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## Four Brain Fitness Programs Tested and Compared by Michael S. Logan, MS

### Introduction

Seems like every day, there is a media source writing an article on “[brain fitness](#)”.

Discover Magazine, Scientific American, The New York Times, even Parade mentioned “[fluid intelligence](#)” recently.

For us who are consumers, we see ads online for a plethora of products touting their capabilities to protect us from or ward off Alzheimer’s Disease, increase our IQ, increase something called “cognitive reserve”, train our attention, memory, visual spatial processing, etc.

Who should I pay attention to and who should I believe? Why?

The marketing to my demographic (Boomer) plays to fear about reduced effectiveness and cognitive abilities. Is there any truth to the claims?

In the back of my mind, I remember those old comic book ads from my youth, with the learn hypnotizing ads.

Are brain fitness tools marketing smoke and mirrors?

And The Answer ...

Based on my reading of the research, and my personal experience, the answer is that there is value in the currently available brain fitness programs. I expect there to be more value as the technology gets more sophisticated.

Here is what the Harvard Business Review has to say. In November of 2007, Roderick Gilkey and Clint Kilts wrote,

**“New Research in neuroscience shows how to stay sharp by exercising your brain.”**

And I quote, because the article is very clear and concise

“Until recently, however, there seemed to be no guidelines for active efforts you could make to stay mentally healthy.

There were no **brain exercises**-no mental push-ups—you could do to stave off the loss of memory and analytic acuity that comes as you grow older.

In the worst-case scenario, you could end up with Alzheimer's disease, for which there are no proven treatments. But a concentrated commitment of resources by the National Institutes of Health, the National Institute of Mental Health, and the Library of Congress during the 1990s—which the White House proclaimed the “decade of the brain” to heighten public awareness of the need for neuroscience research—yielded a broad front of research and training that has upended some deeply held beliefs about the brain.

One such belief is that the brain necessarily diminishes with age.

**It turns out that neurons, the basic cells that allow information transfer to support the brain's computing power, do not have to die off as we get older.**

In fact, a number of regions of the brain important to functions such as motor behavior and memory can actually expand their complement of neurons as we age.

This process, called **neurogenesis**, used to be unthinkable in mainstream neuroscience.

What does all this have to do with you? The process of neurogenesis is profoundly affected by the way you live your life.

**The brain's anatomy, neural networks, and cognitive abilities can all be strengthened and improved through your experiences and interactions with your environment.**

The health of your brain isn't just the product of negative and positive childhood experiences and genetic inheritance; it reflects your adult choices and experiences as well. **That's extremely good news.**

Sigmund Freud and those who followed him both in the neurological sciences and in the psychoanalytic tradition thought for years that brain development ceased in childhood or early adolescence.

Although these periods do hold the greatest potential for neural development, we now know there is a regimen you can follow to retain and even build mental capacity as you age.

Brain-imaging studies indicate, for example, that acquired expertise in areas as diverse as playing a cello, juggling, speaking a foreign language, and driving a taxicab expands and makes more communicative the neural systems in the parts of the brain responsible for motor control and spatial navigation.

In other words, you can make physical changes in your brain by learning new skills.

You can even make changes in how your brain functions by exercising conscious will.

In a recent experiment using real-time brain imaging, scientists demonstrated that individuals learned to mitigate the sensation of pain by consciously controlling the observable activity of the rostral anterior cingulate cortex, an area of the brain involved in pain processing.

In theory, therefore, it's possible for people to alleviate pain through **neurofeedback**, without drugs.

**These advances in neuroscience suggest that there is no reason why your brain at 60 can't be as competent as it was at 25.**

That would not have been news to thinkers such as Socrates, Copernicus, and Galileo, who were all still at the peak of their intellectual powers in their sixties and seventies.

Nor would it surprise business leaders such as Alan Greenspan, Warren Buffett, and Sumner Redstone.

These icons and others like them have intuitively understood that the brain's alertness is the result of what we call **cognitive fitness**—a state of optimized ability to reason, remember, learn, plan, and adapt that is enhanced by certain attitudes, lifestyle choices, and exercises.

The more cognitively fit you are, the better you will be able to make decisions, solve problems, and deal with stress and change.

Cognitive Fitness will allow you to be more open to new ideas and alternative perspectives. (This is what we call **fluid intelligence**. The authors are saying this can be trained).

It will give you the capacity to change your behaviors and forecast their outcomes in order to realize your goals.

You can become the kind of person your company values most. Perhaps more important, you can forestall any senescence for years and even enjoy a second career.

### **Exercising Your Brain: A Personal Program**

So how can you become cognitively fit? Drawing selectively from the rapidly expanding body of **neuroscience** research as well as from well-established research in psychology and other mental health fields, we have identified four steps you can take.

These steps are by no means exhaustive. They overlap and reinforce one another. Together they capture, we believe, some of the key opportunities for maintaining an engaged, creative brain.

Work hard at Play.

Seek Novelty.

Use Experience to Grow Your Brain

Search for Patterns.”

Other writers have indicated that the best platform for effective brain exercise would be include these four steps;

Physical Exercise

Proper Nutrition

**Stress Reduction**

**Mental Stimulation.**

I believe what Gilkey and Kilts wrote is an impressive endorsement of the potential for brain fitness.

Let's get on the the evaluation of the available programs.

What are my credentials?

I am a domestic violence educator in the Partner Abuse Intervention Field. I work with court ordered Anger Management clients and Domestic Violence clients. I have seen miracles in changed belief systems, which actually means changes in neurons, and I have seen tragedy when folks refuse to change their belief systems. I should let you know that I am an educator as opposed to a researcher. I read the research and adopt it to the clinical setting.

I have a Master of Science degree from Illinois State University, and my wife, Julie Logan, RN, LCSW and I are partners in Logan Counseling, Inc. In Rockford, Illinois.

I have been curious about emerging technologies since I read a book called [MegaBrain](#) by Michael Hutchison in the mid-1990's, which was near the end of my career switch and graduate school experience.

In that book, the author talked about emerging technologies like [EEG biofeedback](#) for ADD and ADHD and alcoholism, Open Focus, [binaural beat technologies](#), [sound and light brain wave](#) entrainment tools, Hemi-Sync from the Monroe Institute, pain management using tens units, for example.

Hutchison wrote quite enthusiastically about the potential for those tools.

As a result, I became involved with [EEG Biofeedback](#) for several years, and had some amazing successes in the addictions field, until my partner became ill and died in 2001.

During that period of time, I was introduced to a [HeartMath](#), another wonderful biofeedback tool, which helps clients learn to regulate heart rate variability coherence. More on [HeartMath](#) later, but I have used [HeartMath](#) for about nine years with innumerable anger management and domestic violence clients with good results. Personally, I love to cue the HeartMath experience simply because it feels good. I also attended a Peak Performance training in 2000 or 2001 which advocated the use of the Brain Builder 3.0 program for Peak Performance. I bought it and promptly put it on the shelf.

Earlier this year, I began to see media references to the Posit Science Brain Fitness Program, and online I came across ads for the [Lumosity Program](#). I bought a book called [The Brain That Changes Itself](#) by Norman Doidge, MD, which really intrigued me.

Doidge tells the story of some extraordinary recoveries and discoveries that consign our old model of neuroscience to the dust bin.

Terms like [neuroplasticity](#) and [neurogenesis](#) indicate that we can actually enhance brain effectiveness, that we truly can enhance or induce healthy changes in our brains.

Sharon Begley in her book, [Train Your Mind, Change Your Brain](#) takes a bit of a different tack than Doidge, but her work is just as exciting in its implications.

Then I came across [The Body Has a Mind of Its Own](#) by Sandra and Mathew Blakeslee. In a book review of Doidge's and Begley's work, Mathew Blakeslee writes....

"Based on results like these, Begley holds out hope that our emotional lives and personalities, far from

being carved in stone by our genes and early experiences, will prove as sculptable through mental training as our bodies are through physical training.”

That statement really piqued my curiosity. I know what happens with a hard workout regimen, the muscles define, strength increases, and self-confidence grows. Can I workout my brain also? Can my clients work out their brains successfully, which enhances their sense of efficacy? Can they walk out of my office with a renewed confidence because of their progress on a computer program?

I believe the answer is yes.

So I decided to try out some of the programs available so that I could report on them to my clients. If using the Posit Science program has benefits, for example, then my clients need to know about it.

Thus far in my self-experiment, I have used Brain Builder 3.0, [Mind Sparke Brain Fitness Pro](#), the [Lumosity Program](#), and the Posit Science Brain Fitness Program, and I am just beginning to use the new BrainBuilder from ABT technologies, which will replace the Brain Builder 3.0, and I hope to have experience with the Cogni-Fit program soon.

## **Brain Fitness Defined**

[Brain fitness](#) is a practice, not a destination.

Simply put, [brain fitness](#) programs give me the tools to exercise neurons in various ‘brain circuits’ if you will, and when I exercise those circuits, the neurons in those circuits continue to fire in synchrony, which means that if I am working the working memory circuit, those neurons in that circuit will fire together and working memory will function at a high degree of efficiency.

For example, working Memory is the ability to hold several units of information in our minds and manipulate them in real time. Imagine I ask you to remember, and then say backwards, the 7 digits of my phone number.

Neurons are “deleted” by the brain if not active, and the brain will eliminate them if they appear inactive, which means the number of neurons available for working memory decreases, and in the human brain, bigger means better, believe me. The fewer neurons available for working memory, the more confused my behavior might appear, the more forgetful I am.

If the neurons in my working memory have not been exercised, then they do not fire in unison, and working memory begins to fail. Workouts keep those neurons firing synchronously, and neurons that fire together, wire together.

Other factors impacting brain fitness include nutrition, stress, and physical exercise.

**Brain fitness** is the training of neurons involved in attention, **stress and emotional management**, memory, visual/spatial processing, auditory processes, and language, motor coordination, and executive functions such as planning and problem solving. Brain fitness is achieved just like an increase in muscle mass is achieved in weight lifting, by regular exercise, perhaps even an increased challenge. (New language, new musical instrument). (Research in England showed actual growth in the memory centers of cabbies required to memorize the street maps of London)

A mentally fit person demonstrates improved attention, memory, thinking, and stress management skills. The use of fMRI has allowed us to look at real time neural activity to tease out the success of such practices.

(For example, Dr. Judith Beck, Ph.D. has worked with spider phobic clients, and the fMRI imaging has shown that after her Cognitive Behavioral Therapy process, the amygdala is less active).

Any of the programs I have used thus far have a way to indicate your beginning score and progress. But what you notice in your life will be the true test. Usually the improvements seem small, but they are nevertheless profound.

A mentally fit brain maintains and develops cognitive abilities through neurogenesis, which is the creation of new neurons and dendrites, the hair like projections of each neuron that reach out to neighboring neurons. The more active a particular brain cell, the more connections it develops through dendritic sprouting.

A single neuron can have up to 30,000 of those connections, creating a dense web of connections and activity all over the brain, and that network of connections can increase given the existence of neurogenesis, or growth of new brain cells. A fit brain is the brain which is able to continue this process unhindered by malnutrition, stress, or lack of exercise, free to follow its blue print.

The more dendritic sprouting I have, the more connections available for sorting through the incredible amount of information I have coming at me, which is the essence of fluid intelligence by the way.

**Fluid intelligence**, according to Raymond Cattell is..."the ability to perceive relationships independent of previous specific practice or instruction concerning those relationships." Fluid intelligence contributes to abilities like learning and problem solving. It is distinct from its counterpart, crystallized intelligence which involves"...abilities that have obviously been acquired, such as verbal and numerical ability, mechanical aptitude, social skills, and so on."

I want lots of fluid intelligence.

Given the definition of fluid intelligence, what then constitutes a good brain fitness workout?

Sounds like it cannot be more of the same stuff. What I mean is that my counseling knowledge is crystallized intelligence. Reading a book by a therapist would not then contribute to neurogenesis.

Learning a new language or a musical instrument would be a good workout though. That would increase fluid intelligence.

**The First Program**  
**Posit Science Brain Fitness Program**  
**Michael Merzenich**

I decided to try the Posit Science program after reading what Norman Doidge MD had to say about Michael Merzenich and Merzenich's ideas.

Doidge says Merzenich has made the most ambitious claims for the field, that brain exercises may be as useful as drugs to treat diseases as severe as schizophrenia, that plasticity exists from the cradle to the grave, and that radical improvements in cognitive functioning-how we learn, think, perceive, and remember-are possible even in the elderly.

Merzenich argues that practicing a new skill, under the right conditions, can change hundreds of millions and possibly billions of connections between the nerve cells in our brain maps.

Merzenich says that when learning occurs in a way consistent with the laws that govern brain plasticity, the mental "machinery" of the brain can be improved so that we learn and perceive with greater precision, speed, and retention.

He also says that we can change the very structure of the brain, and increase its capacity to learn, because the brain is constantly teaching itself to learn.

This brain is like a living creature with an appetite, one that can grow and change itself with proper nutrition and exercise rather than in inanimate vessel that we fill.

Merzenich has shown that the brain does not have finite limits on memory, processing speed, and intelligence.

Of particular interest to me, at 60 years old, is Merzenich's ideas about the [aging brain](#). He says that "It is estimated that by the time someone who is sixty-five now dies, the life expectancy will be in the late eighties. When you are eighty-five, there is a 47% chance that you will have alzheimer's disease"

Merzenich thinks our neglect of intensive learning as we age leads the systems in the brain that modulate, regulate, and control plasticity to waste away. In response, he has developed brain exercises for age-related cognitive decline-the common decline of memory, thinking and processing speed.

He indicates that we can sustain normal skills and abilities, and perhaps even develop new skills and abilities.

He reports that one of the most troublesome aspects of aging, problems finding the right word, is due to atrophy in the nucleus basalis and the brain's attentional system, which leads to what I call fuzzy hearing. The nucleus basalis secretes acetylcholine, and when none is secreted due to atrophy the brain cannot tune in and form sharp memories.

According to the Posit Science folks, the key to developing exercises is to give the brain the right stimuli, in the right order, with the right timing to drive plastic change. That means finding the most efficient way to train the brain, by finding mental functions to train that apply to real life.

Posit Science exercises do not emphasize memorizing lists of words, but rebuild the brain's basic abilities to process sound, by getting people to listen to slowed, refined speech sounds.

Merzenich says that this kind of training is similar to what we did as kids in the crib, sorting through background noise for mother's voice.

These exercises increase processing speed, and make basic signals stronger, sharper, and more accurate, while stimulating the brain to produce the dopamine and acetylcholine.

I bought the Posit Science Brain Fitness Program about six weeks ago, and noticed an immediate improvement in my Brain Builder 3.0 scores.

The Brain Fitness Program asks for an hour of your day for 40 days. It is easy to use, the directions are clear, the feedback is frequent, there are pre and post test exercises, progress is easy to measure, challenge is increased incrementally, there are six different kinds of exercises, and rewards are frequent, to lock in that acetylcholine and dopamine. I get to choose from six different rewards too, I like the classical music the best. The rewards are done to enhance dopamine and acetylcholine production necessary for creation of memory.

The Posit Science folks are working on programs which exercise vision, executive function, and gross motor control.

The [Brain Fitness](#) Program has been tested on seniors more than any other demographic, but they have had a successful product called FastForward used with children. I have no problem recommending the Brain Fitness Program to anyone for practice.

However, it is more expensive than the others, and asks that forty hour commitment.

**The Second Program**  
**Mind Sparke Brain Fitness Pro**  
**Martin Walter**

I stumbled across Martin's brain fitness program quite by accident. Actually, I responded to his comment on a page I had put up on docstoc.com, which was critical actually of the amount of information I was offering about brain fitness.

I decided to try his Mind Sparke program before I flamed back, and am I ever glad I did..

It is an exceptional tool, based on research by folks who are not marketing the product, but whose research is excellent I believe.

[Mind Sparke Brain Fitness Pro](#) takes about one-half hour per day to cycle through and had an immediate, noticeable impact on my ability to stay on task. This is the program that trains fluid intelligence. It takes 19 days.

The researchers on whose work Mind Sparke is based indicate that there appears to be no upper limit to improvement. So keep practicing. (That is right, no upper limit).

Before you keep reading, let me clarify a couple of terms:

- "Working Memory" is the ability to hold several units of information in our minds and manipulate them in real time. For example, imagine I ask you to remember, and then say backwards, the 7 digits of my phone number\_

"Fluid intelligence" can be described as the ability to deal with new challenges and new problems, those that we encounter for the first time". Very important, that Fluid Intelligence).

### **The Third Brain Fitness Program**

#### **Brain Builder 3.0**

#### **Advanced Brain Technologies**

I was first introduced to [Brain Builder 3.0](#) in perhaps 1999 or 2000 at a Peak Performance workshop in Chicago by Rae Tattenbaum.

Rae was working with [alpha brain wave biofeedback](#) and peak performance, or learning how to keep the central nervous system in a state of relaxed external focus while performing.

She worked with vocalists to relax vocal cords, for example. One of the tools Rae recommended was the Brain Builder 3.0, which I did order, and got no further with than loading on my computer.until I began to read about brain fitness programs earlier this year, that is.

I dug out my copy of the manual and began to play with the program. Brain Builder 3.0 is a nuts a bolts brain fitness program especially when compared to its offspring, the brand new Brain Builder. It offers little in the way of bells and whistles, but does have charts for you to track your progress.

What it does offer is an outstanding working memory platform that stretches you every day.

There are six trial to chose from. I do two per day and cycle through the six. I chose that particular schedule because the challenges, given verbally or visually, are hard, and it is hard to move quickly through all six activities in one day without taking a lot of time.

Brain Builder 3.0 gives me a second chance when I make a mistake, which I really appreciate, however, that makes the time to complete longer.

I am not so sure I would crank up Brain Builder 3.0 between clients, where I could practice effectively between clients with either [Mind Sparke](#) or [Lumosity](#).

Since I know I am going to continue practicing, I do two activities each day, and I have grown to appreciate the challenge offered by Brain Builder 3.0 because I am now repeating forward or backwards as many as nine numbers at a time, offered in visual or auditory style, in a measured or random manner.

When I began training, I could not hold more than three or four numbers, especially if I had to reverse the sequence.

I am really appreciative of that new level of brain fitness. I am learning to pay quick, focused attention in order to commit a fact to memory as I listen, during a counseling session, or when I need to record a phone number, or remember how I got to a certain online page..

Brain Builder also has helped me to realize how worry, or any thought or feeling other than attending to visual or auditory stimulus from the game, hampers my performance.

### **The New Version of Brain Builder**

It appears that Advanced Brain Technologies is going to take its long history in this field, and capitalize with the new version of Brain Builder, which is a very entertaining version, accompanied by classical music and another CD that is designed to help focus the brain.

The visual presentation is stunning and makes the much larger number of challenge activities seem to fly by, and the classical music seems to push you along. There are pre-tests, and the program provides you a challenge based on your assessment performance.

I am guessing that Advanced Brain Technologies will be coming out with a marketing blitz for their new product soon.

### **The Fourth Program**

#### **[Lumosity](#)**

#### **Lumos Labs**

The Lumosity program is available through an online subscription, which makes it the most economical to begin, and adds up to about \$80.00 per year at today's price.

The [Lumosity](#) folks are marketing heavily online, much more so than the other providers, and even have an affiliate program that allows me to make money should someone sign-up from my link. ([Mind Sparke Brain Fitness Pro](#) offers a similar program).

The brain fitness programs are challenging and fast paced, and the [Lumosity](#) online platform gives them the capacity to add new games.

Lumosity offers excellent combinations of working memory or speed workouts, for example, and once those sequences are completed, Lumosity will mix up the games to challenge your brain across the spectrum of available tasks.

Lumosity and Advanced Brain Technologies also offer excellent newsletters, and a Twitter presence that tells you about updates. The Posit Science folks offer a newsletter and forums for participants.

Martin Walter offers a blog for participants to record their [Mind Sparke](#) training.

So if you are dialed in and like your brain fitness at your computer, with speed and flexibility, [Lumosity](#) is your choice.

The Posit Science program has Michael Merzenich's scientific credentials and research behind his program, which are impressive.

Martin's Mind Sparke Brain Fitness Pro offers an enhancement of research which appears to be quite good, and the researchers are not involved in the marketing.

Lumosity offers the speed and convenience of the internet, and some very difficult challenges.

### **Your Brain Fitness Program Should Also Include....**

**Physical Exercise**

**Stress Management**

**Good Nutrition**

While the above products all contribute to neurogenesis and neuroplasticity, if you want to really insure your brain fitness, then make sure you exercise regularly. [Physical exercise](#), especially of the cardiac variety, inspires neurogenesis.

There is excellent information out there about the benefits of endorphins, which one gets in the brain after exercise, as an antioxidant. Oxidation particularly impacts the neuron at the synapse where its sheath is mostly [omega 3's](#).

Your workout does not have to be of the Michael Phelps win-seven-olympic-gold-medal intensity. It can be as simple as a few extra trips up and down the stairs or a walk around the block.

Please also look closely at the workouts [Scott Tousignant](#) does at home with exercise balls, dumb bells, chairs. He does not believe in long workouts at the gym. (And he is called the Fit Bastard).

But the more deep breathing you do the better off you will be.

## Nutrition

Eat lots of colorful foods, fruits and vegetables, in smoothies for example. Try to get them locally grown, as foods picked green and ripened enroute to you do not develop the phytochemicals in the natural ripening process. While they may offer fiber, there is not as much phytochemical, vitamins, or minerals.

Lycopene is an example men will identify with. It is found in tomatoes in the red skin which happens when the seeds are ready and the plant develops the red skin to protect the seeds from the sun.

Lycopene is the most potent prostate cancer fighting agent there is, and lycopene is one phytochemical not weakened by cooking, so ketchup will supply it. But not on burgers, guys. Phytochemicals are so potent that the FDA has some trouble about classifying them as drugs. Do not forget your [omega 3 supplementation](#), if you do not like fish.

## Stress Management

[Stress Management](#) can be of the high tech or low tech style.

If you can train yourself to breathe deeply and regularly frequently, you can diminish the adrenalin and cortisol in your blood which kill the neurons created by neurogenesis.

If you want a high tech tool, then the [HeartMath emWave](#) is for you. The emWave is a powerful biofeedback tool which allows you to manage the time between heartbeats, establishing an a feeling of contentment and/or relaxation on demand. That is right, on demand. You will train the brain in your heart to respond to a cue thought and your physiology will change in a heart beat, not to coin a phrase. Great relaxation tool in this day and age of working at a desk, constant deadlines, financial crises, and worry.

## Closing

I am very confident that the programs I am using are making a difference in neurogenesis and neuroplasticity for me. I also like my workouts, my HeartMath, and I need to start playing an instrument to really seal the deal. Eat well too.

For more information on the products mentioned here, please click on the following links.

[Mind Sparke Brain Fitness Pro](#) -increase ability to sort through many competing stimuli, increase IQ

[Lumosity](#)-working memory, visual acuity

[HeartMath emWave](#) -stress management

[xtend life](#) -supplements, especially omega 3

[Transparent](#)- biofeedback tools, peak performance software

[Scott Tousignant](#) -truely home made physical fitness, with the cats and children wandering through the workout

[Amazon](#)-for the bibliophile

<http://askmikethecounselor2.com>