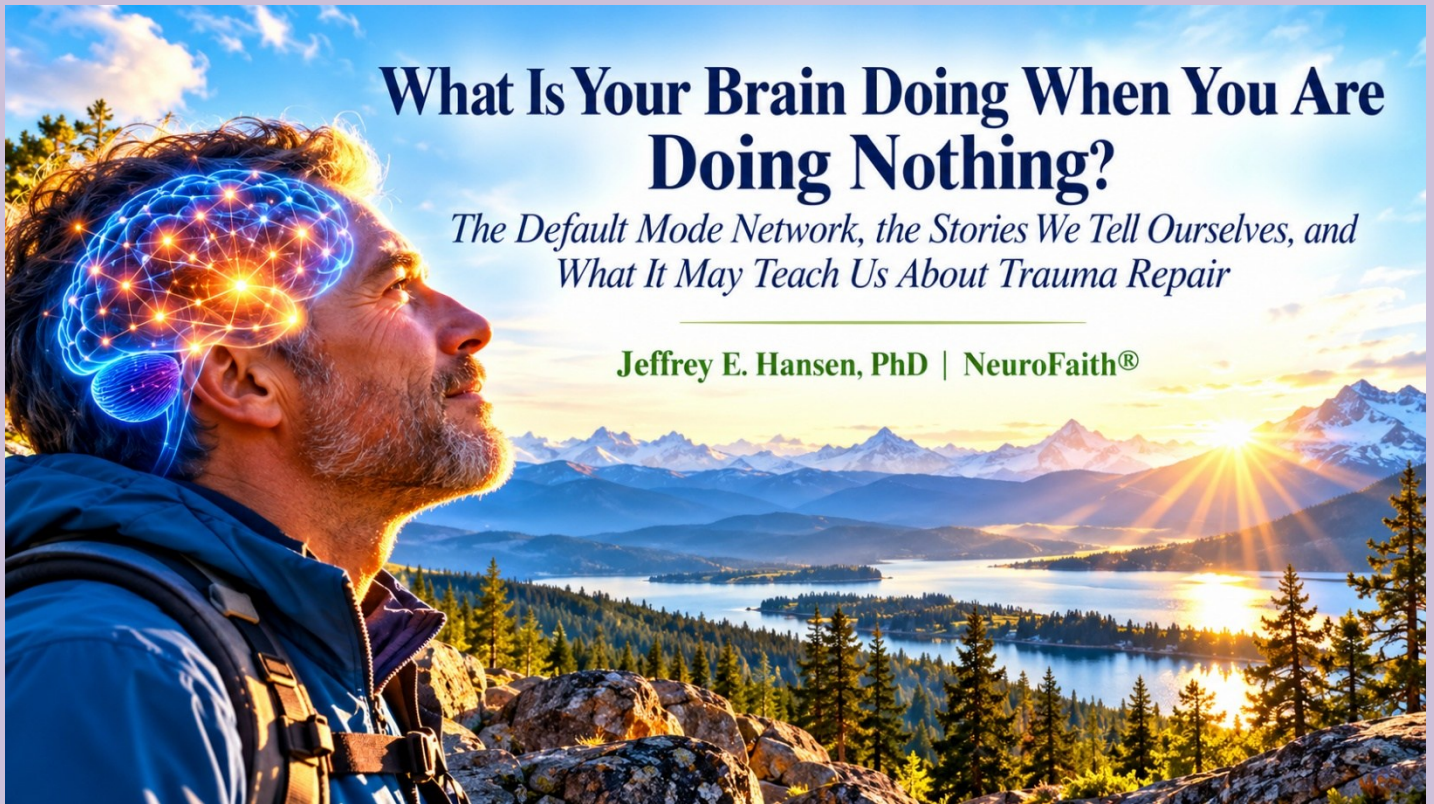


What Is Your Brain Doing When You Are Doing Nothing?

The Default Mode Network, the Stories We Tell Ourselves, and What It May Teach Us About Trauma Repair

Jeffrey E. Hansen, PhD | NeuroFaith®

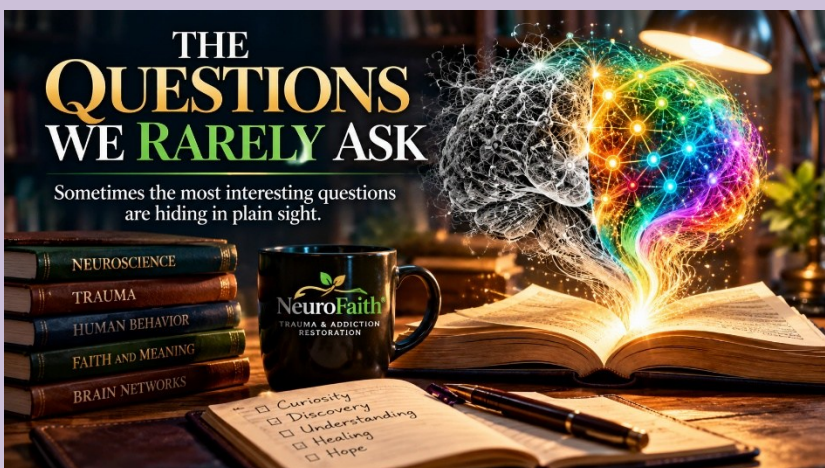


The Questions We Rarely Ask

I have always been attracted to somewhat esoteric subjects. Not obscure things simply because they are obscure, but ideas that most people do not spend much time thinking about and that, once understood, suddenly illuminate something we have experienced our entire lives. The Default Mode Network, or DMN, is one of those subjects.

I have been thinking about what I wanted to bring to our first NeuroFaith consultation group since we completed our certification together. I could have started with something familiar: polyvagal theory, Internal Family Systems, neurocardiology, trauma, or spirituality. We will certainly return to all of those. But I wanted to begin with something a little different, something that sits at the intersection of neuroscience, psychology, contemplation, identity, memory, and the stories we tell ourselves about who we are.

There is another reason. The more I have studied the neuroscience of trauma, the more convinced I have become that understanding at least some of what is happening beneath the surface can give us greater confidence in what we are doing clinically. I am not suggesting that neuroscience “proves” NeuroFaith or any particular psychotherapy. That would be an abuse of the science. What I do believe is that contemporary neuroscience increasingly



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provides a fascinating framework for understanding why some of the things trauma clinicians have observed for decades make sense. When we understand how the brain integrates autobiographical memory, self-referential thought, schemas, prediction, emotion, and present experience, we begin to see why trauma can become so deeply embedded and why genuine trauma repair requires more than simply thinking differently.

So let me begin with a peculiar question: What is your brain doing when you are doing nothing? Imagine sitting outside early in the morning with a cup of coffee. Nobody needs anything from you. There is no computer in front of you, no problem to solve, no patient to think about, and no particular task demanding your attention. You are simply sitting there. Yet within a few minutes you may have traveled forty years without leaving the chair. You remember somebody you loved. You revisit a conversation from yesterday. You suddenly recall something embarrassing you did in 1987 that apparently your brain believes deserves another hearing. You think about your children, something you should have done differently, or something you hope will happen next year. Before long, you are considering who you once were, who you are now, and perhaps who you still hope to become.

You appear to be doing nothing, but your brain most certainly is not. And that observation lies at the heart of one of the most fascinating discoveries in modern neuroscience.

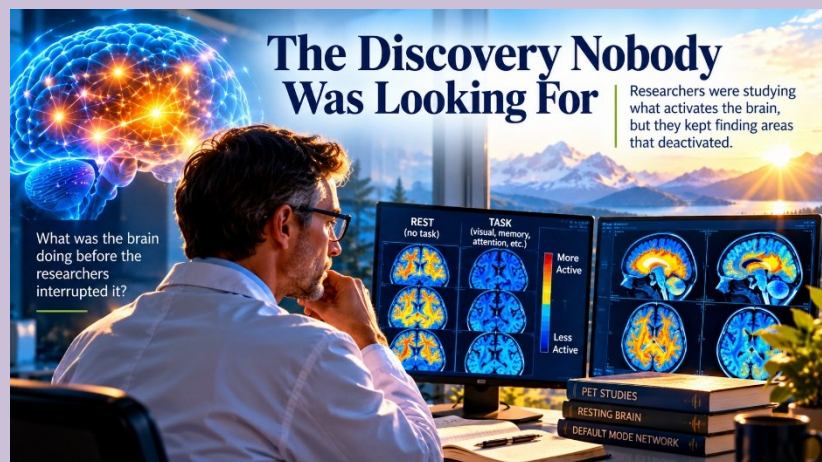
The Discovery Nobody Was Looking For

The story of the Default Mode Network is particularly interesting because neuroscientists did not originally go looking for it. During the development of modern functional neuroimaging, particularly positron emission tomography (PET) studies in the late 1980s and 1990s, investigators were interested in a fairly straightforward question: What parts of the brain become

more active when we ask somebody to do something? Researchers could measure cerebral activity during a passive condition and compare it with activity while that same person read words, remembered information, attended to a visual stimulus, or solved a problem.

The experimental logic was elegant. Measure the brain in one condition, give it something to do, measure it again, and compare the images. Naturally, investigators were most interested in areas that became more active. Those activations might tell us something about which regions participated in a particular cognitive process. But something peculiar kept appearing in the data. Certain regions did exactly the opposite: they became less active when subjects began performing externally directed tasks.

Initially, those decreases were not the star of the show. Investigators were looking for activation, not deactivation, and it was reasonable to wonder whether these decreases were simply artifacts of the baseline condition. But the pattern kept appearing. In 1997, Gordon Shulman, Marcus Raichle, Steven



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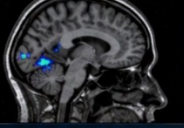
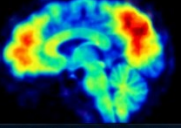
Petersen, and colleagues reanalyzed nine PET studies involving different visual-processing tasks. Despite the differences among the experiments, many of the same regions repeatedly showed decreases in cerebral blood flow when people shifted from passive viewing into active, goal-directed processing (Shulman et al., 1997).

The Discovery Hidden in the Baseline

How a surprising finding changed our understanding of the brain — and opened new doors for healing.

Marcus E. Raichle, M.D.
American neurologist and neuroscientist. His pioneering work in the early 2000s helped identify the Default Mode Network (DMN).
*Raichle et al., 2001
Proceedings of the National Academy of Sciences (PNAS)*

“We expected the brain to be relatively quiet at rest. Instead, we found a set of regions that remained highly active, organized, and coordinated — a **default mode of brain function.”**
— Marcus Raichle, M.D.

- 1 THE EXPECTATION**
Resting brain = minimal activity

Researchers initially expected that when the mind was at rest, most of the brain would be relatively quiet.
- 2 THE SURPRISE**
Consistent, organized activity

Instead, they found a distinct set of brain regions that remained metabolically active and functionally connected — even at rest.
- 3 THE NETWORK**
The Default Mode Network (DMN)

These regions form a network — now called the Default Mode Network — that supports memory, identity, imagination, and the ongoing story of self.
- 4 A NEW UNDERSTANDING**
The resting brain is not “off”

The DMN is an organized system that integrates past experience, self-referential processing, meaning-making, and future simulation.
- 5 CLINICAL IMPLICATIONS**
Why it matters for trauma and healing

 - The DMN can become overactive in rumination, anxiety, and depression.
 - Trauma can bias the network toward negative self-stories and threat prediction.
 - Effective therapies can help normalize DMN function and increase flexibility.
 - Integration with embodied, relational, spiritual, and meaning-based practices supports long-term healing.

When the DMN is stuck in the past, we can become trapped in old stories of threat, shame, and what if — keeping us from fully living in the present.

Rumination and Old Stories → **Presence and New Possibilities**

The goal is not to turn off the Default Mode Network, but to create **flexibility** — so we can reflect when reflection serves us, and re-engage with life when it does not.

With a more regulated and flexible DMN, we can integrate our story, engage in the present, build healthier relationships, and move toward a more purposeful and meaningful future.

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TRAUMA & ADDICTION RESTORATION

NEUROSCIENCE (mechanism) | REGULATION (calm the system) | RELATIONSHIPS (connect and belong) | MOVEMENT (engage and live) | MEANING (purpose and hope) | FAITH (integrate and heal)

Different Inputs. Healthier Networks. A Fuller Life.

That finding began turning the original question on its head. Instead of asking only which parts of the brain became active when a person started working on a task, researchers had to wonder why certain regions were already sufficiently engaged that their activity actually decreased when attention turned outward.

What was the brain already doing before the researchers interrupted it?

Perhaps Rest Was Never Really Rest

Perhaps Rest Was Never Really Rest

The brain is organized and active even when we are not engaged in a task.



Marcus Raichle and his colleagues began taking that question seriously. One possibility had to be addressed first: perhaps these apparent deactivations were simply artifacts created by an arbitrarily chosen resting baseline. Raichle's group therefore investigated the physiology of the resting brain itself, including cerebral blood flow, oxygen utilization, and the

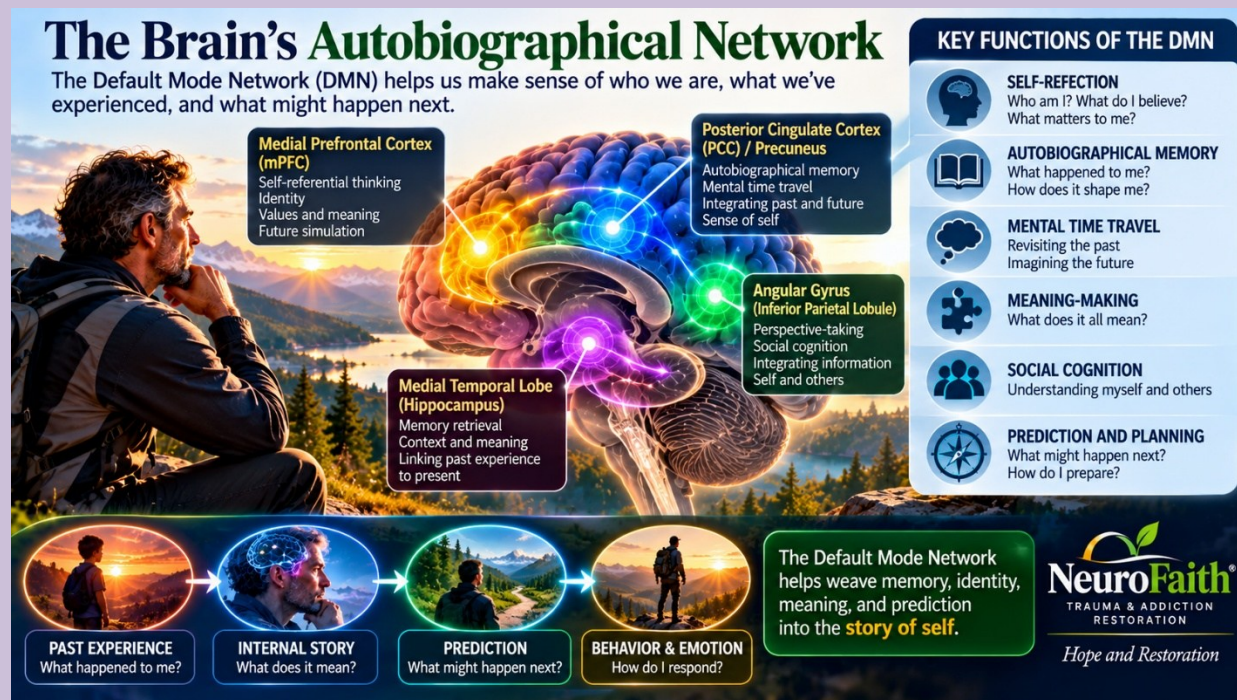
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oxygen extraction fraction. Their work supported the idea of an organized physiological baseline rather than a brain simply idling until somebody gave it something interesting to do (Raichle et al., 2001).

This represented a subtle but important conceptual shift. The resting condition had traditionally served as a control condition, essentially the blank page against which task-related activity could be measured. Increasingly, however, it appeared that the blank page already had writing on it. The brain was engaged in organized activity before the experimenter gave it an assignment.

In 2001, Marcus Raichle, Ann Mary MacLeod, Abraham Snyder, William Powers, Debra Gusnard, and Gordon Shulman published the landmark paper “A Default Mode of Brain Function.” They proposed that the brain possesses an organized baseline or default mode of activity from which it departs when particular external tasks demand attention (Raichle et al., 2001). That paper helped transform what had looked like an experimental curiosity into a new way of thinking about intrinsic brain function.

Also in 2001, Debra Gusnard, Raichle, and colleagues examined the medial prefrontal cortex, a region notable both for high baseline metabolic activity and for decreases during many externally directed tasks. Their work connected this region with self-referential mental activity, making the emerging default system particularly interesting to psychologists. The resting brain was apparently doing more than maintaining itself. Some of its activity was related to evaluating experience in relation to the self (Gusnard et al., 2001).



Then, in 2003, Michael Greicius, Ben Krasnow, Allan Reiss, and Vinod Menon used resting-state functional MRI to ask whether these apparently separate areas were actually functioning together. Their findings demonstrated correlated spontaneous activity among important components of the emerging default system. What had initially appeared as an odd collection of decreases in PET studies was increasingly recognizable as a functionally connected large-scale brain network (Greicius et al., 2003).

The Brain's Inside Voice



The anatomy can become complicated quickly, and we do not need a neuroanatomy lecture to understand the clinical importance. Broadly, however, the DMN includes important midline and posterior regions such as the medial prefrontal cortex, posterior cingulate cortex and precuneus, along with parietal and medial temporal components. More importantly for us, subsequent research has associated this network with internally directed cognition: autobiographical memory, self-referential thought, imagining possible futures, thinking about other people's perspectives, social cognition, and integrating information from previous experience into mental simulations of ourselves and our world (Andrews-Hanna et al., 2014; Buckner et al., 2008).

This is the distinction I find so fascinating. When I am riding my motorcycle through a tight mountain curve, that is not the ideal moment for deep autobiographical reflection. My attention needs to be directed outward: speed, line, road surface, traffic, curve. When I park the motorcycle somewhere overlooking the mountains, however, my attention can move inward. I can remember, imagine, rehearse a conversation, think about someone I miss, consider a decision, or wonder about where my life is going.

These are not two completely separate brains, of course, nor is the DMN simply an on-off switch. Contemporary research emphasizes interaction among networks and even cooperation between default-mode and executive systems during some forms of internally generated thought (Andrews-Hanna et al., 2014). But the distinction between externally directed attention and internally generated experience gives us a useful way to begin understanding what the DMN contributes.

And that brings us directly into psychology, because human beings do not simply remember what happened. We organize experience. We interpret it. We connect yesterday with today. We use previous

experience to imagine tomorrow. Most importantly, we construct stories about what those experiences mean about us.

When an Experience Becomes a Belief

This is where I believe the Default Mode Network becomes particularly relevant to those of us doing trauma repair. Trauma is not simply the storage of a painful memory. An experience occurs, but the developing nervous system also has to make sense of that experience. Particularly when painful experiences occur early in life, children do not possess the cognitive sophistication or perspective of adults. A child whose father repeatedly disappears is unlikely to conclude, “My father has significant attachment difficulties arising from his own unresolved developmental history.” The child's conclusion may be considerably simpler and more personal: “I must not be worth staying for.”



That distinction matters. “My father left” describes an event. “I am not worth staying for” is a learning about the self. “Someone abused me” describes something that happened. “I am damaged” is a conclusion. “Someone I trusted betrayed me” is an experience. “People cannot be trusted” becomes a schema about relationships. Repeated unpredictability can become “I am never safe.” Helplessness can become “I have no control.” Rejection can become “I am unlovable.”

These negative cognitions and schemas are central to much of the trauma-repair work many of us have learned. What the neuroscience adds is a deeper appreciation for how autobiographical memory, self-reference, social understanding, and future simulation can interact. Reviews of the DMN describe medial temporal systems contributing memories and associations from prior experience, while medial prefrontal components participate in constructing self-relevant mental simulations. Those systems interact with integrative regions such as the posterior cingulate cortex (Buckner et al., 2008).

I want to be careful about what we claim here. Negative schemas are not little files physically “stored in the Default Mode Network,” and trauma is certainly not a disorder of one network. Trauma involves memory systems, threat circuitry, salience processing, autonomic regulation, interoception, executive control, and many other interacting processes. But the DMN provides an intriguing part of the neural architecture through which something that happened to me can become incorporated into my ongoing understanding of who I am.

The wound is not only in the memory of what happened. The wound is also in what I learned to believe because it happened.

Yesterday Becomes a Template for Tomorrow

There is another piece of the Default Mode Network research that is enormously important for trauma treatment. The DMN is associated not only with remembering the past but also with imagining possible futures. At first those might sound like separate mental functions, but they are intimately connected. The brain does not construct tomorrow out of nothing. It draws upon yesterday. Buckner and colleagues (2008) described the network in terms of using prior experiences to support mental simulations relevant to future planning and social interaction, while later work has emphasized the broader role of the network in self-generated thought (Andrews-Hanna et al., 2014).

This gives us another way of understanding what happens in trauma. If repeated early experience teaches me that people are dangerous, rejection is inevitable, love is conditional, vulnerability leads to injury, or I am fundamentally inadequate, those conclusions do not remain neatly filed away as historical information. They influence how I interpret what is happening now and what I expect will happen next.

A husband's facial expression may simply be a facial expression, but to someone shaped by repeated interpersonal threat it may become evidence that something bad is coming. Silence may become rejection. Disagreement may signal abandonment. Increased heart rate may become danger. Intimacy may mean vulnerability, and vulnerability may predict injury. The person's reaction can appear disproportionate if we examine only the present stimulus because the nervous system is not responding exclusively to the present. It is interpreting the present through a model constructed from previous experience.

That is one reason telling a traumatized person, “But you are safe now,” so often accomplishes remarkably little. The person may understand the sentence intellectually. At another level, the nervous system continues to predict danger.

The Problem Is Not That the Brain Learned. It Learned Too Well.

There is an irony in all of this. Many trauma responses make tremendous sense when understood in the environment in which they developed. Hypervigilance is useful when danger is genuinely unpredictable. Distrust can be protective when important people repeatedly prove untrustworthy. Emotional withdrawal may protect someone whose vulnerability has repeatedly resulted in injury. Even dissociative responses can be understood as adaptations when physical or psychological escape is impossible.

The problem comes later, when an adaptation developed for one world continues operating in another. This is why I find the language of schemas so helpful. A schema helps organize enormous amounts of information efficiently. We need schemas. We could hardly function without them. But an early schema developed under traumatic conditions can become a lens through which later experiences are selectively interpreted. If I enter a relationship expecting abandonment, I may become exquisitely sensitive to distance, interpret ambiguity as rejection, respond with anger or withdrawal, and eventually contribute to precisely the interpersonal distance I feared. The resulting rupture then seems to confirm what I believed from the beginning: “See? People always leave.”

Experience becomes learning. Learning becomes schema. Schema shapes prediction. Prediction influences behavior. Behavior affects experience, and the resulting experience can appear to confirm the original schema. That cycle is one of the places where trauma repair begins to make tremendous sense.

Reflection, Rumination, and Getting Stuck Inside the Story

The Default Mode Network is not pathological. Internally generated thought is one of the extraordinary capacities of the human brain. It allows us to remember, imagine, reflect, plan, understand other people, construct meaning, and maintain a coherent sense of identity across decades. We need an interior life.

But there is an important difference between reflection and rumination. Healthy reflection has movement to it. We revisit an experience, consider what happened, examine our role in it, discover something from it, and eventually integrate it into the larger story of our lives. Rumination repeatedly returns to the same injury, humiliation, failure, fear, regret, or unanswered question without producing resolution. The mind can be working extraordinarily hard while accomplishing remarkably little. Research has linked depressive rumination with altered Default Mode Network function and connectivity, while cautioning against simplistic claims that an “overactive DMN” causes depression (Hamilton et al., 2015).

Clinically, we recognize the experience immediately. Some people become extraordinarily good at explaining why they hurt while remaining unable to move beyond the hurt. They understand their childhood. They know their attachment history. They can name their triggers. They understand precisely why they are standing at the edge of the swimming pool. Eventually, however, there is something they can learn only by getting wet.

Why Understanding the Neuroscience Matters

This brings me back to why I wanted us to think about the Default Mode Network in the first place. I do not expect anyone in our consultation group to leave remembering the precise anatomy of the posterior cingulate cortex. That is not the point. I want us to understand enough about the neuroscience that we can think more deeply about what we are doing when we engage in trauma repair.

If painful experience helped teach the nervous system “I am unsafe,” “I am powerless,” “I am defective,” “I am responsible,” “I cannot trust anyone,” or “I am unlovable,” then simply substituting a positive sentence for the negative sentence is unlikely to be sufficient. The negative cognition may be the verbal expression of a much deeper model constructed through experience.

This also helps explain a phenomenon we encounter repeatedly in therapy. A patient may tell us, “I know intellectually that my father’s leaving was not my fault,” and genuinely believe that statement at a

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conscious level while continuing to organize intimate relationships around the expectation of abandonment. The explicit belief has changed. Something deeper in the predictive model has not.

Trauma repair therefore asks a more interesting question than, “How do we convince someone to think differently?” We need to ask what kinds of experiences allow a nervous system that learned one model of itself and the world to begin learning another. That is where I see an important convergence between the neuroscience and trauma-repair models built around identifying and repairing negative cognitions and early schemas. The neuroscience does not prove a particular therapeutic protocol. What it does is give us increasing reason to believe that working with autobiographical meaning, self-referential beliefs, physiological state, relationship, prediction, and corrective experience is aimed at something very real.

The Brain Does Not Work in One Network

There is one additional piece of neuroscience worth understanding because it prevents us from making the DMN responsible for everything. Vinod Menon's influential triple-network model focuses on interactions among three large-scale systems: the Default Mode Network, the Salience Network, and the Central Executive Network. Broadly speaking, the salience system participates in identifying what deserves attention and facilitating network switching, while executive systems contribute to goal-directed cognitive control. Menon (2011) proposed that disturbances in accessing, engaging, and disengaging these large-scale networks may be relevant across multiple psychiatric and neurological conditions.

For trauma clinicians, this is useful because it moves us away from thinking about isolated pieces of the brain. Something happens. The nervous system determines whether it matters. Previous learning contributes to that determination. Attention shifts. Physiological state changes. Autobiographical meaning becomes relevant. The person predicts what is coming and prepares to respond. All of this emerges from interacting systems rather than a single “trauma center.” That is much closer to what we actually see in the therapy room. The patient is not merely remembering something. The patient is experiencing a whole-organism response shaped by what has been learned before.

Trauma Repair Is New Learning

If experience helped construct the old model, then I believe experience must participate in revising it. This



is where the different components of NeuroFaith begin to converge. Polyvagal-informed work reminds us that physiological state matters. HeartMath and neurocardiology draw our attention to autonomic regulation and the relationship between bodily state and emotional experience. Internal Family Systems gives us a language for approaching

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protective adaptations with curiosity rather than warfare. Relational work allows someone to encounter

COME BACK TO NOW
Practical Ways to Quiet the Noise, Engage Your Brain, and Live More Fully

STUCK IN THE PAST
Rumination
Self-criticism
Anxiety
What if?
Emotional overwhelm

Default Mode Network (DMN) Active

Intentional Practices Shift the Brain

Task-Positive Network (TPN) Active

PRESENT IN LIFE
Focus and clarity
Emotional regulation
Connection with others
Problem solving
Purpose and meaning

From overthinking and survival mode to presence, connection, and purposeful action.

- 1 MOVE YOUR BODY**
Walk, hike, ride, exercise, or work with your hands. Movement reduces DMN overactivity, improves mood, and increases brain resilience.
- 2 GET OUTSIDE IN NATURE**
Natural environments calm the threat system, reduce rumination, and restore attention.
- 3 SLOW YOUR BREATH**
Use paced breathing or HeartMath® coherence (5–6 breaths per minute) to calm the nervous system and increase heart–brain regulation.
- 4 CONNECT WITH OTHERS**
Conversation, eye contact, laughter, and shared activities activate the task-positive network and increase resilience.
- 5 ENGAGE IN PURPOSEFUL WORK**
Solve, build, create, cook, repair, organize. Meaningful activity pulls the brain out of self-referential loops and into focused engagement.
- 6 PRACTICE PRAYER OR CONTEMPLATIVE STILLNESS**
Not rumination, but grounded awareness, surrender, gratitude, and connection with God. This integrates meaning, identity, and emotional regulation.
- 7 USE SENSORY GROUNDING**
Notice what you see, hear, smell, taste, and feel. Feet on the ground, cold water, touch, or other sensory input brings you back to the present moment.
- 8 PLAY AND ENJOY LIFE**
Music, hobbies, dogs, grandchildren, and activities you love activate reward pathways and increase positive emotion and connection.
- 9 TAKE THE NEXT MEANINGFUL ACTION**
When the mind keeps circling, do something consistent with your values. Small, purposeful steps build momentum, reduce anxiety, and restore a sense of agency.
- 10 INTEGRATE FAITH, IDENTITY, AND PURPOSE**
Anchor in who you are in Christ, embrace your story, and live in alignment with your values. Meaning gives context to suffering and fuels lasting change.

The goal is not to turn off the Default Mode Network. The goal is **flexibility**—the ability to reflect when reflection serves us, and to re-engage with life when it does not.

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Hope and Restoration

safety, trust, and attunement where those experiences may previously have been absent. Faith introduces identity, meaning, forgiveness, hope, relationship, and transcendence. Movement reminds us that healing cannot occur entirely inside an explanation.

There is a time to understand your childhood and a time to examine the trauma. There is a time to understand why you became afraid, why you became angry, why you learned to hide, why you stopped trusting people, and why some part of you still believes the world is dangerous. Insight matters. Understanding matters. The inward journey matters. But there is also a time to get up, walk, work, lift something, call somebody, ride the motorcycle, serve someone, pray, laugh, stand in the sun, do something difficult, do something beautiful, and engage with life. Not because movement magically “turns off” the Default Mode Network—it does not—but

because the nervous system needs opportunities to encounter experiences that do not conform to the old prediction.

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A person who has learned “I am helpless” needs experiences of agency. Someone who has learned “I am unsafe” needs experiences of tolerable safety. Someone who believes “I cannot trust” needs carefully earned experiences of trustworthy relationship. Someone whose deepest schema says “I am unlovable” needs more than an argument against that belief. The person needs experiences capable of challenging it. In that sense, trauma repair is not simply about remembering differently. It is about learning again.

Trauma repair is not simply about remembering differently. It is about learning again.

Perhaps Health Is the Ability to Move Between Worlds



Maybe psychological health is not having a quiet Default Mode Network. Maybe it is having a flexible brain: a brain capable of going inward without becoming imprisoned there, remembering yesterday without mistaking yesterday for today, examining itself without endlessly analyzing itself, and imagining tomorrow without assuming that tomorrow must be a repetition of the past.

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There is something here that also resonates deeply with faith. A meaningful spiritual life requires an interior world. Prayer, reflection, examination of conscience, gratitude, repentance, memory, and contemplation all require the capacity to turn inward. But Christian faith ultimately calls us outward as well: toward relationship, service, forgiveness, love, action, and something larger than ourselves. Contemplation without engagement can become another form of hiding, just as relentless activity without reflection can become another way of avoiding ourselves.

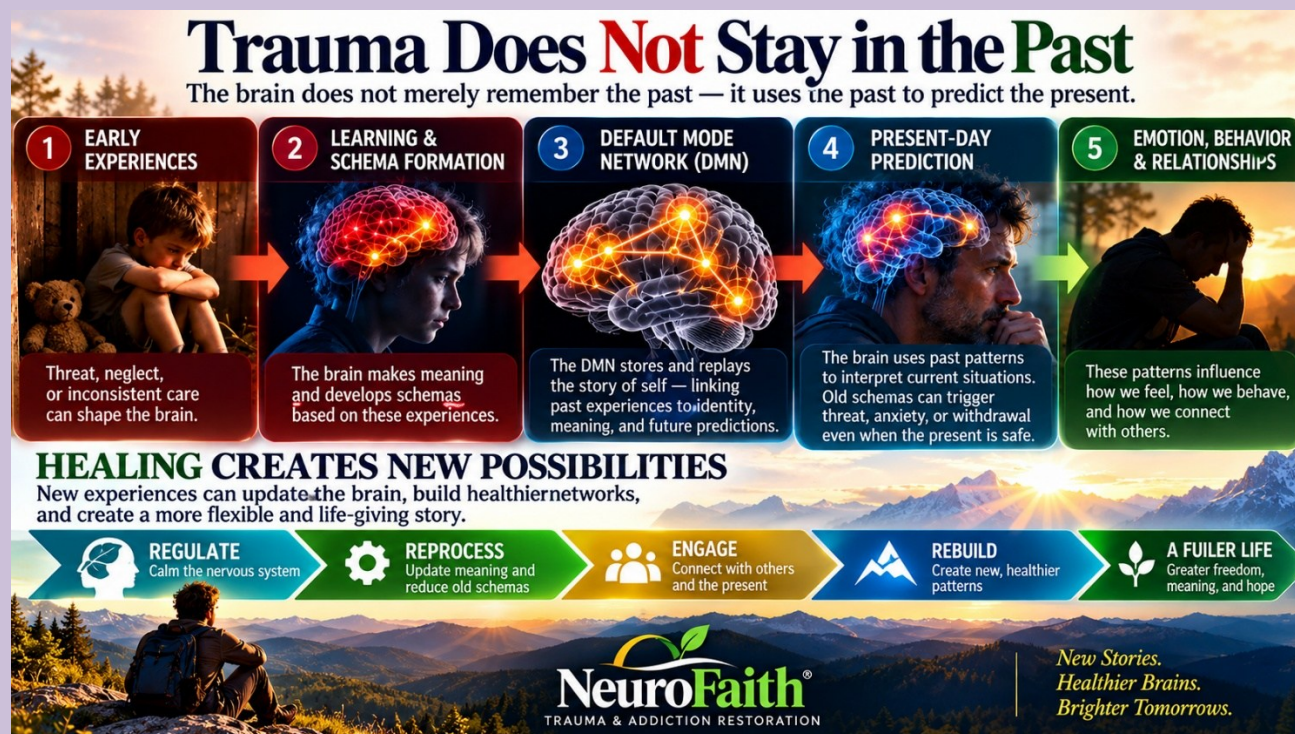


Perhaps health requires both. We go inward to understand the story, and we go back into life to discover that the story can change.

So What Is Your Brain Doing When You Are Doing Nothing?

Quite a lot, apparently. It is remembering and imagining, integrating previous experience, thinking about other people, evaluating the self, constructing possibilities, and moving through time without the body moving at all. The very network that scientists once encountered almost accidentally while studying what happened between tasks opened an extraordinary window into the internally generated life of the human mind.

For those of us doing trauma work, that discovery carries an important message. The person sitting across from us is not merely carrying memories of things that happened. Those experiences may have contributed to deeply learned models about who that person is, whether other people can be trusted, whether the world is safe, and what tomorrow is likely to bring. Understanding some of the neuroscience behind those processes does not replace the art of therapy, relationship, compassion, or faith. It helps us understand why those things may matter so profoundly.



Our work, then, is not to destroy the person's story or silence the inward mind. It is to help distinguish what happened from what was learned because it happened, to honor adaptations that once made sense, and to create conditions in which the nervous system can discover that an old prediction is not necessarily a permanent truth. There is a world beyond the old story. Trauma repair is partly about helping someone experience enough of that world to believe it, and then, eventually, to live in it.

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