

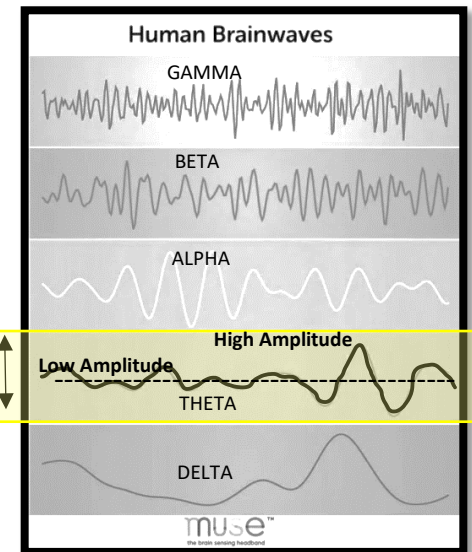
Braindrops:™ An Approach Promoting Self-Regulation

The concept of Braindrops™ provides a way to understand and gain mastery over what is happening in our brains and bodies. This is an overview of the science behind Braindrops,™ followed by ways to teach and apply it.

THE NEUROSCIENCE:

As brain cells, also called **neurons**, pass information to one another in the brain, electrical impulses are created. Together these electrical charges create a wave pattern. We call these patterns brainwaves. The frequency of brainwaves is measured in Hertz (Hz) and indicates how many times neurons are firing and resting per second, also called oscillations. These oscillations range from very fast to very slow and change based on what we are doing and how we are feeling.

Another way to measure brainwaves is by amplitude. If we were to dissect the waves horizontally with a line, the amplitude is the distance from the line to the top and/or bottom of the wave. The more neurons that are involved in communicating, the higher the amplitude. Another way to say this is the higher the amplitude, the louder it is, or the more energy it is carrying.



Types of Brain Waves

GAMMA - Approximately 32-100 Hz

Spirituality and Altruism: Heightened perception and senses, learning, problem solving tasks, cognitive processing. This is considered a peak mental state when there is **simultaneous processing of information from different parts of the brain**. Gamma waves are present during REM sleep and visualization.

BETA – Approximately 13-32 Hz

Focus and Drive: Awake, alert consciousness, thinking, excitement, long term memory retention. Ultra-alert beta waves keep us feeling **ready to go and ready to get things done**. When these have a dominant presence, we might feel **hyperactive** as neurons are firing faster to process information better and keep up with what is happening in our environment.

ALPHA - Approximately 8-13 Hz

Free Flowing Thought: Physically and mentally relaxed. Alpha is a state of **relaxed, alertness**. A state in which we can access creativity and different ways to solve problems. Alpha waves aid overall mental coordination, calmness, alertness, mind and body integration, and learning as they are involved in consolidation. Alpha waves are dominant during repetitive tasks that do not require focus but do require low conscious effort.

THETA Approximately 4-8 Hz

Shifting Consciousness: Creativity, insight, deep meditation, dreaming, reduced consciousness. Theta reflects the state between wakefulness and sleep and is associated with the subconscious mind. In a theta state you may have a **flow of good ideas while feeling dissociative** when involved in tasks that take no conscious thought.

DELTA Approximately 0.5-4 Hz

Healing State: Deep (dreamless) sleep, loss of bodily awareness, repair. It is in these moments that the parasympathetic nervous system is active in **healing our bodies** while we sleep. While Delta waves are dominant all awareness of the outside world is suspended.

The brain typically has multiple types of waves present at any given time. Our brain does not stop producing one type of brain wave when we shift into a different state of consciousness or alertness. **However, nervous system activation, and our actions, emotions, and thoughts, are reflected in what wave is dominantly present.** We are also impacted by where in the brain the waves are occurring, and if they are present in high or low levels.

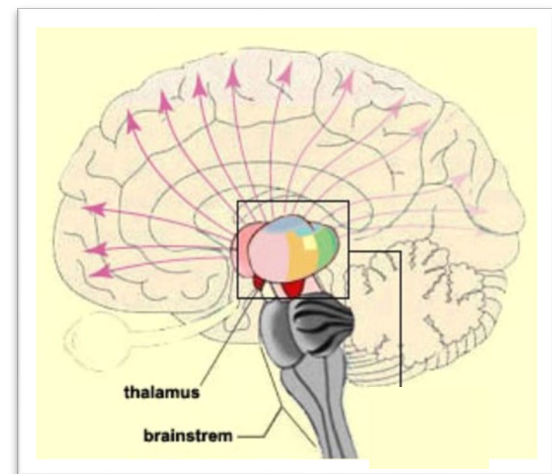
Certain frequencies of brainwaves are inhibitory while others are excitatory. Gamma and beta waves are dominant when our sympathetic nervous system is activated, and alpha, theta and delta waves are dominant when our para-sympathetic system is in charge.

“Synergetic means systems in transformation. It refers to multiple systems coming together to create a ‘synergy’ that each individual system could not have created on its own” (Dion, 2008). We are going to explore the synergy within and among our brains, nervous systems, hearts, and bodies, so we can understand the far-reaching implications of the Braindrops™ approach.

More information on Alpha and Gamma Waves:

Most internal sensory information moves from the thalamus to the cortex. According to neurofeedback researchers, alpha waves are the mechanism by which the sensory gate to the cortex is closed. **This suggests that alpha waves can impact our ability to modulate sensory input.** This is akin to putting on the brakes for incoming sensory input when it is perceived as too much.

Neuroscientists believe that **gamma waves can link information from all parts of the brain.** The gamma wave originates in the thalamus and sweeps from the front to the back of the brain 40 times per second. These oscillations provide a “context” for conscious perception 40 times per second. However, there is another set of oscillations going on at the same time. This 2nd set of oscillations connects the thalamus to specialized areas in the cortex and helps bind the various attributes of a single object. “Broadly speaking, neurons that are active at the same time are believed to be ‘perceiving the same thing.’ In technical terms, this approach is based on the temporal synchronization of neuronal activity” (Canadian Institutes of Health Research).



More simply put, **alpha and gamma waves help the thalamus and the cortex work together effectively creating coherence and synchronization across the brain, while having a regulatory impact on the system.**

In discussing these brain sweeps, Dan Siegel (2018) says that we can change the sweep ratio. This statement is referring to being able to intentionally become aware of something. This is the ability to shift our energy and attention to bring focal awareness to something, rather than remain in a state of open awareness. He says that when we do this, the act of being aware is linked to awareness of something specific. In other words, there is a linking of previously differentiated experiences, and with it, an opportunity to control how much attention we pay to each.

Heartrates, the Nervous System, and the Brain:

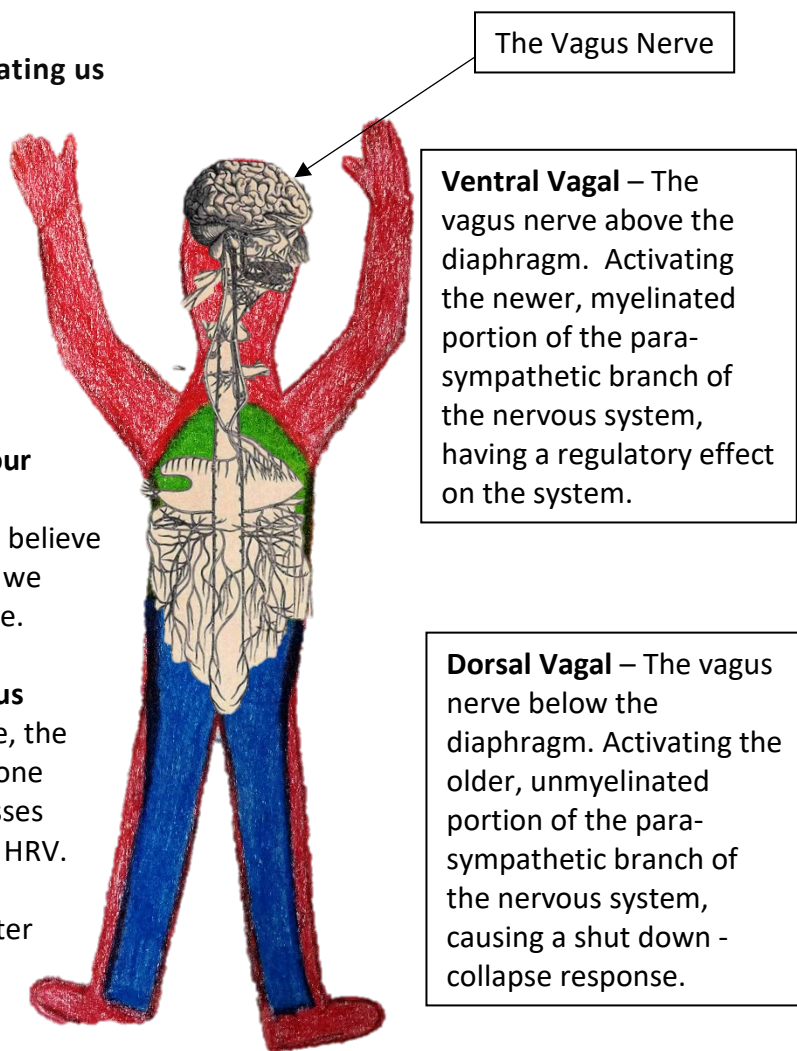
Heartrate variability (HRV) can be a good indicator of resilience and adaptability. HRV measures the rate of change of your heart beat over time. Every time you breathe in, your heart beats faster to speed the flow of oxygenated blood around your body. When you breathe out, your heartrate slows. Additionally, both branches of your nervous system send information to your heart. The sympathetic branch tells your heart to beat faster, and the para-sympathetic tells it to beat slower. **HRV measures the balance between the para-sympathetic and sympathetic systems.** A lower HRV indicates that your body is not adapting to or recovering well from stress. A higher HRV indicates that your body is resilient, and able to bounce back from stress quickly. Your heart is responding to both branches rather than being dominated by one and being stuck in a more static state. **This means the system is working well together and can adapt and recover from stress.**

This variability is one of many things regulated by the vagus nerve (the 10th cranial nerve). The vagus nerve activates the parasympathetic nervous system and is operating when you breathe out, but suppressed when you breathe in.

The vagus nerve plays a critical role in down-regulating us and helping our brain and body believe that we can manage perceived challenges.

There are two branches of the vagus nerve, the ventral vagal and the dorsal vagal. The dorsal vagal is related to the collapse response as part of the para-sympathetic nervous system. The ventral vagal, while also part of the para-sympathetic nervous system, represents a regulated state. It is this section of the vagus nerve that helps us down-regulate. **When we can activate a ventral vagal state it is like putting on the brakes in our nervous system.** In other words, even in the midst of perceiving a challenge, with our foot on the brake, we believe that we will be able to manage the challenge because we have the ability to regulate and modulate our response.

The term vagal tone refers to the activity of the vagus nerve. The stronger our vagus response, or vagal tone, the faster we can relax following a stressor. “Your vagal tone can be measured by tracking certain biological processes such as your heartrate, your breathing rate, and your HRV. When your HRV is high, your vagal tone is also high” (Fallis, 2017). Another way to say this is that the greater the difference in your heart rate when breathing in, versus breathing out, the higher your vagal tone.



The Body:

When we become aware of our bodily sensations, we are using our 8th sense, which is called interoception. “Interoception is a sense that provides information about the internal condition of our body.” (Mahler, 2017).

The ability to tune into what is going on within ourselves, has a strong regulatory impact on our system.

When we feel sad, how do we know we feel sad? When we are hungry, how do we know we are hungry? Curiosity about how we know we feel a certain way, helps us tune into our bodily sensations. It is then that we will notice the clues that our body is sending us.

Potty training a child is a good example. For potty training to be successful, knowing how to use the toilet itself is not enough. We must ultimately be able to identify the physical sensations that clue us into the fact that we need to use the toilet. What about hunger and sleep? Unless we can feel the clues from our body telling us we are getting hungry or sleepy, we will struggle. The same is true for self-regulation. I may know how to do rhythmic breathing, but without knowing how to recognize the clues from my body that I am getting dys-regulated, I won't know when to start using that skill to help me regulate. **Supporting interoceptive awareness is a key piece to teaching self-regulation.** Dan Siegel (2018) talks about different steps involved in self-regulation: Stabilizing, monitoring, and modifying energy and attention. As we increase our ability to stabilize our energy and attention, we strengthen our monitoring capacity, which leads to our ability for modification.

In practice it might look like the following example:

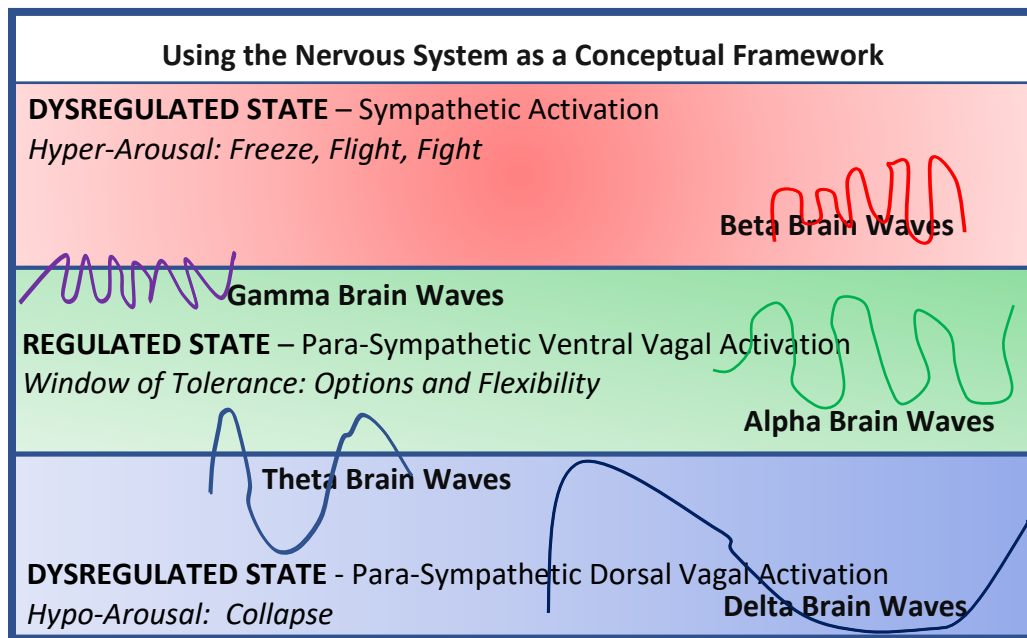
- I stabilize energy and attention by increasing my ability to shift my attention to my breathe, my body or one of my senses.
- I monitor energy and attention by noticing what is happening right now. Through stabilization I shifted my attention to my breathe and my body and now I might notice that I am breathing quickly, or that my shoulders are tense, or that I feel dizzy.
- I modify energy and attention by taking a deep breathe, or rolling my shoulders, or applying pressure to my head.

We cannot recognize what is happening in each moment without interoceptive awareness. However, we often skip teaching this step. Feelings words alone do not have a lot of meaning without the body sensation component, nor do they help us know what our body needs in that moment. Let us say I am feeling angry or nervous. When I can recognize that I am holding my breath, I can then figure out what my body needs in that moment to manage my feelings. Naming the feeling, naming the body sensation, moving my body, focusing on my breathing, any, or all of these, might be the right regulatory activity for me in the moment. Learning to tune into my body, is what gives me the information I need to figure that out.

Conceptual Overview:

By putting these ideas together, using the nervous system as a conceptual framework, we can see how they all interact.

The green portion of the nervous system image on the right, represents a regulated state. The ventral vagal branch of our vagus nerve is activated, and we are responding to the messages from the nervous system branches in a balanced way. We have options, as we are not overly influenced by hyper or hypo arousal. Alpha waves dominate as we are well within our window of tolerance. This means that we believe we can handle the experience, even if we perceive a threat. **This dominance of alpha waves supports our ability to self-regulate.**



At the upper edge of the window of tolerance, approaching the red portion of the nervous system in our image, we are moving towards a state of hyperarousal. Although gamma waves are very fast and excitatory, meaning they activate the sympathetic nervous system, we are not overwhelmed by hyper-arousal. In fact, gamma waves are shown here as straddling the sympathetic and para-sympathetic systems. Lisa Dion (2018) coined the phrase, “one foot in and one foot out.” The ability to do this requires sufficient vagal tone and HRV to be able to balance these states. When gamma waves dominate, we have one foot in hyper-arousal and one foot in a regulated, ventral vagal state, which helps us put on the brakes. We believe that we will be able to manage the perceived challenge because we are able to regulate and can modulate our response. **A high vagal tone and HRV, and the dominance of gamma waves, supports our ability to self-regulate.**

At the lower edge of the window of tolerance, approaching the blue portion of the nervous system in our image, we are moving towards a state of hypoarousal. Although theta waves are slow and inhibitory, meaning they activate the para-sympathetic nervous system, we are not overwhelmed by hypo-arousal. Theta waves are shown here as straddling ventral vagal and dorsal vagal activation. When theta waves dominate, we have one foot in hypo-arousal and one foot in a regulated, ventral vagal state. We believe we can manage the perceived challenge because we are able to regulate and we can modulate our response. **This dominance of theta waves, supports our ability to self-regulate.**

The red portion of the nervous system represents a dysregulated hyperaroused state. Beta waves are dominant and their position is outside of our window of tolerance. This means there is low HRV and vagal tone as we are overly influenced by input from the sympathetic nervous system. **We are overwhelmed by the perceived challenge, and our only behavioral options are freeze, flight and fight.**

The blue portion of the nervous system represents a dysregulated hypoaroused state. Delta waves are dominant and their position is outside of our window of tolerance. This means there is low HRV and vagal tone as we are overly influenced by input from the para-sympathetic nervous system. **We do not believe that we can manage the perceived challenge and we feel helpless to do anything, so we collapse.**

It's important to recognize that our goal is not to avoid a state of hyper or hypo arousal. We are meant to pulse through different arousal states and cycle through different brain waves. **Our hope is to create choice so that shifting states and/or maintaining balance is an option.** The inability to choose to return to a regulated state, leaves us stuck in a dys-regulated state. The inability to increase alpha, theta or gamma waves leaves us stuck in an unbalanced state.

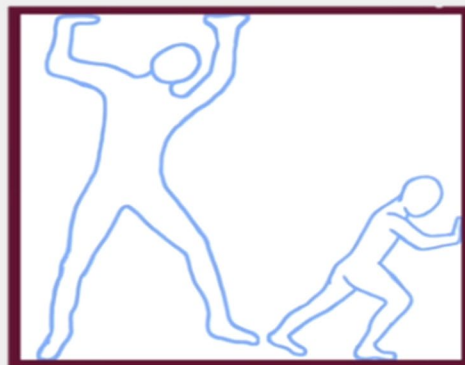
What supports our ability to self-regulate?

- Strengthening vagal tone
- Increasing HRV
- Producing Gamma, Alpha, and Theta waves

Windows of Tolerance

When within our window of tolerance, we believe that we can manage our experience. **Unless we believe that we can manage a perceived challenge, we will not be able to self-regulate.** When we grow our windows of tolerance, our perception of whether or not something can be managed, can shift. **Having an external regulator to support us in regulating in a moment of dys-regulation, grows our window of tolerance.** In this way co-regulation supports self-regulation by promoting this growth.

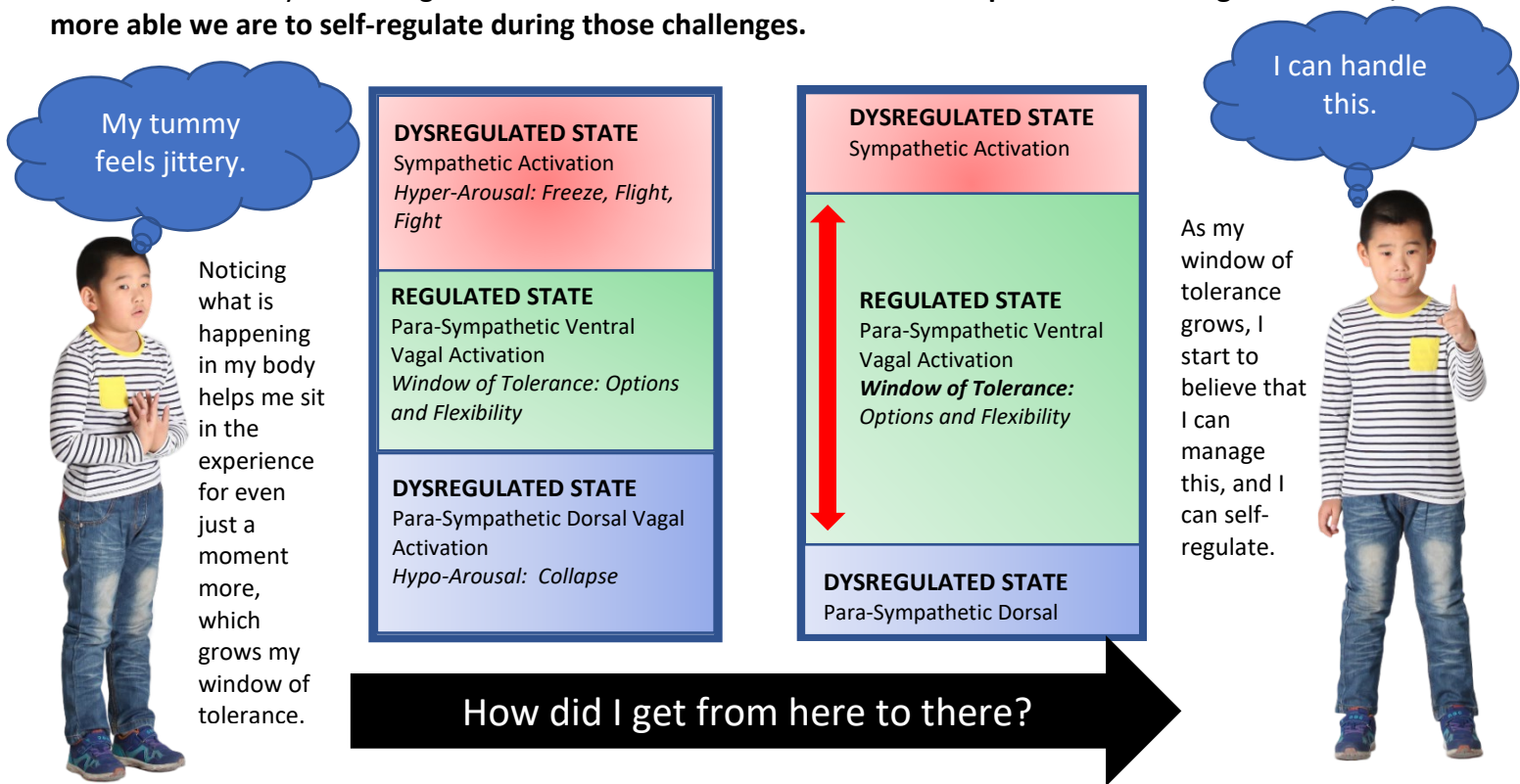
Our job is to grow our windows of tolerance and support others' in expanding their windows of tolerance



Practical Application

This section ties together the neuroscience with practical application.

The awareness of knowing what is happening in our body in the moment allows us to monitor and modulate responses while growing our windows of tolerance. The larger our windows of tolerance, the greater our ability to manage things. This means, that it takes more to push us outside of our windows. This is directly linked to our ability to self-regulate. **The more we believe we can handle perceived challenges in our life, the more able we are to self-regulate during those challenges.**



During this process I need others to act as external regulators.

This supports me in regulating in moments of dys-regulation, by allowing me to borrow their regulatory capacity, until I start to believe I can do it on my own. (Dion 2018, Schore 2019)

How do they do it? Co-regulation.

External regulators can support me in gaining skills in self-regulation, by co-regulating with me in many ways.

- Helping me to activate my vagus nerve which increases my vagal tone and allows me to move back to regulated states more quickly.
- Teaching me to pay attention to my breathing and my heartrate which increases my HRV and also allows me to move back to regulated states more quickly.
- Supporting me in shifting into alpha, gamma and theta states which allows me to modulate my sensory input, as well as link together differentiated experiences promoting coherence, synchronization and balance.
- Modeling keeping one foot in and one foot out so I can learn that it's safe to move towards physical sensations and feelings, and integrate my experiences. This is a key teaching of Synergetic Play Therapy.™ (Dion, 2018)

This process of re-patterning my nervous system helps me shift my perception of myself and my world. I learn to see myself as someone who can make choices.

The next section introduces aspects of the Braindrops approach. Braindrops allows us to teach children how to pay attention to their own levels of activation, and what is happening in their own bodies. Both, critical skills in the process of moving towards the ability to self regulate.

TEACHING & APPLYING BRAINDROPS: ™

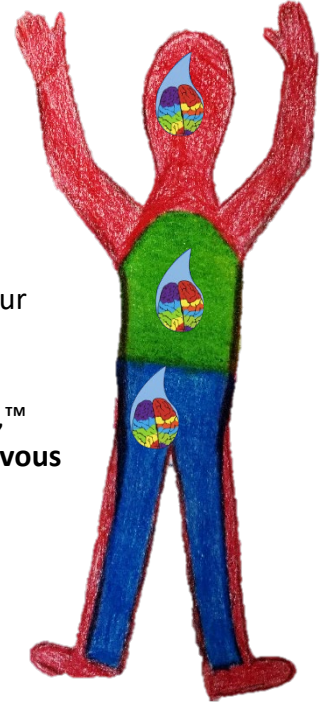
Understanding Braindrops™ strengthens stabilizing, monitoring, and modifying energy and attention. The three steps Dan Seigel (2018) names as being involved in self-regulation. It promotes strengthening vagal tone, increasing HRV and gamma, alpha and theta brainwaves. By supporting self-reflection, Braindrops™ develops interoceptive awareness and increases windows of tolerance. Following are the main tenets involved in teaching Braindrops.™

There is **always energy moving through our bodies and brains**. If we pay attention, we can feel it.

Braindrops™ represent the energy that is created in our brains, as it moves through our bodies.

When we feel our Braindrops™ moving in a rhythmic way, especially in the center of our bodies, we are usually in a relaxed, alert state, and we feel **regulated**.

There are different branches of our body's nervous system. To understand Braindrops,™ we focus on two: The Sympathetic and Para-Sympathetic. When our **Sympathetic nervous system is activated**, we tend to be in a **Dys-Regulated state called Hyper-Arousal**. However, when our **Para-Sympathetic** nervous system is activated, we can be in a **Regulated state or a Dys-Regulated state called Hypo-Arousal**.



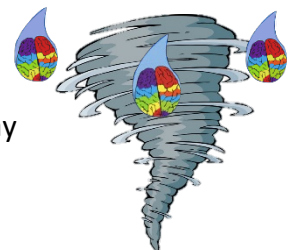
The Sympathetic Nervous System Response



As our Braindrops™ speed up, we start to feel our energy moving up and out in our bodies. Our sympathetic nervous system is activated. Our blood pressure increases, our heart starts beating faster and our digestion slows down. Our energy moves to our arms and hands, our legs and feet, and our faces and head -- the red parts on the picture of the body.

Daniel Goleman termed a phrase “Amygdala Hijacking,” that describes our “emotional” brain taking over our “thinking” brain. “Amygdala Hijacking” occurs when our sympathetic nervous system is activated, and we are in a state of **hyper-arousal**.

This can feel like a swirling inside our bodies that can grow more and more intense. It can feel like a tornado. Braindrops™ get sucked up and spin around. We can feel like we are spinning out of control. Our actions take the shape of outward movement (toward or away from). **This represents a fight, flight or freeze response.**



The Para-Sympathetic Nervous System Responses

When our Braindrops™ slow down we start to feel our energy returning to our center. Things slowdown in our bodies. Our parasympathetic nervous system is activated.

With parasympathetic activation, we can experience a **regulated** state in which we feel able to process and integrate information. Another way to say this is that we are within our window of tolerance. We believe that we can manage what is going on.



If our Braindrops™ keep slowing down, then we enter a state of **hypoarousal** and our energy is drawn inward. It can feel like a cloud forming inside of us filling up with Braindrops.™ The cloud gets heavy and it can no longer hold the Braindrops.™ Then they start falling like rain. It is braining. As the braining gets heavier and heavier it creates a mud puddle. Our bodies feel heavy and get stuck.



This is the fall asleep or shut down response.

As we become aware of our Braindrops,™ we learn to understand how they impact us. By stepping into our experiences, we learn how to communicate about our states of arousal. Recognizing where our Braindrops™ are in our bodies, also teaches us to pay attention to the clues our body is giving us. This on-going process of self-reflection allows us the exploration necessary to discover the right self-regulation tools for us.

Resources for Teaching Braindrops:™

Ebook: Holding a Braindrop in my Hand

A book for children to learn about Braindrops.

Video: How to Introduce the Concept of Braindrops

This is a video from a 2nd grade classroom showing you how to teach kids about Braindrops.

Virtual Regulation Room

The “underlying concepts” section includes information on interoception and understanding dys-regulation and Windows of Tolerance. In the regulation room you will find activities to increase interoceptive awareness, and other self-regulation strategies.

Learn more about Synergetic Play Therapy:™

<https://synergeticplaytherapy.com/>

Aggression in Play Therapy: A Neurobiological Approach for Integrating Intensity, written by Lisa Dion

<https://www.amazon.com/Aggression-Play-Therapy-Neurobiological-Integrating/dp/0393713199>

References:

- Canadian Institutes of Health Research. "Neuronal Assemblies and Synchronization of Brain Activity."
https://thebrain.mcgill.ca/flash/a/a_12/a_12_cl/a_12_cl_con/a_12_cl_con.html
- Diaz, Cheyenne (2019). "The Marvelous Properties of Gamma Brain Waves."
<https://blog.mindvalley.com/gamma-brain-waves/>
- Dion, Lisa (2018). *Aggression in Play Therapy: A Neurobiological Approach for Integrating Intensity*. W.W. Norton & Company. NY.
- Dion, Lisa (2008). *Synergetic Play Therapy Primary Influences*.
<http://synergeticplaytherapy.com/wp-content/uploads/2019/01/SPT-Primary-Influences.pdf>
- Dispenza, Joe (2019). *Rewired: Changing Your Brainwaves*. Gaia Series.
[https://www.gaia.com/share/ckivvv67800f00ipk7ztn4e9w?language\[\]=en&utm_source=share](https://www.gaia.com/share/ckivvv67800f00ipk7ztn4e9w?language[]=en&utm_source=share)
- Fallis, Jordan (2017). "How to Stimulate Your Vagus Nerve for Better Mental Health."
https://sass.uottawa.ca/sites/sass.uottawa.ca/files/how_to_stimulate_your_vagus_nerve_for_better_mental_health_1.pdf
- Holmes, Kristen (2020). *Ways to Stimulate the Vagus Nerve and Boost HRV & Immunity*. "What is the Vagus Nerve and What Does it Do." April, 2020.
<https://www.whoop.com/thelocker/vagus-nerve-increase-hrv/>
- Larson, Jennifer (2020). "What to Know About Gamma Brain Waves"
<https://www.healthline.com/health/gamma-brain-waves#bottom-line>
- Mayler, Kelly (2017). *Interoception: The Eighth Sensory System*. AAPC Publishing. KS
- MELT (2016). *Why Vagal Tone is so Important*. 8/17/26
<https://www.meltmethod.com/blog/vagus-nerve/>
- Neurofeedback Alliance. "Neurofeedback & Brainwaves." Your Guide to Neurofeedback in Australia.
<https://neurofeedbackalliance.org/understanding-brain-waves/>
- Schore, Allan (2019) *Right Brain Psychotherapy*. WW Norton. NY, London.
- Seigel, Dan (2018). *Aware: The Science and Practice of Presence – The Groundbreaking Meditation Practice*. Penguin Random House. NY.
- Trembath, Alec (2019). "Brainwaves and What They Mean to You."
<https://www.mattressnerd.com/polyphasic-sleep/brain-waves-mean/>
- Van Deusen, Peter (2016). "Gamma."
<https://brain-trainer.com/blog/gamma/>