



FEATURE

The Yoga of Creative Consciousness and Cognition in Neuropsychotherapy

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Neuropsychotherapy is an integrative approach to the dynamic interplay between the mind, body, spirit, and social interaction. This fits well with the ancient classical yoga practice of experiencing oneness of personal and social peace. Modern science and yoga have similar aims. Since the dawn of recorded civilization all peoples have strived for these ideals of peace and well-being. How is it that after all these centuries we have failed to do this on a global level? This is the question we will explore through our integrative neuroscience update of yoga. We seek more effective paths for integrating spiritual yoga and the neuroscience of creative consciousness and cognition in neuropsychotherapy.

NEUROSCIENCE AND YOGA IN NEUROPSYCHOTHERAPY

It is the nature of human experience to want to create a cohesive story, a personal narrative for new and more highly adaptive consciousness. A natural course is to integrate ancient, well-established, spiritual practices of consciousness with the developmental views of modern science (White, 1995). In Table 1, we integrate the science, theory, and practice of facilitating the growth of new consciousness and therapeutic cognition in neuropsychotherapy.

Yoga teaches peace for the mind, body and soul. As a reminder, the *Om Shanti* mantra is often chanted at the end of a practice. It is important to note that the root of the Sanskrit word for peace is sham (*śam*: be calm) meaning peace, rest, calmness, tranquility, or bliss. *Om. śānti, śānti, śāntiḥ* is **peace for me** and the unknown and unseen (*aahidairvika*), **peace for you**: the earth and humanity (*aadhibhautika*), and **peace for all**: problem-solving (*aadhyami-ka*). We will review the neuroscience that documents how novelty-numinosum-neurogenesis Effect (NNNE) can optimize the growth of

Table 1: Integration of the Theory, Science, and Practice of the 4-Stage Creative Cycle, Buddha’s 4 Noble Truths, Neuroscience, and the 8 Limbs of Classical Yoga.

SCIENCE	THEORY	PRACTICE
Neuroscience	4-Stage Creative Cycle Buddha’s 4 Noble Truths	8 Limbs of Yoga
Immediate early gene expression Neural Trace Activation	Stage 1: Curiosity Dukha Suffering	Yama Social Ethics Niyama Personal Values
Activity-dependent gene expression Cortical/subcortical dialogues Neural Activation Mirror Neurons	Stage 2: Conflict/incubation Samudaya Causes of suffering	Āsana Physical practice Prānāyāma Conscious Breathing
Heightened gene expression	Stages 2-3: Private inner work Bindu Bridge	Pratyāhāra Withdraw from outer world Tune inward
Brain plasticity	Stage 3: AHA! Insights Nirodha Calming rough seas	Dhāranā Focused concentration Dhyāna Single focus, meditation
Neural enrichment Offline neural processing	Stage 4: Verify and apply Mārga Life’s path	Samhādhi Happiness, bliss, harmony, resonance, contentment

neurons and brain plasticity to enjoy life to the fullest when we are peaceful.

*Ancient and Modern Spiritual Roots
of Consciousness*

We can only imagine and point to the ancient spiritual roots of creative consciousness and therapeutic cognitions.

—Julian Jaynes,

*The Origin of Consciousness in the Breakdown
of the Bicameral Mind, 1976*

In the beginning spiritual practice offered a path for taking “careful regard” of what you are doing (Jung, 1933). Even before the organization of formal religion, sacred rituals of celebrations of life with fire were performed initially to activate awareness and living beyond the perceived limitations of the ordinary physical world. Priests invented stories about God, which then became the central forces and rationale for civilization. Siddhartha Gautama, for example, who became Buddha, was born in luxury between 600 and 400 BCE. He left his comfortable life of luxury and sought to understand why there is suffering. He spent 49 days in deep contemplation sitting under the Bodhi tree and developed a personal practice by honoring God’s Four Noble Truths. How could Buddha teach this to the public? Buddha recognized these truths as guides for optimizing life. He lived along the Silk Road route in the age of great trade between Europe, the Middle East, and Asia. Philosophers and spiritual leaders also traveled the Silk Road to exchange rich knowledge and beliefs with their deeply spiri-

tual colleagues to understand and integrate the best practices and ideologies into their budding religions. Significantly, Buddha’s first public lecture was in Sarnath, India, a few miles from Varanasi, the most spiritual city in India, at the confluence of the sacred Ganges and Varuna Rivers. Clearly, Buddha was influenced by India’s Vedic teachings, specially the *Upanishads* (Krishna, 2018), the predecessors of Patañjali’s Eight Limbs of Yoga. Buddha’s personal spiritual discovery story became a bestseller in Hermann Hesse’s *Siddhartha* (1922/1971). Joseph Campbell came along and studied all the myths of humankind and then synthesized a summary monomyth of six stages of everyone in *The Hero’s Journey* (1949/1991). Ernest Rossi then reduced these six stages of the hero’s journey to four salient stages of the creative cycle to explain the data of modern neuroscience in psychosocial genomic terms (Rossi, 1968, 2004, 2007, 2012). Even today these deep DNA insights continue developing, with each generation finding its own vocabulary and new scientific stories (Doudna & Sternberg, 2018). Recently we have seen mindfulness, as a psychological theory with spiritual roots in ancient yoga, recommending certain practices of meditation with modern roots in neuroscience. Do neuropsychiatrists have something to add to this eternal dialogue? If so, what is it?

*New Scientific Developments:
The Society of Neuroscience*

Thirty scientists got together in 1969 to form a Committee of Brain Science to satisfy the emerging need to broaden and advance studies of the brain and nervous system. These original

biologists on the committee felt that something was missing in psychology. We need to study how neurons work along with the biochemistry of our nervous systems. They broke out of the limitations and restrictions of the status quo research of the early psychological community in the 1890s (Boring, 1950). Several years later the Society for Neuroscience (<https://www.sfn.org/>) was founded in the 1970s. No one today doubts that neuroscience is really a magnificent umbrella science. Neuroscience integrated biology with neuropsychology in the study of the structure and function of the brain. Psychosocial genomics, how the psychology interacts with our genes, now is being developed. This opened the door to bringing behavioral psychology into the limelight and ushered modern-day mindfulness into neuroscience.

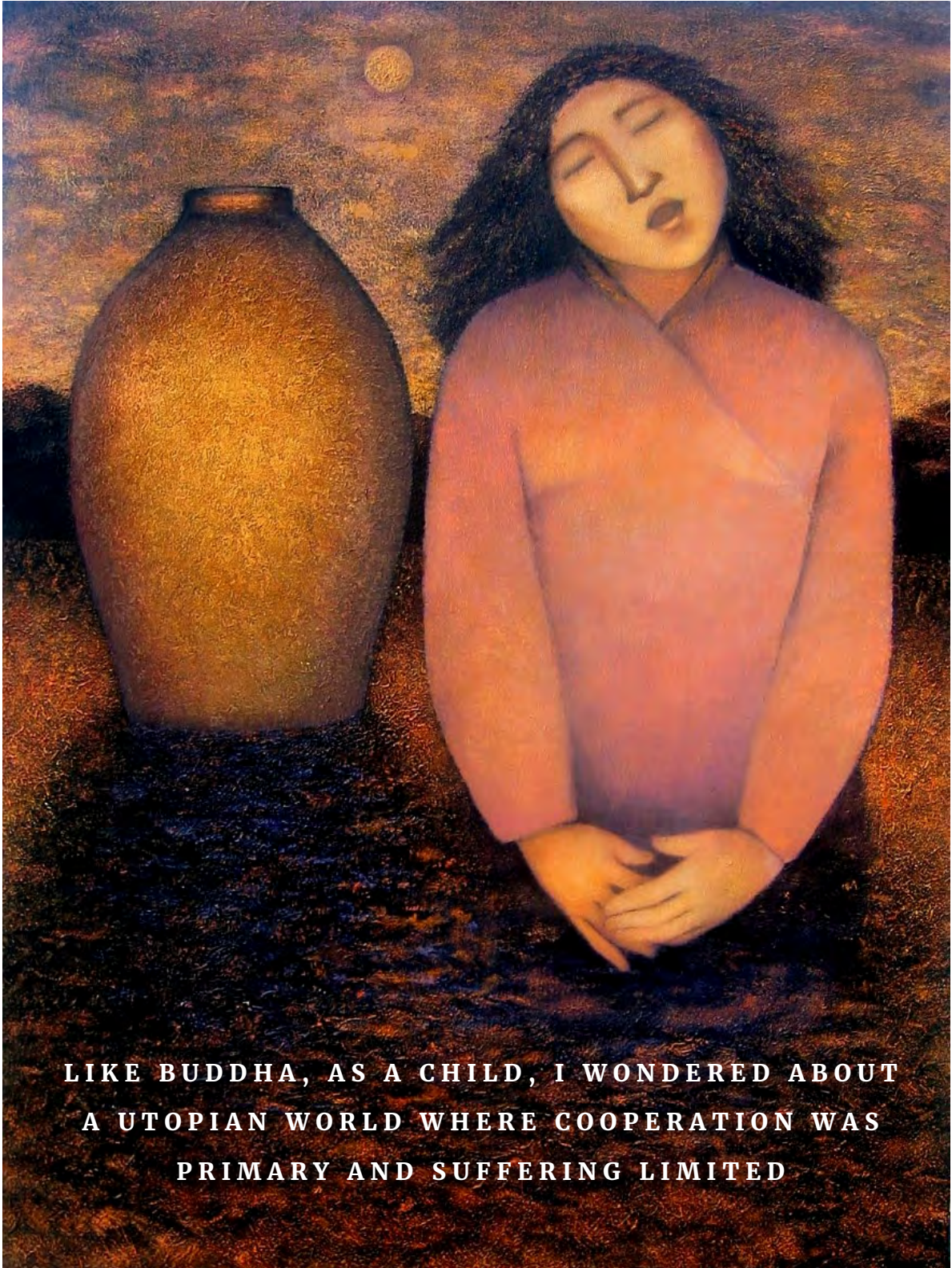
Psychological Roots

Ernest Rossi began his academic education with a full four-year scholarship in Pharmacy, which eventually led to a two-year Predoctoral United States Public Health Fellowship (USPH) to become a psychologist. He then received a two-year USPH postdoctoral grant with Franz Alexander, a global expert in psychosomatic medicine. Ernest was at the time deeply moved by Joseph Campbell (1949/1981), who told the story of how religion emerged from the mists of myths in ancient times. Ernest condensed Campbell's 6-stage monomyth of humankind into Rossi's 4-stage creative cycle in a 1968 paper entitled, "The Breakout Heuristic" (Rossi, 1968, 2007). Ernest began his professional career by hypothesizing how the 4-stage creative cycle integrates consciousness studies: spiritu-

al, psychological, and neurological. Ultimately, the 4-stage creative cycle is based in chronobiology, the science of time and mind (Lloyd & Rossi, 1992, 2008). He hypothesized that the 4-stage creative cycle of consciousness could be mapped into understanding our natural peaks and valleys of the ultradian 90–120-minute basic rest–activity cycle (BRAC) of biology. This integration of psychology and biology helps us harness nature's gifts as well as in problem-solving and new cognitions. Richard Hill aptly describes this in the *Practitioner's Guide to Mirroring Hands* (Hill & Rossi, 2017, p. 80):

The ultradian rhythm is an emergent property of biological and mental integration. The 4-stage creative cycle is a fundamental organizing principle. Creativity is, at its heart, the process of utilizing what is available in this moment to make something new. Creativity involves a sense of personal engagement and self-relevance: the ability to perceive the world in new ways, to find patterns, and make connections between seemingly unrelated phenomena. The 4-stage creative cycle is a universal activity that is evident in just about everything from the activation of gene expression to the emergence of the universe via the growth of new neurons and brain plasticity. In the human experience this is how the four stages play out.

Stage 1: Curiosity/Information/Preparation. The experience of gathering information and data: *What is this all about?*



LIKE BUDDHA, AS A CHILD, I WONDERED ABOUT
A UTOPIAN WORLD WHERE COOPERATION WAS
PRIMARY AND SUFFERING LIMITED

(image: Song of the Sea © Lee Lawson, LeeLawson.com)

Stage 2: Incubation. Working out what the problem is really all about: *How does this affect me? What does this mean to me?*

Stage 3: Breakthrough and illumination. A flash of insight, resolution, or revelation (an Aha! or Eureka moment) followed by an extensive and creative response to change: *Things makes sense now, and I can create something better in my life!*

Stage 4: Verification. The whole experience is quietly reviewed, and its benefits integrated into everyday life: *I understand, appreciate, and accept what I have learned.*

Personal Roots

It was a flash of insight for both Ernest and I to discover the clear parallels between Buddha's 4 Noble Truths and the 4-stage creative cycle. Buddha was curious about suffering, which became the basis of his 4 Noble Truths. He was so disturbed by observing suffering that he spent seven weeks in deep meditation under the Bodhi tree until he understood and developed a practical path out of suffering.

Like Buddha, as I child, I wondered about a utopian world where cooperation was primary and suffering limited. I recorded my recollections several years ago:

I woke up this morning reflecting on four profound events that completely rearranged my world view of what is possible. In the first three experiences, I was deep in the wild Amazon jungle (in 1995), and the

fourth occurred 21 years later at a wedding in India, in 2016.

As a child, I attended a Christian day school where Biblical teachings were emphasized. Repeatedly, a curious verse came up, stating: "And the lion will lie down next to the lamb." How could this be so, I wondered? Under what circumstances could this happen in real life? Unbeknownst to me at the time, age six, I began a quest to see if the world I wanted to live in existed—where the lion (the aggressor) would lie down in peace and harmony with the lamb (its prey). [Stage 1] Isaiah 11:16, the referenced Bible verse, literally reads: "The leopard will lie down with the goat," which is probably not as memorable a meme as the lion and the lamb. For several decades I pondered this question. [Stage 2]

Thirty-four years later, deep in the Amazonian jungle outside of Manaus, Brazil, I saw a rabbit and a snake lying side by side, taking in the beauty of the day together. It was startlingly unmistakable that these two were companions, evidenced by the serenity of their muscle tonus. In Amazonia there is plenty to eat, and so the snake has many opportunities to feed itself beyond one rabbit friend.

The next day we paddled a canoe to a small remote village where the indigenous people have lived for thousands of years. This village of a dozen people was not a tourist destination. I experienced no competition between these people, only cooperation. They reflected living the life of the snake

Integrating the 4-Stage Creative Cycle with Buddha's 4 Noble Truths



Curiosity

Problem

duḥka

Incubate

Stuck?

samudaya

Aha!

Solutions

Nirodah

Integrate

Apply

mārga

Figure 1. The 4-Stage Creative Process and Buddha's 4 Noble Truths. (Images: © Lee Lawson, LeeLawson.com)

and the rabbit—to take only what you need, including life if necessary to survive, but do it thoughtfully.

On my last morning, deep in the Amazon jungle, I woke early at the Ariaú Treetop Hotel to make my way across the swinging, wild and wooly suspension bridges along the treetops, high above the forest floor, to climb a high tower to witness the sunrise over the pristine ink-colored Rio Negro River. A wild spider monkey joined me, insisting I carry him in my arms up the steep

stairs until the staircase became too narrow. I set the monkey down to the sounds of his protests and made my way to the top. A silent moment later the monkey sat right next to me on the bench and took my hand. His hands were three-fourths the size of mine. His palms were the softest warm leather I've ever felt. We exchanged glances, held hands, and watched the sun rise together. The moment was surreal. Our mirror neurons were in interspecies synchrony with each other. Just after the sunrise a tourist bedecked in cameras appeared. The monkey

and I exchanged surprised looks, wondering who this creature was to interrupt our intimate moment? The monkey let my hand go and swiftly descended the tower. [Stage 3]

Every way I looked at life and people changed after this. I no longer wanted to believe in the status quo of dog-eat-dog aggression.



Kathryn's wild spider monkey companion in the Brazilian Amazon rainforest at the Ariaú Treetop Hotel

I understood that we, as humans, are not hardwired for aggression, rather aggression is a learned behavior. The Bible talks a lot about the stress of the opposites, especially love and hate. Why, I wondered as a child, can't people just love each other? I like the idea of "love your neighbor as yourself" as stated in Mark 12:31. However, the racially driven Watts Rebellion in Los Angeles, 1965, loomed large in my 10-year-old mind. I asked myself if there could ever be a place and time for 100% love and 0% hate. Isn't this what the "peace and love" hippie movement of the 1960s and 1970s tried to promote?

Forty years later my answer came that YES there is a place and time for 100% love and 0% hate. My Christian views expanded over time to include room for the teachings of all religions. I particularly love Hindu mythology and ideology. This led me to the blessing of finding a profound Kriya meditation teacher. His son was married last month in India's most sacred and oldest city on the Ganges river, Varanasi.

Indian weddings go on for days with many celebrations leading up to the "I do's". At Puneet and Sakshi's wedding many guests came from around the world who practice the original Kriya meditation. Upon meeting, we all immediately loved, trusted, and were comfortable with each other. There was no question about this experience. Without effort, we were brothers and sisters and grew in love during our six days together. There was compassion, companionship,

and the absence of criticism and competition. So startling was this experience that it took a month to absorb its profundity. While I have experienced 100% love and 0% hate with my teacher, his wife and their son for years, I never dared to hope to experience this with 200 other people for six days and continuing. [Stage 4]

These four profound experiences give me the courage to break away from the common pessimism and negativity of the global status quo. I endeavor to reach beyond all limitations of past thinking to welcome whatever elements of a possible, albeit oftentimes fleeting, utopian world.

Buddhist Roots

In Tibetan Buddhism the Dalai Lama teaches that most suffering is mental (psychological), rather than physical. He offers the distinction that: *Pain is inevitable; suffering is optional.* He sees compassion as the only avenue to end suffering. How does a person develop compassion for themselves and others? The 4 Noble Truths, especially when paired with the natural 4-stage creative cycle, offer life's truths to contemplate. What are the neuroscience correlates in each stage?

Noble Truth 1. *Dukha*: Suffering happens.

Immediate early genes (IEGs) generate a neural trace activation. These neuropsychological activations triggers memory. IEGs ask: *Hello! Is this something new to pay attention to? Can neural trace activators locate past memories to help me now?* An interesting question to ask is: why do we have memory? In our award-winning

paper, "The Future Orientation to Constructive Memory" we concluded that using past experiences could help create a new, more adapted future (Rossi, Erickson-Klein, & Rossi, 2008).

Noble Truth 2. *Samudaya*: Conflict/Suffering.

It is important to look at the causes of suffering. We hypothesize that activity-dependent gene expression turns on during cortical/sub-cortical dialogues. In other words, when we are in the heights of problem-solving, our brains are primed to be adaptive. It takes a village of the whole brain to coordinate the effort. Mirror neurons are a part of this activation (Rossi & Rossi, 2006). Mirror neurons are special in that they pair with certain motor neurons to help us view situations from others' perspectives. This is where one's inner observer begins to work with one's inner operator to generate new possibilities for resolving life's perplexing problems.

Bindu Bridge Transition.

Heightened gene expression and new protein structures formulate new neural networks that generate brain plasticity, new consciousness and cognition during heightened private inner work of meditation.

Noble Truth 3. *Aha!* insights.

After a review a natural calming of mind and body and optimization of brain plasticity and complexity comes into play in facilitating insight. Conflicts and struggles are real. Insights are earned through sensitive inner work of the observer/operator.

Noble Truth 4. *Mārga*: Applying the new to everyday life

Inner dialogues between old cognition and the new perspectives now offer new insights for our daily life. At this point our hippocampus is increasing in size and alerting the gene ZIF-268 to turn on in our sleep and dreams to upload this new knowledge into the long-term memory systems of the brain.

YOGA ROOTS OF CREATIVE CONSCIOUSNESS AND NEUROPSYCHOTHERAPY

Proponents of yoga consider it to be a science as it has been tested and refined in everyday life for centuries. Yoga began between 3300 and 1000 BCE with the oral, and then written *Vedas*. The *Yoga Sutra* was written about 400 CE (Zambito, 1992), distilling wisdom from the *Vedas* by succinctly defining the eight tenets, limbs, or axioms that underly the philosophy and developmental nature of yoga. Yoga is union with the single nature of one's self and consciousness within the universe. Progressively these 8 limbs move from outer-world concerns ever more sensitively to the inner world where happiness, contentment, peace, and higher consciousness are created. Yoga sources of modern neuropsychotherapy are derived from the early philosophy. Brain/body/mind integration were intuited in the stories of the god's activities.

Patañjali is an interesting metaphor of the body/mind, being half snake, half man. Almost everything about his life and work is unknown. His birth was of divine intervention. One day

Shiva danced in front of Vishnu, who was sitting on a celestial snake, Sheesha. Vishnu's body vibrated with excitement. Sheesha asked for a boon to vibrate in ecstasy too. The modern scientific worldview recognizes this *vibration of ecstasy* as the hourly and daily oscillations of consciousness and cognitions of the neurons of the brain/body. Vishnu said, "Okay, one day you can be born as a human and dance." Meanwhile, Gonika, who was a pure and lovely woman, wanted a son. She prayed to Surya (sun) for a child. A tiny serpent then appeared in her open hands. In amazement she watched the snake metamorphosize into a human baby. Patañjali, however, only made the transition about half-way. The serpent remained on his bottom half. The top half became human consciousness and the bottom half animal consciousness.

It is curious how the serpent is associated with the symbols of health and healing. Even modern medicine has two snakes around a winged pole, the Caduceus, to symbolize healing. Some parts of the world symbolize the Rod of Asclepius, with one snake. Asclepius was the Greek god of medicine, representing eternity. This is as much as we know about the connection between Patañjali yoga and medicine. The 8 Limbs of Yoga, the basic reset activity cycle, and the 4-stage creative cycle reduce stress and facilitate the best practices of modern medicine. Could Patañjali have been a brilliant Vedic scholar who became handicapped, unable to walk, so he put his energy into compiling the *Yoga Sutra*? No one knows the answer to all these questions, but we can recognize how the early analogies and metaphors of yoga inspired

the modern science of medicine which we see in these images even today.

Patañjali's 8 Limbs of Yoga

The purpose of yoga is clearly stated in the beginning of the *Yoga Sutra*: know who you are and what you believe.

Yoga quiets the over-active chattering mind
yogaś citta vṛtti nirodaḥ (1:2)

Then the seer (you) will know their own essence
tadā draṣṭuḥ svarūpe 'vasthānam (1:3)

Otherwise we will not know our true essence
vṛtti sārūpyam itaratra (1:4)

The art of yoga is evident in the art of neuropsychotherapy. Cultivating new brain growth supports an optimal life filled with inner peace as well as outer accomplishments. Dualities of thought and action that we often experience in the stuck Stage 2 of the 4-stage creative cycle can dissolve into a mindful oneness of new insight in Stage 3. Our modern scientific worldview of neuropsychotherapy supports 5000+ years of Eastern spirituality and the humanities of many cultures.

To facilitate brain growth with neuropsychotherapy implies how we can utilize novelty, enrichment, and exercise (both physical and mental) as documented in neuroscience (Kempermann et al., 2010; Rossi, 2002). The humanities suggest how art, beauty, and truth (Keats, 1820) function as fundamental catalysts to grow our brains. Spiritual practices of all types promote focus on that which is mysterious, fascinating, and tremendous (Otto, 1923). The foundations of classical yoga liberally include all aspects: novelty, enrichment, exercise

(both physical and mental), art, beauty, truth, fascination, mystery, and a tremendous sense of awe. The 8 Limbs of Yoga can facilitate the developmental transformations of Patañjali's *Yoga Sutras* via the so-called hidden transitions of mind, mood, and body.



Patañjali (Source: Wikipedia)



World Health: The Rod of Asclepius

(Source: Wikipedia)



USA Health: Caduceus

(Source: Wikipedia)

Table 2 pairs the 8 Limbs of Yoga with neuroscience and the 4-stage creative cycle. Neuropsychology brings terms such as empathy, equanimity, and novelty into the research laboratory to find correlated natural functions within the brain and body. We make educated suggestions of neuroscience correlates in the 4-stage creative cycle and the 8 Limbs of Yoga. Naturally, these neuroscience correlates are blending yoga and the 4-stage creative cycle, which we will now explain in more detail.

Yoga Stage 1. Preparation: Yama and niyama

The foundation of yoga philosophy begins with social ethics and personal morals. Essential questions: *Who are you? What do you believe? What is important to you? How do you fit into the world in which you live?* have profound neuroscience implications. The first social ethic (*yama*) is *ahimsa*, meaning non-harming or non-violence

and having compassion. The second *yama* is *satya*, truth and honesty, central functions to create good people and flourishing societies. If one can achieve these pure ethics, then your life can be well lived. How does empathy, morality, and adaptation operate in our brain?

The BRAC is the biological foundation of the 4-stage creative cycle. In Stage 1 the basis of human civilization is to integrate social ethics and personal values. Social ethics begin with empathy. The correlates of empathy in neuroscience are the mirror neurons (Iacoboni, 2008). Survival, for example, is mediated by the limbic (emotional) system in the center of our brains creating adaptive emotional responses to the flight or fight experienced in Stage 2.

Pillay (2010, paras 1 & 2) takes on the tricky task of making the inherent duality of morality (good vs. bad) by outlining the complexities

Table 2: The 4-Stage Creative Process of Human Development and Neuroscience via the 8 Limbs of Yoga

8 LIMBS OF YOGA AND NEUROSCIENCE			
Creative Process	Sanskrit	English Meaning	Neuroscience
Stage 1	Yama Niyama	Social Ethics Personal Values	Empathy Survival
Stage 2	Āsana Prānāyāma	Physical practice Conscious Breathing	Neurons ↑ Equanimity
Bindu Bridge Transition 2 to 3	Pratyāhāra	Moves from outer to inward focus	Stress ↓
Stage 3	Dhāranā Dhyāna	Focused attention Single focus, meditation	Brain growth Altruism - calm
Stage 4	Samhādhi	Happiness, bliss, harmony, resonance	NNNE effect

ies show that the “accountant” of the brain that weighs risks and benefits is a central part of a network of brain regions involved in an innate moral predisposition. This brain region, the ventromedial prefrontal cortex, is highly connected to brain regions on the right side of the brain in what appears to be an innate manner that promotes behavior that takes the needs of others into consideration (Mendez, 2009). We call the latter pro-social behavior (Moretto, Lá-davas, Mattioli & de Pellegrino, 2010).

In the center of our brains is the limbic system, which supports a variety of functions: emotion, behavior, motivation, long-term memory, and olfaction (smell). It is in constant dialogue with our prefrontal cortex (decision maker). Our limbic system actually promotes duality of thinking, a hallmark of creating new consciousness by resolving conflicts and finding a new single overview:

The challenge in human existence then, is that our brain studies are showing us that the moral systems in the human brain live side by side with the formidable and often much more powerful systems for fear and craving and that the desire to forgive is also challenged by the desire for retribution. My point here is that these brain studies show that *none of these ideas is absolute; that as human beings we are prone to a certain struggle of duality and opposites that live together in the brain.* (Pillay, 2010, para. 10, italics added)

Social ethics, personal morals and adaptation are the very basis of human civilization and development. They are the axioms of cul-

ture as we know it. Without it we have war and chaos (Hill & Rossi, 2017). Can you truly embrace empathy for yourself? Can you be as kind and forgiving of yourself as you are to your pet or a stranger? Are the thoughts you have towards your “self” kind and thoughtful?

Yoga Stage 2. Actions: *Asana and Prāṇāyāma*

Stability and comfort are the qualities of āsana (postures).

sthira-sukham āsanam (2:46)

Through the effort of releasing, letting go, and relaxing we create a balanced state of consciousness.

prayatna-śaithilyānanta-samāpattibhyām (2:47)

Then we are no longer upset by the tension and play of opposites because you have integrated it.

tato dvandvānabhighātaḥ (2:48)

Stage 2 is the action of working through perplexing questions and problems. *Asana* literally means “to sit”. After practicing asana there is an opportunity to turn to a comfortable inward focus. The physical practice of yoga pairs movement with conscious breathing. This becomes a fertile ground to promote neuronal growth through gene expression on the cellular-genomic level, the heart of psychosocial and cultural genomics.

The creative psychosocial genomics healing experience is integrated with current theory and research in epigenetics, functional genomics, bioinformatics, neuroscience, and psychosocial and cultural genomics. . .

. intriguing breakthroughs are now taking place in the deep biological level in our understanding of mind-gene communication and healing via our new epigenetic psychosocial genomic process that was outlined in an enthusiastic manner in a recent issue of *Nature*.

More recently others have described epigenetics as “an emerging self-organizing phenomenon” . . . permitting the coevolution of dynamical laws and states that is consistent with our top-down [mind] approach to the psychosocial genomics of psychotherapy: how human consciousness can modulate activity-dependent gene expression and brain plasticity to facilitate optimal health, well-being and creative adaptation. (Rossi, 2012, p. 390)

In practicing the therapy of story yoga, we activate the entire body by using postures to create a mind-body psychodrama to open possibilities of new consciousness and new points of view.

Breath, *Prāṇāyāma*, is the bridge between mind and body. Breath is the life force that pumps blood and nutrients from the heart to the brain and body. Long and slow conscious breathing promotes peaceful equanimity resulting in a decrease in heart and respiration rates and increasing parasympathetic activation (Benson & Klipper 1975).

Indices of autonomic function have been used for decades in the field of psychophysiology to assess how emotions manifest in the body. Popular indices include skin conductance, heart rate, respiratory rate, and

heart-rate variability (HRV). For example, skin conductance varies with sympathetic nervous system activation [Stage 1] and can be used as an indication of psychological or physiological arousal. It is well known that the “fight-or-flight” [Stage 2] response elicits increases in heart rate and breathing rate, indicative of higher sympathetic activation. [Missing is Stage 3: creative response]. Conversely, the “relaxation response” [Stage 4] is characterized by a decrease in heart rate and breathing rate and an increase in HRV, consistent with increased parasympathetic activation. Many studies to date have investigated how these autonomic indices relate to emotion regulation. [added]

How do we go from the 90–120-minute BRAC arousal to relaxation? It is through the natural biological 4-stage creative cycle. It is curious that Benson and Klipper in the above quote would ignore Stage 3, the Aha! or Eureka stage of breaking into new consciousness.

Yoga Stage 3. Contemplation/Meditation:

Pratyāhāra, Dhāraṇa and Dhyāna

Pratyāhāra turns us away from outer world concerns to psychological depths. *Dhāraṇa* initiates focus. In *dhyāna* we are in the deepest meditation of “oneness”. The inner mind can observe and facilitate inspired realizations of Stage 3.

This crucial step between Stages 2 and 3 passes through the Bindu Bridge in the yoga tradition. The neuroscience of reducing stress by activating the parasympathetic nervous

system in this stage is often described as the relaxation response (Benson & Klipper, 1975). Gene expression peaks here, promoting anti-oxidants and anti-inflammatory and healing stem cell responses (Rossi, 2004).

Meditation promotes altruism. In social neuroscience this is placing others in the same supportive context as yourself. Altruism is a natural flow while in the deep state of oneness of mind in empathy and rapport. The *Me* is dissolved into the empathetic *I-Thou* rapport of the oneness that is *Us*. Concern, compassion, and caring become effortless in this state. What does it mean in neuroscience terms? It turns out that these *I-Thou* states of compassion can be taught through experience. Researchers at the Waisman Center at the University of Wisconsin, WI, found that adults can be trained to be more compassionate (Weng et al., 2013). The real test of whether compassion could be trained was to see if people would be willing to be more altruistic, even helping people they had never met. The researchers measured how much brain activity had changed from the beginning to the end of the training and found that the people who were the most altruistic after compassion training were the ones who showed the most brain changes when viewing human suffering. They found that activity was increased in the inferior parietal cortex, a region involved in empathy and understanding others. Compassion training also increased activity in the dorsolateral prefrontal cortex and the extent to which it communicated with the nucleus accumbens, brain regions involved in emotion regulation and positive emotions.

Our fundamental question was: *Can compassion be trained and learned in adults? Can we become more caring if we practice that mindset?* Our evidence points to yes. . . . People seem to become more sensitive to other people's suffering, but this is challenging emotionally. They learn to regulate their emotions so that they approach people's suffering with caring and wanting to help rather than turning away. Compassion, like physical and academic skills, appears to be something that is not fixed, but rather can be enhanced with training and practice. The fact that alterations in brain function were observed after just a total of seven hours of training is remarkable. (Ladwig, 2013)

Yoga Stage 4. Union: *Samhādhi*, happiness

Samadhi is regarded as the final stage, at which union with the divine is reached (before or at death). It is a special state of happiness, bliss, harmony, peace, resonance and contentment. Levels of understanding can be through intellect, reflection, simple joy/satisfaction or an internal "knowing". In Stage 4, applying new realizations to daily life, we look for a new path. Yoga suggests this can be new learning, preparation, visualizing, or cultivating a new path of consciousness and therapeutic cognition.

It would be interesting to link the research of Stage 4 to the benefits of sleep. New research on why we sleep (Herculano-Houzel, 2013; Xie et al., 2013) documents how during sleep there is 60% more clearing of the brain of toxic metabolites by our cerebral spinal fluid. We propose that this process of clearing the brain

during sleep also occurs during the healing/rest phase of the BRAC in daily life in Stages 3 to 4 and samadhi.

The developmental progression in the previous stages prepares the way for ongoing brain growth. In samadhi the experience of the NNNE leads to the generation of new neurons and brain plasticity. The ongoing experience of the Stage 3 Aha! is manifest with optimal gene expression and neurogenesis leading to new brain growth, and pruning dendrites as we change our points of view to let go of what is no longer useful (Cozzolino, Guarino, Castiglione, Cicatelli, & Celia, 2018).

Summary and a Few Personal Issues

Many myths and yoga stories are inspirations for a path to recreate our better new selves. Buddha was moved by suffering. The Society for Neuroscience was formed to document a broader view of biopsychological paths to well-being. Ernest Rossi (1968, 2007, 2012) was inspired by Joseph Campbell's *Hero's Journey* to bridge the gap between myth and the neuroscience of the 4-stage creative cycle. Kathryn wanted to believe that a utopian world of peace and well-being could replace the apparently never-ending Stage 2 stress, conflict and wars of society. She sought evidence and found peace and well-being to be possible in all societies.

- Yoga, along with other Eastern philosophies, facilitates the evolution of consciousness, cognition, comfort and unity by allowing one's true nature to be realized.



STAGE 4 Reintegration – mār̥ga

Which path of will you take?

New Learning?
sambhāra-mār̥ga

Preparing?
pravoga-mār̥ga

Visualizing?
darśana-mār̥ga

Cultivating?
bhāvanā-mār̥ga

Personal Path?
aśiksa-mār̥ga

(image: Initiation © Lee Lawson, LeeLawson.com)



Qualities of samprajñāta samādhi Levels of Understanding

vitarka
Intellect

vicāra
Reflection

ānanda
Joy & Satisfaction

asmitā-rūpa
Internal Knowing = Freedom

(image: Song of the Sun © Lee Lawson, LeeLawson.com)

- Neuropsychotherapy is an integrative approach that facilitates the dynamic interplay of empathy and rapport between mind, body and social relations.
- Psychosocial Genomics is the biopsychosocial foundation of social work theory and practice.
- Recent research on neuroplasticity and psychosocial genomics lends compelling support to neuropsychotherapy by elucidating mechanisms through which psychosocial forces shape and reshape neurobiology.
- The 4-stage creative cycle is a natural 90–120-minute psychobiological rhythm utilized in ancient and modern approaches to creative meditation, yoga and psychotherapy.
- We propose that a neuroscience perspective of these four stages of the creative cycle provides the evolutionary molecular-genomic underpinning of Buddha's 4 Noble Truths and the essential dharma of meditation and psychology.

Each of these disciplines complements the growth of new consciousness and cognition. Can we use this new knowledge to bring peace and well-being to individuals and societies? Developing your personal story can pave the way for new consciousness. As we go deeper in Part 2, yoga story therapy will be introduced with practical applications of integrating yoga, neuroscience, Buddha's 4 Noble Truths and the 4-stage creative cycle.

It may be appropriate for the reader to explore a few questions:

1. What is the personal story of my enlightenment?
2. What do I recall of how I woke up one day and realized I had my own mind—different from others?
3. How will I put into practice my own new learning, empathy, and rapport with others?

References

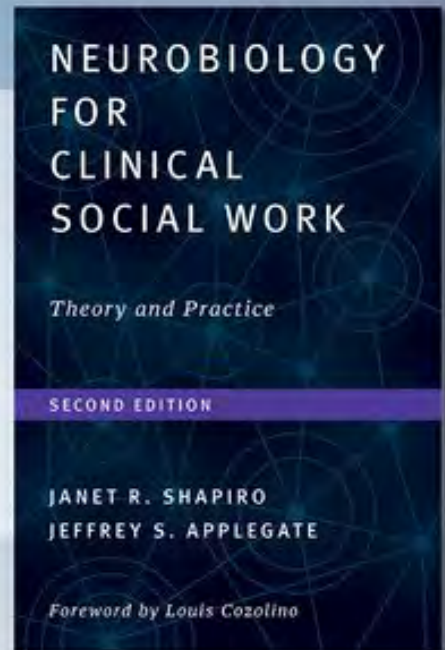
- Benson, H., & Klipper, M. (1975). *The relaxation response*. New York, NY: Avon.
- Bergland, C. (2013, October 10). The neuroscience of empathy. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/us/blog/the-athletes-way/201310/the-neuroscience-empathy>
- Boring, E. (1950). *A history of experimental psychology*. New York, NY: Prentice Hall.
- Campbell, J. (1981). *The hero with a thousand faces*. New York, NY: Pantheon Books. (Original work published 1949).
- Campbell, J. (1991). *The hero's journey*. Princeton, NJ: Princeton University Press. (Original work published 1949).
- Cozzolino, M., Guarino, F., Castiglione, S., Ciatelli, A., & Celia, G. (2018). Pilot study on epigenetic response to a mind-body treatment. *Translational Medicine @ UniSA*, 17, 40–44.
- Desbordes, G., Gard, T., Hoge, E. A. Hölzel, B. K., Kerr, C., Lazar, S. W., . . . Vago, D. R. (2015). Moving beyond mindfulness: Defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness*, 6, 356. doi:10.1007/s12671-013-0269-8.
- Doudna, J., & Sternberg, S. (2018). *A crack in creation: Gene editing and the unthinkable power to control evolution*. New York, NY: Mariner Books.
- Herculano-Houzel, S. (2013). Neuroscience: Sleep it out. *Science*, 342(6156), 316–317. doi:10.1126/science.1245798
- Hesse, H. (1971). *Siddhartha: A novel*. New York, NY: Bantam Books. (Original work published 1922).
- Hill, R., & Rossi, E. (2017). *The practitioner's guide to mirroring hands*. Wales, United Kingdom: Crown House Publishing.
- Iacoboni, M. (2008). *Mirroring people: The new science of how we connect with others*. New York, NY: Farrar, Straus and Giroux.
- Jaynes, J. (1976). *The origin of consciousness in the breakdown of the bicameral mind*. Boston, MA: Houghton Mifflin.
- Jung, C. (1933). *Modern man in search of a soul*. London, United Kingdom: Keegan Paul.
- Keats, J. (1819). Ode on a Grecian urn. *Annals of the Fine Arts*. Retrieved from <https://keatsovertime.wordpress.com/ode-on-a-grecian-urn/annals-of-fine-arts-edition-1819/>
- Kempermann, G., Fabel, K., Ehninger, D., Babu, H., Leal-Galicia, P., Garthe, A., & Wolf, S. (2010). Why and how physical activity promotes experience-induced brain plasticity. *Frontiers of Neuroscience*. Retrieved from <https://www.frontiersin.org/articles/10.3389/fnins.2010.00189/full>
- Krishna, N. (2018). *You are the supreme light: Life lessons from Adi Sankara*. New Delhi, India: Aleph Book Company.
- Ladwig, J. (2013, May 22). Brain can be trained in compassion, study shows. *University of Wisconsin-Madison News*. Retrieved from <https://news.wisc.edu/brain-can-be-trained-in-compassion-study-shows/>
- Lloyd, D., & Rossi, E. (Eds.) (1992). *Ultradian rhythms in life processes: An inquiry into fundamental principles of chronobiology and psychobiology*. New York, NY: Springer-Verlag.
- Lloyd, D., & Rossi, E. (Eds.) (2008). *Ultradian rhythms: From molecules to mind: A new vision of life*. New York, NY: Springer.

- Mendez, M. F. (2009). The neurobiology of moral behavior: Review and neuropsychiatric implications. *CNS Spectrums*, 14, 608–620.
- Moretto, G., Ládavas, E., Mattioli, F., & de Pellegrino, G. (2010). A psychophysiological investigation of moral judgment after ventromedial prefrontal damage. *Journal of Cognitive Neuroscience*, 22(8), 1888–1899. doi:10.1162/jocn.2009.21367
- Otto, R. (1923). *The idea of the holy*. Oxford, United Kingdom: Oxford University Press.
- Pillay, S. (2010, August 23). Fear and the biological non-existence of morality: Why are we tortured by our brains? *Psychology Today*. Retrieved from <https://www.psychologytoday.com/au/blog/debunking-myths-the-mind/201008/fear-and-the-biological-non-existence-morality>
- Ramachandran, V. S. (2010). *The tell-tale brain: A neuroscientist's quest for what makes us human*. New York, NY: W. W. Norton.
- Rossi, E. (1968). The breakout heuristic: A phenomenology of growth therapy with college students. *Journal of Humanistic Psychology*, 8, 16–28. doi:10.1177/002216786800800102
- Rossi, E. (2002). *The psychobiology of gene expression: Neuroscience and neurogenesis in therapeutic hypnosis and the healing arts*. New York, NY: W. W. Norton.
- Rossi, E. (2004). *A discourse with our genes: The psychosocial and cultural genomics of therapeutic hypnosis and psychotherapy*. Rome, Italy: Editris.
- Rossi, E. (2007). *The breakout heuristic: The neuroscience of mirror neurons, consciousness and creativity in human relationships*. Phoenix, AZ: The Milton H. Erickson Foundation Press.
- Rossi, E. (2012). *Creating consciousness: How therapists can facilitate wonder, wisdom, truth and beauty*. Phoenix, AZ: The Milton H. Erickson Foundation Press.
- Rossi, E., Erickson-Klein, R., & Rossi, K. (2008). The future orientation of constructive memory: An evolutionary perspective on therapeutic hypnosis and brief psychotherapy. *The American Journal of Clinical Hypnosis*, 50(4), 343–350. doi:10.1080/00029157.2008.10404301
- Rossi, E., & Rossi, K. (2006). The neuroscience of observing consciousness and mirror neurons in therapeutic hypnosis. *The American Journal of Clinical Hypnosis*, 48(4), 263–278.
- Silani, G., Lamm, C., Ruff, C., & Singer, T. (2013). Right supramarginal gyrus is crucial to overcome emotional egocentricity bias in social judgments. *The Journal of Neuroscience*, 33(39), 15466–15476. doi:10.1523/JNEUROSCI.1488-13.2013
- Weng, H. Y., Fox, A. S., Shackman, A. J., Stodola, D. E., Caldwell, J. Z., Olson, M. C., . . . Davidson, R. J. (2013). Compassion training alters altruism and neural responses to suffering. *Psychological Science*, 24(7), 1171–1180. doi:10.1177/0956797612469537
- White, J. (1985). *What is enlightenment: Exploring the goal of the spiritual path*. New York, NY: Paragon.
- Xie, L., Kang, H., Xu, Q., Chen, M. J., Liao, Y., Thiyagarajan, M., . . . Nedergaard, M. (2013). Sleep drives metabolite clearance from the adult brain. *Science*, 342(6156), 373–377. doi:10.1126/science.1241224
- Zambito, S. (1992). *The unadorned thread of yoga: The Yoga-Sutra of Patañjali in English: A compilation of English translations of Sri Patañjali's exposition on the Yoga Darshana*. Poulsbo, WA: The Yoga-Sutras Institute Press.

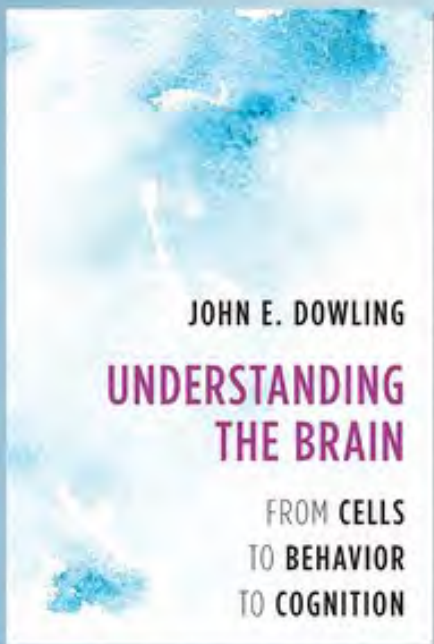


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