The Effects of Audio-Visual Entrainment on Cerebral Blood Flow and Improved Reading Ability

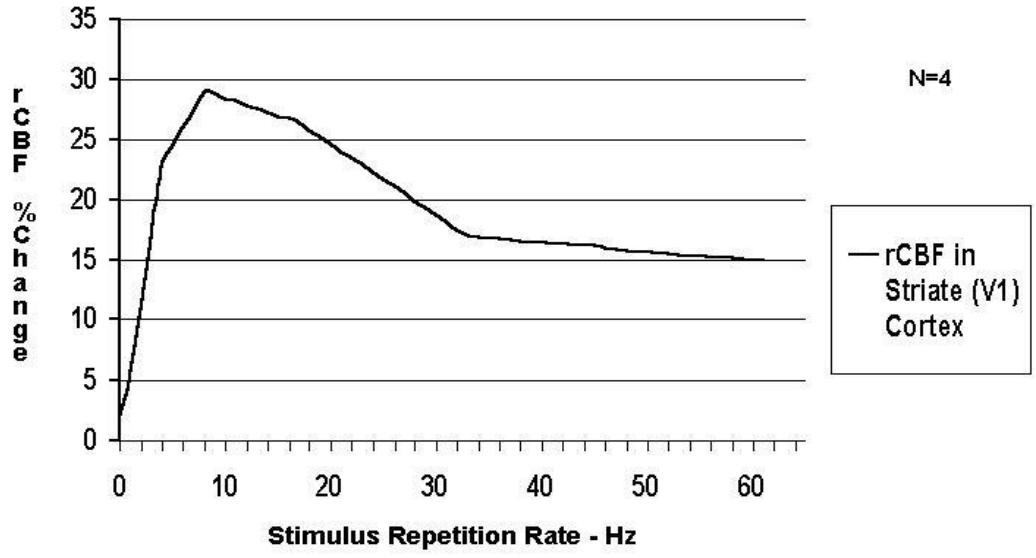
- By Dave Siever, June 2018.

Introduction

Often, when a brain isn't functioning well, it uses less cerebral blood flow (CBF) than normal. This is because the neurons aren't very active and just like lying on the couch, there isn't much need for blood flow until activity begins. Normal CBF is essential for good mental health and function. Measures of CBF show that hypoperfusion of CBF is associated with many forms of mental disorders including anxiety, depression, attentional, and behavioral disorders[1] , and impaired cognitive function[2, 3, 4].

It has been established that the more engaged the brain is from a frequency perspective, such as with suppressed alpha and theta brainwaves and dominant beta brainwaves (high beta/alpha ratio), which are prominent during mental tasks, the greater the CBF[5]. One of the beneficial effects attributed to AVE is that it increases CBF[6, 7, 8]. For example, Figure 1 shows an increase of 28% in CBF within the striate cortex, a primary visual processing area within the occiput and overall brain activity. As an interesting side note, maximal increases in CBF have been shown to occur with stimulation around 7.8 Hz, which is known as the "Schumann Resonance" frequency of the electromagnetic propagation around the earth[9].

Figure 1. AVE Frequency and CBF Effects



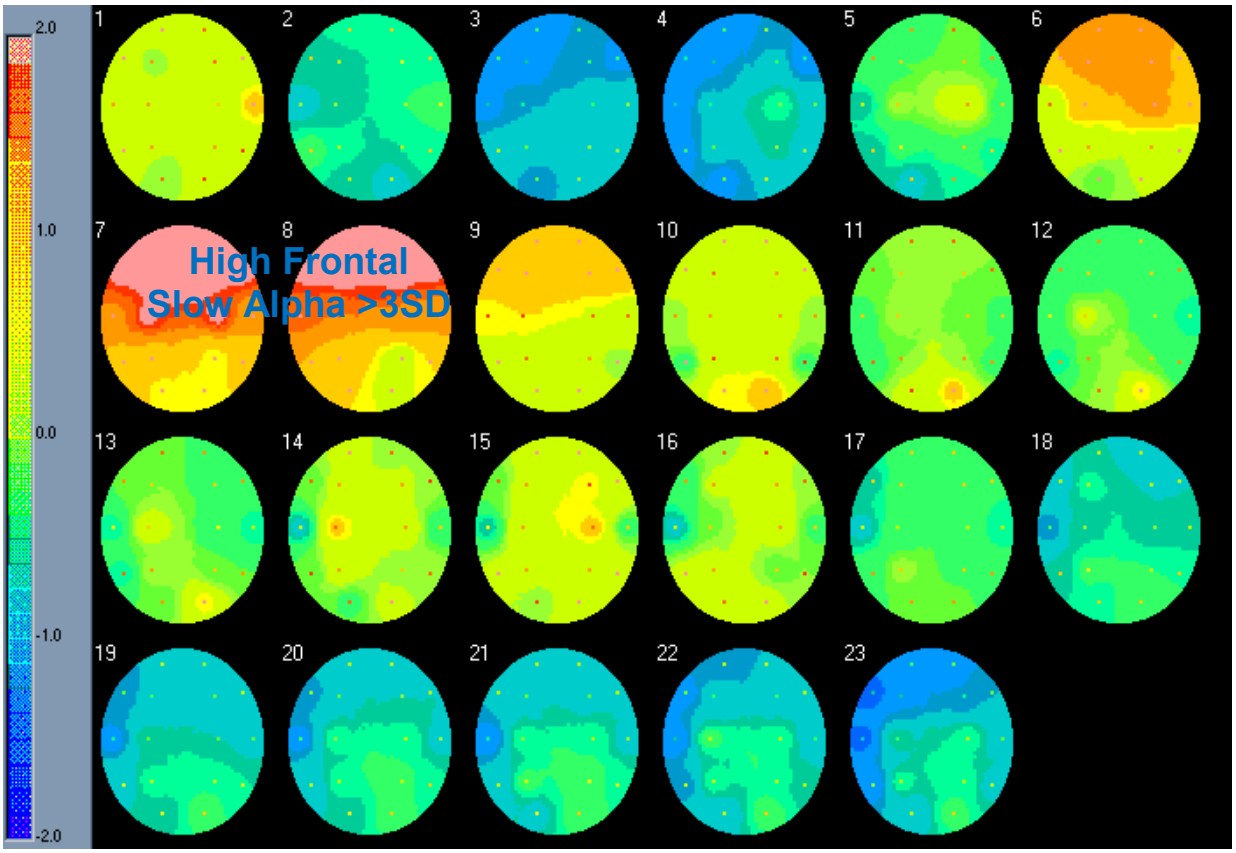
Hershel Toomim developed a brain biofeedback technique called haemoencephalography (HEG), primarily used to treat slow brainwave conditions such as ADHD. HEG consists of a head

band containing an LED and light sensors that is placed over the head with the light and sensor over the forehead. The light is absorbed by blood and oxygen. So, the more oxygenated CBF in the brain, the less light that reaches the sensor. When the LED emitter and sensor are placed over the forehead, it is possible to use this technique to train people with ADHD to increase their CBF and manage their ADHD symptoms, just the same as if directly training the brainwaves as with neurofeedback. This proves that only CBF need be increased to treat a slow brain wave (excess slow theta brain waves and low CBF) condition.

Method

In the following example, we have a failing college student who struggles to focus on reading more than two paragraphs. When looking at her peak brainwave activity (Figure 2), we see that she shows an eyes-closed EEG peak at 7 to 8 Hz. This is very slow, given that normal eyes-closed brainwave activity should be at 10 Hz. Frontal brainwaves that are very slow and high voltage are typical of advanced dementia – and that's why this student was only able to read two paragraphs without fogging out. This is also why she was failing in university and considering dropping out.

Figure 2. QEEG of Struggling College Student Prior to Using AVE

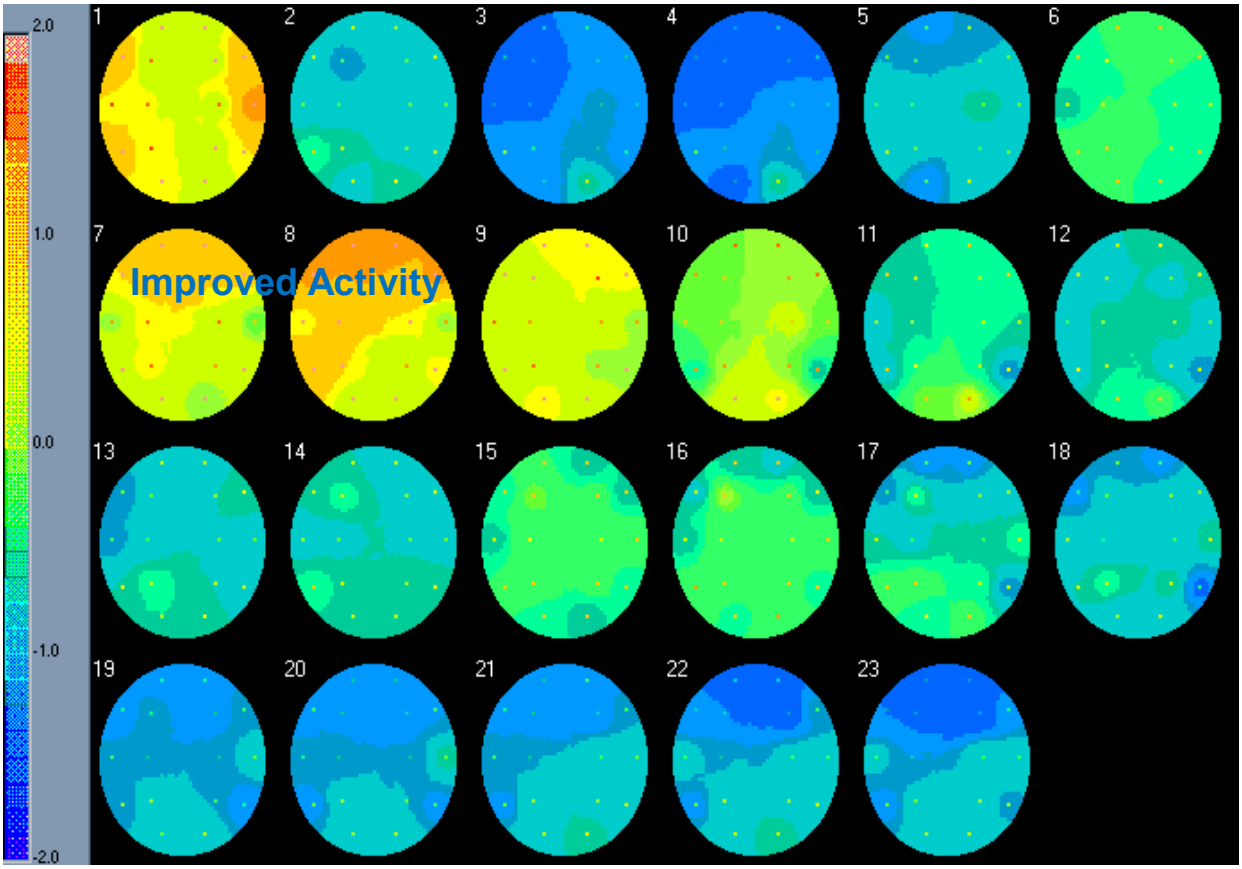


Typically, when using AVE to treat ADHD, frequencies in the beta range are used as it has been shown that the fast frequencies suppress the slow ones associated with poor brain function such as ADHD, dementia and head injuries. But understanding the research by Fox & Raichle, it

was only too tempting to give this student the exact frequency of stimulation that (based on a frequency model) she should not be given – and so we used 7.8 Hz.

When I was watching the EEG, I was excited to see that indeed, this out-of-the-box, counterintuitive approach paid off. The student showed remarkable brain improvements by suppressing the slow brainwaves as shown in Figure 3. She was also able to read a full 10 pages before losing her attention and yes, with the aid of AVE, she was able to stay in college.

Figure 3. Improved qEEG of College Student After Using 30 minutes of 7.8 Hz AVE



Conclusion

The significance of using slower AVE frequencies is that instead of stimulating an already exhausted person to improve their reading ability, the person can be deeply relaxed with alpha-theta AVE and yet have all of the benefits of being neutrally stimulated. Given the dramatic improvements in such a short time, it is likely that alpha AVE will outperform neurofeedback and other stimulatory approaches for improving reading ability. It appears that AVE can be used in a counterintuitive way and still have the benefits of the traditional methods. In fact, Michael Joyce at "A Chance to Grow" in Minneapolis has used slow-frequency AVE on hundreds of special needs children, particularly if they are struggling with trauma-related anxiety.

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