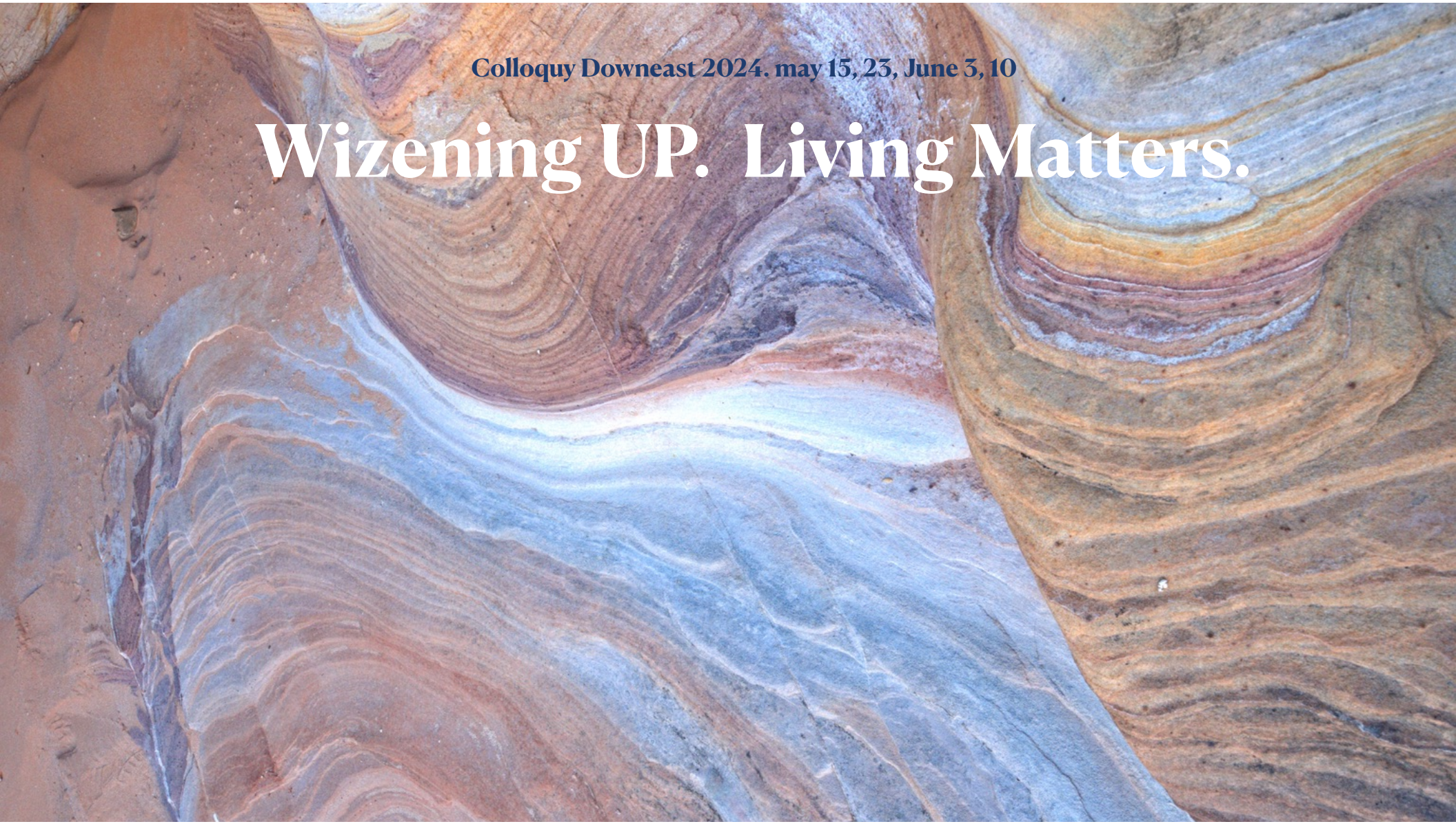

Colloquy Downeast 2024. may 15, 23, June 3, 10
Wizening UP. Living Matters.

Where are we going together?

Our course journey

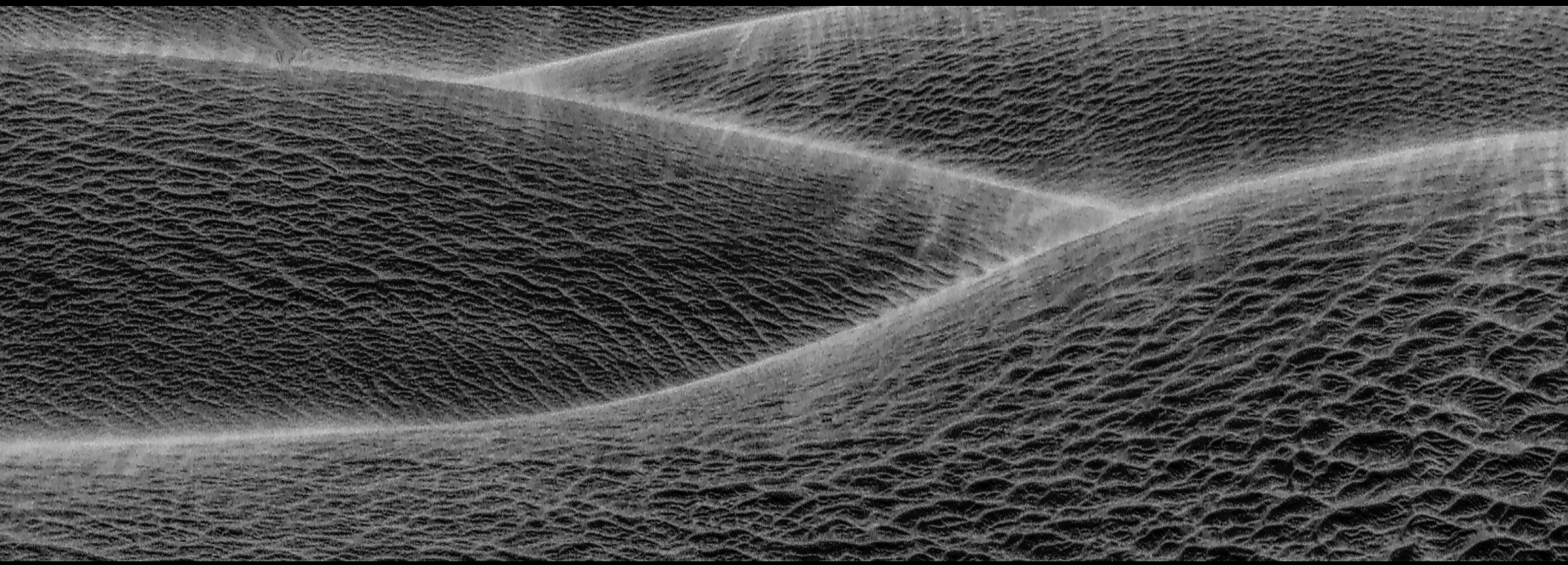
Week 1: Introductions. Course overview. Introduction to key concepts from evolutionary biology and earth sciences. We will learn about current neuro -biological findings on the remarkable and growing capacity of our maturing, evolving mammalian brains. Wizening up and wising up are entangled partners in the dance of living.

Week 2: Introduction to classical western “Enlightenment” ideas of separateness, specialness, and meaninglessness which have endarkened our sense of belonging as a species to Earth, and have rendered us spectators in and of our own lives. We will delve into new discoveries from quantum physics and evolutionary biology which reveal the interconnectedness and intra-connectedness of everything alive on the planet. We belong to, and are co-creators of, something big, Very Big and Alive.

Week 3: Continuation of our exploration of quantum discoveries begun in week 2 and inquiry into Native Science teachings on the non-hierarchical, circular, interconnectedness of all of life, especially the stances of All Our Relations and Being One of Many visible and invisible energies held within the container of the Whole of Earth. We, and every other being/element on the Earth, are matter, and it matters how we “make with" and “world” with all the others on Earth.

Week 4: Summing Up. Wizening up and wising up and dancing in our world.

WHAT IS YOUR EXPERIENCE OF WIZENING?



WIZEN-ING DEFINED

- Merriam-Webster definition: : to become dry, shrunken, and wrinkled often as a result of aging or of failing vitality.
- Biological process related to being alive.
- Earthly; not virtual, imaginative, cognitive, in-the-future.
- It is an ongoing process that is always Now and here.

WIZENING DEFINED

Wizening —as a present participle of the verb wizen —points to our lived experience of being mammal — of belonging to and being participants in Earth's living processes.

What does recent evolutionary and quantum biology tell us about the Living Earth?

GAIA THEORY

Life IS a Dance

The **Gaia Theory of James Lovelock** showed that life itself had altered the environment such that "the evolution of the species and the evolution of their environment are tightly coupled together as a single and inseparable process.. The conditions are only constant in the short term and evolve in synchrony with the changing needs of the biota as it evolves. Life and its environment are so closely coupled that evolution concerns Gaia, not the organisms nor the environment taken separately."

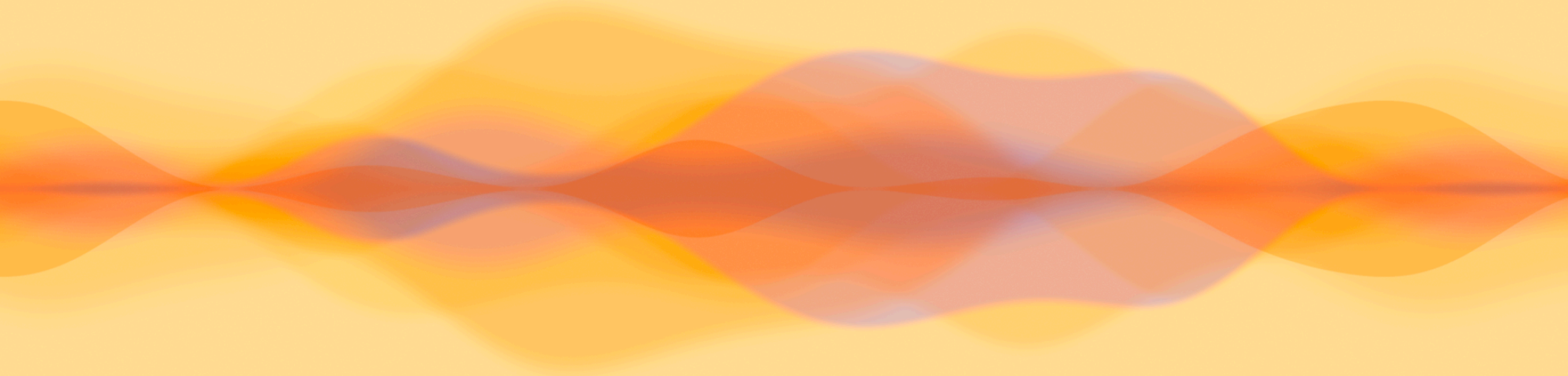
- J Lovelock, Ages of Gaia, NY: Norton, 1988, 19-20.

Biological processes are **collaborative** and **regenerative**, always creating the conditions for further living of the Whole.

WHOEVER COLLABORATES BEST, WINS.

Many ones “**make with**” (sympoesis) in order for the One, the Whole Earth, to exist. Everything is always changing at the singular “part”icipant level (earthworm, human, river) in order for the singular Whole (Earth) to flourish.

Evolutionary and biological processes of
decomposing and **recomposing**
are the means by which the conditions for further living are created.



We are always decomposing and recomposing our lives.

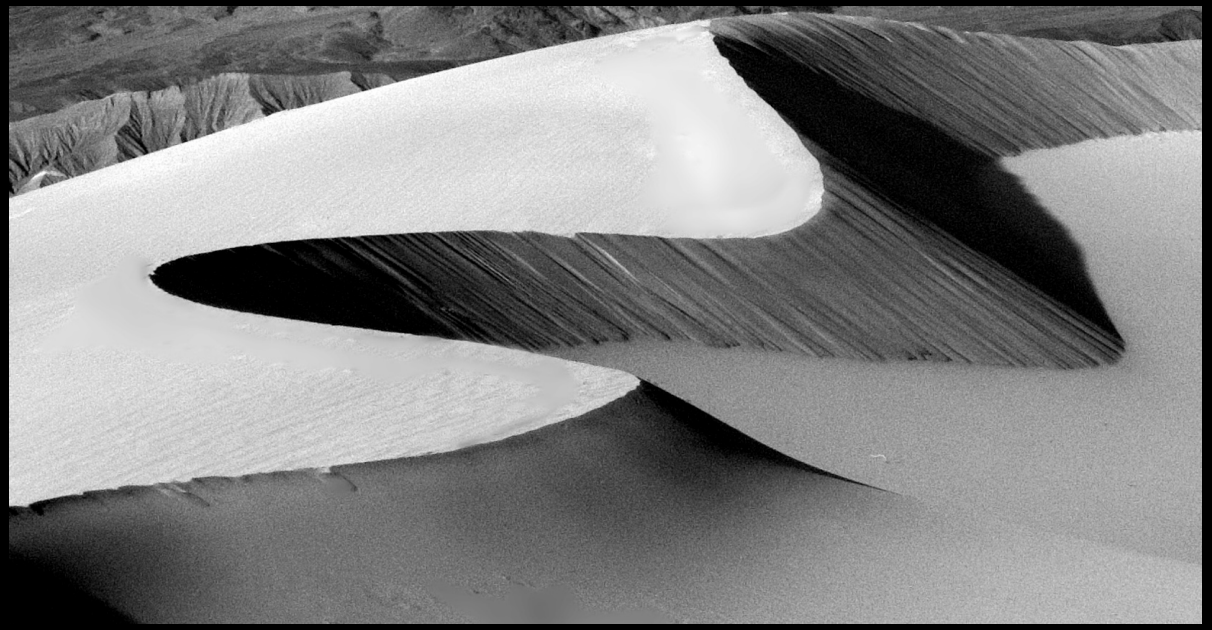
WIZENING IS THE MOST LOCAL OF LOCAL EXPERIENCES OF BEING IN AND OF SOMETHING BIG AND ALIVE.
IT EXPOSES US TO AND INVOLVES US DIRECTLY AND INTIMATELY IN THE MYSTERY OF EARTH'S DECOMPOSINGS AND RECOMPOSINGS.

IT EVOKES **WONDER**.

Wizening and Wonder

Wizening invokes our inner cosmonaut. What is happening? Who is this? What is this?

This tendency to become curious and seek answers is something humans and all mammals innately do; especially in the presence of phenomena that inspire awe (both scary and sublime).



How, then, is our own wizening involved and contributing to Gaia's/ Earth's/ Nature's collaborating and regenerating, decomposing and recomposing, in order to create the conditions for further living? What is going on right under our noses? Right beneath our skin? And all around us at the same time?

The Neurobiology Of the Wizening Brain.

Wising Up.

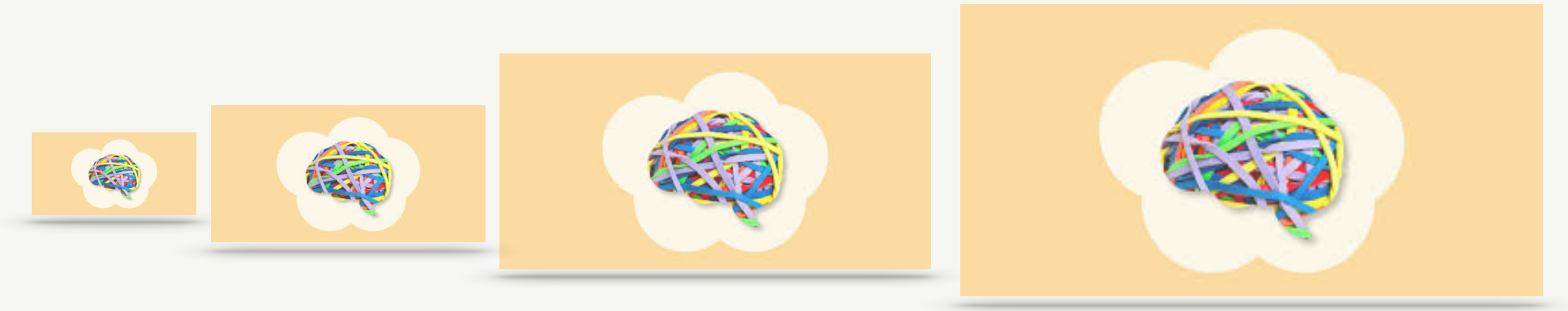
The aging body and brain hasn't been of interest or even on the research map until recently when researchers have themselves become older and others have begun to exploit the "anti-aging" gold mine.

I may not remember your name

But I remember a lot about you

Recent Brain Research: the MATURE BRAIN:

Our brain only begins to understand itself fully and revs up to full capacity somewhere between 48-65. (R. Cabeza and G. Bartzokis). We actually have more of our brain available at and after our mid 50's. Our brains become more "talented."



Recent Brain Research : PRUNING

Brain cells do not decline with age, we keep most of our brain cells for our whole life; however, connections to them are pruned with non usage. So, 'use them or lose them' applies.

SAKAI, JILL. "CORE CONCEPT: HOW SYNAPTIC PRUNING SHAPES NEURAL WIRING DURING DEVELOPMENT AND, POSSIBLY, IN DISEASE." PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA VOL. 117,28 (2020): 16096-16099. DOI:10.1073/PNAS.2010281117

Recent Brain Research : PRUNING — How's and Why's

The brain also uses the amount and frequency of use of neural activity to determine which synapses it needs to reinforce and which it needs to retain.

Those that are used less frequently and for shorter durations are flagged and the brain destroys them, probably via glial (non-neuronal) cells engulfing the synapses. Glia are the most abundant cells in the central nervous system and play a primary part in the process of sculpting neural circuits based on use and necessity.

SAKAI, JILL. "CORE CONCEPT: HOW SYNAPTIC PRUNING SHAPES NEURAL WIRING DURING DEVELOPMENT AND, POSSIBLY, IN DISEASE." PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA VOL. 117,28 (2020): 16096-16099. DOI:10.1073/PNAS.2010281117

Recent Brain Research: NEUROPLASTICITY

How we use our brain is important because brain cells are"neuroplastic".

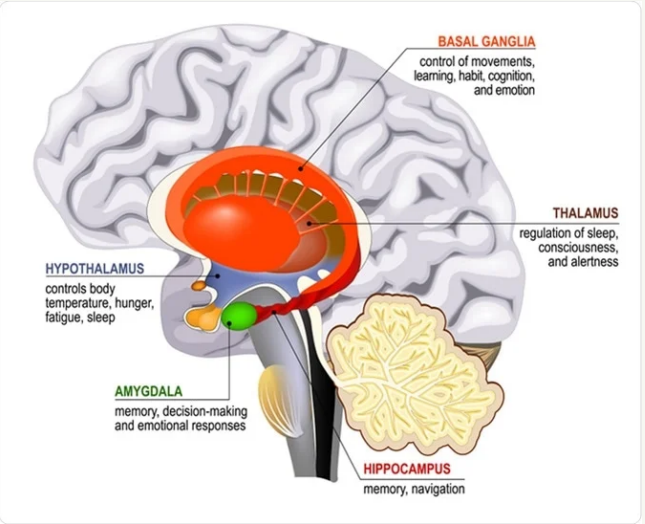
In other words, what we practice, we become.

Due to plasticity, we continually change. If you have adapted yourself to something you now dislike or want to free yourself of, you can change it. If you have developed something you treasure, keep practicing!

See Chen, Sebastianelli, and Smith

Recent Brain Research: MOVEMENT and Moving

Moving is the most important thing you can do for your brain. Neurogenesis happens when we move. Regular moving of our body through space or water actively stimulates the dentate gyrus in the hippocampus, which is the signaling center for the brain to build new neurons, produce myelin, and increase brain volume.



See Zou 2024, Lei 2019, Harridge, 2017

The 2022 study by Vardalaki revealed that in adult mice, about 30 percent of all synapses in the brain's cortex are silent.

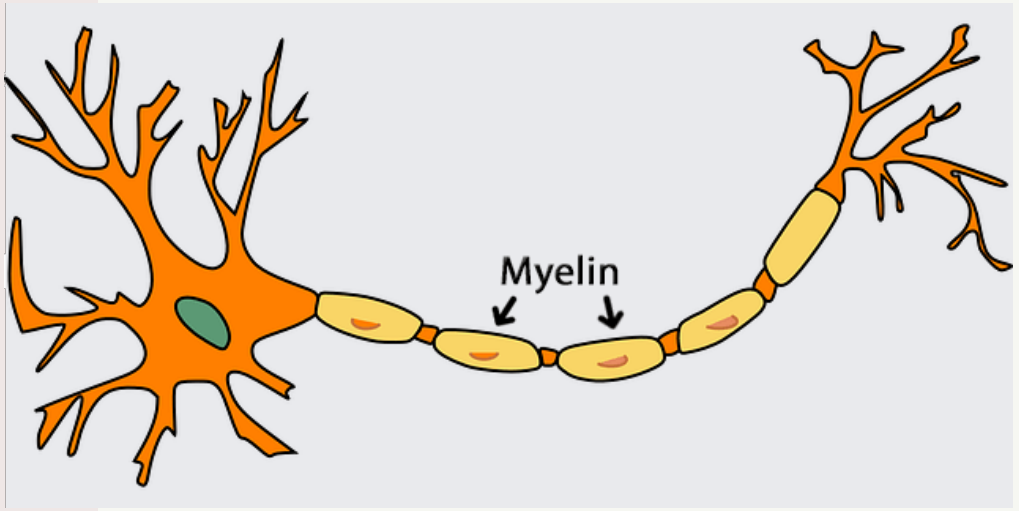
The existence of these silent synapses allows the adult brain to continually form new memories and learn new things without having to modify existing conventional synapses.

These silent synapses are looking for new connections, and when important new information is presented, connections between the relevant neurons are strengthened. This lets the brain create new memories without overwriting the important memories stored in mature synapses, which are harder to change," says Dimitra Vardalaki, the lead author of the new study.

See Trafton 2022, Vardalaki, D. 2022, Whalley 2023

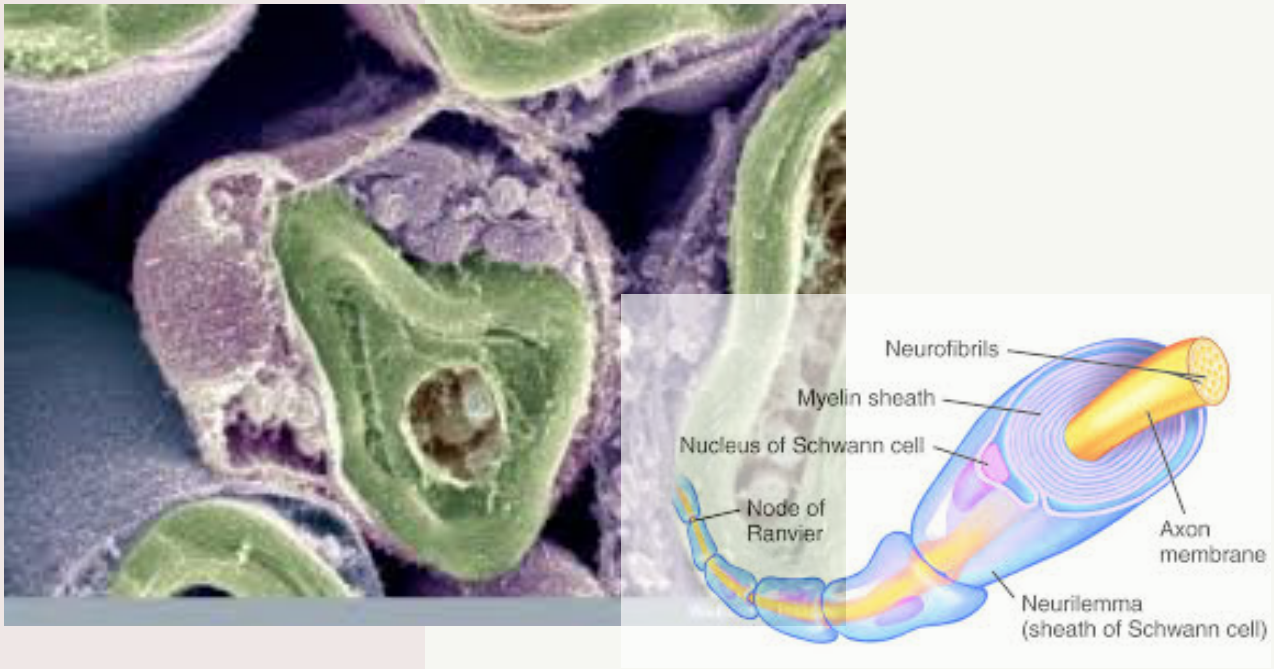
From dial-up to broadband

Myelin Brain Bloom

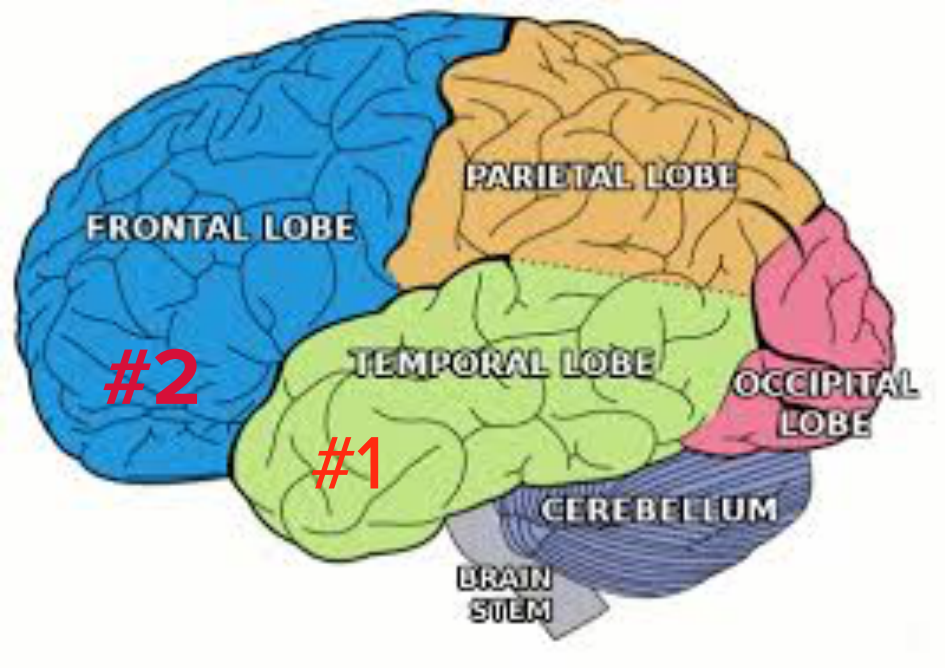


George Bartzokis, a UCLA neuroscientist, showed in 2001 that myelin, the fatty substance that insulates neurons (brain cells) and makes info pass between them more quickly, increased up to 3000 % for some in their 50's and some in their 60's, in two areas of the brain.

Myelin brain bloom



Myelin Brain Bloom

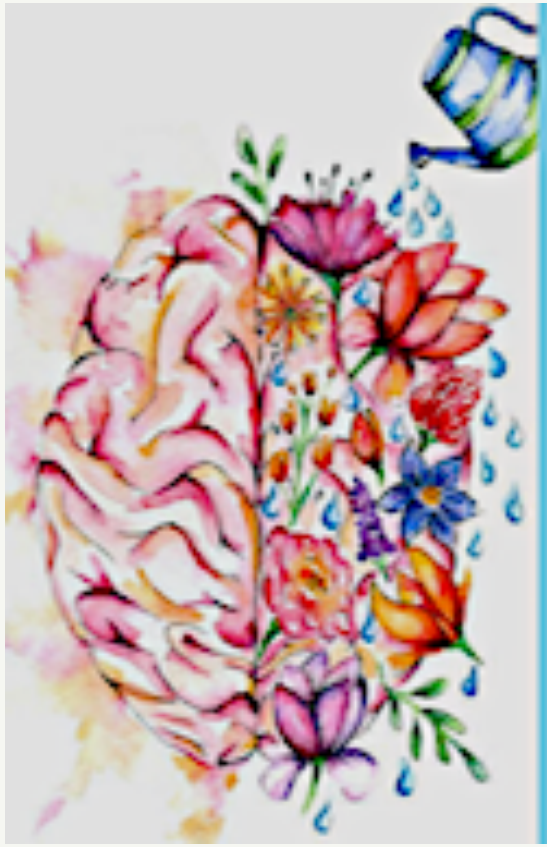


1. The biggest brain bloom is in the medial temporal lobe which is responsible for synthesizing and integrating experience and information.

2. The second biggest is in the medial prefrontal cortex (mPFC) which is our evaluation center for risk-taking, decision making, and control of emotions and impulses. Both brain blooms expand our inner world awareness-ing and our ability to choose, to modulate, and to evaluate.

3. This is different than the myelination that signals the end of adolescence and occurs in a different part of the brain around age 20-28. This earlier myelination boosts the ability to function in the outer world.

specific studies on the neuroscience of adult brain



Neural Integration And Dedifferentiation

Neural Integration and our Physical Bodies

Jumping with both feet together

*

Catching a ball with both hands

*

Swimming

*

Running

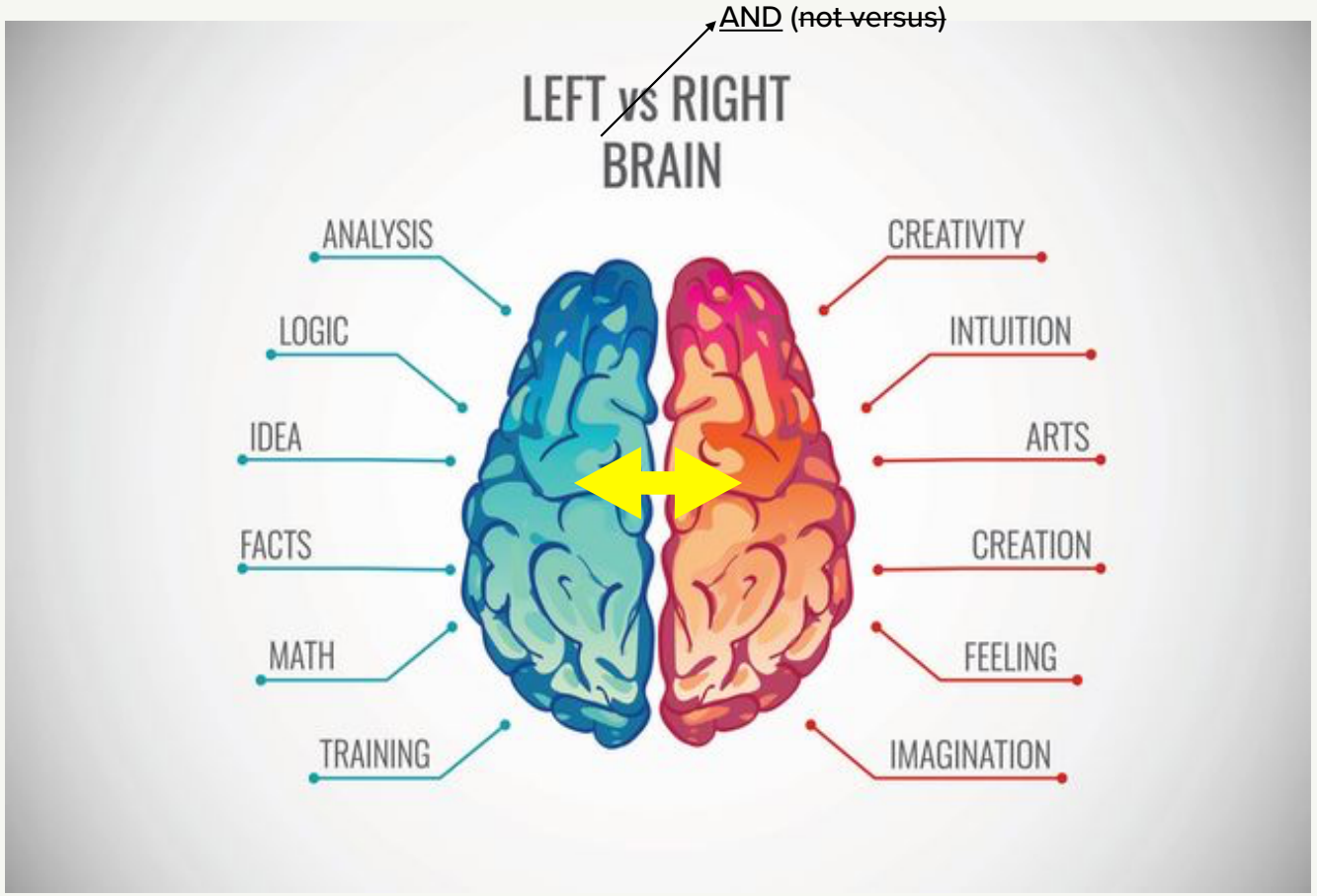
*

Playing the piano with both hands

*

Using a knife and fork in a coordinated way

The mature brain is more neurally integrated



(See Cohen, 2009)

Neural integration and processing information

In the first half of life, we use the two hemispheres for different tasks.
The left hemisphere for speech, language, logical reasoning, and the right for more intuitive, gestalt tasks like recognizing faces and reading emotional cues.

When we are younger, we use our right frontal cortex when recalling two words, when we are older we use both left and right—we use more of our brain, “two hands rather than one to lift the chair” so to speak.

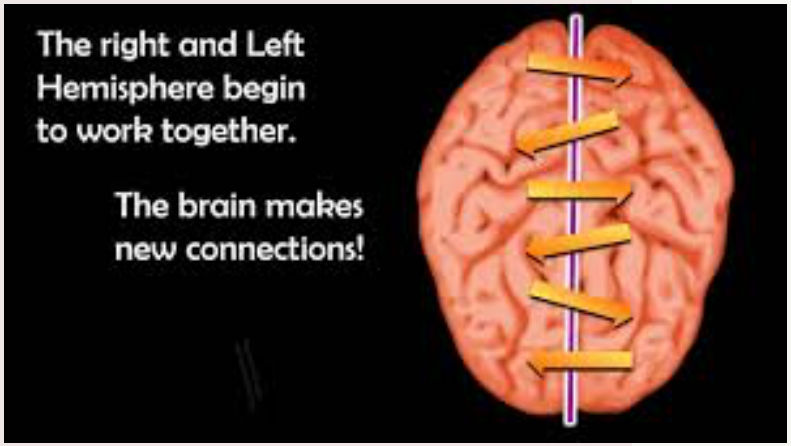
Ageing is associated with decreased neural selectivity (dedifferentiation) in cortical regions.

Dedifferentiation

Neural Dedifferentiation in the Aging Brain. Koen JD, Rugg MD. Trends Cogn Sci. 2019 Jul;23(7):547-559.

Cross-hemisphering

Using both “hands” of the brain



In our late 40’s to early 50’s, the left and right hemispheres become more densely wired and neurally intertwined, less bifurcated, and the pattern of bifurcation changes. We begin to use both hemispheres for tasks, “cross hemisphere-ing” (Cohen, 2009).

Cross-hemisphere-ing allows us to:

- Get to the point faster than a 20 year old
- Reconcile thoughts and feelings more easily
- Analyze situations and solve problems more accurately. See air traffic controller and pilot studies:

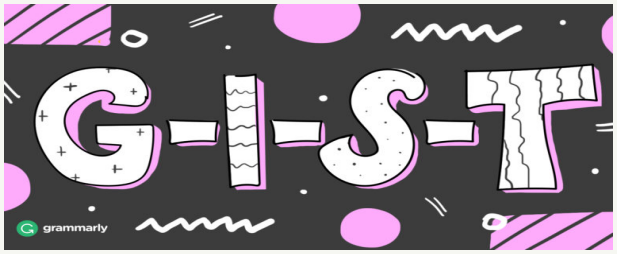
(See Taylor, 2007)

From *"New theories and research findings on the positive influence of music and art on health with ageing"*:

"Virtually every form of art provides optimal utilization of the benefits of synchronized hemisphere involvement, ultimately integrating left and right brain capacities — all art is like chocolate to the brain."

See Noice, 2014; Cohen, 2009.

Researcher: Valerie F. Reyna. American psychologist, Professor of Human Development at Cornell University.



1. Gisting (Valerie Reyna) means being able to understand and remember underlying themes. We remember what the story was/is mostly about. We CHUNK information instead of using verbatim memory. This means we more easily forget some details, such as names.

2. WE SEE A VASTER CANVAS...AND

3. WE DRAW ON MORE OF OUR RESOURCES simultaneously, e.g. life experience, intuition, objective knowledge, so we are more creative and capable problem solvers and we can solve complex problems that younger folks cannot.

What is a ‘senior moment’?

It’s a misnomer for our improved larger processor at work processing more infobits so it takes longe to derive an answer. No more snap judgments.

All of your brain library’s index cards are available simultaneously. It takes some processing time to sort and decide what is relevant and what isn’t. Someone’s name is a small fact in a library of knowledge about another person.

TIP: to remember a name, start from the big picture, think about all you know about that person, the name will sift out into your memory.

Improved decision making

Seeing the forest AND the tree

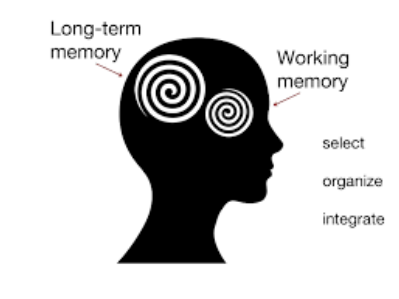
Less susceptible to dopamine squirts and knee jerk reactions

Being fierce and understanding

We are more adamant and sure about our truth at the same time that we recognize that there are many truths.

Long term memory retention stays stable

Long term memory receptors stay pretty much intact (is this lessons learned?)



Short term memory declines

But it is not because the ability to remember short term has declined,
but rather that the brain is challenged to retrieve the information b/c it is so full of stored info--- the library of information from which we are recalling things is just too huge to recall where you put your glass down a moment ago.

Plasticity and "Silent Synapses"

Receptors responsible for learning new things tend to die off unless we purposely keep activating them by learning hard new things like a musical instrument or a language…

Do anything that gives you a brain cramp.

Image Source: Olivia Gaines blog

Plasticity and Brain Reserve

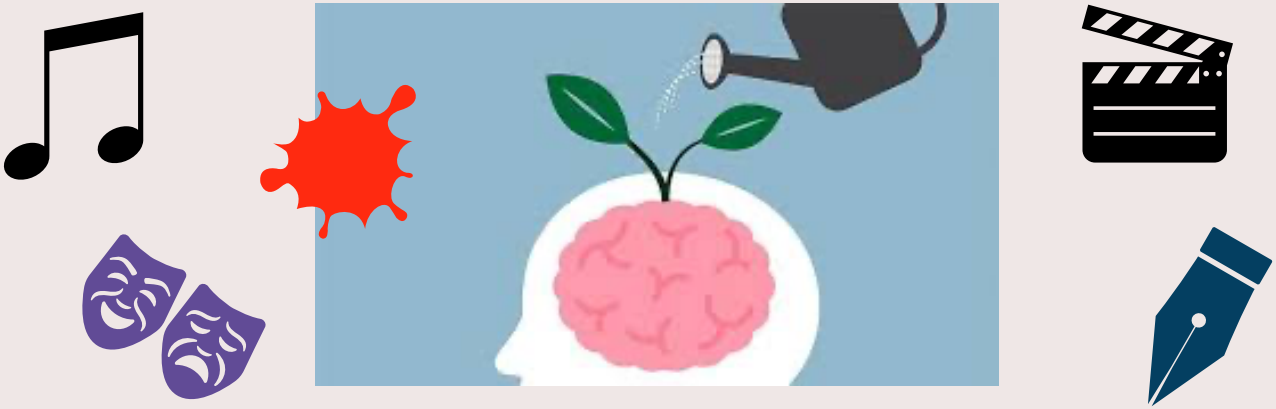
Research vividly demonstrates that when the brain is challenged through our activities or exposure to new surroundings, it is altered through the formation of new synapses -the contact points between cells.

Challenging activities induce the sprouting of new dendrites, thereby enhancing *brain reserve.* As with physical exercise, the brain, like muscles, benefits from the ongoing challenge.

Brain Reserve

A greater brain reserve delays the onset of Alzheimer’s and dementia

Researcher J. Verghese reported in the New England Journal of Medicine that having a greater reserve of neurons, synapses and dendrites can delay the onset of dementia and Alzheimer's symptoms since both conditions occur as a result of a decease in extent and efficiency of brain connections. A brain reserve of neurons, dendrites and synapses is built up as a result of engaging in challenging activities and new experiences and thus dementia and Alzheimer symptoms are delayed.

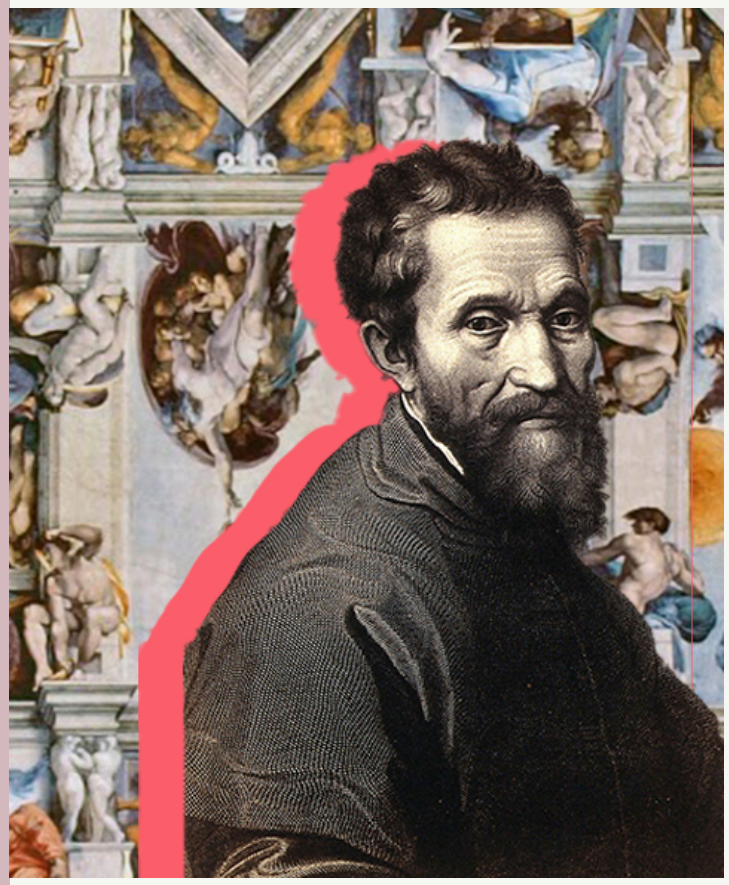


Matter and Mystery

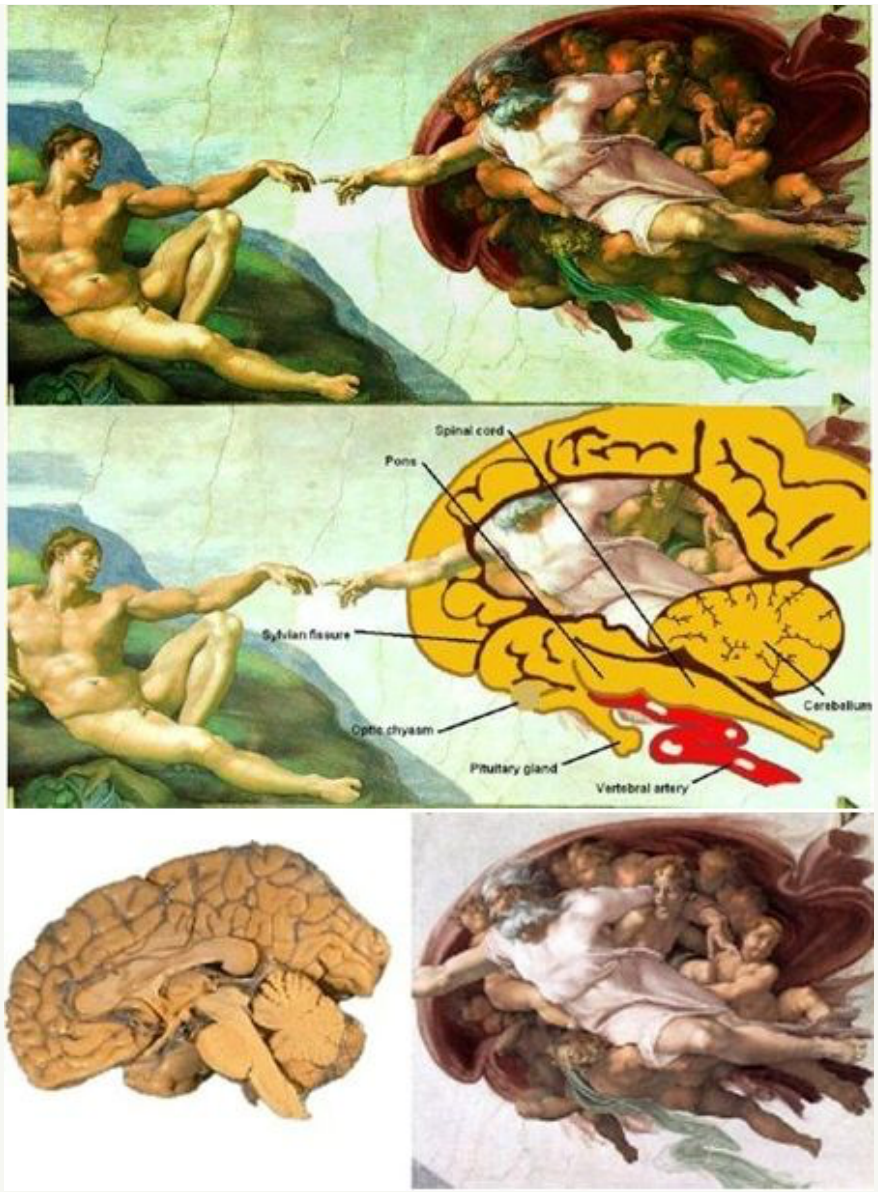
Michelangelo

"What spirit is so empty and blind, that it cannot recognize the fact that the foot is more noble than the shoe, and skin more beautiful than the garment with which it is clothed?"

"My soul can find no staircase to Heaven unless it be through Earth's loveliness."



See Meshberger 1990


Spinal cord
Pons
Sylvian fissure
Cerebellum
Optic chyasm
Pituitary gland
Vertebral artery

See Suk, 2010

Summary

Brain revs up to full capacity in early 50's.

Use it or lose it— or connections will be pruned.

Neuroplasticity— brains can and do change acc to what is done a lot and frequently.

What you practice, you become.

Summary

Moving is essential for neurogenesis. Move any part of your body to create more neurons and connections and myelin.

Myelin blooms in those parts of our brain that

1) synthesize and integrate info and experience, and

2) evaluate emotions and decision make.

Summary

Gisting becomes a skill.

We have a larger processor and access to it.

Brain becomes a Library, not a brochure of info.

Cross-hemisphere-ing.

Can see forest and tree.

Short term memory gives way to long term.

Summary

New challenges and experiences help retain immediate and short term memory and build brain reserve

Creativity blooms and ability to access it improves.

Plasticity plasticity plasticity: what you practice, you become.

Summary

We become ever more networked, able to "put it all together."

There is a neurobiology of wisdom.

This is yet another example of the fractal nature of nature. We are a microcosm of the macrocosm. A "Part"-icipant in Earth's Wholing. Networked. Evolving. A bidirectional alive conversation.
A "we/I".

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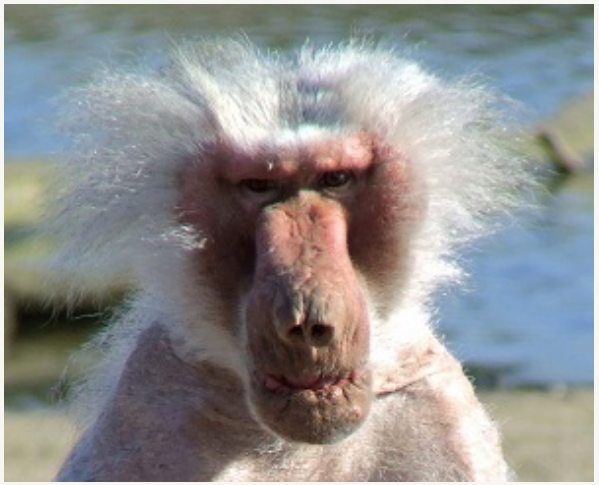

END OF NEUROBIOLOGY SLIDES