

Activate Your RAS

Words- 1,815

References- 3

Figures- 3

Dr. Raymond L. Hatfield

Asst. Professor - Tusculum College

60 Shiloh Road, Greeneville, Tennessee 37743

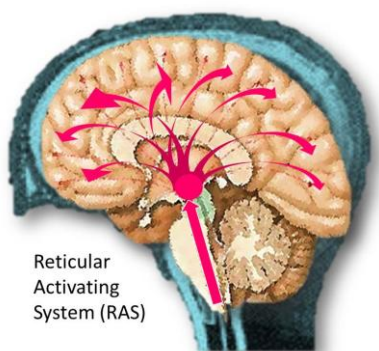
rhatfield@tusculum.edu

Activate Your RAS

Simply understanding and changing the way that an educator addresses his/her teaching style may significantly impact student learning.

By Dr. Raymond Hatfield

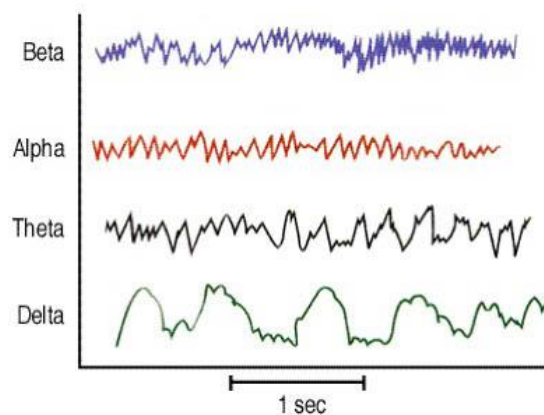
Imagine yourself at a very noisy shopping center where there are people in every direction. The noises of clanking buggies, children running, loud conversations, music in the background, intercom interruptions, and many other distracting sounds that you might expect to hear in such a large and noisy area. Suddenly, you hear a small sound off into the distance that grabs your attention. Your senses become heightened and you close out all other distractions and focus on the voice of a child crying for his/her mother. The power to focus, and to isolate on such a small bit of information is brought about by the reticular activating system (RAS).



The RAS is the autonomic mechanism located in the midbrain that brings relevant information to your attention. The RAS determines what bits of information that get into your active conscious state and conversely those bits of information that are ignored. Determining the state of the RAS can be difficult to measure. However, using scientific measurements such as brainwave frequencies may help determine the emotional state within individuals being studied. The human brain exists within a varying range of electrical frequencies and emotional states. Brain wave frequencies may be categorized as the alert state (Beta 14 - 30 Hz), the relaxed state (Alpha 8 - 13 Hz), the drowsy state (Theta 4 - 7 Hz), or the deep sleep

state (Delta .5 - 3 Hz). The emotional states include fear, anger, sadness and happiness. By understanding the relationship between brain wave frequencies and emotional states, it may be possible to introduce and avoid triggers to change learning behaviors within individuals.

The alert state of mind exists when beta waves are occurring within the brain. Beta waves exist between 14 - 30 Hz. This is when the brain maintains a heightened state of awareness. Things such as visual and auditory acuity are at their highest levels.



Neural pathways in the brain are opened, allowing for a broader communication to all parts of the brain. The alert stage is the optimum time for learning to occur. This heightened state of mind is the ultimate goal of all educators during teaching. Brain wave frequencies above 30 Hz, especially above 40 Hz, induces the type of stress that we do not want and should avoid.

A relaxed state of mind exists when alpha waves are most prominent in the brain. Alpha waves exist between 8 - 13 Hz. This state of mind allows the creative processes to be at their peak. Brain waves in the alpha state are lower than the beta state, which allows a slightly deeper ability for concentration without distractions. This is also an optimum state of mind for reflective or critical thinking. The alpha state of mind facilitates the release of endorphins (pain control) and serotonin (anti depressant), which are important for the reduction of stress. Children diagnosed with Attention Deficit Disorder (ADD) and Attention Deficit Hypertensive Disorder (ADHD) spend most of

their time bouncing between the alpha and theta frequencies (described below).

Children with this problem have difficulty reaching the beta state of mind, which is the desired frequency for focus and learning.

The drowsy state of mind exists when theta waves are present in the brain. Theta waves exist between 4-7 Hz. This meditative state allows the brain to exist between creative activity and the lucid dream state. Usually the drowsy state of mind is a transition from the relaxed state into deep sleep (delta state). The theta state of mind is important because at this frequency Corticoids are suppressed. Cortisol causes aging and places a great amount of stress on the immune system. Additionally, the hormone catecholamine is produced during this state and is essential for learning and memory.

Finally, deep sleep delta waves exists between .5 - 3 Hz. This is a critical time for the human body because it is considered to be a period for growth and repair. During this stage, a cascade of hormones are released which aids in physical growth and myelination. It is a critical time for children and young adults (especially under age 21) to get at least 9 hours of sleep during each day. During deep sleep, large amounts of endorphins are released which have pain-reducing effects that may last for several days.

Fear- The emotional state of students is an important RAS consideration. When the emotion of fear is induced, the RAS reroutes essential brain wave activities to those areas of the brain essential for survival. The RAS has the ability to activate the limbic system in the brain, which evokes fight or flight response mechanisms. During the fight or flight stage, visual and auditory acuity increases, the autonomic system peaks, and the frontal cortex is almost completely shut down. The frontal cortex is the region of the brain where rational decisions are made. Rerouting brain signals away from the frontal

cortex usually results in emotional outbursts, bad judgments, or lack of control. Triggers such as scaring, yelling and making threatening remarks to children will do nothing but shut down the critical learning pathways of the brain. This literal hijacking of the brain may require from 20 minutes to 3 hours of recovery time before the brain returns to a normal learning state. Fear produces emotional displays such as freezing, anger, anxiety or hyperactivity. It may be very common to mistake these emotional displays as seizures, Oppositional Defiant Behaviors and Attention Deficit Disorders.

Anger

Anger is probably the most detrimental emotion to learning. When the anger threshold is reached, rational judgment becomes difficult to control, and language centers in the brain become heightened which may provoke outbursts of yelling. The act of screaming or yelling may also trigger negative emotions of others within earshot. During stressful situations visual acuity is diminished and the autonomic system becomes heightened; this also leads to an increase in the heart rate and respiratory system. Just as in the emotion of fear, the frontal cortex shuts down and diminishes the ability for sound judgment or reasoning. Once the anger or fear threshold is reached, the person may require a recovery period at least 20 minutes to 3 hours to return to normal.

Sadness

Sadness is the emotional state that involves more areas of the brain than does anger. However, the brain has a tendency to freeze. This freezing state usually inhibits visual acuity and has a negative effect on learning. The emotional effect of sadness may be mistaken for a misdiagnosis of seizures within an individual. These are not the typical tonic clonic seizures that are characterized by the jerking and stiffening of the entire

body. They look more like absence seizures in which the individual appears to be staring off into space or daydreaming. If you see someone staring off into space, it may be that he/she is demonstrating the effects of emotional sadness, and not a medical diagnosis of absence seizures.

Happiness

Finally, happiness is the optimum emotional state for learning and is correlated to the beta frequency. Most areas of the brain are electrified, especially the frontal cortex. Remember that the frontal cortex is where reasoning occurs. It should be the goal of the educator to keep students within a happy state of mind as much as possible.

There are many ways to initiate happiness. The simplest and most rewarding way to generate happiness is with a simple smile. Other methods to induce happiness include-making things interesting, using vibrant colors, playing music, movement, happy surprises, and building interest of events through advertising. One example of generating interest (advertising) is the use of a mystery box. The mystery box may be introduced at the beginning of the week and opened at the end of the week. The box is used to mystify and create interest within students.

Another effective method is called the ball toss review. By tossing a ball around the classroom during instructional time, the RAS is forced into an active state that opens the neural pathways to the frontal cortex, allowing learning to occur.



Probably the best classroom activity to use to activate the RAS is an educational strategy called Power Teaching (Biffle, 2013). This strategy has the ability to keep the learning

brain in an active awareness state. Power Teaching creates interactions between the educator and student, which provides constant stimulation to the RAS. This strategy meets all of the criteria to keep the brain within the Beta state, which is the optimum state of mind for learning to occur.

Another recommendation for reducing the hijacking of the brain with a negative emotional state is to write down (journal writing) feelings before an event that requires mental acuity. For instance, before taking a test or before a job interview, write down positive statements on how you will overcome the fear of the event and perform flawlessly on the task at hand. Use pen and paper. Other forms of communication may not work as well.

In conclusion, causing sadness, fear or anger within the mind discourages learning. For instance, if someone is fearful or angry, the RAS shuts down neural activity to the frontal cortex. The initial act of fear releases a cascade of inhibitory neurotransmitters such as dopamine, serotonin, and nor epinephrine into the brain; therefore, inhibiting neural activity. All other parts of the brain that enhance the fight-or-flight response becomes heightened. Because this heightened state of awareness, and the diminished communication with the frontal cortex, the reasoning or thinking portions of the brain are greatly reduced. After the hijacking event occurs, chemical enzymes such as monoamine oxidase are released into the brain to break down the inhibitory neurotransmitters. Over an extended time (up to three hours) these enzymes break down the inhibitory neurotransmitters allowing the brain to begin functioning normally. During the resolution period learning and retention are very difficult to achieve.

The goal of this article is to positively promote a positive emotional state within students. When brain waves exist within the beta frequency and the student is happy, the potential for learning may be dramatically increased. Engaging and keeping students in a positive state of mind should be the ultimate consideration for educators when teaching. Understanding some of the idiosyncrasies of the human brain, avoiding negative triggers, and inducing the human brain into a positive state of mind should lead to many successful learning experiences.

References

"The Brain & the Mind." *Psychology* Volume 2. 2002: 97.

"The Brain & the Mind." *Psychology* Volume 1. 2002: 117.

Biffle, Chris. "Whole Brain Teaching." *Teaching Challenging Students*. Web. 31 Mar. 2013.