

Meditation

Part 2 of 6

Health, Wellness, and the Science of Meditation

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Session #2 Agenda

Today's topic:

- Health, Wellness, and the Science of Meditation

Agenda:

- Health and Wellness
- The Science of Meditation
- Meditation Practice

Reasons for Meditating

Health

- Treatment of disease or mitigation of the symptoms of injury or disease

Wellness

- Prevention of disease, dealing with stress, and improving quality of life

Awakening

- Achieving deeper levels of consciousness and oneness with the universe

Reminder: Two Types of Meditation

1. Samadhi –

- Desired Result: “calmness”
- Approach: turn *away* from thoughts and the senses
- Focus on: breath or other object

1. Vipassana –

- Desired Result: “mindfulness”
- Approach: turn *toward* thoughts and senses
- Focus on: a positive or troubling thought or emotion

Samadhi is usually the starting point for Vipassana practice.

Health From Meditation

Health refers to the treatment of disease

- The Mayo Clinic web site* says:
 - “While a growing body of scientific research supports the health benefits of meditation, some researchers believe it's not yet possible to draw conclusions about the possible benefits of meditation.
 - With that in mind, some research suggests that meditation may help such conditions as” (those on the following page).

<https://www.mayoclinic.org/tests-procedures/meditation/in-depth/meditation/art-20045858>

Health From Meditation (continued)

- **Health** “...research suggests that meditation may help such conditions as:
 - Anxiety*
 - Asthma
 - Cancer
 - Chronic pain
 - Depression
 - Heart disease
 - High blood pressure*
 - Irritable bowel syndrome
 - Sleep problems*
 - Tension headaches”
- I have highlighted (*) three items. Some of my students have reported significant improvement in these.

<https://www.mayoclinic.org/tests-procedures/meditation/in-depth/meditation/art-20045858>

Wellness From Meditation

Wellness refers to improved quality of life

- Among the well described benefits are:
 - Calmness is achieved
 - Stress levels are reduced
 - Resilience is increased
 - Life seems in better balance

And, according to a number of studies, including Harvard's:

- People who meditate are *happier*

Science fo Meditation: How the Brains Works

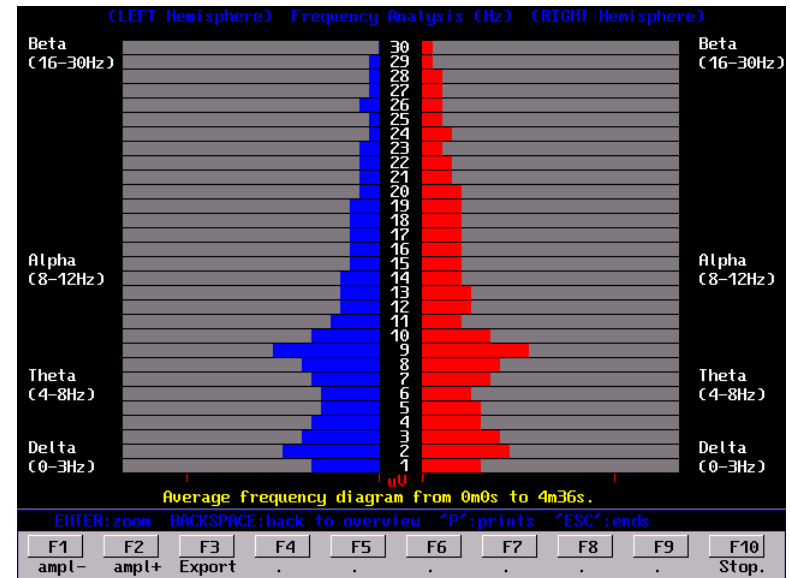
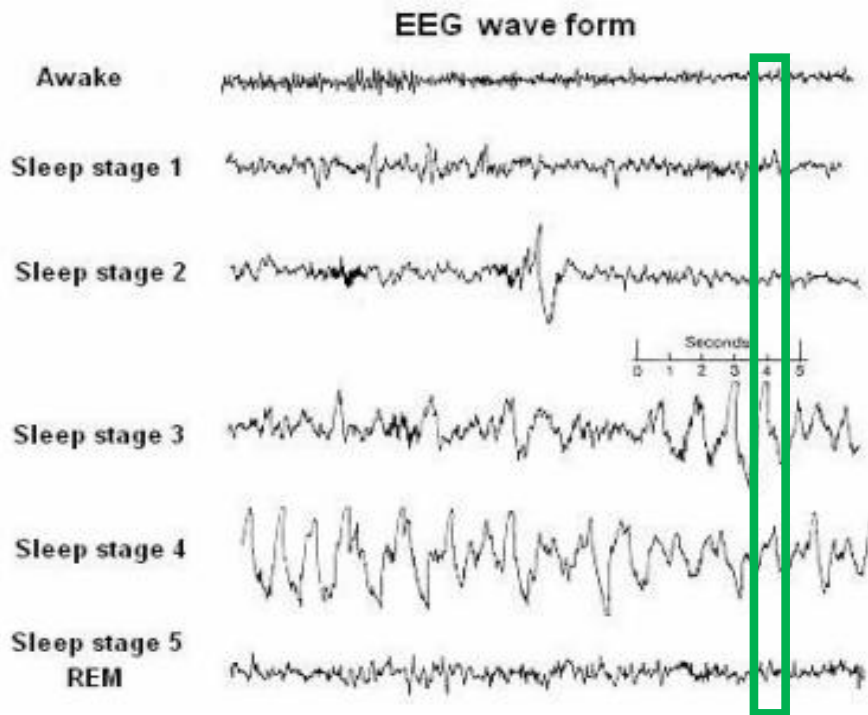
- Electrical signals are produced by the brain.
 - The signals come in a constantly changing stream.
- The signals are observed in:
 - Frequency ranges (tones)
 - Amplitude (signal strength)
- Meditation:
 - Lowers the frequencies.
 - Changes brain wiring.



Brain Science: Electroencephalogram

Below is a brain wave plot from an electroencephalogram (EEG)

- Each line is a different frequency.
- Height of plot shows amplitude (strength).
- The green rectangle highlights a single instance in time.



Above is a display of brain waves at an instant in time.

- This amplitude view is rotated 90 degrees from the EEG amplitude plot.
- Blue is the left brain and red is the right brain

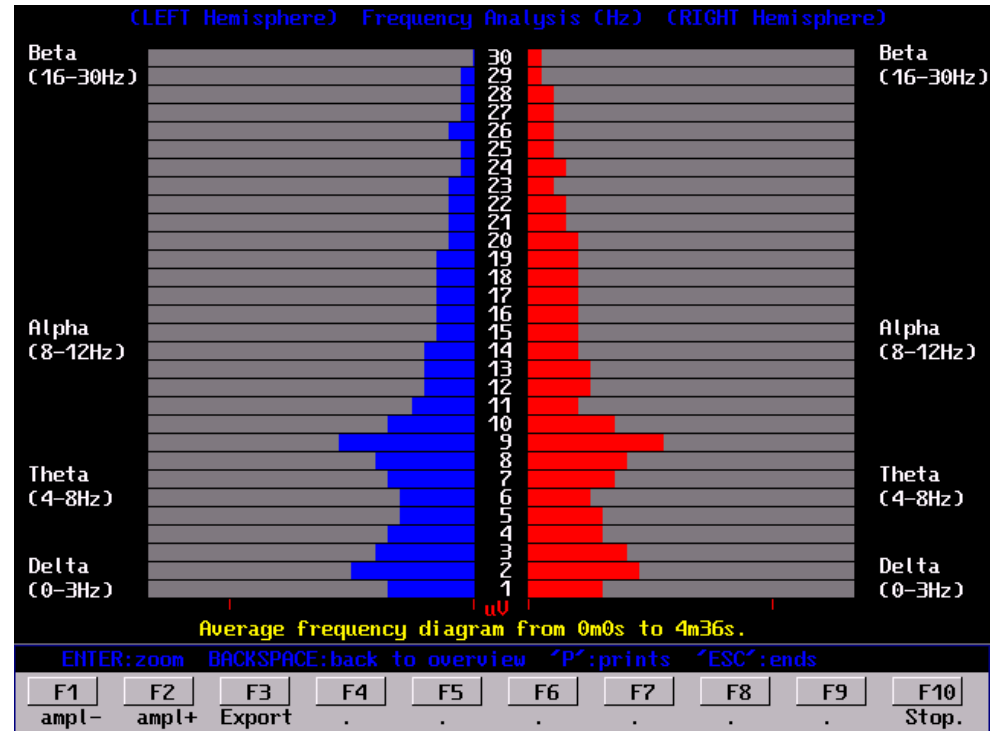
Brain Science: Frequency Bands in Meditation

The Four frequency bands:

- Beta (13-38 Hz)
- Alpha (8-12 Hz)
- Theta (4-8 Hz)
- Delta (0-3 Hz)

In the example, high amplitudes are:

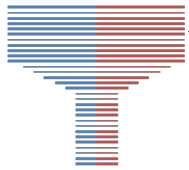
- 9 Hz (low Alpha)
- 2 Hz, (middle Delta)
- Blue is the left brain and red is the right brain



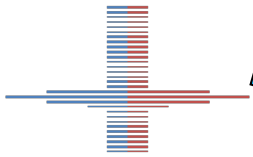
Above is an amplitude display, by frequency, of a subject's brain waves in an instant

Frequency Bands Descriptions

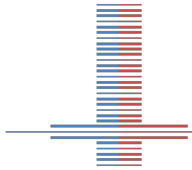
Brain frequency patterns describe specific types of activity:



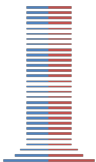
← **BETA - The *conscious* mind** thinking with external awareness (38-13 hz.) where we logically think, reason, plan and act. Spans from high anxiety (38 hz.) to finding flow (around 13 hz.)



← **ALPHA - The *relaxed, detached* mind** (12-9 hz.) lacking focus, laid back, “surfer dude” behavior. Not doing. This state is required as a bridge to access Theta.



← **THETA - The *subconscious* mind** (8-4 hz.) where we access our memories, insights, and creativity. This same frequency pattern is present when sleeping during REM, dream sleep.



← **DELTA - The *personal unconscious*** (3-0 hz.) heightened sensing, intuitive or psychic knowledge. Frequency of shaman, healers, and the enlightened. Also accessed in deep dreamless sleep.

<http://www.brainwavetraining.com/brainwave.htm>

* Frequency ranges adjusted to reflect data from The Art and Science of Meditation, John Lowan 2005

Frequency Bands and Meditation

Wave	Frequency	Mental State	Meditation State
Beta - high	31-38 Hz	Aroused mind – anxiety, panic	none
Beta - medium	15-30 Hz	Active mind – normal waking state: working, socializing, etc.	none
Beta - low	13-14 Hz	Focused mind –attentive state, “flow”	Release senses, quiet interruptions, 1 st Jhana
Alpha	9-12 Hz	Relaxed mind – passive, pleasant, calm	Release thoughts, achieve "rapture", 2 nd Jhana
Theta	4-8 Hz	Creative subconscious mind – visualizing, resolving <i>Asleep: Dreaming, REM</i>	Engage dreams & creativity, achieve "bliss", 3 rd Jhana
Delta	0-3 Hz	Resting mind – sensing, healing <i>Asleep: Deep Sleep</i>	Sense oneness & equanimity, achieve awakening, 4 th Jhana

Brain frequencies and amplitudes are always changing.

EEGs continuously read changes in the brain activity.

- Amplitudes shift constantly:
 - Both within a given frequency.
 - And up and down the frequency bands.
- The shifts occur fast:
 - At the speed of thought.

Meditation focused the brain activity.

- And lowers the frequency, bringing calmness

So, Why Does Meditation work

- The "Default Mode Network" (wandering mind) is a function of the brain evolved to protect us from danger.
 - It has three mental states:
 - **Positive (happy), 2. neutral, 3. negative (sad/fearful)**
- Meditation shuts down the "Default Mode Network".
 - Samadhi does this by calming the entire Network*
 - 2/3 of your time is not negative or neutral, and wellness improves.
 - Vipassana does this by actively focusing on a positive state, or on reducing a negative state.
- A Yale study** confirmed this
 - Practitioners already happier from the other wellness effects, are also happier from the reduced operation of the "Default Mode Network".

* "Default Mode Network" is commonly overactive in depressed people.

**Dr. Judson Brewer, Medical Director, Yale Univ., on MPR 2012-05

Meditation Practice

- We will meditate for 6 minutes
- 1 gong will sound every 2 minutes
- 3 gongs will signal the end of the meditation

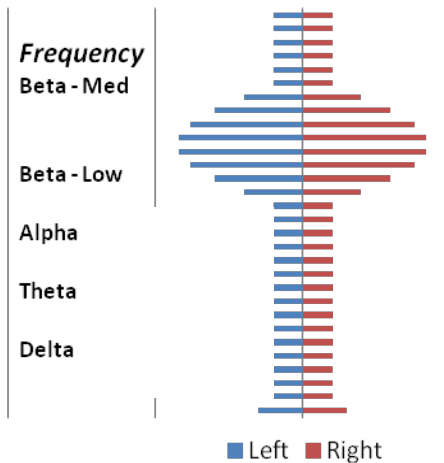
How We Will Meditate

- Align your posture and sit comfortably relaxed
- Breathe through your nose
- Use diaphragmatic breathing (Belly out with inhale / belly in with exhale)
- Observe only the present moment (Not the past, not the future)
- Focus on your breathing
 - Observe your breathing: air in/out, shallow/deep, long/short, belly out/in, etc.
- When thoughts jump into your mind:
 1. Name them silently (acknowledge they exist)
 2. Let them go (release them from your thinking)
 3. Return your focus to your breath
- This means:
 - Do not hold onto *any* thought (positive or negative)
 - Do not value or judge any thought
 - Do not judge your meditation practice or yourself

Meditative States (part 0)

*What you see on
brain wave plot:*

Non-Meditating Mind



The Non-Meditating Mind

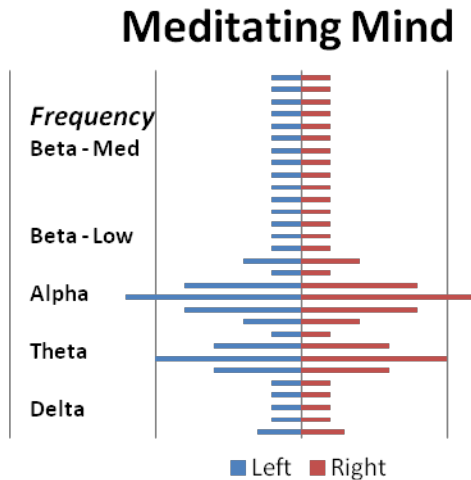
- The normal pattern of the *activity and external awareness* of beta, defines the non-meditating mind.
- the Non-Meditating Mind is fully engaged in the awareness of day to day activities and work.
- There is no ready access to creativity and insights of the meditative mind (little likelihood of "aha!" ideas, solutions and self-actualization.
- ***This is normal for the most people most of the time.***

Meditative States (part 1)

The Meditating Mind - *Our immediate goal!*

- The combination of Alpha and Theta brainwaves frequencies defines *meditating mind*.
- In this meditative state, beta is quiet.
- The mellow Alpha “bridge” is open.
- Theta is accessed. Memories, insights, creativity, and spiritual awareness are available
- Delta is quiet, but, can be accessed from Theta.
- *Calmness is achieved*

What you see on
brain wave plot:

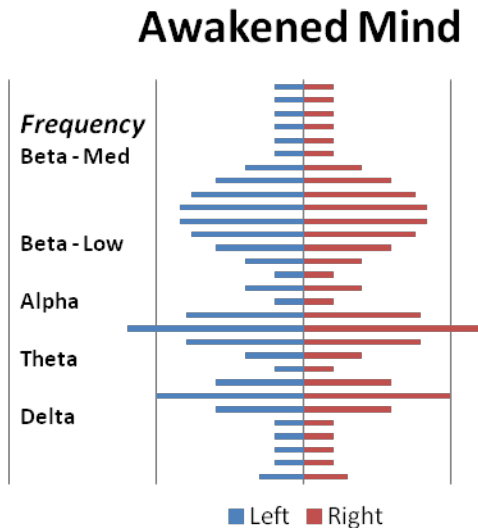


The goal of meditation is to achieve the focused awareness and sustained attention, enabling practitioners to achieve calmness required for higher states of awareness.

Meditative States (part 2)

The Awakened Mind - *A Long Term Goal.*

What you see on brain wave plot:

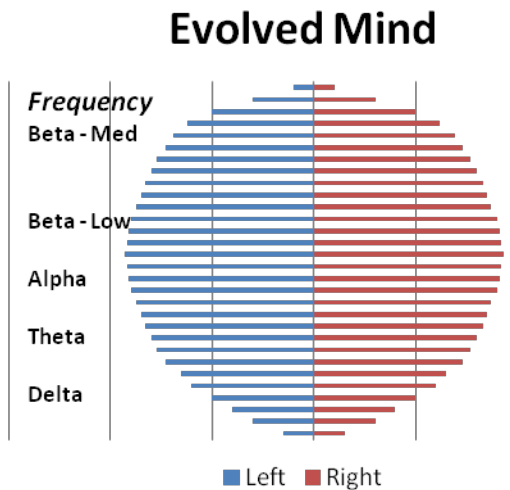


- The meditation pattern, along with the *external awareness* of Beta, defines the *awakened* mind.
- the awakened mind is a combination of inner and outer awareness, with a free flow of information between the frequency ranges of the brain.
- Ready access to Theta creativity and insights makes the awakened mind capable of "aha!" experiences of ideas, solutions and self-actualization.
- For the awakened mind, introspection is a way of life.
- *Awareness is achieved*

The goal of awakened meditation is to enable practitioners to achieve higher states of awareness and insight, all the time, and in everyday life. *Sometimes right away, more often after disciplined practice, the awakened awareness of meditation generalizes into ordinary life.*

Meditative States (part 3)

*What you see on
brain wave plot:*



The Evolved Mind - *What Experts Achieve*

- The *evolved* mind shows up as a circle of high-amplitude brainwaves. Frequency “gaps” disappear. Yes, it actually looks like this on an EEG brain monitor.
- Beta and alpha merge, with delta lifting up into theta as what was unconscious becomes conscious.
- However briefly, all blocks and boundaries disappear in this open flow of awareness, both within self and as delta's personal unconscious merges with the Collective Unconscious and the meditator experiences joy, bliss, pure awareness, and union with all of reality.
- *If Awakening exists, it is achieved from this state.*

The goal of evolved meditation is to enable practitioners to achieve transcendent enlightenment and union with all reality ... nibbana. *The experienced meditator experiences intense sensations of light at the crown of the head ... bringing higher perspectives and self-realization.*

Lesh Scale

Lesh Number	Subjective correlates of state	EEG Brain-wave Monitor
0	Just beginning to relax. Subject may report difficulty in stilling the mind; the itchy state. Why am I doing this?	Intermittent Alpha and Beta.
1	You may find yourself filling your mind with everyday affairs, almost as an avoidance of meditation; (the fear of the mind to let go from time to space). Subjects have reported feeling dizzy or having befogged consciousness or sensation like going under an anesthetic.	Reduced Beta, continuous Alpha.
2	Calmness and relaxation; childhood or other scenes from the past recalled as 'flashbacks'. Focus may not be very sustained.	Continuous Alpha, no Beta, intermittent Theta.
3	Well defined state. Pleasant bodily sensations of floating lightness, rocking, swaying (may actually move rhythmically). More sustained focus than prior level. Increased and clearer imagery.	Continuous Alpha, but with falling frequency, almost continuous Theta.
4	Extremely vivid awareness of your other bodily sensations; heartbeat, breathing, etc. Effortless awareness of this moment. Sometimes a sensation of 'being full of air' or of 'growing to great size' and/or an alternation between internal and external awareness.	Continuous Alpha, continuous Theta falling in frequency (toward 3 Hz range)
5	Very lucid state of consciousness. Deeply satisfying, intense alertness, calmness and detachment. Feeling of alerted state lacking in previous levels. Extreme relaxation. May have peak, "ah-ha", experience.	Continuous Theta, Alpha frequency only at very low end (near 8 Hz).
6	Intuitive insight into old problems. Feeling of higher spiritual awareness. Sensation of surrounding light. Sense of greater universal knowledge. Experience bliss, peace, and enjoy just being.	Very little electrical brain activity except occasional Delta.
7	Feeling of union with the universe. Utter peacefulness. Loss of self.	Occasional Delta

Thank you for joining me in this dharma practice of meditation



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