A Brief History of the 40 Hertz Rhythm

Neureka! is a Re-Discovered Brain System

Aha! That's the brief feeling we have when we discover something new! For just a moment, we are particularly aware of the event. We remember the important discoveries, and we feel satisfied.

This Neureka! system is a part of the brain's design, undoubtedly there because it helps us survive. We remember new discoveries, but first, we need to put them into their context, since a memory that is too simplified will not be as helpful as one with enough surrounding detail to help us apply it properly next time. So the same brain system that enhances the memory also boosts the awareness of the event in its context. Things seem clearer for a moment. Satisfaction is also part of the response, to encourage us to keep discovering things about our environment and solving problems to meet our needs. Anticipation of satisfaction is also included. However, there is a balance here, because dwelling too long in a satisfied state leads to mental (and perhaps physical) inactivity, which can decrease our survival by slowing down our responses in critical situations, making us easy prey. All of this usually takes place in a brief moment, in the midst of a day's rushed activity, until we train ourselves to enhance this Neureka! experience.

The Neureka! Protocol™ actually refines the brain's 40 Hertz rhythm—a 40 cycle per second beat that waxes and wanes very quickly. We measure it from the prefrontal cortex, in the same location that we sample the other Peak Achievement Trainer measures, right in the middle of the forehead. We have discovered a unique, proprietary method to clarify the brainwave pattern by eliminating most of the influences of the EMG (contamination by muscle contraction), Focus, and Alertness.

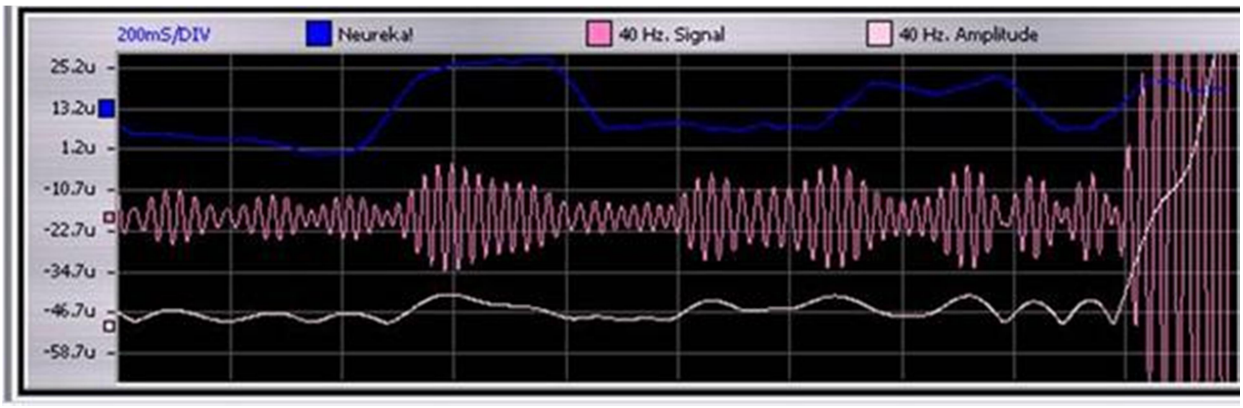


Figure 1 is an example of the 40 Hertz rhythm, displayed by the panel on the lower left of the "Neureka! F--Neureka! Triggers and Enlarges DVD Research Version.bxd" design. The filtered 40 Hertz signal is shown in dark pink in the middle, and its integrated amplitude by the light pink at the bottom. On the left, you can see the rapid waxing and waning of the 40 Hertz filtered signal, which looks like an old-fashioned spindle. At the right end of the Figure, you can see the both of them respond to tightening the nose. The blue Neureka! trace on top responds to the 40 Hertz brain output, but not to the tight jaw. This is what is unique about Neureka! Concerns about muscle tension contamination have kept the 40 Hertz rhythm from widespread use for many years.

It is now becoming clear that advanced meditators have been training themselves to enhance and prolong the 40 Hertz rhythm for thousands of years. Perhaps we can train ourselves to enjoy a similar blissful state in far less time with the Neureka! Protocol. Studies of meditators (summarized later) have helped us identify the brain state that they intensify during meditation on kindness and compassion, and which also permeates their life. Recent data from Dr. Richard Davidson's (2005) talk at the Mind and Life Symposium indicates that the particular brainwave rhythm that characterizes their state of kindness and compassion is also associated with the clarity of their meditation. Their typical brainwave rhythm is similar to the rhythm we train with Neureka!™

Implications and Cautions

Training people to enhance their awareness, memory, and feelings of satisfaction, gratitude, and compassion would certainly be a great kindness to many people who are chronically lacking in these mental attributes. I could spend some time here creating a long list of those who may benefit, but I'll leave that to your imagination for the time being. Suffice to say that training people to enhance Neureka! is very likely to contribute to improving the human condition.

There is, however, a possibility that this could be overdone. We all know a few people who have become so intent on experiencing states of bliss that they have diminished their ability to function in everyday society. This can happen even without the use of psychoactive drugs. Dr. Jean Houston, the famous experiential trainer, called them "bliss-ninnies". She was rightly concerned, and so am I. We do not have the luxury of prolonged clinical trials of Neureka!

training to chart the typical outcomes or potential problems here. So be cautious: Drink not too quickly or deeply from this powerful potion… Think of it as a very rich desert. Maintain your psychological balance. If you notice that you are becoming too attached to regular practice of Neureka! or that it is frequently getting in the way of your ability to function, stop your practice of Neureka! and return to practicing single pointed Focus on the activities of everyday life. Please take this warning seriously. If the psychological dependence persists, please seek professional help. We have included a warning and release of liability as part of the agreement required to use this package of protocols. To prevent overdoing it, the Peak BrainHappiness Trainer Protocols actually include an upper limit on Neureka!

The Story of the 40 Hertz Rhythm

My purpose here is to give you some background on the 40 Hertz rhythm that will show its importance and also support the ideas that it is a system designed to optimize the brain's processing of new discoveries. This is by no means an exhaustive review, or even an academic one.

One indication of the importance of the 40 Hertz rhythm is that it is the most highly correlated with the rate of brain metabolism (Oakes et al, 2004), suggesting that there is probably a good reason for such energy expenditure. Relatively few EEG studies of the 40 Hertz rhythm have been performed in comparison to its neurophysiological importance because of some methodological problems. In addition to the EMG (muscle contraction artifact) contamination issue, early researchers had to deal with another daunting methodological problem when measuring above 32 Hertz (cycles per second). The old style pen and paper strip physiological recorders couldn't easily go that fast without catching paper or spitting ink across the room. Most of the current research is recorded by computers and analyzed quantitatively or printed out by newer, faster technology. It is also well known that the higher the frequency of any EEG wave, the greater the percentage of its energy is lost coming through the scalp and meninges, so the 40 Hertz rhythm appears very small and therefore unimportant when it is measured from the scalp. On the surface of the cortex, it is much larger. The Neureka! Protocol compensates for this problem.

There are several strands of scientific work that I will weave together to sketch in this brief history. They appear to be somewhat independent in origin, because two different techniques were used, electroencephalography (EEG) and

magnetoencephalography (MEG). The third strand concerns the relationship between 40 Hertz and memory. The fourth strand focused on the study of meditation and other altered states such as hypnosis, using EEG. The story begins there, back in the mid-1950's.

The original study on the EEG of meditators was by Das and Gastaut back in 1955. They reported (in French) high amplitudes of 40 Hertz rhythm from seven trained yogis, recorded from the occipital lobe (in the back of the brain) during the samadhi state. Banquet (1973), studying 12 subjects practicing transcendental meditation and recording from left occipital and frontal leads, also observed 40 Hertz during the third deep stage of meditation.

A recent study of Buddhist meditators who are followers of the Dalai Lama recorded their brainwaves as they performed an objectless meditation practice, enhancing "unconditional loving kindness and compassion". It demonstrated increases in the 25-42 Hertz band at a number of locations on the scalp, including the prefrontal locations surrounding the middle of the forehead (Lutz et al, 2004). Subsequently, at a meeting sponsored by the Mind and Life Foundation (2005), Davidson reported that there were strikingly significant correlations between these amplitudes and the monk's reported clarity of their meditation, on a moment to moment basis, but only for the EEGs recorded from the prefrontal sites.

For the technically minded: Davidson also reported that there was enhanced long-range synchrony of the brainwaves between sites in these meditators. Synchrony is a very confusing word for neurophysiologists, open to a number of different interpretations. The basic idea is that it is a measure which responds to the similarity of the shape of waveforms that come from two different sources. Actually, the waveform that is measured by the Peak Achievement Trainer comes from two different sources—the front tips of the right and left cerebral hemispheres. These two waveforms are superimposed or added together before we measure them. I prefer the term "superposition". Some of the founders of neurofeedback, particularly Lester Fehmi, would call this synchrony. In a sense, then, the Neureka! Protocol responds to long-range synchrony, since the actual fiber connections between the tips of the hemispheres take a long route through the corpus callosum. Also, Davidson's paper calls this "gamma synchrony", but this takes some liberties with the term, since gamma generally refers to brainwave frequencies above 30 Hertz. I don't find "gamma" precise enough to use here. In general, when I refer to the 40 Hertz band, I mean approximately 35 to 45 Hertz.

There is also some evidence that high hypnotizable subjects produce greater 40 Hertz amplitudes while they are hypnotized than low hypnotizable ones (de Pascalis, 1993). The same researcher did some very interesting work on the relationship between memory and 40 Hertz. The idea that hypnosis leads to its life-changing effects through an effect on memory mediated by the 40 Hertz rhythm is a fascinating one.

The second strand is the work of Dulio Giannitrapani and Daniel Sheer. Giannitrapani (1966) found that "increases in 35-45 Hertz occurred immediately prior to answering in tasks such as multiplication questions" (Hammond, 2000), suggesting the Aha! response to a new discovery. Sheer thought that 40 Hertz was a particular type of focused arousal (Sheer, 1984), basically a high frequency "beta" mechanism. He did not realize that a large part of the 40 Hertz signals he so carefully isolated from EMG had a different origin. Sheer (1974) found that normal children produced more 40 Hertz in their parietal cortex as they solved problems, while those with learning disabilities did not. His group (Bird et al., 1978a, b) demonstrated that people could be trained to selectively enhance their 40 Hertz rhythm and to develop conscious control over it--both increasing and decreasing it when requested--and five out of six subjects could repeat this (Ford et al., 1980) when tested one to three years later! Sheer was not interested in the 40 Hertz rhythm from the prefrontal cortex, presumably because he was so concerned about demonstrating that the effects he saw were not due to muscle artifact. Most neurofeedbackers were even more concerned and opted not to do 40 Hertz brainwave feedback anywhere on the scalp for many years. I sincerely hope that the Neureka! Protocol will help to reverse this trend.

According to Hammond (2000), Giannitrapani also found that the 40 Hertz rhythm "seemed to synchronize and coordinate neurons that process incoming sensory stimuli". There's not much of a leap from there to the idea that it enhances awareness, as we have found from direct observation. Some have called it the "event binding rhythm". Other researchers have found that activation of this rhythm will not occur with meaningless words, but does occur in response to meaningful stimuli, even when you aren't paying attention to them (see the review by Hammond, 2000). That's just what you would expect from a brain system that is designed to respond—but only to meaningful discoveries—by increasing your awareness of them and the surrounding context, remembering them, and then rewarding you with a brief moment of satisfaction.

In an elegant series of experiments combining animal tissue work, implanted electrode studies and human MEG (magnetoencephalography), Llinas and his coworkers (1998) developed evidence for the hypothesis that there were actually two different brain systems that carried information at about 40 Hertz. Both of these systems involved feedback loops between (different) layers of the cerebral cortex and the thalamus, the organ shaped like two flattened eggs, one in each hemisphere, with a thick bridge between them in the center of the brain. Information, in the form of somewhat repetitive patterns of nerve excitation, resonates--travels back and forth--between the thalamus and the cortex at about a 40 Hertz frequency in both of these systems. One system, the specific sensory and motor relay system, relays information from the external world through the outer nuclei (technically called the extralaminar nucleii, those located outside a fiber bundle or lamina dividing each egg) of the thalamus to the cortex. It is the system in which most all of the activity related to the Focus and Alertness measurements takes place. The 40 Hertz activity in this system may not be that different than the activity in other frequency ranges, "focused arousal" as Sheer argued. The other, non-specific, thalamocortical system is uniquely set up to scan all the regions of the cortex and collect information back from them, using a beam that resonates near a constant 40 Hertz frequency. It scans the brain from front to rear 40 times a second, and delivers this information back to a more central location, the intralaminar nuclei, where it can be integrated and analyzed, combining or binding the different neural aspects of the event together. Hence, the name "event binding rhythm". Next, the scanning function can be refined for the next pulse, modulating our awareness to emphasize the important new discoveries. This location is very close and well connected to the hypothalamus, the control center for many of the body's important functions.

Llinas argues that consciousness is actually a result of the simultaneous neural firing produced by the coherence (I prefer superposition) of the inputs from the specific and non-specific systems on the layers of dendrites in the cortex. The specific system would then provide the content that relates to the external world, and the non-specific system would give rise to the context. Together, they generate a single cognitive experience. My perspective is that consciousness is not inherent in the brain, but rather exists in a field that is co-located with and simultaneously external to it, a multidimensional "electroholomorphic" field. In a paper I gave at the first ISSSEEM meeting in 1990, published informally in Megabrain (1993), and formally in ***Subtle Energies***, I argued that the brain is actually able to holographically project this dendritic excitation pattern into this electroholomorphic field by using the

coherent radiation (a brain "laser") that is emitted by these thalamocortical systems.

I believe that the Neureka! Protocol actually isolates the output of the non-specific scanning system that increases awareness and contributes the context to the cognition. Outside of my knowledge of the proprietary method by which it is calculated, the evidence for this is largely empirical. The "Neureka! F--Neureka! Triggers and Enlarges DVD Research Version.bxd" design shows correlations between Neureka! and both Focus and Alertness. Our preliminary testing shows that these correlations are never more than 0.06 if they are allowed to stabilize for at least three minutes. This indicates that the measures are independent of each other.

There are several lines of evidence that indicate that the 40 Hertz rhythm profoundly enhances learning and memory. Sheer speculated about this relationship in 1970 on the basis of his studies of the olfactory bulb. There are studies which show that stimulating cortical cells at more than 7 Hertz enhances long term potentiation of their ability to transmit information across synapses (Sterman, 2006). This process is triggered by calcium entering the cell every time the synapse is stimulated (Malenka and Nicoll, 1999). It would seem reasonable that faster stimulation speeds, such as 40 Hertz, would increase the amount of calcium entering the cells per second and speed up this process. Long term potentiation of a group of cells connected together (a "cell assembly") forms a long term memory. The clearest experimental evidence for the specific role of the 40 Hertz rhythm in learning was published by Miltner et al. (1999) in **Nature**. They measured the EEGs of a group of young women who were learning the association between a colored light and a shock to one hand, examining those regions of the cortex that were known to be stimulated by the light and the shock to the hand. They found that there was more 40 Hertz activity in those regions of the cortex, as well as some surrounding regions, during the trials than at other times. Furthermore, they examined the coherences between the 40 Hertz outputs of the specific areas involved and compared them with other regions and other times when the specific color and shock were not paired as controls. They found clear evidence that associative learning involved increased connectivity (coherence) between these brain regions in the 40 Hertz band, and that this coherence dropped off very quickly as they examined higher or lower frequencies. In a study of epileptic patients with electrodes implanted right on their cortical surfaces, Sederberg et al, 2003 found that their short-term memory for words was related to the gamma output of electrode sites in their frontal and temporal areas, particularly near the 40 hertz band. There are several recent studies which feature relationships

between gamma and theta bands, learning and memory. There is also one study which indicated that quicker reaction times are related to the faster appearance of the 40 Hertz band at relevant brain sites (Haig et al., 1999).

Our Studies

The study that lead to the discovery of the Neureka! Protocol produced some remarkable results that puzzled me for quite some time. I believe that they can best be understood as an indication of the power of the Neureka! Protocol in improving learning and memory. This was a small pilot study—an undergraduate thesis—performed by Marcus Perman under the supervision of Dr. Artur Pocswardowski at St. Lawrence University; the results are in Appendix A. Briefly, three groups of five young ladies were given the IVA (Integrated Visual and Auditory Continuous Performance Test) and our Concentration Protocol (without instructions) as pretests before training. These tests were repeated after the fourth and eighth (final) testing session. One group was given training on the Concentration Protocol, one on the Neureka! Protocol (both from our older software) and one was a control group given no training. To our surprise, the Neureka! group showed a very large gain (1.5 standard deviations of their original scores) in just four sessions on the IVA Full Scale Attention Quotient, and outscored the Concentration Protocol group. They also did as well as the group trained on the Concentration Protocol in learning how to concentrate, despite a lot less practice. Is it possible that they learned the pre-tests more quickly during their Neureka! practice right afterwards due to its effects on memory?

One overall reminder about interpreting these studies is that unless I have specifically stated that they were done in the prefrontal area, they may not be clearly applicable to the Neureka! Protocol.

To investigate the quality of our feedback for the Three Dimensions of Mental Processing (Focus, Alertness, and Neureka!), I surveyed 10 biofeedback experts who did a demo in our booth at the International Society for Neurofeedback and Research by asking them to fill out the Three Dimensions of Mental Processing Questionnaire #3. For each dimension, a 7 point scale was used to answer the question: "How strong do you think the relationship between your definition of single-pointed Focus and the Peak Achievement Trainer's measurement of [the Dimension] is? Make a / anywhere along the line." Responses were permitted anywhere along a continuous line from 1 (Extremely Strong Negative) to 7 (Extremely Strong Positive). Each of the Dimension's ratings was significantly

different from Neutral (4), $p<.001$. The averages were all between 5.8 to 6.0 (Moderately Strong Positive) and did not differ significantly from each other.

I also asked them to compare the PAT's clarity with "other types of biofeedback I have experienced". The average of the 8 responses for each of the Dimensions--Focus, Alertness, and Awareness--was "clearer than 90% of the other feedback experiences." While this was only an imperfect pilot study, it is consistent with all my experience in demonstrating our system to thousands of people.

Dr. Beverly Rubik or the Institute for Frontier Sciences recently conducted a study which shows that brainwave signals associated with feelings of happiness, love, satisfaction, gratitude, full awareness, mindfulness, peace, and the absence of stress, are related to the Neureka! feedback. The study established that the Neureka! brainwave biofeedback system, which is used in the Peak Brain Happiness Trainer, is able to give users instantaneous, clear information about these brainwaves related to these positive feelings.

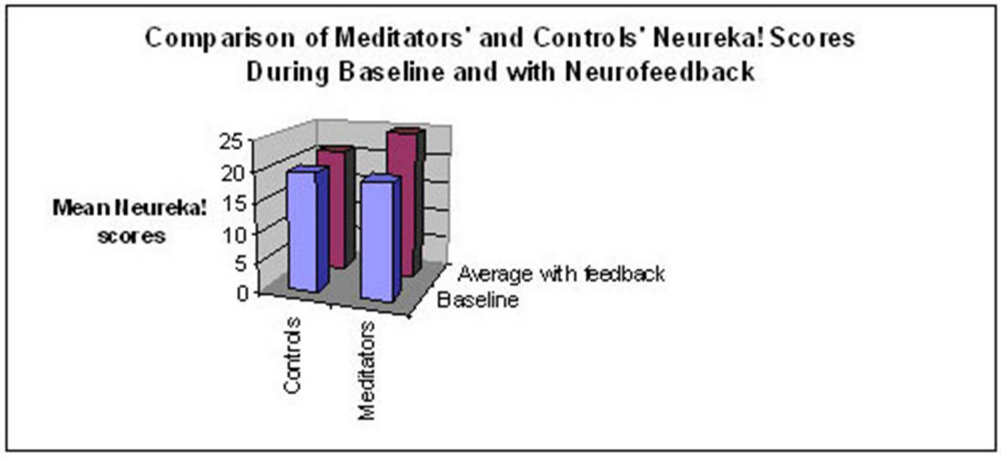
The study also showed that Transcendental Meditators™ with over 10 years experience could enhance this brainwave pattern associated with good feelings much more powerfully than subjects who did not meditate, although both groups learned to increase this pattern in just one session.

Both meditators and controls were asked to try to create particular positive and negative experiences by following a description for two minutes each, while they were looking at the Neureka! feedback signal, and to rate the relationship between momentary changes in the experience and the Neureka! measure along a -100 to +100 scale, with 0 representing no relationship, 20 a mild relationship, 40 a moderate association, 60 a strong one, 80 a very strong relationship, and 100 an extremely strong connection. Eleven of the 16 adjectives showed very strong positive relationships.

On the negative side, 0 to -100, there were three adjectives that were strongly related to the Neureka! measurement.

There were no differences in these relationships between meditators and controls.

However, the meditators were far better able to reach the Neureka! state quickly upon request, indicating that practicing Transcendental Meditation™ prepared them to have these positive experiences.



Dr. Sokhadze and I, along with colleagues, have also performed two additional studieswhich showed that we could detect a variety of positive feelings by using the Neureka! protocol.

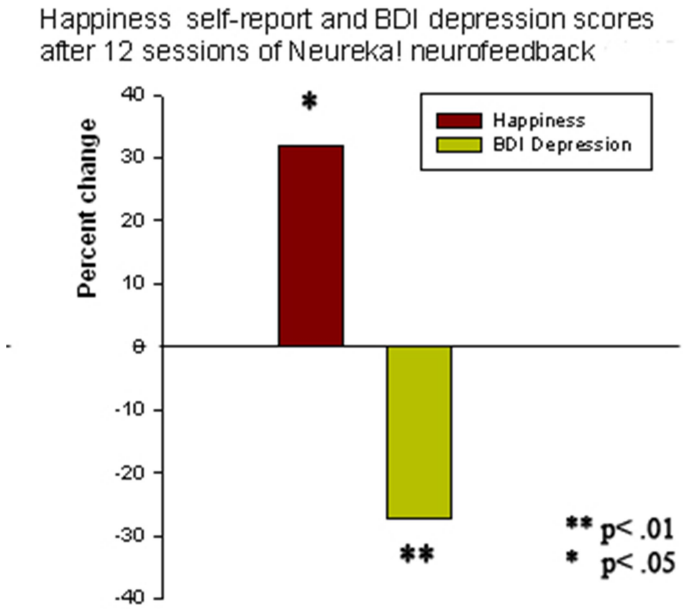
I was not able to find any other literature which substantiated the relationship between the 40 Hertz rhythm and these feelings. There is the potential overlap with the kindness and compassion that characterize the states of Davidson's meditators. Kindness, compassion, satisfaction and gratitude are somewhat similar emotions. All of those feelings will often briefly enhance Neureka! It is intriguing that those who practice HRV (heart rate variability) feedback also find that gratitude and acceptance are related to success. Perhaps there is a brain to heart connection which involves the 40 Hertz rhythm.

Training with Neureka! Enhances Happiness, Decreases Depression, and Improves Cognitive Function and Memory

A study performed by Dr. Estate Sokhadze at the University of Louisville showed all of these positive changes from only five hours of training with the Peak BrainHappiness Trainer. A follow-up survey taken after the study showed the subjects had effortlessly remained just as happy for 4 months. This led to the hypothesis that the results of this study may also indicate that this training can improve long term health.

There were two goals for this preliminary study, which is being published in Adolescent Psychiatry. One aim was to compare the results of potential substance abusers (who had been in legal trouble for substance use but did not meet the criteria for substance abuse used by psychiatrists) with normal controls (university staff and students). It turned out that the results from the five potential substance abusers were no different from the 6 normal controls. The results from both groups were combined and used to measure the effects of 12 sessions of the Neureka! training in the Peak BrainHappiness Trainer, the second goal. Sessions were conducted approximately once a week and lasted approximately 25 minutes. The subjects viewed DVDs with beautiful scenes from the BBC series, Planet Earth, during the training sessions with the Peak BrainHappiness Design. When their Neureka! values increased, the size of the DVD picture that was displayed also increased proportionately until the screen was full. They were asked to increase the picture's size as much as possible. If their attention waned and the Focus measure went below a certain level, the picture began to dim and then it would stop until they became engaged again.

Happiness enhancement. The study used a question about happiness that was drawn from the Household Income and Labor Dynamics in Australia Survey, so that we could relate the results to those in an article about how happiness improves subsequent health: "During the past four weeks, have you been a happy person?"

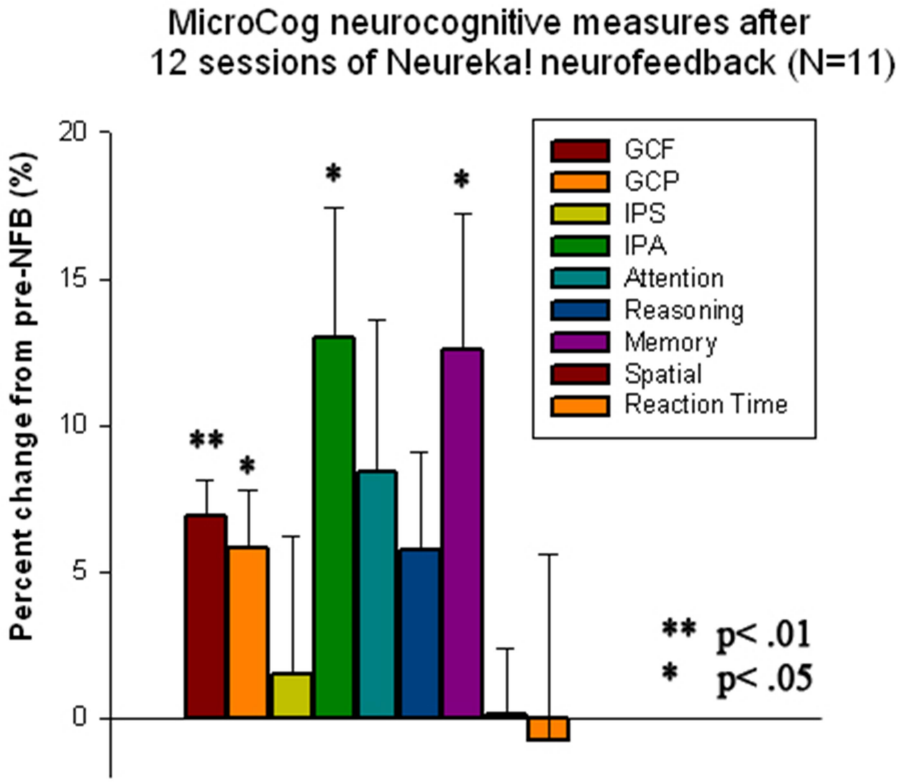


The six responses and their scores were: (6) all of the time, (5) most of the time, (4) a good bit of the time, (3) some of the time, (2) a little of the time, and (1) none of the time. The mean happiness rating for the group increased from 3.45 to 4.18, or by 21%. If you average the individual percentages, the increase was 32%, as shown in the graph. This may actually underestimate the effect, because 4 of the 11 subjects started out with happiness ratings of (5) most of the time. Since very few people will ever say they are happy all of the time, they had no way to show any improvement. If we eliminate those 4 people, the improvement in happiness was 44%, from 2.57 to 3.71, or 50% by the other method. More on happiness and health
below.

Lower depression scores. The Beck Depression Inventory is a very well known and accepted measure of depressed mood, which is filled out by the client and yeilds a score that increases with the degree of depressed mood. The scores before training averaged 8.45, with three subjects at or above the cutoff for a clinical diagnosis of the illness of depression* of 15. After training, the average was 5.45, a highly significant 35% improvement, or 27% by the other method, shown in the figure. None of the scores were above 15. The highest (worst) score improved from 21 to 13.

Attention. There were very significant improvements in attention after 12 sessions of training, measured by the IVA+ test. Most notable were improvements after training in the Attention Quotient ($t=3.46$, $p=0.006$), Sustained Auditory Attention Quotient ($t=3.19$, $p=0.01$), Sustained Visual Attention Quotient ($t=3.13$, $p=0.01$), and Auditory Reaction Time ($t=2.41$, $p=0.04$). These improvements are actually substantially larger than our studies using the Focus training protocol.

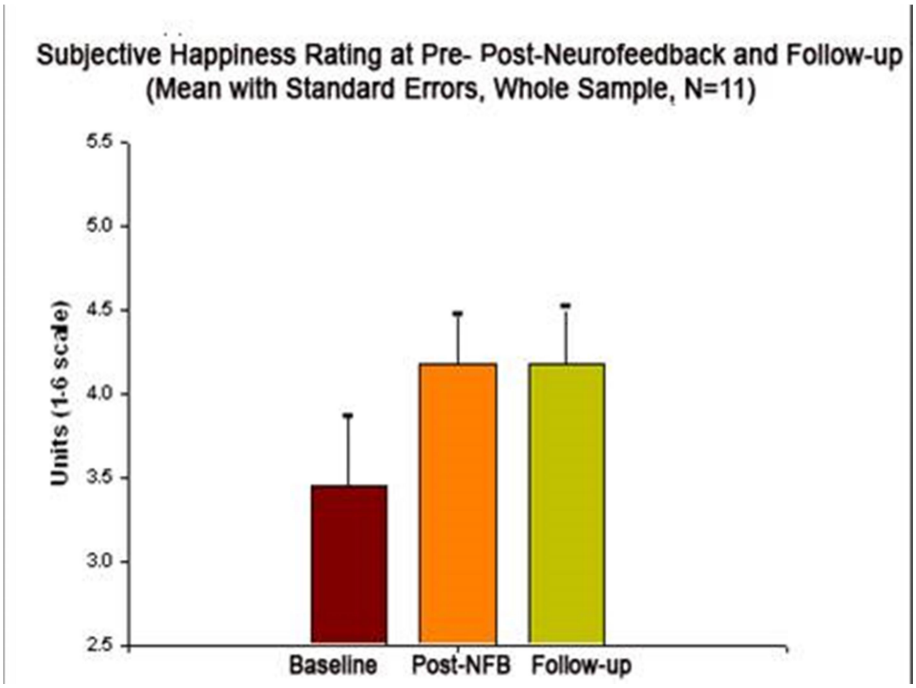
Cognitive performance and memory. The MicroCog is a brief computerized assessment of cognitive functioning, developed at Harvard and primarily intended to screen for impairments in thinking.



It produces an overall summary score, General Cognitive Functioning, combining processing speed and accuracy measurements for all the tests it offers. After only five hours of training, there was a very significant ($p < .001$) 7% increase. General Cognitive Processing was increased by 6%. The next level of summary indicated that the improvements were all due to better Information Processing Accuracy (13% increase, $p < .05$) rather than Information Processing Speed (1.5% change). More specifically, the largest increase was in memory (13%), significant at the $p < .05$ level. There were two improvements--Attention/Mental Control and Reasoning--that were almost significant. The other two categories, Spatial Processing and Reaction Time, were not improved at all. This indicates a very selective improvement in brain function, particularly centered around memory accuracy. It is consistent with the hypotheses we made several years ago when we wrote the Neureka! manual.

Enhanced happiness and improved health. There are several studies which indicate that enhanced happiness leads to improved health. The most thorough study was done by the Department of Labour in Australia and analyzed and published in the American Journal of Health Promotion by Siahpush, Spittal and Singh. They looked at two representative population-

based samples of 9981 people surveyed in 2001 and 2004. They examined the relationship between happiness in 2001 and their health in 2004. In 2001, they used the question about happiness that we copied, and corrected their calculations for health problems noted in that year. The survey data from 2004 found that the odds of reporting good (or better) health were 50% better for those who were happy most or all of the time in 2001. Similarly, the odds of having no limiting, long term health conditions were 53% better.



We did a follow-up evaluation on the participants in the Neureka! training study approximately four months later. As the Figure shows, the average improvement in happiness for the combined groups did not change. In fact, the significance level was slightly better than right after training, p = .01. If we eliminated those who started out with ratings of 5 and couldn't improve, the significance levels were slightly better. The Drug Abuse subgroup was significantly improved by itself (p=.035), and even more so after eliminating the one "5" rating (p=.028). The Control group, which started out with a slightly higher average Happiness level (3.67) than the Drug Abusers (3.2), did not show a significant improvement (p=.44), even after eliminating the three "5s" (p=.09).

Putting the two studies together supports the idea that training with the Peak BrainHappiness Trainer may produce long-term improvements in health. We know that the improvements due to neurofeedback are typically long-lasting, if not permanent, after a sufficient number of sessions, and we expect that

Neureka! training is no exception. Since we used the same Happiness question, it seems legitimate to hypothesize that as few as 12 sessions of Neureka! Training may improve long-term health.

However, the most prudent approach to improving happiness and health would be to continue to do Neureka! training sessions on a regular basis. You may continue to improve with more sessions. Our choice of 12 sessions was just an arbitrary one, but after later review it was discovered that 12 sessions appeared to be sufficient to produce a major improvement.
This is the fourth study on Neureka! and happiness, all confirming our original ideas. You can find information on all of them on this page. The last three studies were presented at the 2010 meeting of the International Society for Neurofeedback and Research, as papers and part of a workshop, "Gamma: The New Frontier".

Peak Brain Happiness Training and Autistic Improvement

Dr. Sokhadze, Dr. Manuel Casanova and their colleagues have studied the effects of training with the same Peak BrainHappiness Protocol on children with autistic spectrum disorders. They found improvements in their behavior—particularly decreases in Hyperactivity and Lethargy/Social Withdrawal, indicating normalization. They published an article showing that their Neureka! and Focus levels both went up from the beginning of the study to the 18th session, but had not reached a maximum improvement. We believe that most of these children would have improved further with more training. We are organizing a home study of autistic children who will do many more sessions with this Trainer.

The Big Picture

To summarize, I believe the big picture is that the Neureka! Protocol reflects the moment to moment activity of a scanning system, based in the center of the brain and looking outwards, which creates the awareness of events as wholes, in their context. It is activated particularly at moments of new discovery (the Aha! experience) or the anticipation of one and results in the enhanced learning, memory, happiness, and satisfaction of accomplishment.