

Brainwave entrainment – a new “tool” for the Reiki system

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by Lisa Langlois, M.M., Ph.D.

from University of Metaphysical Sciences

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1 Introduction

There is more to the world than science can explain, so far. Synchronicity or mystical experiences are some examples. Alternative medicine such as energy medicine is another example from the realm called metaphysics. A great divide between science and metaphysics – they often do not speak the same language – poses a barrier for research of metaphysical topics to be recognized by the science community. Research on energy healing performed by Gary Schwartz, Ph.D., published in *The Energy Healing Experiments: Science Reveals Our Natural Power to Heal* (2007), and research on energy medicine in general collected by James Oschman, Ph.D., published in *Energy Medicine* (2016), show the effort to overcome this issue. The research project presented here is a contribution within the area of experimental metaphysics.

Reiki and brainwave entrainment are important factors in metaphysics for quite different reasons. Brainwave entrainment, as discussed by M. Hutchinson in *Megabrain* (1986), is part of a technology that was recently discovered for the use in metaphysics to get into an altered state or meditative state. There are new techniques that can help a person to learn how to meditate, besides the traditional way of practicing meditation with a dedicated teacher for years. These novel techniques include biofeedback and brainwave entrainment. Biofeedback as described by M. Cade and A. Wise in their books as useful in the practice of meditation. However, listening to brainwave entrainment music is a simple and effective way to support meditation. This is described by Dr. James Mathews in *Binaural Beats - A Beginner's Guide* (2012) as, “the practice of listening to binaural beats is often referred to as binaural beats meditation, and there is good reason for this. Binaural beats recordings are used by millions of meditators around the world to gain faster access to the ‘meditative state’.” The reason for this effect is that brainwave entrainment induces a frequency to which the brain can align itself.

Reiki has been described by Penelope Quest in *The Basics of Reiki – A Step-by-Step Guide to Healing with Reiki* (2007) as, “Reiki is (...) a form of complementary therapy – a safe, gentle, non-intrusive hands-on healing technique that uses spiritual energy to treat physical ailments (...).” The Reiki system, based on the teachings of Mikao Usui, is handed down by personal instruction, which is a typical strategy for historic times. Therefore, Reiki is generally kept rather secretive, and students can learn certain details only directly from the teacher. The Reiki community also restrains authors from publishing certain details in books, such as the symbols used in Reiki II. That makes it quite difficult for me to understand Reiki on the level that I hope for. However, I actually could find a book, i.e. Frans Stiene, *The Inner Heart of Reiki– Rediscovering your True Self* (2015), which did deliver the depth of answers that I was looking for.

Presenting theoretical background information on brainwave entrainment and on Reiki, as well as research reported in peer-reviewed magazines together with the results of a series of experiments performed by myself (as a Reiki practitioner), the goal of this project is to support the following thesis statement: “Brainwave entrainment music can help the Reiki practitioner/novice to deepen the meditative process and improve the quality of the Reiki energy channeled for a treatment.”

In order to understand how Reiki and brainwave entrainment affect each other, to evaluate how to improve my Reiki abilities and find support for this statement these following questions should be answered by this research project:

- Is meditation necessary for Reiki?
- What effect has brainwave entrainment music on meditation?

- Does Reiki have “flavors” - like *intensity* or *quality*?
- Does brainwave entrainment music have an effect on a Reiki treatment?

2 Review of Literature

The book *The Awakened Mind: Biofeedback and the Development of Higher States of Awareness* (1997) by Maxwell Cade (a British biophysicist and Zen meditation master) and Nona Coxhead describes the research on biofeedback and brain wave states with the goal of finding the brain wave pattern that is present when a person is in a healing or a Zen state.

Anna Wise, a teacher of meditation for many years and student of M. Cade, worked on strategies to help the practitioner understand the different stages of meditation using the ideas developed by Maxwell Cade and his group. The exercises and experiences collected by Wise are published in her books *The High Performance Mind – Mastering Brainwaves for Insight, Healing, and Creativity* (1995) and *Awakening the Mind: A Guide to Mastering the Power of Your Brain Waves* (2002). These are very helpful books for the practitioner of meditation to advance the practice to the next level using biofeedback components.

The eBook *Binaural Beats - A Beginner's Guide* (2012) by Dr. James Mathew is, like most of the electronic books on binaural beats, very short. However, for its shortness, the book covers the basics and explains the topic well. Only a few of the books about binaural beats available today as eBooks, mainly Kindle, are actually written by real persons.

Among the eBooks about binaural beats that are not well written nor well edited, is the book *Brainwaves: The Nature Of Brain Waves & Their Frequencies* (2015) by Miles McDowell. Nevertheless, this book is included here because it gives some interesting thoughts on the matter.

In *Megabrain* (1986) Michael Hutchinson summarizes different kinds of state of the art research in neuroscience (of the 1980s), including the idea of the plasticity of the brain, and their technological offspring, such as mind machines. The main point of the book is to put the power back into the hands of the people by understanding that we can stimulate the brain and trigger brain growth for health and personal well-being.

The book *Empowerment Through Reiki – The path to personal and global transformation* by Paula Horan (1998) is one of the most read books about the basics of Reiki since it is small and short. The descriptions include the fundamental information about Reiki and applications to advance the skills.

In *The Magick of Reiki: Focused Energy for Healing, Ritual, & Spiritual Development* (2004) Christopher Penczak breaks with the tradition of not revealing “the secrets” and discusses the symbols for level two, different symbols for level three, and the attunement process. Penczak expands the discussion and combines Reiki with magic from the old traditions (Wicca), seeing both as one and not separate. This is a very interesting approach that explains some features of Reiki in a new but historic way.

However, the book that helped me most to finally understand, what Reiki is actually about, is *The Inner Heart of Reiki – Rediscovering your True Self* by Frans Stiene (2015), co-founder of the International House of Reiki and Shibumi International Reiki Association. Stiene researches the origin and basis for the teachings of Mikao Usui and explains in a clear way what

he describes as the “heart of Reiki”. This book laid out the philosophy and spirituality of Reiki even better than the very good written UMS course on Reiki.

One of the most exciting books that I used for this project is written by Gary Schwartz Ph.D. and William L Simon, *The Energy Healing Experiments – Science Reveals Our Natural Power to Heal* (2007). Using basic concepts of physics (what is energy, what is a field), Dr. Schwartz, a psychologist and psychiatrist, discusses several revolutionary yet basic questions regarding energy healing such as, how to detect the human energy field, can we measure effects of energy healing, and how to explain why energy healing works.

Dr. James Oschman, a biophysicist and biologist, collected a huge amount of information related to physics, biology, and interdisciplinary subjects to describe and define energy medicine. The book *Energy Medicine* (2016) is difficult to read if the background in physics and biology is missing. Besides clear the correct description of models related to physics and biology, Dr. Oschman describes the controversy of the scientific research and its absence of the topic very diplomatically and openly. This is a very well researched book with a fundamental basis in physics and biology.

3 Methods

For this dissertation in the area of Metaphysical Sciences, I chose to perform experiments myself. With a Ph.D. in physics, I have excellent experience performing experiments, and it is fun. The selection of the topics, Reiki and Brainwave entrainment, for this Ph.D. project is related to my personal interests. I received the attunements to the first two Reiki levels in 2011 and in 2016. However, I consider myself a beginner, because I do not understand what I am really doing while practicing Reiki? Brainwave entrainment music is an exciting new technology, which I have been using for some time now. I carried out experiments using Reiki while listening to brainwave entrainment music. With these experiments, I would like to find out, as preliminary research, how useful this approach can be for further scientific research.

3.1 Description of the experiments

I designed the following series of experiments from a basic stand point of Reiki as a hands-on healing technique. By using the brainwave entrainment music, I added a component that emphasizes meditation as part of the healing process. I performed the experiments personally, with me giving the Reiki and my husband, John Langlois, receiving the Reiki. We carried out the experiments once a day during a period of three months (whenever possible). Based on my experience as an experimental physicist, I defined a procedure and two “devices” of measurement. The procedure includes a time period of listening to brainwave entrainment music before the Reiki treatment starts (listed in brackets in the table of results, Table 4.3), 10 minutes of Reiki treatment (while still listening to the music), and a short evaluation of the treatment.

The measurement “devices” were a thermometer (to measure the temperature before and after the treatment) and my husband (as the receiver of Reiki). My husband estimated the intensity of the Reiki. The thermometer used is the digital thermometer SC30T by the German company Scala electronics GmbH with the lowest temperature of 32.0 °C and the highest temperature 43.9 °C. The time for each measurement varied since the thermometer beeps when the temperature is stable. Dr. Schwartz reports in *The Energy Healing Experiments: Science Reveals Our Natural Power to Heal* (2007) of experiments, where the influence of Reiki energy flowing from the hands of a Reiki practitioner is measured, a) as temperature (hands being hot) and b) with a magnetic field meter. The heating up of the hands during the Reiki session is well known as Diana Stein in *Essential Reiki: A Complete Guide to an Ancient Healing Art* (1995) writes, “Having hot hands is a mark of a Reiki healer.” Measuring the temperature is, therefore, a signpost and easy to accomplish. However, I do not have access to a magnetic field meter. I believe that my husband gave a reasonable assessment of the intensity of the Reiki instead.

3.2 Presumptions for the experiments

The following list sets the framework for the experiments:

- I am not using any method/technique to increase my Qi flow (with e.g. Qi Gong, Tai Chi). Therefore, I assume that my Reiki ability is generally the same every day during this project and my Reiki ability is only altered due to the different brain wave states.
- My husband has quite some experience with me giving Reiki to him. He is also a Tai Chi teacher for many years and has a long experience of feeling the flow of Qi. Therefore, I think that his judgment about the Reiki treatment is reasonably objective.
- Anne Wise describes in her book *The High Performance Mind* (1995) that a person will very rarely only be in one brain wave state. This means, when I write relaxed + Alpha (or Theta, or Delta) I cannot determine what other brain wave patterns are present, but because of the biofeedback method I can assume that I am predominantly in this state.
- At the same time with this research project, I practiced improving my meditation skills. Specifically, reaching a deep meditative state, with the help of brainwave entrainment music and using the instructions given by A. Wise in *The High Performance Mind – Mastering Brainwaves for Insight, Healing, and Creativity* (1995).

3.3 Definition of steps to carry out the experiments

The experiments were carried out in the following manner:

1. A preparation time of 0 to 50 minutes was set in order to give my brain time to settle into the desired brain wave state. During that time I was listening to specific brainwave entrainment music. The length of time was discussed by Dr. Mathews in *Binaural Beats - A Beginner's Guide* (2012). The music I used is listed below.
2. Measuring temperature in one of my hands (in Table 4.3, described as Before (B)).
3. For 10 min, I gave Reiki to my husband, while listening to the brainwave entrainment music. Specifically, laying my hands on his knees and not moving, to other places.
4. Measuring temperature in the same hand as above (in Table 4.3, described as After (A)).

5. My husband estimates the intensity of the Reiki he felt, gauging it between 1 and 10, where 1 was “yes, I felt something” and 10 was “that was very strong”.
6. Comments are added to describe how I felt before the session/during the session, and how my husband felt during the session.

Further notes:

These experiments are effectively a blind study; I did not tell my husband what approach (what brainwave pattern or none at all) I had prepared for each session.

I used biofeedback to confirm the brainwave state after listening to certain brainwave entrainment music. This particular information from Anna Wise’s book: *The high performance mind* (1995) is discussed in chapter 4 under biofeedback.

In the beginning we were not sure how to proceed and I would give Reiki to one knee at a time. Later we changed it to both knees, as it felt more symmetric for him.

For the brainwave entrainment I used the following tracks: Alpha: Ocean waves with alpha (BNB) by Dr. Jeffrey D. Thompson, Theta: Visions (BNB) by Dr. Jeffrey D. Thompson, Delta: Adrenaline reduction (IT) by Sleep music.

4 Findings

In this section the information collected from the literature and the results of the experiments performed are presented.

4.1 Basic terminology

In order to understand all the components that are involved in this project, a set of basic terms and concepts need to be introduced.

4.1.1 Some basics about the physics of sound waves

Brainwave entrainment, as will be discussed later, requires listening to certain music. “What do we hear? How do we hear? What is sound anyway?” – are some questions that need to be addressed at least in a brief fashion. **Sound** is a **wave** of pressure changes in a medium. This is shown schematically in Figure 4.1, a source creates a sound (depicted as moon shaped areas of high density) that is registered by the ear. Sound without air, for example, does not exist. Sound is generated through the continuous vibrational movement of material objects that are connected to each other through the molecules in the medium (e.g. air).



Figure 4.1: Sound is an effect of density (From: <https://mygreekreview.com/2015/03/06/healing-with-sound-vibrations/>)

The repetitive movement of an object is called **vibration**. A simple example is a pendulum, such as a weight on a spring. An example can be seen in Figure 4.2. The weight can move from one maximum (of stretching) to the other maximum (of compression) – back and forth. In the more general case, the weight is any kind of material object that is moving, i.e. vibrating. Examples for material objects are water or air or other molecules, the ball/disc of a pendulum clock, etc. This object is only changing positions between the two maxima and “does not go anywhere else”.

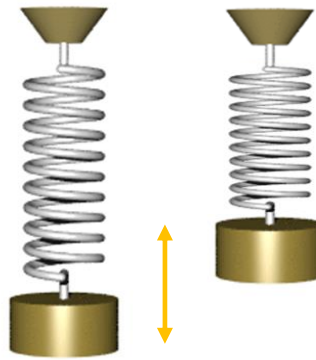


Figure 4.2: Vibration is demonstrated by a basic pendulum: weight on a spring (check out: https://en.wikipedia.org/wiki/Simple_harmonic_motion to see it moving)

The time that this object needs to return to the point of origin is called time period. The frequency f is the number of cycles that the object finishes per second. The unit of the frequency is Hz, named after physicist Heinrich Hertz (1857-94). The unit of the frequency was used to be called “cycles per second.” Thus, if a cycle is completed in 1s the frequency is 1 Hz. This example, with the weight on the spring, is a simple representation of sound vibrations as the air is compressed or “stretched” in a similar manner. A vibration in itself does not move in space and, therefore, in itself is not a wave. If the objects vibrating are connected to each other, the

movement of each object spreads out in space through the connection with the other objects. This is called a **wave**. A wave can be pictured as a sine curve (see Figure 4.3) with crests and troughs.

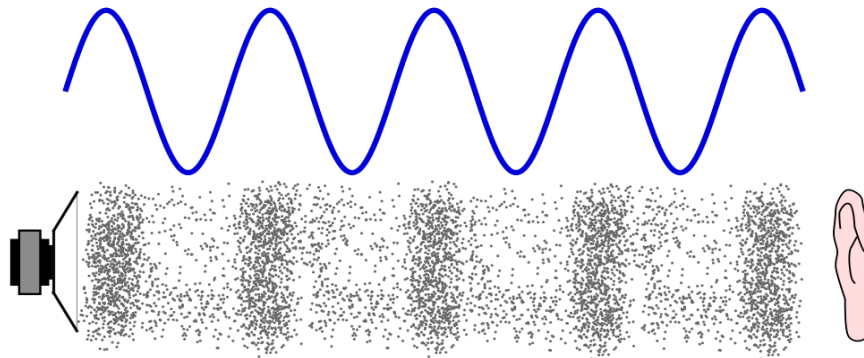


Figure 4.3: Sound wave: schematics as sine wave (top) and showing the density changes as the sound propagates through a medium like air (bottom) (From: <http://www.kidsdiscover.com/spotlight/sound-and-vibration/?wpss-routing=results>)

This representation of a wave includes the movement in space. If sound is described as a wave in this manner, as shown in Figure 4.3, the compressed sections of the air represent the crests and the stretched sections are the troughs. For a wave, the frequency also describes the number of cycles that are completed. However, a cycle for a wave is from one crest to the next crest or one trough to the next trough. This is related to the movement of the wave through space. The frequency of a sound wave determines the pitch. A tone like the standard “A”, for example, has a pitch frequency of 440 Hz. Sounds, for example noise, can be an overlap of all kinds of sound waves. However, to simplify this introduction, only sounds that are comprised of one tone with one pitch frequency are considered here.

Summary: A **vibration** is the repetitive movement of one object. Due to a connection to other objects moving in a similar fashion, a **wave** is created. The wave transports the information that caused the movement throughout space. This information can be a **sound**, for example.

4.1.2 Beats – a sound illusion

Figure 4.4 shows sound waves as tones created by a computer program. These are the red and blue curves on the top. Each curve, the red and the blue, represent a tone with each a distinct frequency. The frequencies of the two tones are slightly different. If two sound waves/tones with only a small difference in frequency are played at the same time, an audible effect is generated. This effect is called **beats or beating**. Any number of tones played at the same time affect what we hear. The waves do not dampen each other when they overlap but they interfere.

Interference means that when a crest of wave one and a crest of wave two overlap they become a bigger crest. On the other hand, when a crest of wave one and a trough of wave two overlap they cancel each other out. For all the points of the wave between crests and troughs, the process is the same but just seems to be more complicated. For the effect called beats to occur, the frequency of the two waves overlapping has to be only slightly different. This leads to the pattern of the green curve in Figure 4.4 on the bottom.

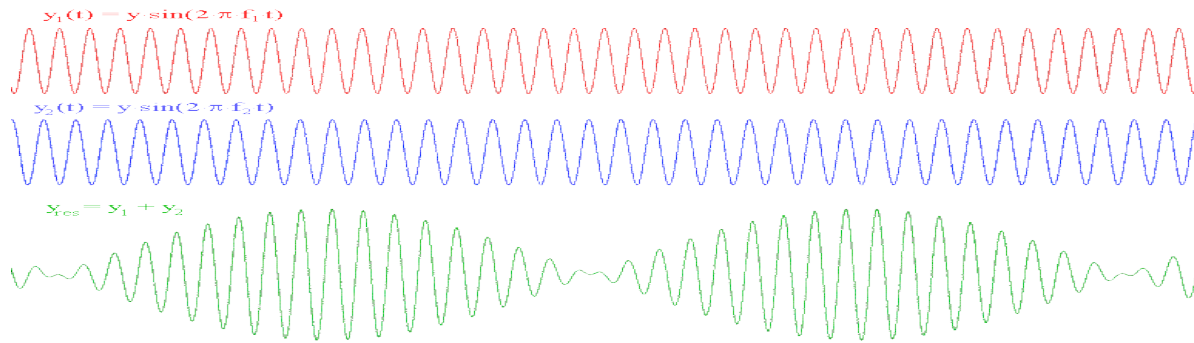


Figure 4. **Error! Use the Home tab to apply 0 to the text that you want to appear here.**4: Sound waves with a small difference in frequency (red and blue) generate the effect of beats (green curve) (From:

Beats are actually a sound illusion. Beats sound as if the volume of the carrier tone is getting louder and then softer, and louder and softer, etc.

People who play guitar or other string instruments, and are used to tuning their instrument, know this sound pattern very well. This occurs when the tone of one string is close to the tone of another string that is played. This effect can be experienced for pianos as well. However, one is rarely present when a piano is tuned.

4.1.3 Some basics about the brain - brainwave patterns

The brain, composed of some billions of brain cells, also called **neurons**, is in charge of exchanging information in the body and with the outside world (Hutchinson, 1986). The neurons generate and pass on electrical signals. This electrical activity of the brain, the state of the brain, that can be detected by a device call electro encephalogram (**EEG**), form patterns. As recorded by an EEG, these patterns appear similar to water waves and were, therefore, called **brain waves** (Cade and Coxhead, 1997).

The frequency of a brain wave pattern is determined, just as described above for waves, as: how many cycles can be observed in 1s; again given in Hz. Brain wave states are separated into several bands of frequencies¹: Alpha, Beta, Gamma, Delta, and Theta. These are the names of letters from the Greek alphabet (for a, b, c, d, h) and are related to the order in which the different brainwave patterns were ‘discovered’ or discussed in the literature. The German scientist, Hans Berger, recorded the first human EEG in 1927 (these were later called Alpha waves) and coined the word electroencephalogram (Haas, 2003). The order of discovery is not related to the inherent meaning of the frequency range or brain wave state. The brain has 5 core brain wave states. The following list gives a short description of the physiological experience that we humans have when we are in one of these brain wave states (from: *Awakening the Mind* (2002) by A. Wise, *Binaural Beats - a Beginners Guide* (2012) by Dr. J. Mathews, *Brainwaves: The Nature Of Brain Waves & Their Frequencies* (2015) by M. McDowell, *The Awakened Mind* (1997) by M. Cade and N. Coxhead):

Gamma²: “more than 40 Hz. The brain is in high mental activity, where bursts of insight and high-level information processing occur.” (Mathews, 2012) “[Gamma states are] related to a higher level of consciousness, and it is said that only those who are truly spiritually aware can reach this [level].“ (McDowell, 2015)

¹ Band of frequencies means: a range of frequencies

² Comment: Gamma waves are not researched by A. Wise or M. Cade because the device used, the Mind Mirror, developed by M. Cade and Geoff Blundell, does not allow for frequencies of brain waves higher than 40 Hz.

Beta: 13-40 Hz: “The normal waking rhythm of the brain is associated with active thinking or active attention, focusing on the outside world or solving concrete problems. The strength of the signal is increased by anxiety.” (Cade and Coxhead, 1997) “[Beta waves] are produced by our thinking mind – your conscious thought process. (...) In combination with other brain waves, beta is vital to the creative process. Without it, your creativity would stay locked away deep inside.” (Wise, 2002)

Alpha: 8-12Hz. “Alpha is the state of relaxed mental awareness or reflection, and is typically associated with contemplation, visualization, problem solving and accessing deeper levels of creativity.” (Mathews, 2012) “It denotes an empty mind rather than a relaxed one.” (Cade and Coxhead, 1997) “Alpha is our relaxed detached, awareness, or daydreaming mind. It provides that lucidity and vividness of our imagery. With it we sensualize, using all our senses, not just visual.” (Wise, 2002)

Theta: 4-8Hz. “The Theta state is associated with deep relaxation and meditation, enhanced creativity, stress relief, light sleep, and dreaming [REM state].” (Mathews, 2012) “Theta brain waves are produced by the subconscious mind. The subconscious holds our long-term memory and is also the storehouse of creative inspiration (...). The key to the profundity, bliss, and depth that people look for in meditation is in the theta waves. It is through theta that we make our strongest spiritual connection.” (Wise, 2002)

Delta: 0.5-4Hz. “The brain is in the delta state when we are in deep sleep and the body is regenerating itself.” (Mathews, 2012) “Delta is the (...) slowest of all frequencies. (...) Delta has been connected with the concept of the collective unconscious. (...) Delta can provide access to a kind of universal psyche or mind. This collective unconscious is a kind of merging of the vast wealth of unconscious understanding and knowledge. (...) In some people, Delta is present in a waking state in combination with other brain waves. As such, it acts as a kind of ‘radar’ or unconscious scanning device that underlies our intuition, our empathy, and our instinctual action.” (Wise, 2002)

Figure 4.5 presents a glimpse of how the different brain wave patterns appear as recorded by an EEG device.

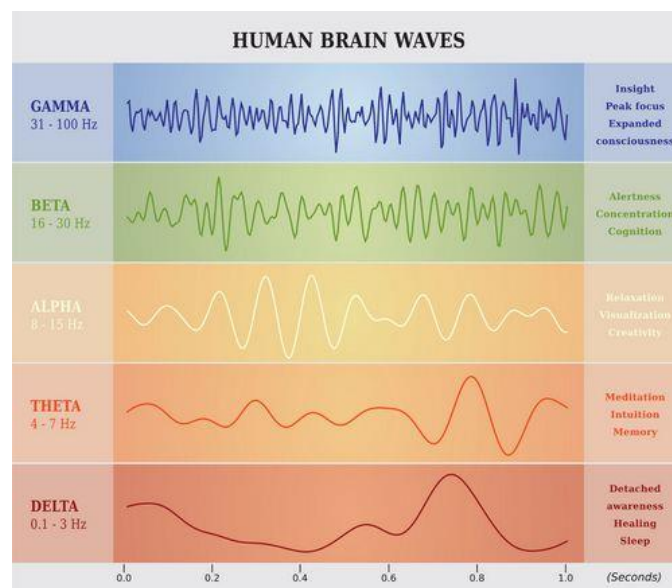


Figure 4.5: The five brain wave states as seen on an EEG. (From: <https://bebrainfit.com/neurofeedback/>)

The ranges of brain waves reported in the literature are not consistent, so one system was adapted for this study. As discussed earlier while explaining the effect of the different brain waves, sometimes several states are actually “happening” at the same time, all the time (Cade and Coxhead, 1997). This is not really surprising because the brain is analog, a part of a natural body, where lots of things can happen at the same time and not a computer with only 2 states, 0 or 1. A very special brain wave state was called “the Awakened Mind” by M. Cade in his research of the meditative states, using a special EEG device. This device, the Mind Mirror, was developed by Cade and Geoff Blundell. In the Awakened Mind brain wave state, Beta, Alpha, Theta, and Delta brain waves are all present at the same time in a specific pattern. The following shapes (cf. Figure 4.6) depict different brain wave states as recorded with the Mind Mirror. The vertical axis (not drawn) is related to the frequency range of the brain wave states (top = high frequency, bottom = low frequency). The horizontal axis refers to the intensity.

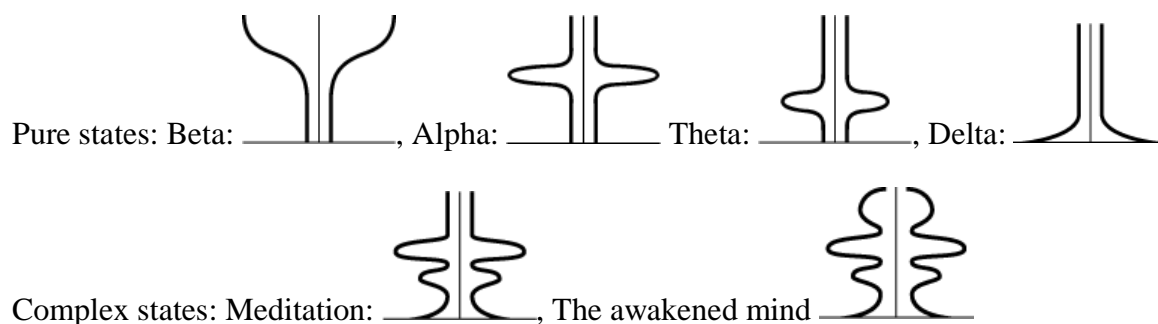


Figure 4.6: The brainwave patterns measured with the mind mirror – schematic (From: *The High Performance Mind* (1995) by A. Wise (See also: <http://annawise.com/the-work/brainwaves/>)

The effort that was put into the research starting with M. Cade in the 1970s on the relationship between meditation and brain wave states, shows that use of technology (in this case biofeedback) helps immensely with meditation practices. It is so much easier to understand, what a still mind is and why we need it, when there is a feedback that tell us when we are in that brain wave state and how to remain there. M. Cade and his team discovered that the brain wave state Awakened Mind is present for people that are highly evolved meditators, and they used this understanding to train people to become deeply aware and deeply attuned to higher levels of consciousness (Cade and Coxhead, 1997).

4.1.4 The relevance of biofeedback for the project

Maxwell Cade and Nona Coxhead describe biofeedback in their book *The Awakened Mind* (1997) as a “way of learning about ourselves”. Biofeedback includes observing and controlling of biological processes. Devices, such as an EEG, can help us observe a reaction (i.e. pattern of the brain waves). However, Cade and Coxhead point out, “it is also important to notice that the reaction can and should also be felt, so that the person becomes aware of the functions of the body without the devices.” (Ch1)

Biofeedback is important for this research project because it provides a way for me to determine my brain wave state. For Alpha brain waves, I used a very simple EEG device, the Force Trainer, to establish if I am in an Alpha state. The device can only distinguish between Beta and Alpha, as the description advises. For testing the other brain wave states (Theta and

Delta), I do not have a device. Therefore, I used the clues given in Table 4.1, as found in *The High Performance Mind: Mastering Brainwaves for Insight, Healing, and Creativity* (1995) by A. Wise. Important for my project are categories 1 and 2 for Alpha, categories 3 and 4 for Theta, and category 5 for Delta. A part of my training for this research project was to practice these brain wave states with the help of brainwave entrainment tracks. While I am certain to have reached Alpha and Theta states, I am rather uncertain about the Delta state.

Table 4.1: Table of Subjective Landmarks for different brainwave states (From: <https://www.institutefortheawakenedmind.com/home/the-awakened-mind/patterns-of-consciousness/>)

#	Descriptions	EEG
0	May have difficulty stilling the mind or mind racing out of control Itchy, distractible, inattentive state A feeling of "Why am I doing this?" Just beginning to relax A feeling of "settling down"	<ul style="list-style-type: none"> Continuous beta, often with some flares of other waves Possibly intermittent alpha
1	Foggy state * Feeling dizzy * Sensations of going under an anesthetic Occasional feeling of nausea Mind filled with everyday affairs—almost as an avoidance of inner stillness A feeling of scattered energies A sensation of drifting off to sleep or being pulled back from the edge of sleep	<ul style="list-style-type: none"> Somewhat reduced beta, but still present Intermittent but stronger alpha
2	Scattered energies beginning to collect Childhood flashbacks Beginning to feel calmness and relaxation Uninvited vivid flashes of imagery Images from distant to immediate past Attention not very sustained A feeling of being in between states Transitional state	<ul style="list-style-type: none"> Reduced beta Stronger alpha could be continuous Intermittent low-frequency
3	Greater sense of stability Well-defined state Pleasant bodily sensations of floating, lightness, swaying, or rocking Occasional slight rhythmical movement Concentration easier and stronger Increased and clearer imagery Increased ability to follow guided imagery	<ul style="list-style-type: none"> Highly reduced beta Continuous alpha Possibly more continuous theta with increased frequency and/or amplitude
4	Extremely vivid awareness of breathing, heartbeat, blood flow, or other bodily sensations Feeling of loss of body boundaries Sensation of numbness in limbs or of being full of air Sensation of growing to great size or becoming very small Sensation of great heaviness or lightness Sometimes alternating between external and internal awareness	<ul style="list-style-type: none"> Highly reduced beta Continuous alpha Increased theta
5	Very lucid state of consciousness Feeling of deep satisfaction Intense alertness, calmness, and detachment Sensation of spacing out or disappearing from environment and /or body Extremely vivid imagery when desired Feeling of altered state lacking in previous levels, 0-4 Sense of peak experience, "ah-ha" moment, intuitive insight High performance	<p>Best meditation (alpha, theta, delta) Awakened mind (beta, alpha, theta, delta)</p> <ul style="list-style-type: none"> Strong beta mastery, ranging from no thoughts to creative thoughts Continuous alpha Continuous theta
6	New way of feeling Intuitive insight into old problems, as though seen from a more aware level Synthesis of opposites into a higher union Sensation of being surrounded in light A feeling of higher spiritual awareness A sensation that nothing matters other than just being The experience of bliss or of indefinable peace A feeling of greater knowledge of the universe	<p>Five Possible patterns:</p> <ol style="list-style-type: none"> Awakened mind (beta, alpha, theta, delta) Evolved mind (circular pattern) Occasional flares of delta (yoga nidra) Little to no brain activity (out of body pattern) Superconscious mind or higher self

4.2 Brainwave entrainment

Drumming and flickering light stimulation affect the brain. This has been known for thousands of years, well before modern neuroscience was able to understand brainwave patterns and their physiological relations with the brain. In the research article *Exploring Shamanic Journeying* in the open access journal PLOS Gingras, Pohler, and Fitch (2014) report that “Ancient shamans used flickering lights or drumming to achieve a trance state (Theta), a key component in the development of the spiritual practices of a wide variety of ancient cultures.” A drumming pattern with a single beat at regular intervals is actually called monaural beats (see below).

This little introduction shows the relevance of the question if a modern, technology-based strategy such as brainwave entrainment can have an effect on a spiritual practice such as Reiki. In metaphysical circles, brainwave entrainment is one of the recently developed metaphysical technologies to help the spiritual seeker to achieve deeper levels of meditation, out-of-body experiences, for example. Therefore, it is reasonable to test if there is an effect of brainwave entrainment on Reiki.

4.2.1 Binaural beats and Brainwave entrainment

When two sounds with different frequencies overlap, they create beats (see above).

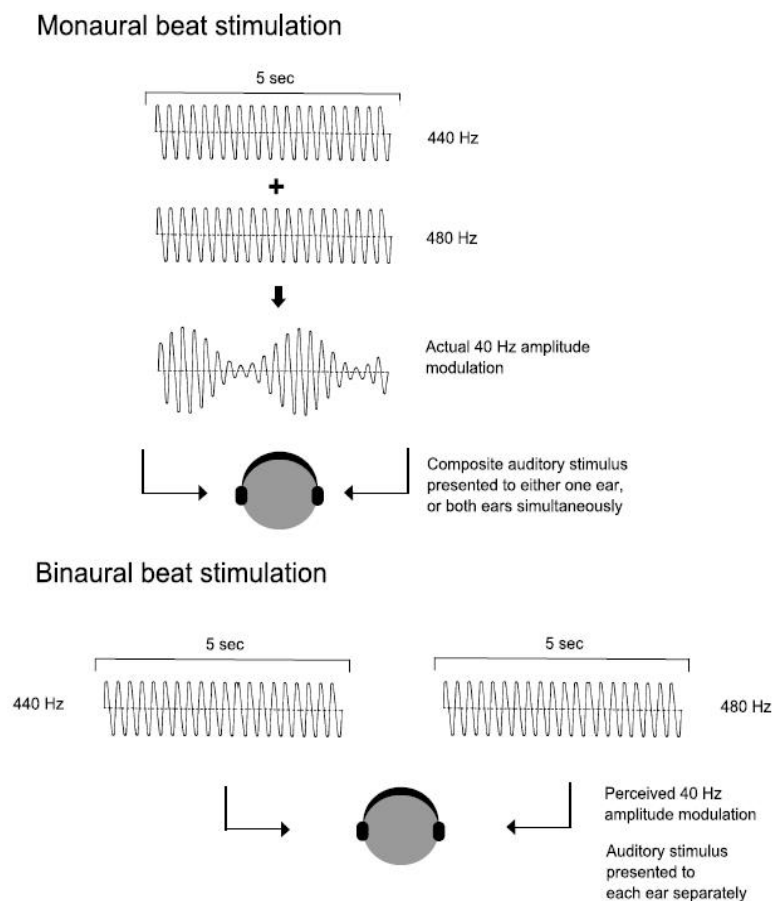


Figure 4.7: Application of monaural and binaural beats. The superposition of amplitude modulated signals of nearby frequencies delivered either to one ear or both ears simultaneously define the monaural or binaural

Therefore, beats are a typical part of acoustics, the physics of sound. The new and inspiring idea is to listen to these beats with headphones. Gerald Oster, Ph.D. wrote in an article in *Scientific American Auditory beats in the brain* in 1973 that “when listening to a binaural beats sound track wearing headphones, where the left ear channel delivers one frequency and the right ear channel delivers the other frequency, the brain adapts to the difference in frequency creating a particular brain wave pattern”. Dr. Oster, a biophysicist, was the first to publish research on the physiological effect of brainwave entrainment on the brain and collecting the information on the topic that was available at the time. The term binaural, with bi (meaning two) and aural (of the ear), was coined to reflect the idea that both ears are used for this effect to be observed.

Two main categories are possible and are used today, Binaural Beats (BNB) and Isochronic Tones (IT). IT is also called monaural beats. IT (or monaural beats) uses the modulation of the volume of the sound to create sharp, pulsed tones similar to the beats. Headphones are not necessary when listening to IT to have an effect. However, in general the sound quality is better with headphones and other noises are reduced. The pulses are set at regular intervals to generate the IT (i.e. monaural beats). The frequency of the beats is matched with the frequency of the desired brainwave state as listed in section 4.1.3. The audible and technical differences between monaural beats (i.e. IT) and binaural beats are described in Figure 4.5.

The general term for this concept is **brainwave entrainment**. In medical research that investigates physiological or neurological effects the use of BNB or IT is called **auditory beat stimulation** (ABS). Brainwave entrainment music can easily be created with the computer for about any carrier frequency (the lower frequency) and beats frequency. Today, sound tracks are available, for purchase at different websites or for free on YouTube, that are adjusted to each of the brain wave frequency ranges (even one single frequency) in order to create the desired brain wave states. More resources are available at the different websites where the sound tracks can be purchased. In some cases the sound track only features the beats (IT or BNB) frequencies. In other cases ambient sounds or musical tunes are overlaid on the beats, since the droning tone is not pleasant to listen to. All this gives the user a wide range of selection with regards to application and taste. Dr. Mathews in *Binaural Beats - A Beginner's Guide* (2012) discusses this variety from the point of view of the designer of such music: “Binaural beats produced at different levels of a particular brain state zone will produce different results for the listener. For example, a 5 Hz Theta recording will induce deep relaxation and is ideal for meditation, whereas an 8 Hz Theta recording would allow for gentle relaxation with the ability to focus comfortably on a task. By honing in smaller frequency bands within a given brain state zone, brain entrainment engineers are able to produce recordings for specific disciplines of self-development.”

Brainwave entrainment has been ascribed the following benefits:

- Increased relaxation
- Better sleep
- Deep meditation
- Increased positivity
- Increased concentration
- Lower stress, eliminate anxiety
- Spiritual consciousness

(From: <https://www.ennora.com/blog/everyday-benefits-binaural-beats/>)

4.2.2 Research on auditory beat stimulation

This list of benefits could be extended following claims at other websites. However, it was possible to find several research articles that give more trustworthy information. The first clue can be found in the article *Auditory beats in the brain* (1973) by Dr. Oster, the biophysicist. Oster was interested in how the brain interprets signals, such as BNB. Firstly, he quotes E. Lehnhardt who discovered that even if one of the frequencies is delivered below the threshold of hearing the BNB are still perceived by the person. In conclusion, Oster states, “[Because] sub-threshold sounds are effectively rendered audible by binaural beats suggests that there may be other stimuli processed by the brain of which we are not aware.” This is of course, at this stage a mere hypothesis.

In the research article *Influence of BNB on EEG signal* (Kasprzak, in *acta physica polonica*, 2011) C. Kasprzak gives an overview of the neurological theory to date which explains of how BNB might affect the brain: Summarized, Kasprzak writes that binaural beats are basically the result of superposition of neuron discharge from the two ears and that this provides stimulation for the reticular system, which controls concentration and consciousness. Further, the reticular system adjusts the brain wave activity to the beat frequency if this information is not contradictory to internal stimuli (e.g. feelings) or external stimuli from the sensory organs. The reason for this adjustment is related to the fact that the BNB frequency patterns are similar to those of actual brain wave activity, which in turn the reticular system interprets as internal patterns (Kasprzak, 2011).

This article explains one important fact, why the BNB frequencies, the difference between the two initial frequencies, have to be within the range of the brain wave patterns. This theory also helps us to understand, as Oster puts it, “there may be other stimuli processed by the brain of which we are not aware” (see above). Homeostasis is a typical control mechanism for biological systems. The reticular system controlling the brain waves has these “redundancies” (check with internal or external stimuli) incorporated in the control mechanism. If certain feelings such as anxiety “disagree” with for example a theta BNB pattern the person cannot get into that relaxed state. I personally use a track called *Adrenal Reduction* by Sleep Music, a delta IT track, at times of high anxiety and it works really well for me. However, I have to listen to this track during normal activities at home for a couple of hours without further anxiety triggers to have an effect. The explanation that the adaption of the brain involves homeostasis helps explain this experience. It can take hours for brainwave entrainment to have an effect, and I was not concentrating on the brainwave entrainment by meditating.

In the research article *Influence of BNB on EEG signal* (Kasprzak, 2011) C. Kasprzak reports that Alpha wave BNB (10 Hz) showed an effect in the same frequency as delivered by the BNB music that could be observed on the EEG. This is to date the only study to report BNB effecting the EEG (as far as I know). The literature is quite controversial about the “scientific proof of BNB”. In their review article *Auditory beat stimulation and its effects on cognition and mood states* (Chaieb, Wilpert, Reber, Fell, in *Frontiers in Psychiatry*, 2015) Chaieb and coworkers discuss that experimental protocols are widely different in the studies reported so far, that BNB or IT are used with a very different background (as a mechanistic tool or healing aid), and that the duration of the applied stimulus varies widely. An important factor for an effect to occur is connected to the carrier frequency of the BNB signal, which is the lower of the two frequencies. Chaieb and coworkers write, “It may be that the choice of carrier tone impacts upon the efficacy of beat stimulation, as it was reported that lower carrier tones as well as beat frequencies produce more robust effect.” Dr. Oster in the article *Auditory beats in the brain*

(1973) discusses the frequency range for the carrier frequency. The optimum carrier frequency is about 440 Hz, and at higher carrier frequencies the perception of the BNB is less distinct. Several studies that tested this notion are summarized in the review article *Auditory beat stimulation and its effects on cognition and mood states* by Chaieb and coworkers (2015). In these studies different carrier frequencies (250 and 1000 Hz) and different BNB frequencies (3 and 6 Hz) were tested, including BNB vs. IT. The results show that monaural beats generated higher amplitudes, as well as the lower carrier frequency and the lower BNB frequency. While BNB was not detected above 3000 Hz for the carrier frequency, IT was detectable above 3000 Hz.

The review article *Auditory beat stimulation and its effects on cognition and mood states* by Chaieb and coworkers (2015) is a well of knowledge on this topic. Here several subtopics are discussed related to physiological effects, mood, and other behavior. IT (monaural beats) and BNB, with 5 Hz BNB show pronounced power and synchronization of different areas of the brain. This means that BNB can help synchronize different areas of the brain – like a harmonization. Another study confirms the alteration of functional connectivity between brain regions. Further reports reviewed include positive effects on mood, memory, creativity, reducing anxiety, accuracy of a task performed, and strengths of the cortical networks during the task.

A study, conducted by Lavalley and coworkers (discussed in Chaieb et al. 2015) using BNB music to induce different brainwave patterns, revealed that while for non-experienced meditators the entrainment of the different brainwave states (Theta or Delta) was not conclusive, whereas for experienced meditators the entrainment could be observed on the EEG including an increase in Theta or Delta strength. For the Gamma band the results were reversed. These results indicate that the effects of BNB on the brain depend upon prior experience and individual skills. These skills involve, for advanced meditators, the ability to use their whole brain and to live in a more balanced state. This is characterized by brain synchronization.

This section about brainwave entrainment discussed the basic principles and some research on the real effectiveness of BNB on the brain. Why was it important to go into such detail? The material I brought together showed a more complex picture of the physiological and neurological interactions of BNB with the brain than is described in the books on the topic. The presentation of these studies supported that brainwave entrainment has an effect on the brain, which is an important basis for the experiments describe in this dissertation. The study by Lavalley and coworkers support the idea that with practice of meditation the effect of BNB on the brain increases and supports synchronization.

Finally, there is a concern about the “safety” of using BNB. When we try to change our brain waves using BNB music are we not influencing our brain in an unhealthy way? McDowell writes in *Brainwaves: The Nature Of Brain Waves & Their Frequencies* (2015) about BNB as being related to falling asleep. Summarized McDowell writes that lowering the frequency patterns of the brain from beta to alpha to theta to delta is natural during the different sleep periods. The stages of sleep explained by McDowell are also quite similar to the stages of meditation described by A. Wise above. With the support from McDowell and research by M. Cade published in *The Awakened Mind: Biofeedback and the Development of Higher States of Awareness*. (1997) it is clear that changing the brain waves consciously is actually natural, since we are doing it during sleep all the time.

For years now, I have been experimenting with different types of sound healing music, mainly to support my meditation efforts. My own experience in this area shows that brainwave entrainment music, BNB or IT, have the most pronounced effect on me and the development of

my meditation skills, because it makes it easier to get “over the beta hump” as I call my increased beta levels that are caused by anxiety.

4.3 Reiki

Reiki is a form of hands-on energy healing. Hands-on healing is known for more than 2,500 years (Quest, 2007). More specifically, the system of Reiki was developed by Mikao Usui being interested in the Buddha’s healing capabilities in Japan in the late 18ths (Penczak, 2004).



Figure 4 8: Reiki written in Japanese

4.3.1 Reiki – a discussion of some questions

Reiki is Japanese (see the Kanji in Figure 4.8) and literally translated means ‘Universal Life Force Energy’ (Horan, 1998). From this basic point of view we all have Reiki, since we all have the universal energy, also called Qi. This agrees with the conclusion that Dr. G. Schwartz, who published the results of his research on energy healing in *The Energy Healing Experiments* (2007), formulated as “everyone has the ability to heal (others).” The difference between a Reiki practitioner and a non-Reiki person as stated by Reiki masters, is something called “attunement”. The attunement is a form of initiation (Horan, 1998). The reasoning behind the attunements could not be sufficiently elucidated until I found the book *The Inner Heart of Reiki – Rediscovering your True Self* (2015) by Frans Stiene. Stiene explains that Mikao Usui initially would bless his students. This is called Reju which is Japanese for blessing. Stiene writes, “Unfortunately, calling the Reju an attunement gives rise to many misconceptions. One such misconception is that Reiki is external to the recipient. For example, some Reiki teachers say, ‘without attunement, you cannot channel Reiki’, others say ‘An attunement is the transfer of the ability to channel Reiki, passed from a teacher to a student.’ Such statements contradict the teachings of Mikao Usui (...).” (Ch 15)

With this misconception being handed down in the West from teacher to student, the next question to ask is, what is then the relevance of the hands-on technique in the first place? Here Stiene states, “Kinesthetic learning is (...) an important element within Mikao Usui’s teachings, especially for beginners physically placing the hands on or slightly off the body. If you ask a beginner to just sit together with his client without any physical movement or touch, he would find that very difficult. However, a dedicated practitioner within Mikao Usui’s teachings would have no issue with this.” (Ch 22) This means that Mikao Usui designed the hand-on techniques as tools and not as the basis of his “theory” which is stated as the core of western Reiki.

Reiki masters state that for the purpose of a Reiki treatment the practitioner does not use her/his own Qi (e.g. Horan, 1998). What do they use? What is healing anyway? Dr. Schwartz in *The Energy Healing Experiments* (2007) discusses these questions in his interviews with healers. Schwartz learns, “Healers claim that disorders in the flow and structure of energy around and

within the body not only play a fundamental role in disease, but they occur before physical changes and symptoms occur.” It is known that the flow of energy around and within the body has something to do with the universal energy that Reiki is. So, if Reiki energy can harmonize the body then that is the healing. Frans Stiene in *The Inner Heart of Reiki* (2015) explains this thought process a little more precisely: “(...) the real inner meaning [of Reiki] is **True Self**. (...) The word healing means to make whole. (...) In other words, we need to rediscover our True Self because it is only in that **state of mind** that we fully realize that the universe is us and we are the universe. (...) From a Taoist perspective (...) the true self (...) can only be accessed through serious meditation practices.”

Summarizing these ideas of the True Self means that being a healer is primarily a spiritual practice of meditation. Stiene is not the only one discussing the spiritual background of Reiki. P. Quest in *The Basics of Reiki* (2007) writes, “Unlike other complementary therapies, the practice of Reiki is a spiritual discipline that includes meditation, energy-cleansing techniques and spiritual principles for living, and practitioners are encouraged to use Reiki on themselves daily, not only for self-healing, but also to increase self-awareness, personal growth, and spiritual development.” However, for Quest the spiritual background is “encouraged” rather than taught as a prerequisite. Coming back to the question of what kind of Qi does the Reiki practitioner use. Stiene answers this question with, “(...) since [Usui] taught that Reiki is our True Self, hidden within us, waiting to be rediscovered. It does not need to be channeled (...) because it is already channeling within, through, and around us.” (Stiene, Ch15). In an absolute blunt way K. Prasad phases it, “In reality, hand positions have nothing whatsoever to do with the deeper process of healing. Hands are a very superficial way for humans to connect to energy, when we are first learning. The true power of energy, however, lies in the ability to completely let go of our reliance on our hands and allow the energy to flow throughout or entire body. More than that, we must learn to allow the energy to flow even deeper – beyond our physical bodies and into our minds and spirits” (Kathleen Prasad, quoted in Stiene, 2015). This quote not only explains the different level of training but also explains, in essence, how distance healing works: the connecting of the energy fields, the harmonizing, is the reason for the healing, not the hands. Concluding Stiene writes, “All the practices within the system of Reiki are meditation practices. If we have not built a good foundation, then we cannot work with the deeper teachings. (...) Therefore, all meditation practices within the system of Reiki – the precepts, breathing meditations, hand-on healing, symbols and mantras, and the Reju/attunement – are signposts to help us to “become” meditation (...)” (Ch25) The harmonizing of the energy is a general theme that is described by other thinkers as well and forms a full picture of the healing process.

*“The healer radiates such a strong state of harmony and
congruence that anybody in their presence naturally realigns
to the healer’s state of unity and health.”*

Dr. Christine Page in *2012 and the Galactic Center – the Return of the Great Mother* (2010).

4.3.2 Research on Reiki

There are quite a number of research articles on Reiki to be found on pubmed. However, Dr. A. Baldwin and Dr. G. Schwartz in the article *Practicing Reiki Does Not Appear to Routinely Produce High-Intensity Electromagnetic Fields from the Heart or Hands of Reiki Practitioners* in the Journal of Alternative and Complementary Medicine, (2013) summarize the research related to Reiki, that as of 2013 no mechanism for the Reiki healing has been demonstrated, that the number of experimental subjects were relatively small, and that the number of publications is small in general. This is the main issue with research on Reiki and often the studies cannot report that Reiki has an effect that is statistically significant. It is not my intention to question the effectiveness of Reiki. I know that it works. Therefore, I do not discuss studies related to this particular question. More interesting are studies that are related to the effect on the practitioner herself/himself and theories about how it works. However, as Baldwin and Schwartz point out there is no mechanism reported as of yet (Baldwin, Schwartz, 2013). There is one article cited in the literature by J. Zimmerman published in 1990, which is not available to me, discussing the effect of the magnetic field of the earth on the Reiki healer. Dr. Oschman in *Energy Medicine* (2016) discusses this research and the hypothesis that Zimmerman reported. In the article *Practicing Reiki Does Not Appear to Routinely Produce High-Intensity Electromagnetic Fields from the Heart or Hands of Reiki Practitioners* (2013) Baldwin and Schwartz report the results of experiments designed to repeat Zimmerman's experiments. Baldwin and Schwartz state that the results reported by Zimmerman could not be confirmed, that no high intensity electromagnetic fields were detected. The authors Baldwin and Schwartz hypothesize that Reiki practitioners, as described by Zimmerman need to tune into an electromagnetic frequency such as the Schuman resonance (7.8 Hz) to be effective. It was shown by other researchers that certain frequencies (i.e. 7 Hz, 10 Hz) promote healing for specific parts of the body (in Baldwin and Schwartz, 2013, with a more specific and extended list in Oschman 2016). Dr. Oschman, in his book *Energy Medicine* (2016) discusses the possibility that biological organisms can be and are entrained by the rhythms of the environment, "Living tissues are nonlinear, cooperative, and coherent, and are capable of responding to very specific 'windows' in terms of frequency and intensity." Which is related to "Every cell and every molecule is 'listening' to its environment and receiving information that enables it to function in concert with the whole body." Oschman collects information gathered by many other researchers and writes, "Rhythms in one person can entrain rhythms in another without touching." (McCraty et al., 1998, in Oschman, 2016). However, Oschman describes the controversy of this subject which reflects the dilemma to "prove the effectiveness" of energy healing with conventional science methods.

In research performed by Cade and his group in the 1970s on the effect of the healer on the patient it was found that "(...) there is a measurable brainwave change in the patient as well. The practitioner affects the client's brainwaves dramatically!" This was reported by A. Wise in *The High Performance Mind* (1995). This is directly related to what was just discussed "The person being healed allows their brain waves to become synchronized with the healer's biofield. (as quoted from Zimmermann, in Schwartz, 2007)."

One mechanism as a basis for energy healing that is discussed by Oschman in are Scalar waves, Discussing this topic here without establishing a proper fundament in physics is not reasonable and I am not just quoting this topic without discussion. Therefore, I cannot say at this point if this approach is realistic. For the research at hand, this topic is too theoretical to be of any support for the thesis statement and will not be discussed further.

So far Dr. Schwartz published several studies about his approach to the question how energy healing such as Reiki works. Some of this research is published in his book *The Energy Healing Experiments* (2007). His approach includes testing devices to detect biofield energies. I will not elude into this topic. More interesting for the present project are the results of other experiments in that series. Dr. Schwartz conducted experiments to test the effectiveness of healing touch energy healing techniques such as Reiki. In experiments with bacteria, where the Reiki healer would stand in front of the cells and send Reiki energy, it could be concluded that when the healer is not feeling well, i.e. is stressed, the results are not significant. Only when the healer is feeling well, the results are significant and showing improvement. Dr. Schwartz states as a conclusion to these experiments: "(...) the energy and conscious intention of healers can modulate cellular functioning in rats and even *E. coli* cells in test tubes. The findings support the claim of healers that their energy and intention make a difference in the success of their efforts." And further, "(...) caring energy and loving intention are the keys to healing and health." Another result of his research is related to the belief of the practitioner. In summary this means, that only then can there be an effect, if the practitioner and the receiver of the healing believes that the method works. C. Penczak in *The Magick of Reiki* (2004) discusses this background as part of the Reiki teaching, "First, the recipients of Reiki energy must ask to be healed. They must be open and willing to change, and ready to receive the healing energy. "

In *The High Performance Mind* (1995) A. Wise reports about research with regards to the brain wave state of the healer in general, "the brainwave state that is optimum for self-healing is usually the combination of beta, alpha, theta, and delta (the Awakened Mind). The theta brainwaves allow the imagery to come from und return to the subconscious, deep levels of the individual, where it can continue to create effective input. The alpha brainwaves provide the bridge from the subconscious to the conscious mind, so that the individual can maintain an open flow of the sensory images and information important to the healing process. Beta brainwaves provide the conscious mind access to the subconscious mind thought the alpha bridge. The individual is able to communicate his conscious thoughts, ideas, and needs to his own inner being." This detailed description of the state of mind of a healer is highly relevant to the research presented in this dissertation.

A. Wise is of the opinion, "Though the optimum brainwave state for self-healing is usually the awakened mind, deep mental and physical relaxation is also useful. (...) With this depth of physical and mental relaxation, the individual's body and mind are put into a restorative, regenerative state, a very deep form of rest." (Wise, 1995)

The collected information in this section forms a rough picture of energy healing. However, at this time it is not clear how (if) Reiki is different from other systems. The healer creates an energy field through intention and belief that can have an effect on the receiver of the healing which can only work if the receiver of the healing consciously allows for the healer to affect the receiver's energy field. The healer has a profound experience with meditation and can be in a meditative state even in "the normal waking time" like any spiritual master. That is the difference between the normal person and a real healer.

4.4 The Results of the Experiments

After all these definitions and discussions of the background material, the results of the experiments I performed with my husband can be presented and evaluated.

4.4.1 The data collected

Table 4.2 and 4.3 show the information gathered in the experiments. In Table 4.2 temperature measurements in the center of the right hand, collected several times, were performed to find an error margin.

Table 4.2: Temperature measurements to determine a measurement error of the thermometer

Time	Temperature (in °C)
8:40	36.4
8:45	36.5
8:50	36.6
9:00	36.5
9:05	36.4
9:20	36.3
9:35	35.8
9:50	36.0
10:10	35.9
10:20	35.7

The mean temperature was found to be 36.2° C with an error (variation) of 0.5° C. This means that the measurement of the temperature in the hand can deviate by a maximum of 0.5° C. This determines the accuracy of the measurements.

Why was the first experiment with the thermometer (Table 4.2) necessary? There is a general belief that when something is measured that it is always correct. It is not completely correct. Sure, my hands have a certain temperature at a certain time of day, depending on the stress level and the temperature of the environment. However, when using the thermometer to measure this hand temperature I might have sweaty at one time or dry hands or hold the thermometer a bit differently each day. Consequently, the data I take differs a bit. The data in Table 4.2 above shows how the temperature fluctuates within about 2 hours where I just try to stay focused on one thing (like writing) while sitting down in a chair (and not moving). I will take this into consideration with the following main series of experiments.

The data collected for Table 4.3 include the date of the treatment, the length of the preparation time (listening to the music), what brain wave state was selected for the session, the strength of Reiki flow from the right hand (Rate – estimated between 1 and 10), and the temperature measured in the center of the right hand before (B) and after (A) the Reiki treatment. For each particular Reiki session, as a preparation, I let myself adjust to a certain brain state: not relaxed, like watching TV; relaxed without music; relaxed in Alpha state; relaxed in Theta state, relaxed in Delta state. The “TV state” should form a baseline, where I do not prepare to give Reiki and let myself be distracted. Here, the TV was just running to create noisy background. In this state I also did not set the intention to do Reiki.

Table 4.3: Results of Reiki experiments including parameters

Date	Temperature Before After (in °C)	No Reiki (with TV)	Reiki (w/o TV)	Reiki with α (min)	Reiki with θ (min)	Reiki with δ (min)	Rate 1-10	Comments
2-17-17 10:40 a	B: 34.2 A: 36.6	X					6; 4	J: local Me: nervous
2-18-17 10:30 a	B: 35.3 A: 35.6	X					6	J: feel the energy all over LK
2-18-17 5.25 p	B: 34.5 A: 35.7			X (50)			5	J: local Me: relaxed LK
2-19-17 11:00 a	B: 35.3 A: 36.0	X					5	J: energy moved to ankle Me: nervous RK
2-20-17 6:40 p	B: 35.5 A: 36.5			X (10)			5	Me: imagine flow, connection LK
2-21-17 7:00 p	B: 34.9 A: 36.3	X					5	RK
2-22-17 8:00 a	B: 35.2 A: 36.4	X					6	Me: nervous Both knees from now on
2-23-17 8:00 a	B: 35.4 A: 36.4		X				6	J: 1-2 jolts Me: not feeling good, did not feel jolts from my hands
3-12-17 8:00 p	B: 35.0 A: 36.1	X					8	Me: was very before busy Reiki
3-15-17 9:00 p	B: 36.6 A: 36.4	X					8	Me: stressed, exercise for 4h before Reiki to calm down
3-18-17 9:30 p	B: 35.7 A: 36.1		X				8	Me: 1 h meditation before
3-20-17 9:00 p	B: 36.6 A: 36.8*		X				8	J: energy moved to ankle and hip
3-26-17 1:00 p	B: 36.7 A: 36.4*					X (5)	7	J: energy feels very sedative, relaxed
4-1-17 8:00 p	B: 35.7 A: 35.8					X (5)	8	J: jolt as well several times Me: 30 min meditation before; experienced several jolts
4-2-17 10:00 p	B: 36.0 A: 36.3		X				9	J: energy move up to chest, very warm
4-4-17 9:00 p	B: 35.9 A: 36.0				X (5)		8	J: energy feels very sedative, relaxed Me: when relaxed I can feel connection to intuition
4-6-17 8:30 p	B: 36.3 A: 36.2					X (5)	8	J: energy feels strong and relaxing Me: no meditation before, I feel a connection
4-7-17 9:00 p	B: 36.2 A: 36.1					X (30)	8	J: energy feels relaxing, Me: stressed, listened to Delta music for more than 30 min before Reiki
4-21-17 9:00 p	B: 36.9 A: 36.8*				X (5)		8	J: energy feels relaxing

Comment to Table 4.3: *very warm in the house (77° F and above)

Finally, I collected some weather data from the internet to find out if the general raise in temperature in my hands was related to an increase in outside temperature.

Table 4.4: Historic Weather data - highest temperature of the day (in °C)

Date	Outside Temperature (in °C)	Date	Outside Temperature (in °C)	Date	Outside Temperature (in °C)
2-17-17	16	3-12-17	18	4-1-17	29
2-18-17	21	3-15-17	16	4-2-17	27
2-19-17	27	3-18-17	28	4-4-17	31
2-20-17	28	3-20-17	28	4-6-17	23
2-21-17	23	3-26-17	29	4-7-17	24
2-22-17	25			4-21-17	31
2-23-17	27				

Comment to Table 4.4: The temperatures are given in °C instead of °F (which is typical for the U.S.), because the temperature measurements (Table 4.2 and 4.3 above) were carried out using a German thermometer with °C scale.

As an example: 16°C is about 61°F or 31°C is about 88°F.

4.4.2 What the Results mean

The data presented in Tables 4.2 to 4.4 suggest the following conclusions of the experiments:

- There is a trend of the temperature in my hands that parallels the increasing outside temperature between February and April 2017. In several cases, the temperature in my hands increased by about 1°C after the Reiki session. However, I was already hot (e.g. from hot weather or workout) the temperature in my hands did not increase anymore, with 37.0 °C being the limit. This means that the temperature does not always increase due to Reiki because the hands cannot be warmer than the body.
- There is an increase in the rating of the Reiki intensity from 6 to 8. This could mean that the intensity of the Reiki increased constantly. I do not believe that this is correct. This increase is too fast compared to my personal development.
- Concentrating on channeling or trying hard does not improve the quality of the Reiki energy but makes me rather stressed and tired. This statement shows that relaxation is the key to improving the quality of Reiki, not stress.
- BNB music with Alpha does not have an effect on the quality of the Reiki treatment. The meditation is not deep enough or I cannot get reduce the Beta waves in this state well enough.
- BNB music with Theta or Delta does have an effect on the quality of the Reiki energy: it feels more relaxing and helpful to the receiving person. These brain wave frequencies help to get into a much deeper meditative state. And personally I find that BNB music with Theta or Delta does help me to get into a deeper state of relaxation. In this state, I can get in touch with my intuition better.

4.4.3 Answering the questions from the Introduction

- Is meditation necessary for Reiki?

As discussed in section 4.3, the answer to this question is “yes”; meditation is a basic component of Reiki.

- What effect has brainwave entrainment music on meditation?

The research listed above could find few cases of confirmation that brainwave entrainment has an effect on meditation. Personally, brainwave entrainment does have an effect on my meditation. It helps me to access a deep state of meditation faster, compared to not using brainwave entrainment music.

- Does Reiki have “flavors”?

The comments my husband gave for different Reiki sessions were, “energy moving to so and so” and “very relaxing”. These metaphors could qualify as “flavors”. These comments are also highly subjective and not necessarily the result of my initial state. Therefore, I use this idea as a working theory.

- Does brainwave entrainment music have an effect on a Reiki treatment?

As the results from table 4.3 indicate, the answer is yes, the brainwave entrainment music with Theta and Delta frequencies changed my own perception and my husband’s feelings during the Reiki sessions. The flavor of the Reiki changed to “relaxing” for my husband when I was in a deep meditative state. In this manner, brainwave entrainment helped me get into the meditative state faster. Therefore, it improved my Reiki.

5 Discussion

Following my instincts in this matter, such as taking the time to read the necessary books as background, and taking the time to meditate on the whole subject until it felt completed, helped me immensely to grow more confident in my abilities. Moreover, what I learned about the research that has been done on energy healing (by Schwartz and Oschman for example) confirms my view that the metaphysics community needs to make more of an effort to understand the sciences (i.e. physics, biology, chemistry). Energy healers and researchers in the metaphysics community can only be taken seriously by scientists if they a) speak a language that everybody can understand and is clear about concepts and definitions, and b) understand the concepts that are known in science (even if these concepts need improvement). It is not that the “scientists” are all right or all knowing. They resist change as much as possible. We need more change in the world of science to make energy healing “provable”.

On a personal level, I learned from this project that my “problems” with Reiki are related to my lack of practice of meditation. As shown by the experiments, if I can get over the “Beta hump”, I seem better able to synchronize my field. This means that if I can reduce the high frequency brain waves that are related to alertness and stress, I can get into the meditative state

more easily. Therefore, my personal outlook is to keep practicing meditation on a daily basis to change from a stressed mind to a state of peace and calm.

6 Conclusion

The subject presented here is quite complex. Starting from the different background information of the two topics, i.e. brainwave entrainment and Reiki, and reaching a point of synthesis with the concept of meditation. It was discussed that brainwave entrainment, known and used with drums for thousands of years, is an effective way to synchronize the brain.

The system of Reiki, on the other hand, is based on meditation with the hands-on healing being mainly a tool in the process of pursuing enlightenment. The process of healing can be explained as, the receiver of the healing is adjusting her/his energy field to the pure synchronized energy field of the healer. In order for the healing to work, intention and belief from both the healer and the receiver of the healing is required. Intention and belief are important factors in the process of alignment of the two people involved in the healing process. One aspect of this process that can be supported by research is that the person being healed also changes his/her brain wave pattern. Another aspect, with regards to intention, is that the well-being of the healer is mandatory for healing to occur. The experiments showed the direct effect of Theta brainwave entrainment music on the Reiki healing practice, because a more relaxed field was created which could be felt by the person being treated.

This means that brainwave entrainment music can help the healer to create the energy field of a certain frequency faster than without the use of such a tool. This is because the entrainment created by the healer depends on the level of meditation/synchronization that the healer can achieve. The summary of this information supports the thesis statement that brainwave entrainment music can help the Reiki practitioner/novice to deepen the meditative process and improve the quality of the Reiki energy channeled for a treatment.

This project left several questions unanswered. For example, how long does a person needs to meditate until the effect sets in? What frequency for the BNB music is most effective?

Further research of these questions could be quite exciting; for example, using the SQUID machine (see Schwartz, 2007) to determine an effect in the magnetic field of the (Reiki) healer. A set of BNB frequencies between 2 and 15 Hz (Delta, to Beta) could provide the basis. The hypothesis could be: 'for Reiki to show an effect on the magnetic field (SQUID machine) the practitioner needs to be in resonance with a certain frequency'. Maybe the Schumann resonance (7.8 Hz) does have a significant response compared to other frequencies.

Since, the healer has a measurable effect on the receiver the brainwave state of the healer is responsible for this effect. What is the best brainwave state for the healer? According to A. Wise it is the Awakened Mind, which is a specific synthesis of Beta, Alpha, Theta and Delta waves. Moreover, healing is all about intention and dedication! What is the most profound intention? It is love.

'All we need is love.'

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