



High Performance Memory

By Pat Wyman, M.A.

It's something we all want more of – a great memory. Why? Because it makes our lives easier and even increases our intelligence. We perform better in school, better in life and think faster on the job. Everyday facts stay at our fingertips and learning new things becomes a snap! Even as adults, we know that activating our memory and constantly learning new things may very well prevent age related diseases such as dementia and Alzheimer's.

So the question is - how do we do it? What does neuroscience say about the possibility of creating a designer brain – one that has an excellent memory? Can we even raise smarter children with great memories?

A resounding YES – to all of the above!

Keys to A Great Memory Toolkit

Let's take a look at what science has learned about memory. After each item, you'll find tips on how to create an extraordinary memory.

1. **The Science: Exercise Your Body for A Better Brain** – Exercise positively affects the hippocampus, a sea-horse shaped brain structure that is vital for memory and learning. Researchers found that adult mice doubled their number of new brain cells in the hippocampus when they had access to running wheels. Exercise alters the molecular mechanisms that are important for learning and memory. Regular exercise prevents the negative effect of chronic stress on the brain at the molecular level and boosts the brain's biological battle against infection.

- **High Performance Memory Tip** - Move! Do something – anything that involves movement. Walk, run, workout on one of those dusty home exercise machines. I went out to the garage and brought all of mine into the house. Now I use the treadmill, ab-doer and bun and thigh master every day! Wow – what a great way to start my day! I can feel my memory improving already! (I even notice thinner thighs – hmmm... there is something more than memory here too!)

2. **The Science: Join a gym for your Brain** – Neurobic workouts strengthen the





connections between brain cells and help us form new ones! So say neurobiologist Larry Katz and coauthor Manning Rubin who wrote *Keep Your Brain Alive: 83 Neurobic Exercises To Help Prevent Memory Loss & Increase Mental Alertness*.

When you exercise the brain, you release natural growth factors called neurotrophins, which in turn enhance the brain's level of fitness. This is a great little book and the first one of its kind scientifically based on the adult brain's ability to produce its own natural brain food. You can find it for about \$8.00. [Click here to order](#).

“Through special brain exercises, the authors say, (Jan. 1, 2000 Newsweek article) we hope to be able to untangle our circuits to relieve depression, cure learning disabilities, rehabilitate stroke victims, etc. Stimulating the senses to form new connections can lead to a stronger ability to learn new things and retrieve what we already know from memory”.

- **High Performance Memory Tip** - Try brushing your teeth with your non-dominant hand, showering with your eyes closed, switch accustomed seats at the dinner table, shop at a farmer's market instead of the supermarket.

3. **The Science: You can teach an old brain new tricks – it's called neuroplasticity.** It means your brain is constantly reorganizing itself. You can create your brain from the input you get says Paula Tallal, co director of the Center for Molecular and Behavioral Neuroscience at Rutgers University in Newark, N.J. In other words – designer brains are possible.

Neuroscientists will learn how to use “directed neuroplasticity to determine what specific inputs will change the brain in helpful ways. For example, right now we can see on brain scans that brains capable of logic are physically different from brains that are not. The question remains – how do we change the input to help a person become more logical”?

Science has now proven that the brain never stops changing and adjusting. This flexibility can even help maintain language processing even in the face of severe obstacles. Researchers once thought that only young brains were plastic and flexible – now we know that the brain retains its plasticity throughout life.

This means that even people with specific disabilities and challenges like dyslexia, reading problems and language processing problems can all respond to interventions that modify brain networks. Reading programs that alter neural circuits like Fast ForWord are already improving reading ability by two years during a 6 to 8 week training session.





The implications of brain plasticity are almost limitless – it will mean that schools can deliver education based on neuroscience principles and that learning isn't only in textbooks. Coaches may soon learn to use plasticity to create better athletes by improving brain circuitry and trainers will no longer need to rely on hit-or miss training for anything! Peak performance is a reality.

- **High Performance Memory Tip** - Keep learning. Change your activities often. Add challenges to your daily routine. Do everything you can to enrich your own and your child's environment. Visit museums, art, tech, etc. Read new things often and read to your child. Have your child draw pictures about what you read. Remember – you can grow new brain connections even as you age. Don't just coast through life – you'll have a smaller brain with fewer options available to you. Variety is the “spice” of life. Add new music, pictures and even different plants to your environment often. Add novelty to your life as often as possible. Shake yourself out of a rut - make new friends. Find a new hobby. Your brain will thank you a million times over with newer connections, more intelligence and a better memory.

4. **The Science: Stress Can Damage Your Brain.** Stress can change both the structure and function of your brain. In fact, “stress causes brain damage”, says Richard Restak, M.D. of the George Washington University School of Medicine and Health Services. Long term and chronic stress, even from every day things like traffic, financial worries and school or work stress can actually shrink the hippocampus, the memory center of the brain.

Researchers have found that stress hormones like corticosterone, similar to cortisol, can even block retrieval of information stored in the brain. Learners in a state of fear or threat not only have a harder time learning, their immune system becomes depressed and their learning slows down. The good news – when you're calm, your memory returns.

- **High Performance Memory Tip** - Use stress buster techniques! Try meditation or use simple relaxation techniques. Move and stretch your body often – roll your neck in all directions and lift your arms above your head toward the ceiling and out to the sides to keep tension out of the neck and shoulder area. Do deep breathing while you're on the computer or studying. Take breaks about once every 30 minutes. Keep learning fun! Make sure you know where to find the resources you need when taking on a new project. If you're feeling overwhelmed – take a hike out in nature and get a complete change of environment. You'll feel refreshed and more creative when you return.





- Also, before an examination, familiarize yourself with the location where you'll take it. Knowing the room well, or even studying in the room where the exam will be relaxes you and increases your odds of better recall when you take the test.

5. **The Science: Get smart by eating “Smart Fats”** – Believe it or not, some fats are not only good for you, they're essential to your health. These fats, known as omega-3's have been proven to make you smarter and even help you burn body fat faster! These crucial fats affect mental, physical and emotional intelligence. They impact not only the brain's structure but its function as well.

The mayonnaise you put on your sandwich and the type of dressing you put on your salad may have an impact on your stress levels, moods, impulsiveness and even your ability to learn.

(Skip all trans-fatty acids like those found in margarine and most packaged goods. Read the labels- if you see the words hydrogenated or partially hydrogenated, pass them by!) Read on to find out how essential fatty acids, the good omega-3's, affect everyone's brain, including your baby's.

Essential fatty acids are components of every cell and are needed for many functions in the body. In fact, one reason the type of fat you eat has such an important effect on your mind, is that your brain is more than 60% fat (I guess that makes us all true fat heads)! This is not the same type of fat you see around your belly but structural fat, the type that forms your cell membranes and plays such an important role in how your cells function.

Essential fatty acids are found in cold water fish like salmon, fish oils (sometimes hard to digest) and flax seeds and flax oil. The reason these fats are called essential is because they cannot be made by the body. They must be supplied by your diet! If you're like most people, more than likely you won't be able to eat enough of the foods that contain them to get what you need. So, you might want to consider supplementation!

As far back as 1930, researchers found that if an animal did not get enough essential fatty acids in the diet, it could cause symptoms such as poor reproduction, lowered immunity, rough, dry skin (like the kind you might notice as little bumps on the back of your arms) and slow growth, among others.

The list of benefits from essential fatty acids is enormous :

- Helps to eradicate plaque from the artery walls
- Lowers blood pressure





- Lowers triglyceride levels
- Reduces inflammation
- Helps construct body membranes
- Helps strengthen cell and capillary structures and increases fluidity of cell membranes preventing stiffness and deterioration
- Prolongs blood clotting time, helping wounds to heal
- Helps the body manufacture hemoglobin, the compound in the blood that provides oxygen to the cells from the lungs
- Removes excess cholesterol from the blood
- Nourishes hair, skin and nails
- Increases the rate at which the body burns fat
- Helps maintain proper body temperature
- Crucial for proper visual function
- Helps the learning process (a Purdue study found that boys with ADHD were deficient in Omega 3 essential fatty acids)
- Play a significant role in maintaining normal mood and behavior
- Helps prevent Alzheimer's (those with Alzheimer's are twice as apt to have low DHA levels; those with low blood DHA had a 67% greater risk of developing Alzheimer's in the next ten years according to a study done at Tufts University (
- Many studies on essential fatty acids show a significantly positive effect on memory and learning. Refer to Artemis P. Simopoulos, M.D. books and articles)
- Helps you think faster and concentrate better, speeds up brain waves

[More science about omega-3 oils: DHA in formula boosts children's intelligence –](#)

According to a study funded by the National Institute of Child Health and Human Development, researchers at the Retina Foundation of the Southwest in Dallas, Texas, writing in the March issue *Developmental Medicine and Child Neurology* demonstrated how DHA, (the good fat) improved children's intelligence as well as visual acuity.

DHA, docosahexaenoic acid and AA are fatty acids present in human breast milk and prior to birth are supplied through the placenta to the developing fetus. Both DHA and AA are believed to play a role in the development of the nervous system. Fifty six 18 month old children were divided into three groups. One group received formula containing only DHA, while another received DHA and AA. The control group received a commercial formula without either. All three groups were enrolled in the study within five days of their birth and received one of the three formula types for 17 weeks.

Overall intelligence and motor skills were tested using the Bayley Scales of Infant Development, 2nd edition (BSIDII). No differences were seen on motor skills, but the children differed significantly on Mental Development Index of the test. It measures memory, ability to solve simple problems and language capabilities. Children in the control group received an average MDI score of 98, slightly below the national average





for U.S. Children of 100. The DHA group received an average scores o 102.4 and the DHA plus AA group received an average score of 105! You can read more about this study at www.nichd.nih.gov and it's interesting to note that European baby formulas have essential fatty acids in them and the U.S. is only just now deciding whether to include them in their baby formulas.

Apparently, according to Artemis P. Simopoulos, M.D., there is quite a link between omega 3 fatty acids and learning. According to a 1996 study done at Purdue University, 100 boys between the ages of six and twelve were studied. Those who had the highest levels of omega 3 fatty acids had the fewest learning problems.

According to information in the book, [The Omega Plan](#) by Artemis P. Simopoulos, M.D., president of The Center for Genetics, Nutrition and Health in Washington, D.C. and former NIH chair for the Nutrition Coordinating Committee, the “process of learning and remembering involves the transmission of various chemicals from one nerve ending to another. These chemicals are stored in tiny packages called ‘synaptic vesicles.’

The more synaptic vesicles in a nerve ending, the more chemicals that can be transmitted. Enriching the diet of rats with omega-3 oils resulted in considerable more vesicles in their nerve endings as well as better performance on all their tests. This study suggests there may be a direct connection between the amount of omega-e fatty acids in your diet, the number of synaptic vesicles in your neurons, and your ability to learn.”

- **High Performance Memory Tip** – In case you can't eat enough salmon, flax or flax oil to reap the benefits of EFA's, you might decide to take the omega 3's in supplement form. When you decide to supplement with essential fatty acids, the best place we know of to obtain the purest form of omega 3 oils is a company called [Nordic Naturals](#). We take their products and have noticed, along with all of the above, some other benefits like easy weight loss, shinier hair, no more bumps on the back of the arms, higher energy, and of course a sharper memory! Their [Pro OMEGA's](#) (Essential Fatty Acids Omega-3 oils), are wonderful and we highly recommend everything they have because they go the extra mile to use the purest ingredients. When you're ready to boost your brain power go to: www.howtolearn.com/omega3.html.

P.S. There's a wonderful side benefit to taking EFA's - If you happen to want to lose weight, you can take them about 20 minutes before you eat and your carbohydrate cravings will end! Remember, carbs turn to sugar, and sugar turns to fat. Taking the balanced EFA's before eating is the quickest, safest and most scientific way to lose weight safely we've ever seen!





6. [The science: Ginkgo Enhances Brain Function](#) – You’ve probably heard of this extraordinary herb as the most widely used prescription medication in Europe. It has the ability in its flavonoids and ginkgolides to facilitate increased blood flow circulation and mental function. Ginkgo relaxes the blood vessels and inhibits the aggregation of platelets. It’s particularly helpful in cases of decreased blood flow to the brain, which is usually age related.

Ginkgo, says Julian Whitaker, M.D., works by combating free radicals and promoting circulation to the tiny capillaries of the brain. A high quality extract will be standardized to contain 24 percent ginkgo flavone glycosides and 6 percent terpene lactones. But, he cautions, be patient. It can take up to three months to work.

- **High Performance Memory Tip:** According to Dr. Whitaker, if you decide to take ginkgo, make sure it’s 60 mg. twice daily for adults and it is standardized to contain 24 percent ginkgo flavone glycosides and 6 percent terpene lactones. He also recommends taking a high potency multivitamin and mineral formula to provide proper nourishment and support for every cell.
- [Brain Smart Nutrients](#) - If you're looking for the best all around formula for enhancing brain power, it's called [Cognitex](#) (Product Number 564) and it can be found at the Life Extension Foundation website. Their site has all the latest scientific medical research on every possible health and nutritional need and they have full time staff to answer any of your questions. This is one of the best sites when you want to keep current on what's in the medical journals as well as find the best nutritional products. Their monthly catalog is extraordinary!

7. [The Science: Memory Lanes and retrieval systems that enhance learning and memory.](#) We know through numerous studies that memory is more easily triggered when you use association and mental imagery or pictures. (See numerous books by Dr. Stephen Kosslyn, Professor, Harvard University, Associate Psychologist in Neurology, Massachusetts General Hospital).

Also, memory that has an emotional component or even a smell connected with it is even more powerful and easier to retrieve. (Goleman, Daniel. [Emotional Intelligence](#)).

Since learning and memory occur when neurons communicate with each other it’s a lot easier to access the memory you want when you intentionally store that memory in several different ways. That way you’ll be able to use various triggers to retrieve any memory.





According to brain researchers, the process of memory is far more important than the location since the brain doesn't just store memory in one location. The point: When you activate a single memory system or memory pathway, you might appear to forget what you know. However, activating multiple memory systems or pathways through a wide variety of activities increases your ability to retrieve what you want. It's a lot like going to a filing cabinet for a single file on a certain subject. If you can't remember where you filed it, but knew you have made several copies and filed them under different headings, you'd be more apt to find the file more quickly.

Here are five types of memory or storage and retrieval systems:

a. **Semantic** (categorical) also known as short term immediate and short term working memory. This is where new information comes into the brain and is housed in the frontal lobe of the cerebral cortex. This type of memory is what's currently in focus and can only manage about seven bits of information (plus or minus 2) and lasts only 15 – 30 seconds before it transfers the information into the working or intermediate memory. (See [Fire-Up Your Learning](#) by author, Tom Madden).

According to Tom, the short term information gets downloaded into long term memories at night during sleep. Semantic memory holds the information learned from words. This type of memory seems to be a difficult one to use for learning because it takes so many repetitions to cement it into the pathway. It also has to be sorted and stimulated by associations, comparisons and similarities to be effective. This type of memory can easily fail us in many ways.

b. **Episodic Memory**. It is easier to access this type of memory according to Marilee Sprenger, author of *Learning and Memory*. This is sometimes called contextual or spatial memory because you are always somewhere when you learn new information and you can connect the learning with the location. The quickest way to think of episodic memory is to ask, "Where were you when President Kennedy was shot or when you first learned about Princess Diana's death?"

The reason episodic memory is so important to understand is because children and adults who learn information in one location and are shuttled off to an unfamiliar location to be tested on that information consistently underperform. According to Sprenger, "The content of the room becomes part of the context of the memory." So, when you know you will be tested in another location from the one you learned the information in, try and visit the testing room often, visualizing the information you want to remember in various locations around the room.

c. **Procedural Memory**. This is also known as motor or muscle memory and once a physical task is learned, lasts for years. Procedural memory involves tasks like writing, riding a bike, tying your shoe laces, etc. It works by association and your brain seems to





have an unlimited storage capacity for body-kinesthetic memory. Procedural memory is stored in the cerebellum and gives humans the ability to do two things at once like driving and talking. When you want to recall something you learned, return to the same position and do whatever you were doing when you first learned the information. People who like to move around when they are learning can more easily recall the information if they move around in the same way. I know of children who do cheers when learning or skateboard when memorizing their times tables.

d. **Automatic Memory** is known as conditioned response memory. This type of memory is automatically triggered by certain stimuli and is located in the cerebellum. You might hear the first few words of a song and start singing it, remember your multiplication tables or the alphabet here.

Your ability to read but not comprehend is in automatic memory. According to Jensen and Sprenger, “Your automatic memory may cause other memory lanes to open.” When you hear a certain song on the radio you may remember the words to it and also where you were when you first heard it (episodic) and what events were going on when you first heard it. You may even recall something procedural, like driving your car when the song was playing and better yet, some factual, semantic memory lanes may open up too.

Further, hearing the song may even cause you to have an emotional reaction similar to the one you had when you first heard the song. Obviously, automatic memory has great implications for enhancing recall through strong associations. The more memory lanes you can connect with what you are learning, the easier it will be to recall that learning.

e. **Emotional Memory.** This type of memory takes precedence over all others and may even take over your logical mind. Daniel Goleman, author of [Emotional Intelligence](#), (1995) calls this type of response “neural hijacking.”

Emotional memory is opened through the amygdala, located next to the hippocampus. While the hippocampus files factual information, the amygdala stores emotional information. The fear response is stored here as is happiness, sadness and a host of other emotions. When learners are feeling threatened, learning abilities plummet. Stress hormones may simply block access to the facts.

Remember, your brain will always give priority to emotional memory. While you have facts stored in your semantic memory, how you feel about those facts may affect your ability to recall them. That is why learning is so much more effective and efficient when the learner is relaxed and associating things like humor to the learning. Access to learning is easier in the future when it is connected to something funny.





- **High performance memory tip:** When you want to learn new things, connect relaxing and exciting emotions to the learning. You might want to add music to make the learning even more automatic. Make the learning relevant by connecting something that you already know and love to the new learning. For example, if you want to learn about ratio in math and have no concept what it is, learn the definition and think about what, in real life, can be in ratio form. How about mixing one can of frozen juice with three cans of water? Now you have a procedural physical connection, an emotional component (assuming you like the juice you choose), a semantic connection lane if you say and write the words about the ration between one can of juice and three cans of water, and episodic memory if you connect the learning about ratio in a room such as your kitchen. Imagine what will happen come test time – you'll easily recall everything you learned about ratio because you can access multiple memory lanes during the test! Wow – true high performance memory!

Pat Wyman, M.A. is America's Most Trusted Learning Expert and the best-selling author of three books: [Learning vs Testing, Strategies That Bridge the Gap](#); [What's Food Got To Do With It? 101 Natural Remedies for Learning Disabilities](#); and the soon to be released, [Amazing Grades: Tune-In To Your Child's Personal Learning Style and Create Higher Grades in Just 14 Days!](#)

She is the Director of the award winning website, <http://www.howtolearn.com> and Director of the non-profit foundation, I Read, I Succeed found at <http://www.ireadisucceed.org>. Pat is also an Instructor of Education at California State University, Hayward in the Extended and Continuing Education Department.

Ms. Wyman has appeared on numerous radio and T.V. programs and gives accelerated learning seminars to parents, teachers and medical schools. For more information on these seminars, please call (800) 469-8653.

