

Teachers' Guide: Neurosky MindWave Mobile II & Neurosky Sichiray Doc 3



Using the Graph and Meters

1. THE BAR GRAPH. Most of the time, all of the brainwave bars are going at once. Why is that?

Our 80-100 billion neurons all respond according to changes in the voltage that travels through them. Each neuron can generate or transfer up to .04 of a volt (approximately – yet ALL will never get to that level at the same time). A group of neurons in Delta (sleep) have a very low voltage while a group in Gamma are 'spiking' at their full voltage capacity of around .04v. However, for students it is better to describe brainwaves as frequency oscillations or 'different wave patterns from 'slow to fast'. A good site for this is <http://www.brainworksneurotherapy.com/what-are-brainwaves>

Our brains are never fully at rest unless we're dead. The graph tells us how much of a certain brainwave we have compared to others. We would expect someone meditating to have more Delta, Theta and Alpha, while someone dancing to loud music would have more Beta and Gamma.



The example at right indicates someone meditating (Theta). The graph says that the person has more slow Theta waves than any other, yet they still have active Beta and Gamma. Someone meditating efficiently will have less high Beta and low Gamma, but MAY have more high Gamma. Why then, does the Meditation Meter show more 'attention' than 'meditation'? The answer is below in section 2.

Another useful site is <http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001045> While focussed on Gamma, it describes the concepts scientifically yet clearly.

2. THE METERS. How do they correlate to the bar graph?

The two meters of Attention and Meditation are activated by an algorithm – The ATTENTION meter is activated by the right 4 bars of the graph. The MEDITATION meter is activated by the left 4 bars.

However, some brainwaves are less prevalent in activities than others. In meditation, Delta is less prevalent than Theta or Alpha. In Attention, low Beta (light blue) is less prevalent.

Therefore, the algorithm for ATTENTION gives a **lower value** to low Beta **and more value** to the right 3 bars. The algorithm for MEDITATION gives a **higher value** for Theta and Alpha than Delta. This is why in the picture **above**; the person has high Theta, but the Meditation meter is still slightly lower than Attention. If the person would have had a little more Alpha, the meditation meter would be higher.



3. Possible activity (maths stage 5)

1. When a student has the headset on and the bars and meters are working, get one student to take a photograph of the graph and meters.
2. This student shares the photo with everyone or the teacher who projects the image.
3. Students try to work out the algorithm or mathematical formula that is used for either Attention or Meditation. They will need to count the bar segments and calculations will initially be trial and error until they get closer and discover it. The section on '**values**' above is vital to this work and it shows the importance of maths/statistics in psychology and neuroscience.