Head, Heart and Hands
Reading and Brain-Compatible Learning

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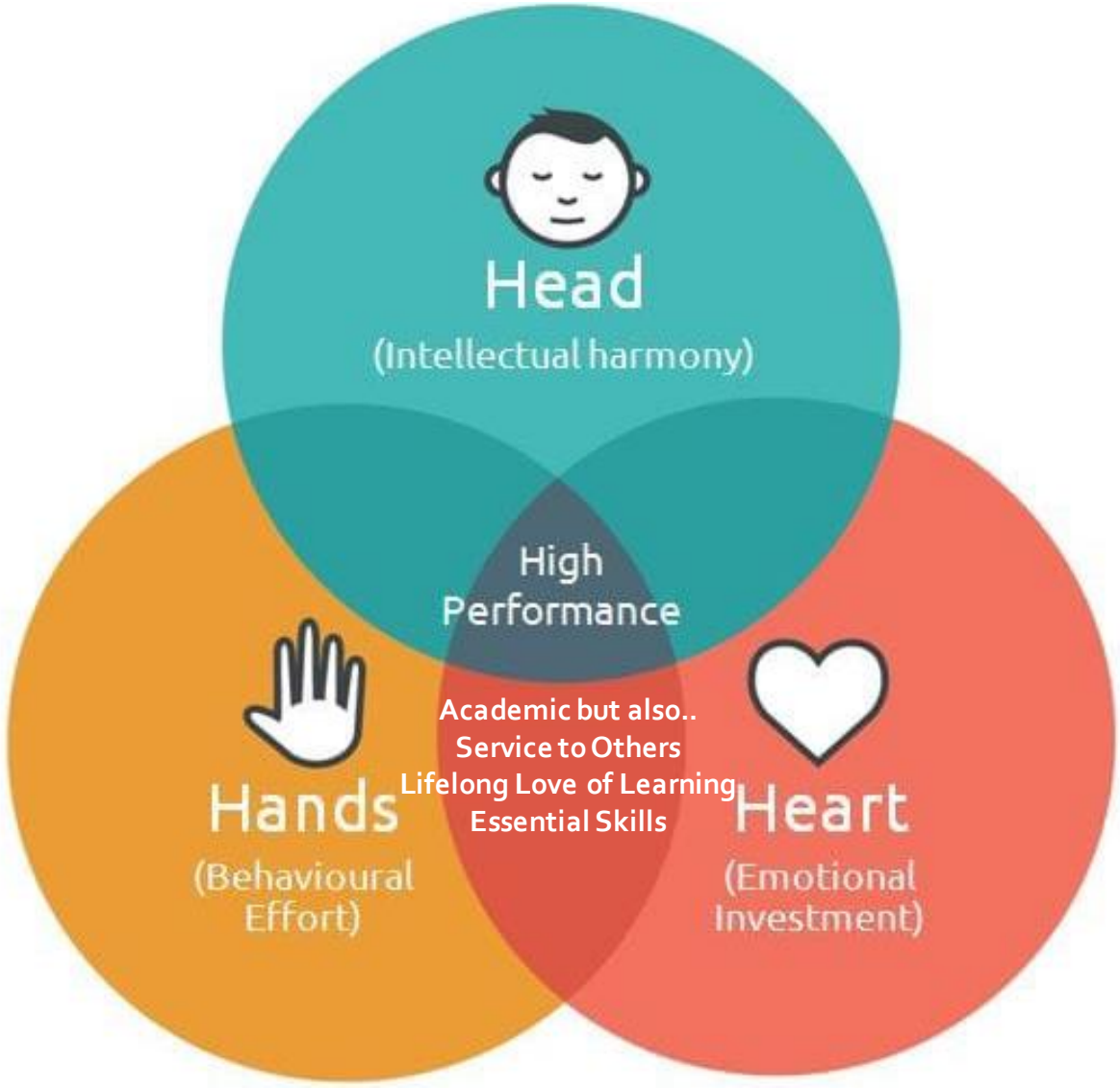
Welcome Parents and Caregivers!

- Introductions
- About the Barnard–UC San Diego Parent and Caregiver Education (PACE) Collaboration
- Recorded Sessions
- Awards (Upon Completion of Sessions)
- Today's Topic: The Brain—Where it all Begins

Recurring Themes

Good For Heart, Good For Head, Good for Hands



Books for the Reading and Books for the Writing

I kept always two books in my pocket, one to read, one to write in.

Robert Louis Stevenson

What's the Big Deal With Reading Anyway?

Imperative for engaging every aspect of life every hour of every day—be it in a textbook or in a text message. Key to social engagement and survival in the modern world.

Ability to express and share opinions and to access information.

Holistic approaches to literacy that move beyond reading and writing (also includes visual and digital media).

Literacy is the cornerstone of development. It leads to better health, better employment opportunities, safer and more stable societies.

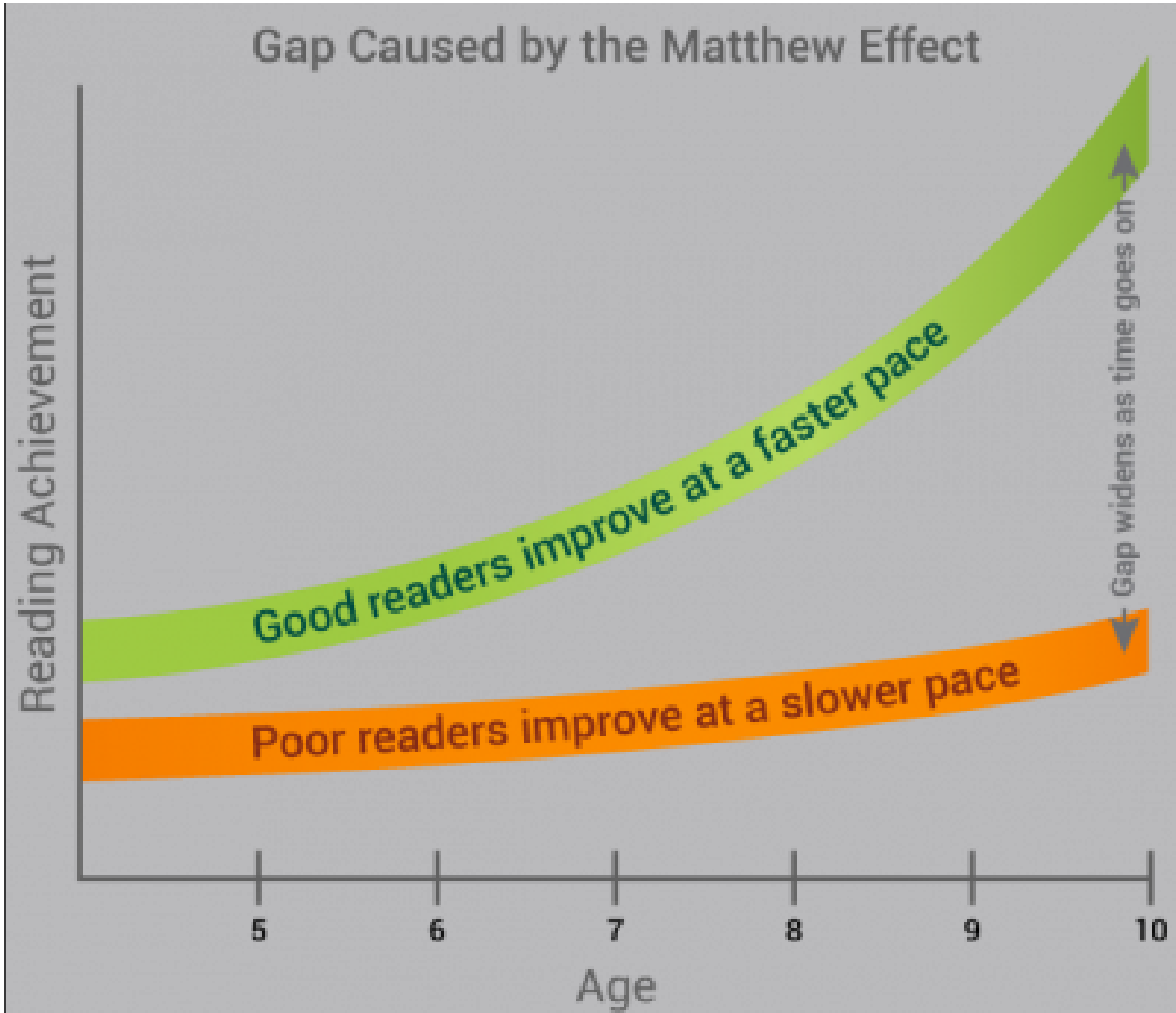
Source: National Literacy Trust, 2017, among others

Literacy Development and the Matthew Effect

This idea (by Keith Stanovich) is that children who learn to read in the first three years of their education become fluent readers. They read more, learn more vocabulary which then enables them to read more and comprehend more advanced texts and so they advance further.

The children who fail to learn to read, read less, are less fluent, have a poorer vocabulary, comprehend less and the gap just keeps on growing. It is the principle of 'The rich get richer and the poor get poorer'.

Source: **Phonic Books,** 2017



Learning Reading as Brain-Based Developmental Practice

- Novice readers use different neural pathways when reading than do skilled readers (efficiencies)
- Those with reading difficulties access different brain regions to decode than proficient readers
- The brains of those with reading difficulties work harder than those without them
- The brain can be retrained for young struggling readers (rewired) to better align with cerebral processes used in proficient readers

Learning Reading as Brain-Based Developmental Practice

- Need for novelty (Reticular Activating System) and emotional connection
- Skills repetition (automaticity): denser neural connections and myelination (quickens nerve impulses)
- Reading as integration of two systems: the ability to speak (language circuit) and object recognition system, both present in infancy
- After sounding out a word, stored in the form of a picture (place and face recognition for lower primates)

Source: B. Bell *Brain-Based Strategies for Struggling Readers* downloaded 2021.

Thinking About the Brain

Although we may have seen evidence to the contrary, everyone has a brain. Everyone.

We don't think much about the brain, but we rely upon it every day for ***everything*** we do.
Any strategy or advice I can provide starts here.

This begs the questions: *what is up with the brain?*
Why do we have a brain, anyway?

Reading and the Survival-Based Brain

*The brain has but **one purpose**. Although it is a great place to store information, the brain is here for one thing: **helping us navigate the world and survive**. We use the information we store to help us survive.*

This was true of the great reptiles and is true today. The brain is specially designed to solve problems in the world.

Wisdom from the Ancients

In ancient Egypt, when humans were preserved through mummification, the brain was discarded—it viewed as a superfluous organ. Egyptians believed that the heart was the center of all emotion and learning.

Learning lies at the heart of surviving and thriving as humans.

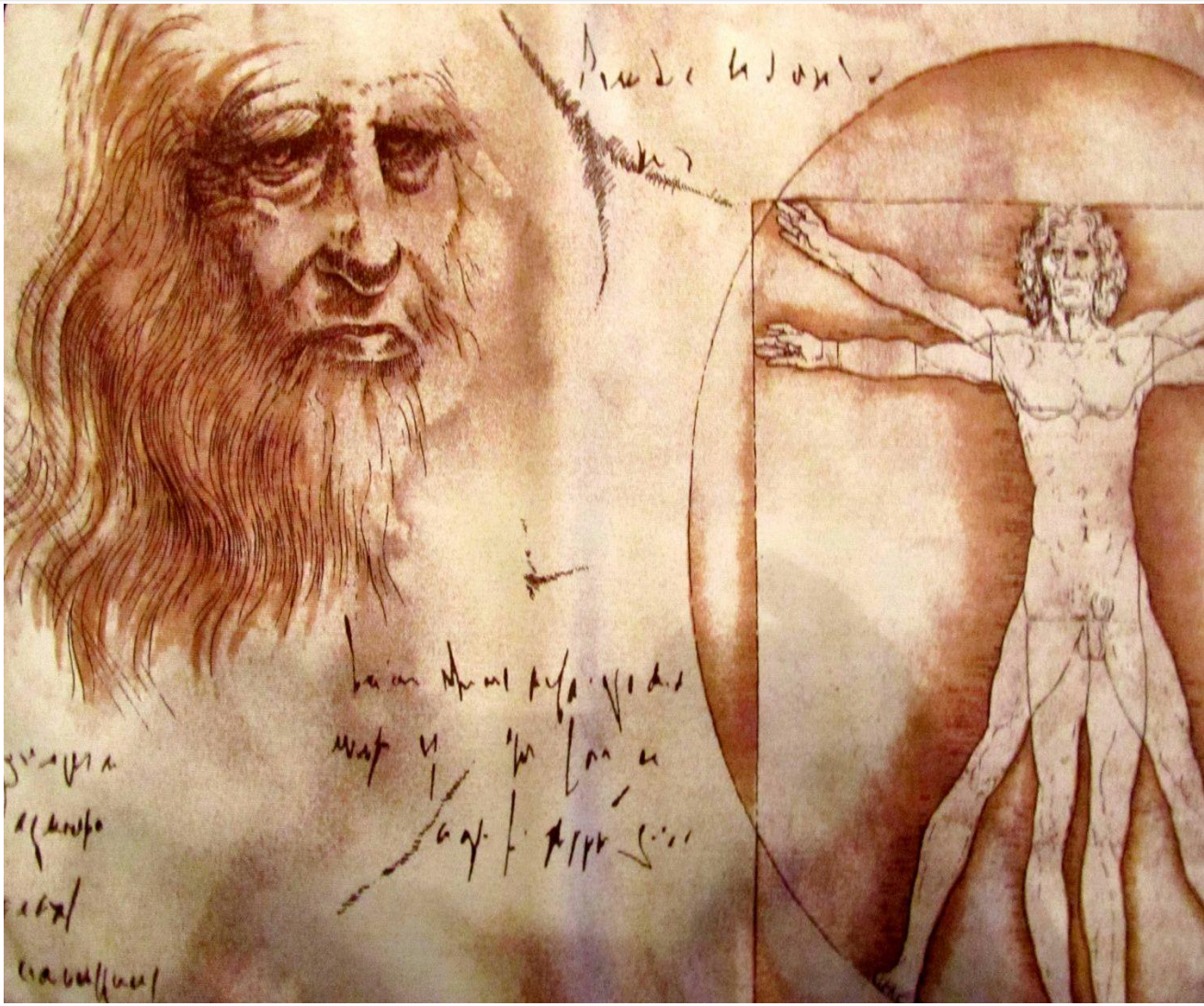
Wisdom from the Original Renaissance Man

"As every divided kingdom falls, so every mind divided by many studies confounds and saps itself."

"I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough. We must do."

"He who loves practice without theory is like a sailor who boards a ship without a rudder and a compass and never knows where he may cast."

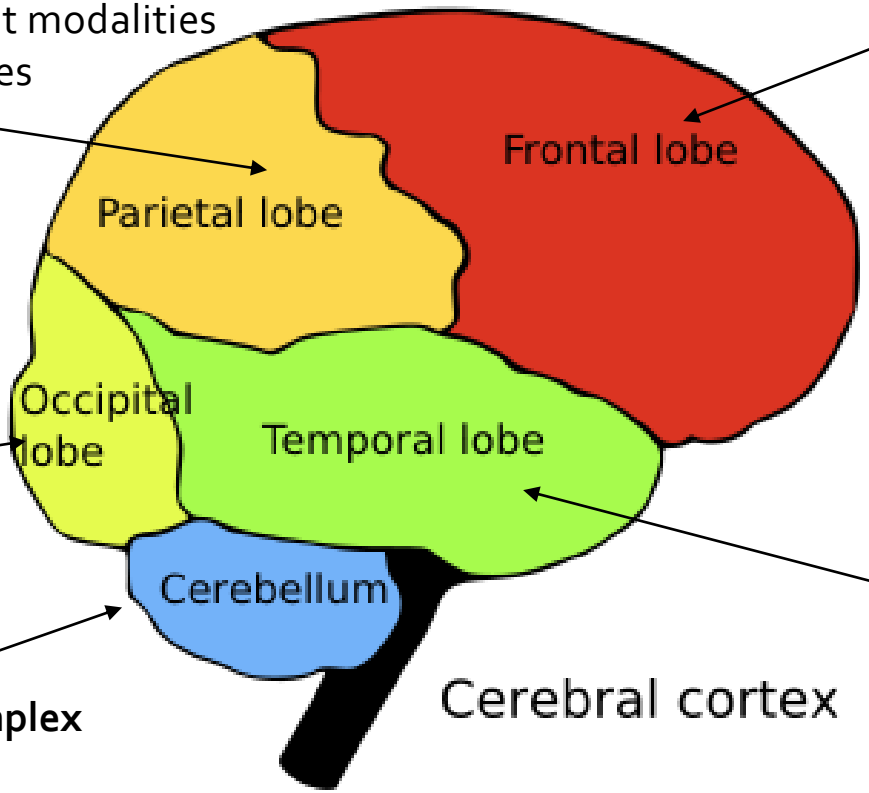
"All our knowledge has its origin in our perceptions."



The Human Brain

Integration of
Sensory information
From different modalities
Making Wholes

Impulse Control
Judgment
Language
Working Memory
Motor Function
Socialization
Spontaneity
'Human Things'



Visual processing

Auditory processing
Speech
Vision
Semantics

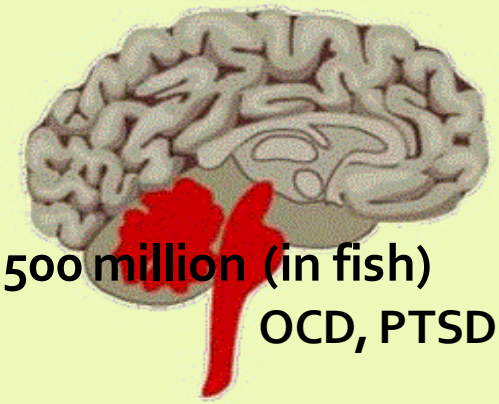
Cerebral cortex

Reptilian complex
Motor control
Sensory pathways
Some cognition
'Little Brain'

The deeper you go into the brain, the more primitive the structure.

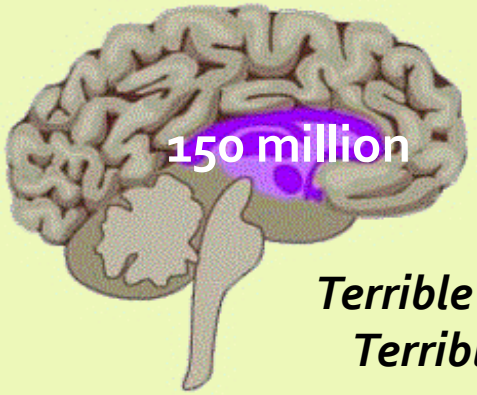
A Different Perspective

The Three-Parted Brain

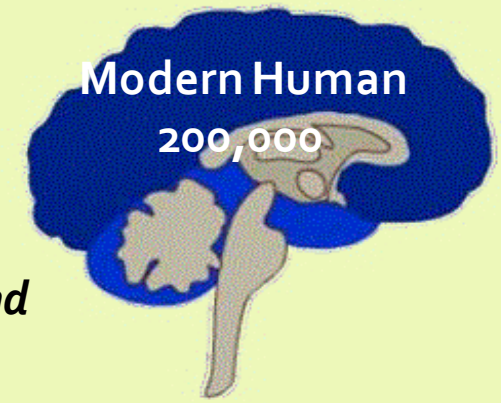


500 million (in fish)

OCD, PTSD



Terrible Twos and Terrible Teens



Lizard Brain
(Brain stem and cerebellum)
Autopilot
Fight & Flight

Mammal Brain
(Limbic System)
Emotions
Memories
Habits
Attachments

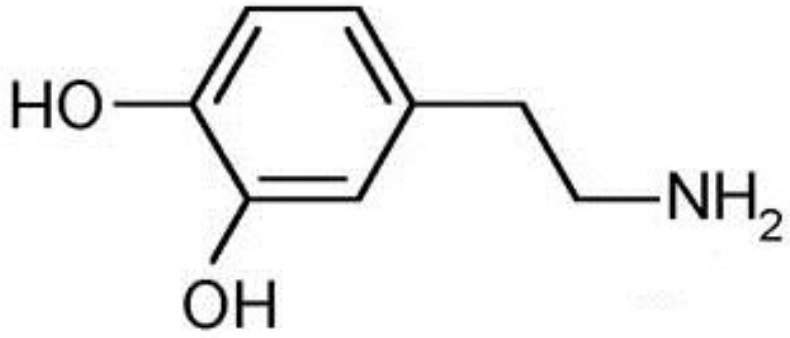
Human Brain
(Neo-Cortex)
Language, abstract thought, imagination, consciousness, reasoning, rationalising

(From Paul D. MacLean's model of the "Triune Brain")

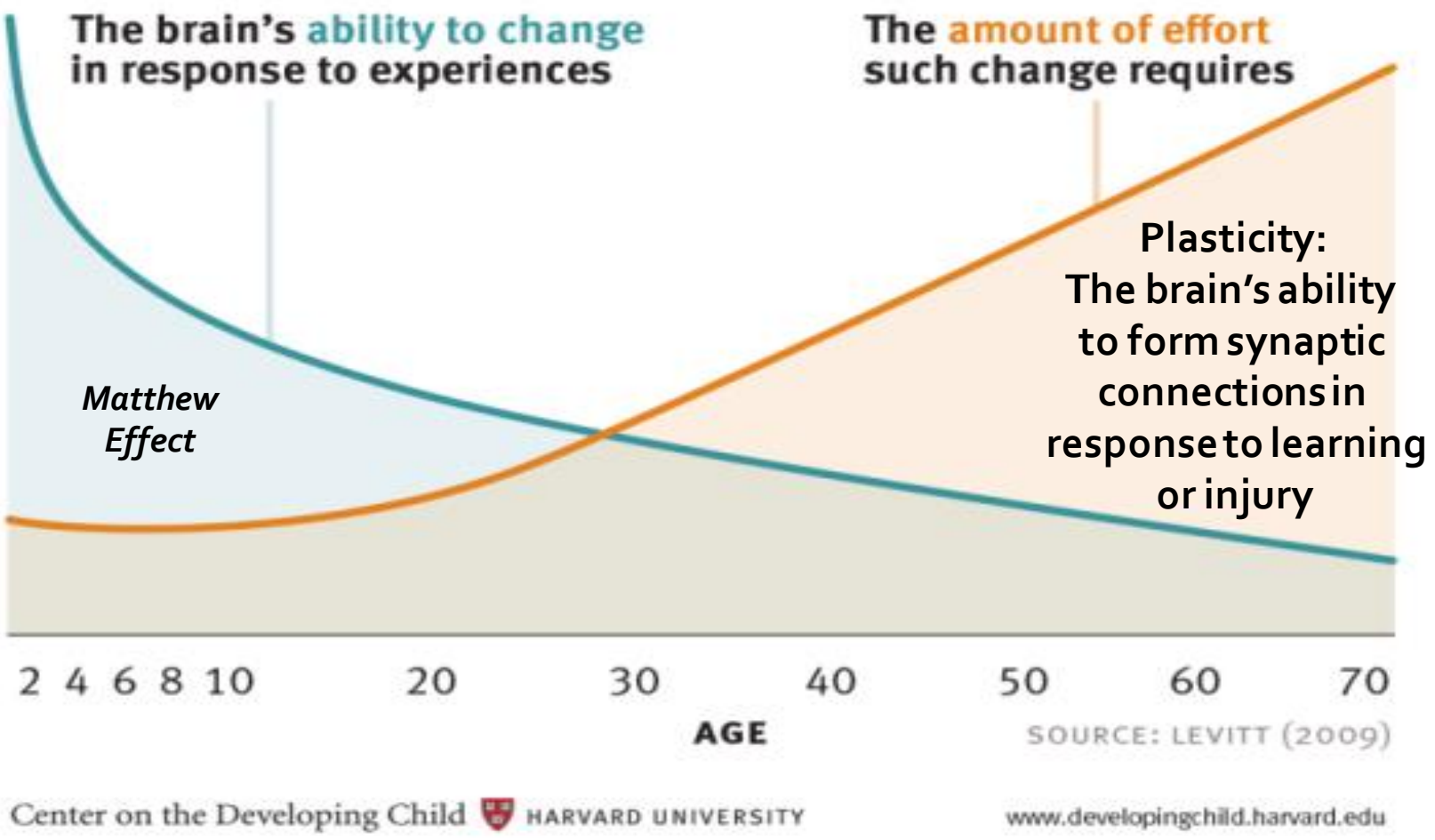
The Neurochemistries of *Persistence* and *Avoidance*

- **Positive** feelings about a learning experience produce *endorphins* (euphoria), *dopamine* (stimulates the prefrontal cortex), *oxytocin* (puppy love/trust/relationships) and *serotonin* (well-being)

- **Negative** feelings about a learning experience produce *adrenalin* and *cortisol* –which puts the brain in survival mode and causes anxiety/ stress

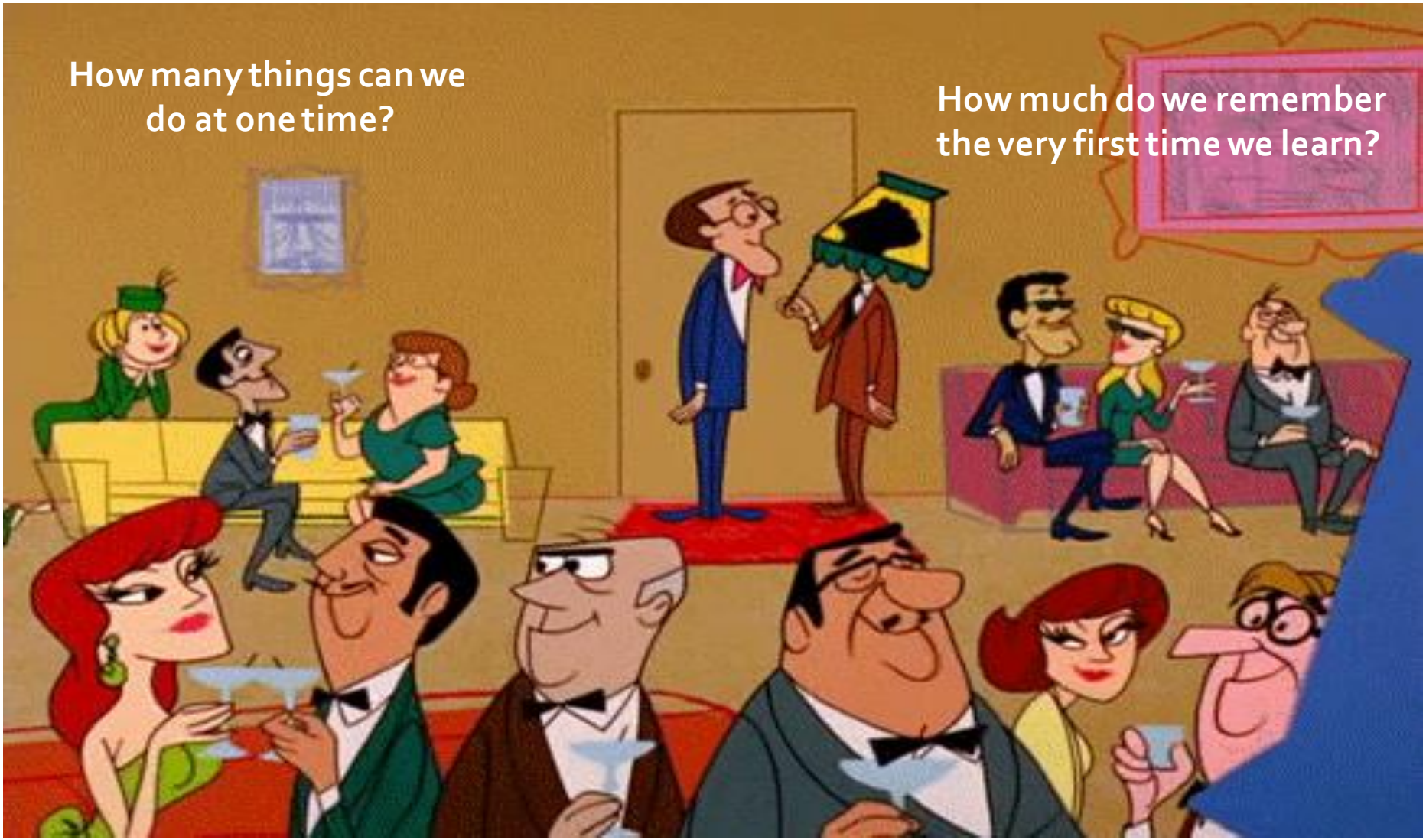


Aging and Plasticity



Source: Edutopia and Harvard University, 2021

The Cocktail Party Effect



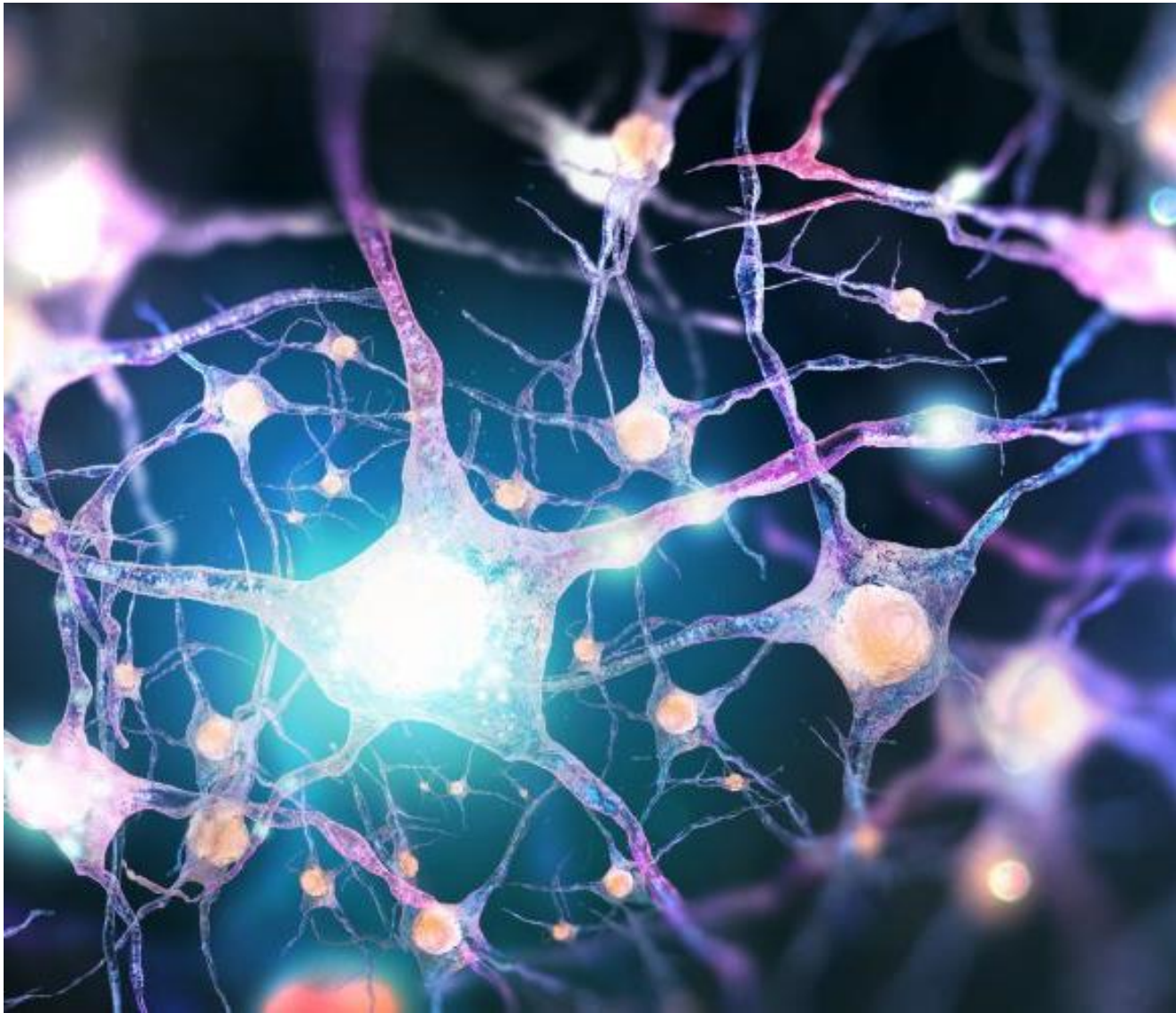
How Does the Brain Learn?

Over 100 billion nerve endings in the brain that process information.

Active learning creates dendrites/fibers that bridge across them.
As dendrites grow closer, they create synapses (bridges).

This is the process of learning—the creation of neural networks or pathways

Information stored in various parts of the brain



Understanding the Brain

- Learning involves **multiple parts** of the brain, **multiple modalities** and **senses**
- New information stored in different parts of the brain, but connected loosely by **neural networks** (bridges between different parts of the brain)
- Because the brain is 'network based', it searches for meaning and context within to help process new information and its significance
- In practical terms, the brain asks itself 'have I seen this before? Where? Was it important?'

Gaining New Knowledge: Stronger Nets

Learning new things is the process of adding additional layers of information onto what we already know.

In this way, not only does our knowledge improve, but our understanding becomes stronger and more flexible.

Learning: The Brain/Body Connection

- When the brain is 'excited' by new information (that is, meaningful), a variety of physiological processes occur:
  - Adrenalin (fight or fight) and cortisol flow: harkens back to an earlier time
  - The brain says: **STOP!** This is important— **PAY ATTENTION!**
  - Digestion processes slow
  - The logic/rational part of the brain begins to shut down so that the brain may pay better attention
  - Recall a time that you learned (or taught) something that really grabbed you— were you emotionally engaged?

Twelve Brain-Mind Principles

1. The brain is a complex adaptive system.
2. The brain is a social brain.
3. The search for meaning is innate.
4. The search for meaning occurs through patterning.
5. Emotions are critical to patterning.
6. Every brain simultaneously perceives and creates parts and wholes.
7. Learning involves both focused attention and peripheral attention.
8. Learning always involves conscious and unconscious processes.
9. We have at least two ways of organizing memory.
10. Learning is developmental.
11. Complex learning is enhanced by challenge and inhibited by threat.
12. Every brain is uniquely organized.

Source: *Caine and Caine (1997)*

How Does Memory Work?

In context, searching for meaning

Memory is reactivation of pre-existing neural networks and building upon them (scaffolding)

The importance of redundancy and reinforcement across the curriculum

The Dynamics of Memory

Sensory Memory

- Received through the senses: auditory, olfactory and visual (immediate)
- Filters into short-term memory by attention (what is important at the time?) – survival mechanism

Short-Term Memory

- "Scratch Pad" for recall of information under process (need to recall beginning of sentence to understand the end)
- 30 seconds without repetition
- "Chunking" helps (hyphenated telephone numbers and credit cards/organizing essays)

Long-Term Memory

- Long-Term Storage (little decay)
- Episodic and Semantic Memory (scaffolding)

More About Long-Term Memory

- Three functions: **Storage, Deletion, Retrieval**
- Repeated exposure/rehearsal transfers from Short-term to Long-term Memory—encoding repeatedly processed in the hippocampus
- Learning is most effective over time
- Deletion through interference or decay
- Retrieval: **recall** (reproduction) and **recognition** (knowledge that information has been seen before)
- Memories not stored in a specific location, but spread through the brain's entire surface

Learning Reading as Developmental Practice

Multi-step/-level that occurs over time with greater degrees of proficiency

- Phonemic Awareness
- Phonics instruction
- Vocabulary
- Fluency
- Comprehension

Source: B. Bell *Brain-Based Strategies for Struggling Readers* downloaded 2021.

Enhancing Motivation

Habituation and Novelty

Confidence

Play

Joining the Community

Source: ASCD, 2021.

All You Need is Love

When it comes right down to it, we have an innate sensibility that pushes us forward creatively.

Students want to feel appreciated, confident and experience a general sense of solace and success as they move through school, career and life.

But in the end, it is unconditional love that all we need to make it through.

Comments and Questions

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