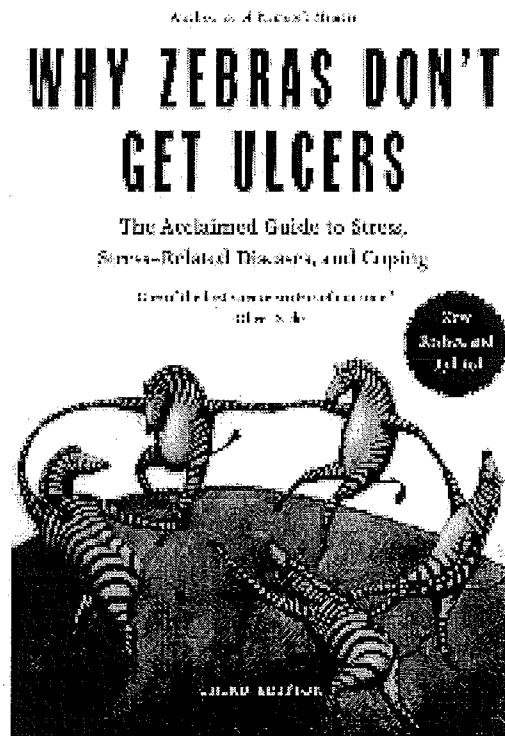
We like variety and change in our lives. Without it we become bored. However, in periods of rapid change, we can become very stressed. The stress reaction in the body can be very damaging.

We all need stress to live. When we are under stress, physiological changes take place that prepare us to flee or fight. This response is appropriate when we are in physical danger. It may be very damaging if the stress response is prolonged. Concentrate on your goals. This will help reduce stress because your sense of mission will move you forward. Have a look at Victor Frankel’s book - *Man’s Search for Meaning*. He believes that one of the problems of modern day life is that a lot of people have failed to choose to have meaning in their lives so they are unhappy and anxious.

Adults who are 60 or older, who love their work and in the eyes of their peers are excellent at what they do, whatever the occupation — have one thing in common. They see their work as something greater than themselves. This quality has been called a sense of mission, a belief that one’s work contributes to something transcendent. For some, it is connected to a spiritual belief, for others to a social contribution or to the beauty of the work itself. To have this quality for ourselves we need to realize and question the worth of what we do, to inform our faith with reason.

For more information on the effects of stress on the human brain, see *Why Zebras Don’t Get Ulcers*

by Dr. Robert Sapolsky (2005)



In order to place things into memory, they must have meaning and emotion.



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## Meaning

What meaning do you construct from this picture?

If you had never had any experience with the object you see, would you likely see it?

Our job as leaders is to help employees experience things so they can construct meaning from them.

## The Trivial Pursuit Model of Education

- Overwhelming emphasis on factual knowledge
- Tests focus on facts and procedures
- Textbooks contain little “language of thinking”
- Emphasis is on “coverage”

(Remember the Battle of Hastings?)

## Mindful Learning

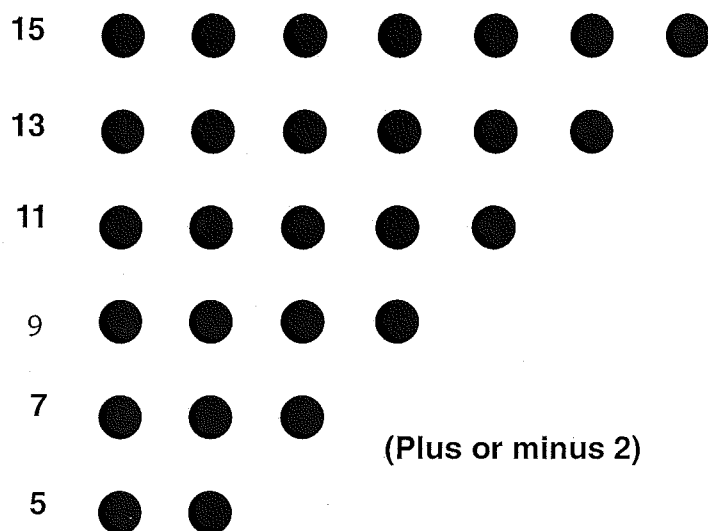
A mindful approach to any activity has 3 characteristics: the continuous creation of new categories; openness to new information; and an implicit awareness of more than one perspective. Mindlessness, in contrast is characterized by an entrapment in old categories; by automatic behaviour that precludes attending to new signals; and by action that operates from a single perspective.

Being mindless, colloquially speaking, is like being on automatic pilot.

*The Power of Mindful Learning*  
by Ellen Langer

## Memory Spaces

The capacity of short-term memory appears to develop with age. The number of spaces increases by one unit every other year beginning at age three.



Adults can work with 7 bits of information, plus or minus two, at one time.

## Chunking

A chunk is any coherent group of items of information that we can remember as if it were a single item. For example, if we have a chunk of letters that have meaning, they can be remembered as easily as a single letter (but carry much more information).

“The difference between novices and experts in a field appears to be that experts tend — because of a great deal of experience in a field — to organize information into much larger chunks, while novices work with isolated bits of information.”

Benjamin Bloom

## The Cocktail Party Effect

The mind can pay attention to only one train of thought at a time. Don't let your students or kids fool you. They cannot listen to their Ipod, watch television, chat with 3 friends in chat rooms and do their homework well all at one time. If they attempt this, recent research shows they will store the homework information in the wrong place and in the wrong way. They will find it difficult to use the new information in a mindful way.

Proceedings of the National Academies  
of Science, August 1, 2006

When you want to move something from short term to long term memory, think of all the ways you could

Describe it  
Use it  
Define it  
Explain it

This will create rich, logical, emotional connections in your brain.

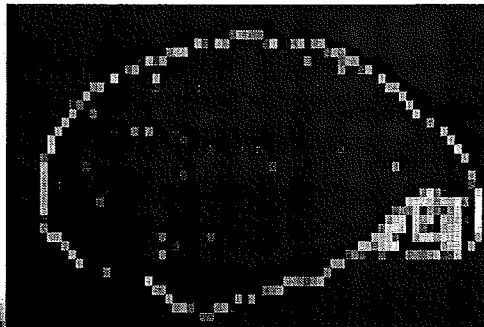
# Cognitive Rehearsal Theory

“Research in Cognitive Psychology has found that if information is to be retained in memory and related to information already in memory, the learner must engage in some sort of cognitive rehearsal, restructuring, or elaboration of the material. For example, writing a summary or outline of a lecture is a better study aid than simply taking notes, because the summary or outline requires the student to reorganize the material and sort out what is important in it.” (Slavin, Robert *Cooperative Learning — Theory, Research and Practice*, 1990)

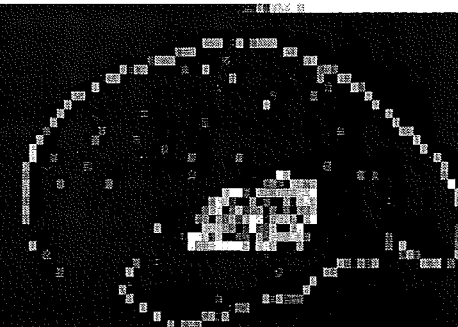
One of the most effective means of elaboration is explaining the material to someone else. By asking someone to explain what you just explained to them, you allow them to cognitively rehearse or process the information. This helps the person who is receiving the information as well as the person giving the information.

A number of studies have been carried out where students were asked to take one of two roles — recaller or listener. In some cases, students were asked to read and elaborate on some material while their partners were asked to actively listen. Students who were listening learned more than students who worked on their own. But students who were taking the role of elaborator learned the most of all.

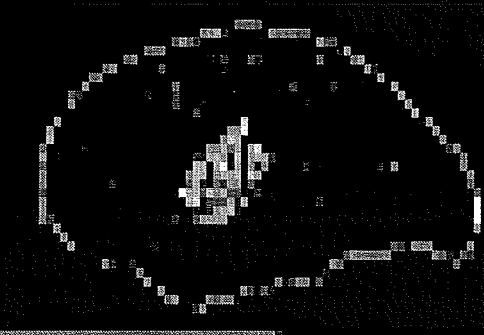
Scan 1



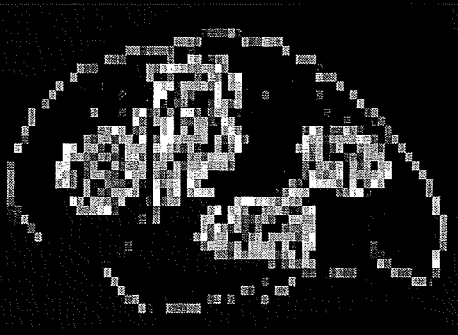
Scan 2



Scan 3



Scan 4



Scan 1 - Student reading a textbook  
Scan 3 - Student recalling info. from past

Scan 2 - Student listening to a teacher  
Scan 4 - Student teaching another student

Unfortunately in many training sessions, the instructor's brain is like scan 4 and the trainees' brains are like scan 2. We need to increase the amount of time trainees are using their whole brain as in scan 4. Active learning, etc. can do this.

# Emotional Intelligence

Emotional Intelligence (EQ) is a much better predictor of a person's success in life than a person's IQ (Intelligence quotient) The subscales of emotional intelligence outlined by Dr. Reuven BarOn are as follows:

## Intrapersonal

Self-regard  
Emotional Self-Awareness  
Assertiveness  
Independence  
Self-Actualization

## Adaptability

Reality Testing  
Flexibility  
Problem Solving

## Stress Management

## Interpersonal

Empathy  
Social Responsibility  
Interpersonal Relationship

Stress Tolerance  
Impulse Control

## General Mood

Optimism  
Happiness

Women tend to score slightly higher in empathy, social responsibility and interpersonal relationships.  
Men tend to score slightly higher in self regard, stress tolerance and optimism.  
In high level leaders, gender differences disappear.

Emotional intelligence skills can be learned throughout the lifetime.  
EQ usually peaks when people reach their 50's but it can increase throughout a lifetime.  
*The EQ Edge* by Stephen Stein is an excellent resource for ideas on developing EQ.

We are hired for our qualifications.  
We are promoted for our performance.  
We are fired for our lack of interpersonal skills.

## The Mankato Nuns

This group of nuns in Mankato, Minnesota are incredibly bright well up into their 90's and 100's. They are the world's largest group of brain donors. Dr. Snowden found that among the first 100 brains he dissected of these nuns, 44 had Alzheimer's. but only 4 of them had shown any symptoms of the disease while they were alive.

**Use it or lose it** is something that all neuroscientists agree on.

## How to Make Your Dendrites Grow

1. Do puzzles. Crossword puzzles are great for you.
2. Try a musical instrument - new one if you already play.
3. Fix something.
4. Try the arts.
5. Dance, exercise. (Mice that exercised grew 20 to 30% more new neurons than those who did not)
6. Go out with friends or find new playmates.  
Date provocative people. (better yet, marry one of them)  
Be socially involved.
7. Turn off the TV or watch TV with others and discuss it.
8. Stock your life with rich experiences of all kinds.
9. Play with toys. Lots of them. Different ones.
10. Skip bingo. Play bridge or chess instead.
11. Learn to roll with the punches. Learn to forgive and forget.
12. Stay physically healthy. Manage stress - too much kills dendrites.
13. Keep your job. Don't retire, ever. If you must retire,  
look upon retirement as an opportunity to begin a new life.
14. Become an expert in something — anything.
15. Search for truth rather than settle for a good fantasy - challenge your brain. Newness and challenge are tremendously important.

Have a look at the 30 suggestions made by Richard Restak in his book *Older and Wiser - How to Maintain Peak Mental Ability For As Long As You Live*.

The more you learn, the better it is for your brain. A study of more than 1000 people from age seventy to eighty showed that four factors seem to determine which older people maintain their mental agility:

- education, which appears to increase the number and strength of connections between brain cells. Sign up for courses, go to conferences, read, etc.
- Strenuous activity which improves blood flow to the brain.
- Lung function, which makes sure the blood is adequately oxygenated.
- The feeling that what you do makes a difference in your life. Give your life meaning. (When you are a safety trainer, that is easy to do!)

The brain is designed to process knowledge and information just as the digestive system is designed to process food or the lungs process oxygen. If food, oxygen or knowledge is cut off, the organism dies. It's that simple.

Richard Restak

*Older and Wiser — How To Maintain  
Peak Mental Ability For As Long As You Live*