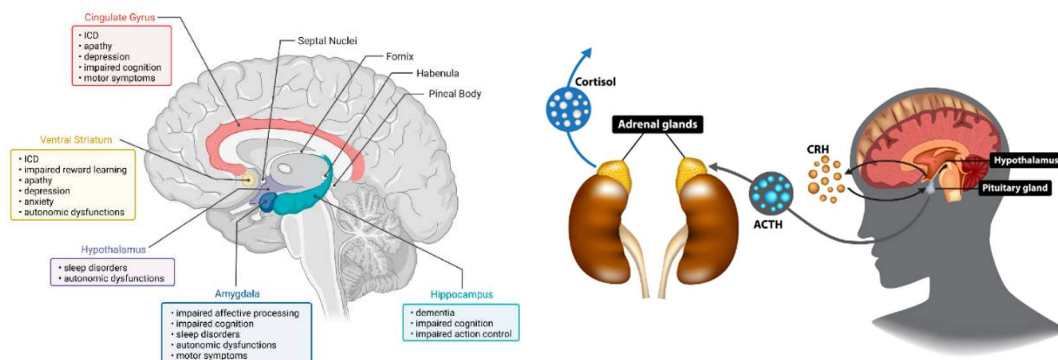


## Foundational Brain Areas we will be Referencing Throughout the Day



As we delve into the intricate interplay between mythology, neuroscience, and cultural analysis, it's essential to also familiarize ourselves with several key brain regions that underpin our capacity for symbolic thought and self-reflection. Areas that are involved in the birth of human consciousness and early mythmaking.

Understanding these neural networks provide a foundational framework for exploring how ancient myths, such as the Babylonian and Norse creation stories, mirror and foreshadow the brain's inherent structures and functions, offering important insights into how consciousness and cultural identity emerged.



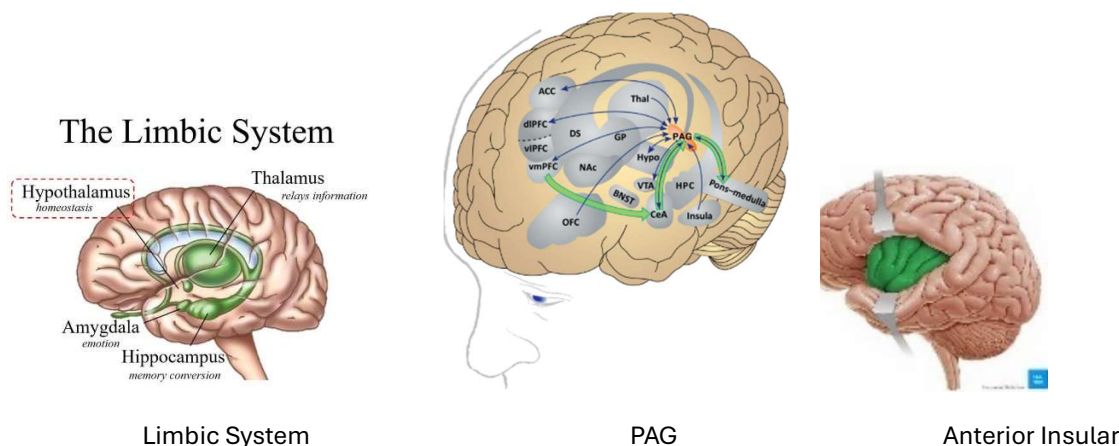
## Limbic System (Emotional Brain) & Prefrontal Cortex

The limbic system includes the amygdala, hippocampus, hypothalamus, and cingulate gyrus. These play a central role in processing emotions, forming memories, and regulating stress responses. In the context of trauma, the limbic system acts as the brain's emotional alarm system. The limbic system is unconscious, instinctively reactive. Unlike the prefrontal cortex which is the seat of rationality and weighing of values.

The amygdala — often referred to as the brain's "fear center"—detects the threat and triggers

The hypothalamic-pituitary-adrenal (HPA) axis, leading to the release of stress hormones.

The hippocampus, responsible for encoding episodic memory, memory consolidation, and bridging the midbrain to the PF cortex. In trauma or emotional overload, it goes offline, contributing to rumination, emotional reactivity, or shutdown. In trauma work the aim is to restore this bridge to the prefrontal cortex, which regulates thinking, planning and feeling functions. The cingulate gyrus is a translator between heart and head—helping us interpret emotional experiences, make adaptive choices, and respond appropriately to stress or relational situations.



**Anterior Insular:** The brain's seat of compassion and empathy and its Relationship with the Periaqueductal Gray (PAG): The Brain's Central Hub of Stress, Trauma, and Pain Responses

Imagine the **periaqueductal gray (PAG)** as the brain's version of Grand Central Station. It's a bustling, constantly active hub that processes a ton of information related to our responses to pain, threat, and stress. Located in the midbrain, it acts like a control center, regulating how we react to danger by managing our fight, flight, or freeze responses. When you feel that rush of anxiety or pain, the PAG is hard at work, organizing how your body and brain respond. It also helps modulate pain by releasing natural opioids that dampen the pain signals traveling up the spine.

What's fascinating is how this neurobiological process mirrors ancient mythologies. In the Babylonian creation story, Marduk faces and defeats the chaos dragon, Tiamat, splitting her body to create the ordered world. Similarly, in Norse mythology, Odin and his brothers slay the giant Ymir, using his body to create the world. These stories are about transforming chaos into order—a process that closely mirrors the PAG's function. Just like these mythical heroes impose structure on chaos, the PAG helps us navigate and organize overwhelming sensations into manageable responses.

Now, here's where the **Anterior Insular** comes into play. The anterior insular is the seat of empathy and compassion. Unlike the limbic system – which is totally unconscious and reactive, the anterior insular requires a rational decision to activate it. Once activated it sends signaling that slingshot across the PAG to the limbic system with lightning speed calming down emotional reactivity resulting from insult, injury and life's wounding harshness.

While the **limbic system** is instinctively reactive—often firing off emotional responses before we have time to think—activating the **anterior insular cortex (AIC)**, especially in relation to empathy and compassion, requires something more: conscious engagement. It doesn't happen automatically. We must deliberately turn our attention toward the experience of another—really *feel with them*—for the AIC to light up and begin weaving emotional resonance into deeper understanding.

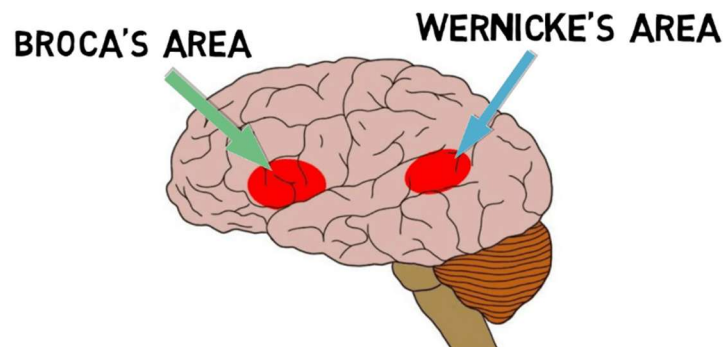
This kind of intentional emotional presence isn't just important in relationships, it's crucial in therapeutic work. As therapists, we're constantly working to activate this inner empathic network—not only to connect with our patients, but also to model and invite them into compassion for themselves.

That last part—helping patients access self-compassion I find deeply challenging. So often, early complexes, internalized criticism, or trauma-based defenses step in to block that softer response. For many, turning inward with warmth can feel impossible, even threatening. And yet, this is where the healing work lives: in creating the conditions—neurologically, relationally, symbolically to awaken and allow empathy to flow inward, not just outward.

The neural pathway from the **anterior insula**, through the **periaqueductal gray** (PAG), and into the **limbic system** is not just a circuit, it's a symphonic arc, a dramatic ascent and release. When we engage in conscious emotional processing—especially empathy and compassion—we begin in the anterior insula, where awareness meets feeling. From there, something extraordinary happens.

As if tightening the tension of a bowstring, the signal moves through the PAG, a hub of primal survival instincts. It's here that the stakes are highest—where the body readies for threat or surrender, fight or embrace. This moment is the slingshot, the tremor before release, the crescendo before the climax. And then, it launches into the limbic system—the emotional heart of the brain—where feeling becomes fully embodied, and meaning begins to unfold.

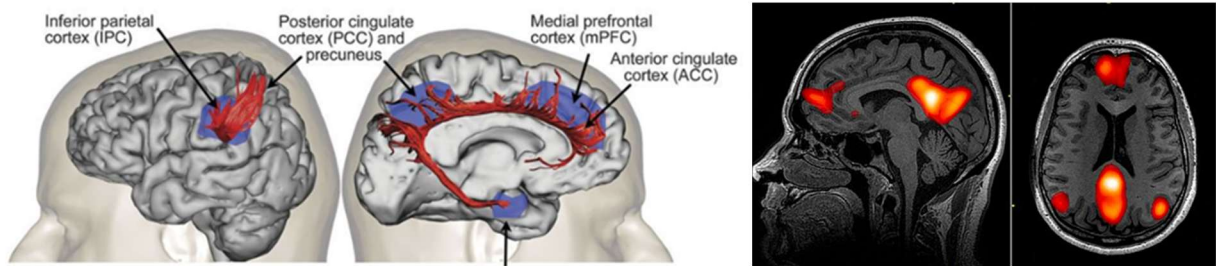
When we consciously choose empathy—when we soften toward another or ourselves—we are not simply calming the nervous system. We are conducting a neural symphony, transforming raw reactivity into emotional regulation, intimacy, and integration. In this light, compassion becomes not just a virtue, but a powerful neurological act, capable of reshaping how we experience fear, pain, and connection.



### Broca's & Wernicke's Areas

Wernicke's area (language comprehension) and Broca's area (speech production) via the arcuate fasciculus.

Wernicke's Area is typically located in one's dominant hemisphere. It is the seat of "what you want to say," while Broca's Area is putting those thoughts to words and saying them out loud. So, why do I bring this up? As an introvert I was satisfied that my thoughts had meaning, and I often didn't realize that I hadn't finished my thoughts out loud. In early analysis this was pointed out to me. Later, when I studied for my psychology license I fell in love with brain anatomy. I learned of Wernicke's link - the link between thinking of what to say - and actually saying it. The link is called Wernicke's link became life-changing image schema for me - allowing me to consciously exercise this link - much like any other muscle that I needed to exercise. I share this with all the introverts in this class - just in case you've ever had this problem or treating patients who have issues with expressing what they have to say.



## Default Mode Network: Your Brain's Inner Storyteller

The Default Mode Network (DMN) is, frankly, a bit boring—and that's precisely its job. It hums quietly in the background, maintaining the status quo of normalcy. Nothing flashy. Nothing urgent. Just the steady, ongoing work of holding our sense of self together.

This “boring” network is where the brain manages our autobiographical memory—not just the personal stories we tell ourselves, but the ancestral echoes we carry. It weaves together our past, orients us in the present, and gestures toward the mystery of the future, what many traditions have called *fate*.

And while it may not dazzle like a flash of insight or a limbic surge of emotion, the DMN is the psychic infrastructure that gives continuity to who we are. Later, when we turn to Norse mythology, we'll see how these seemingly uneventful functions resonate with mythic images of time, memory, and destiny. It's subtler than a lightning bolt—but no less profound.

### PFC

The medial prefrontal cortex – Decision Making, Planning, Reasoning, the “Social Brain”

The anterior cingulate – Cognition, Task Switching, Attention, Emotional Processing, Values

### Parietal

The inferior parietal cortex – these two work together as a Cross-Modal Hub, complex behaviors

The angular gyrus – language, math, motor control, social cognition, semantic processing

The posterior cingulate cortex – Default Mode Network – a crucial hub contributing to our inner life

The precuneus – along with how we direct our attention and process our emotions and cognition

In psychotherapy, DMN is especially important because it's where we construct the story of our lives. It's where memories are stitched into meaning. When someone is traumatized, that storytelling function often fragments—the DMN is disrupted or degrades into unhelpful loops of self-blame or rumination. Good therapy helps restore a healthier DMN function. Through reflection, relationship, and integration, psychotherapy reactivates DMN in more organized, compassionate, and coherent ways. It's where healing becomes not just symptom relief, but a deeper re-authoring of the self.