Autism and the Brain

Brain Research for Better Outcomes

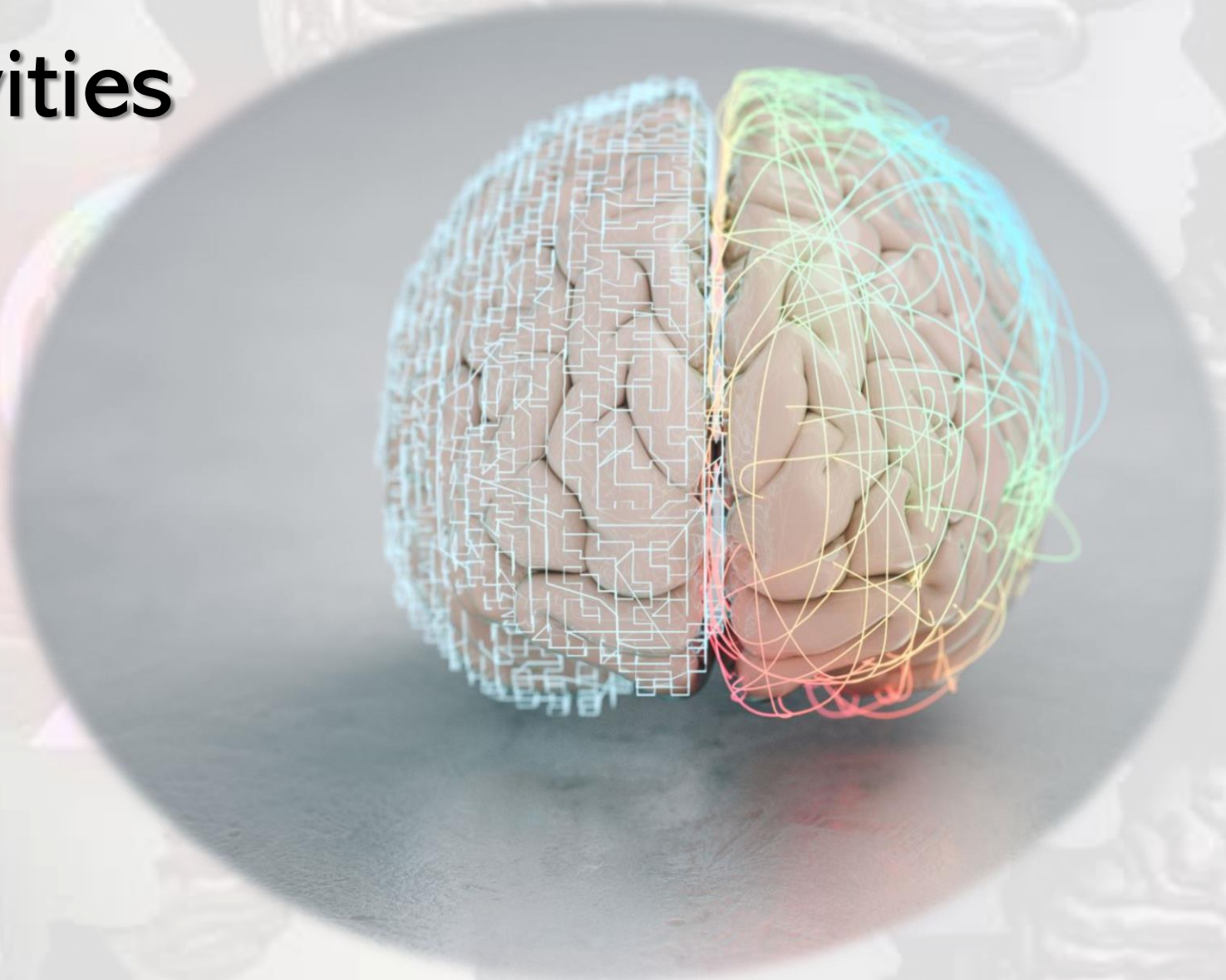




- When we know our "why"…
- This is to make you think…

Strong Brain Activities
(Quick and Fun Activities)

- Synapses
- **Neuroplasticity (Depression and Anxiety)
- Limbic System
- Prefrontal Cortex
- **Corpus Callosum




Strong Brain Activity

What have you heard?

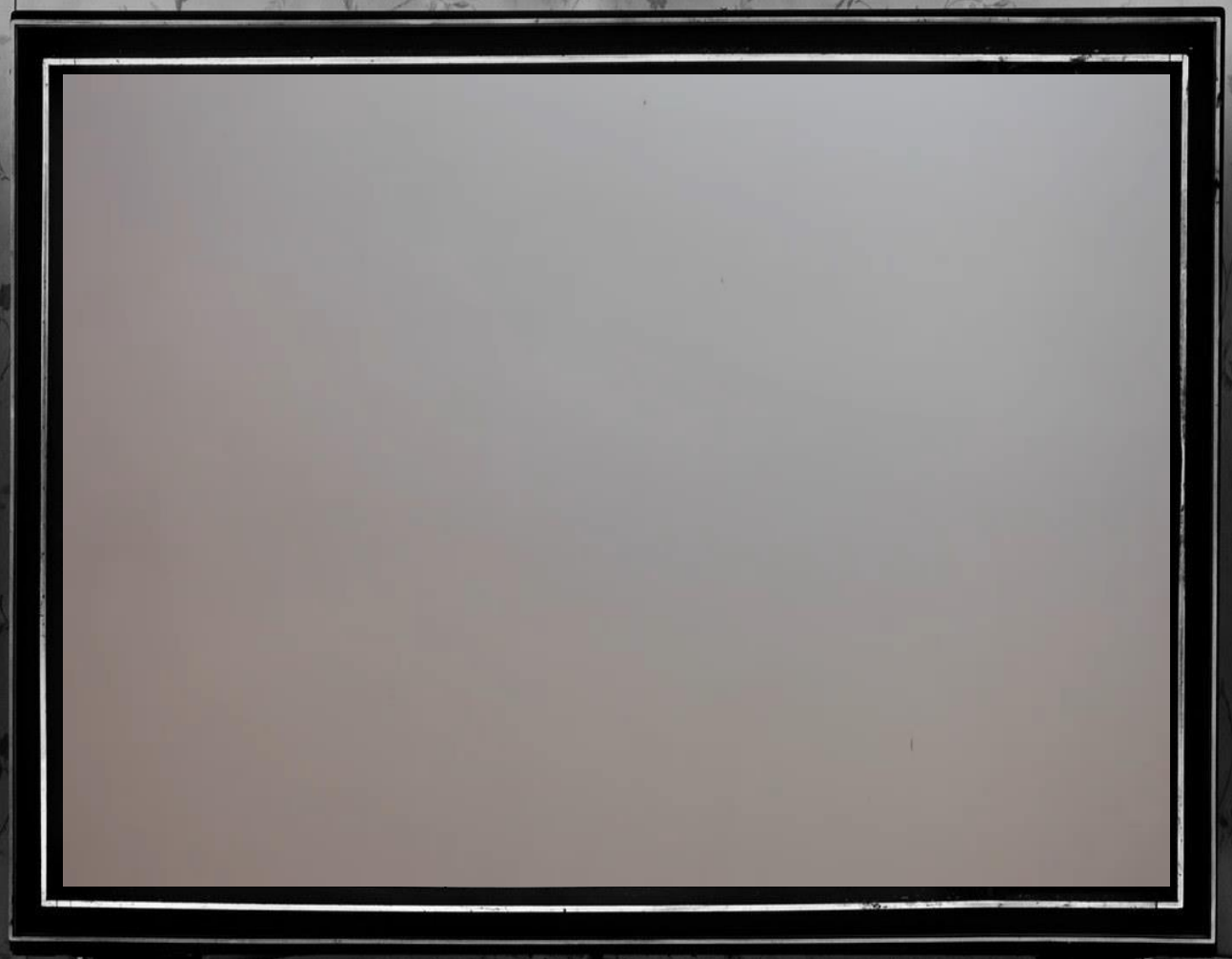
Some of the latest brain research in autism:

- Amygdala development
- Genome/gene therapy
- Brain changes in white matter
- Prenatal brain changes
- Eye gaze
- Screen use
- Exercise and movement
- Peers
- Trauma informed teaching
- Mental health supports
- Music
- Control/compliance-based interventions and their effects on increasing anxiety

2 Areas of Brain Research

Start Having an Impact Today

Screen Time



Screen Time and the Brain

(…and now we have "virtual" everything…)

- Technology is not inherently good or bad, the outcomes depend on how we use it (over use is detrimental to brain development, social-emotional growth, behavior regulation, and so much more…)…Addiction, addiction, addiction

- Areas of the brain that are affected the greatest include: **Limbic System** and **Frontal Lobe**
  - current research found frequent use of digital devices to calm young children leads to increased emotional dysregulation, particularly in boys and children with strong temperaments (Wachsman, 2022)
  - using devices, such as phones or tablets, to soothe dysregulated young children hinders the children's chances of learning emotion-regulation strategies over time and decrease their executive functioning. Emotional regulation allows children to stay calm, focused, and flexible as they face new challenges (JAMA Pediatrics, 2022)

Diet



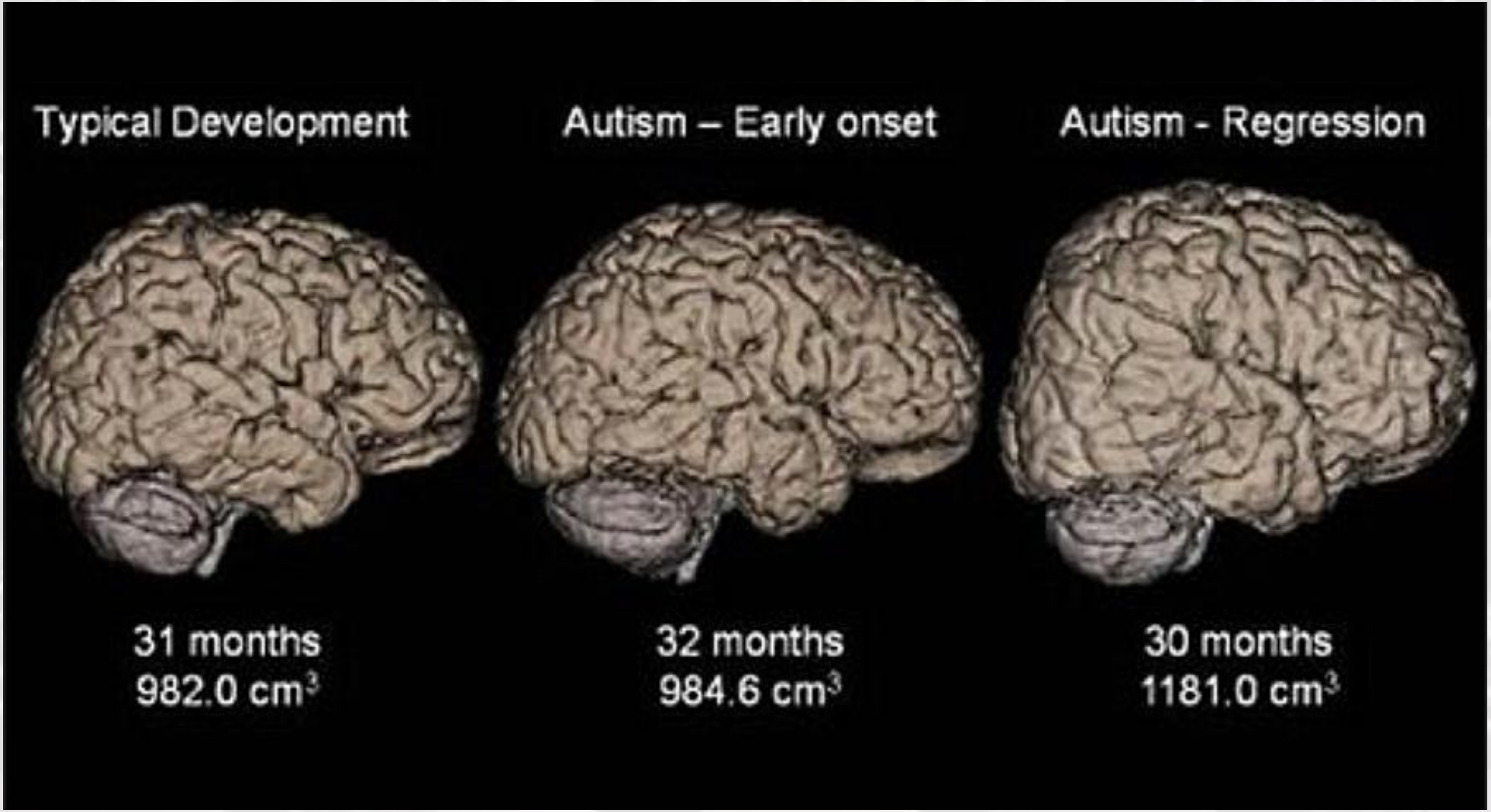
Some Other Areas of Brain Research

Understanding the “Why” for Better Outcomes

Brain Structure Studies

- Abnormal brain development beginning in the first month of life
- Rapid brain growth during 6 and 14 months and again around age 2…the faster the growth the greater the impairments
- Knowledge and skill organization
- Sensory input and organization




Typical Development
Autism – Early onset
Autism - Regression
31 months
982.0 cm3
32 months
984.6 cm3
30 months
1181.0 cm3



- More brain tissue in the cerebrum and cerebellum…but white matter is disproportionate to this increase and it becomes impossible to interconnect so many extra brain synapses


Strong Brain Activity


FUN
TASKS
WORK
MEALS
TIME
SLEEP
SCHEDULE

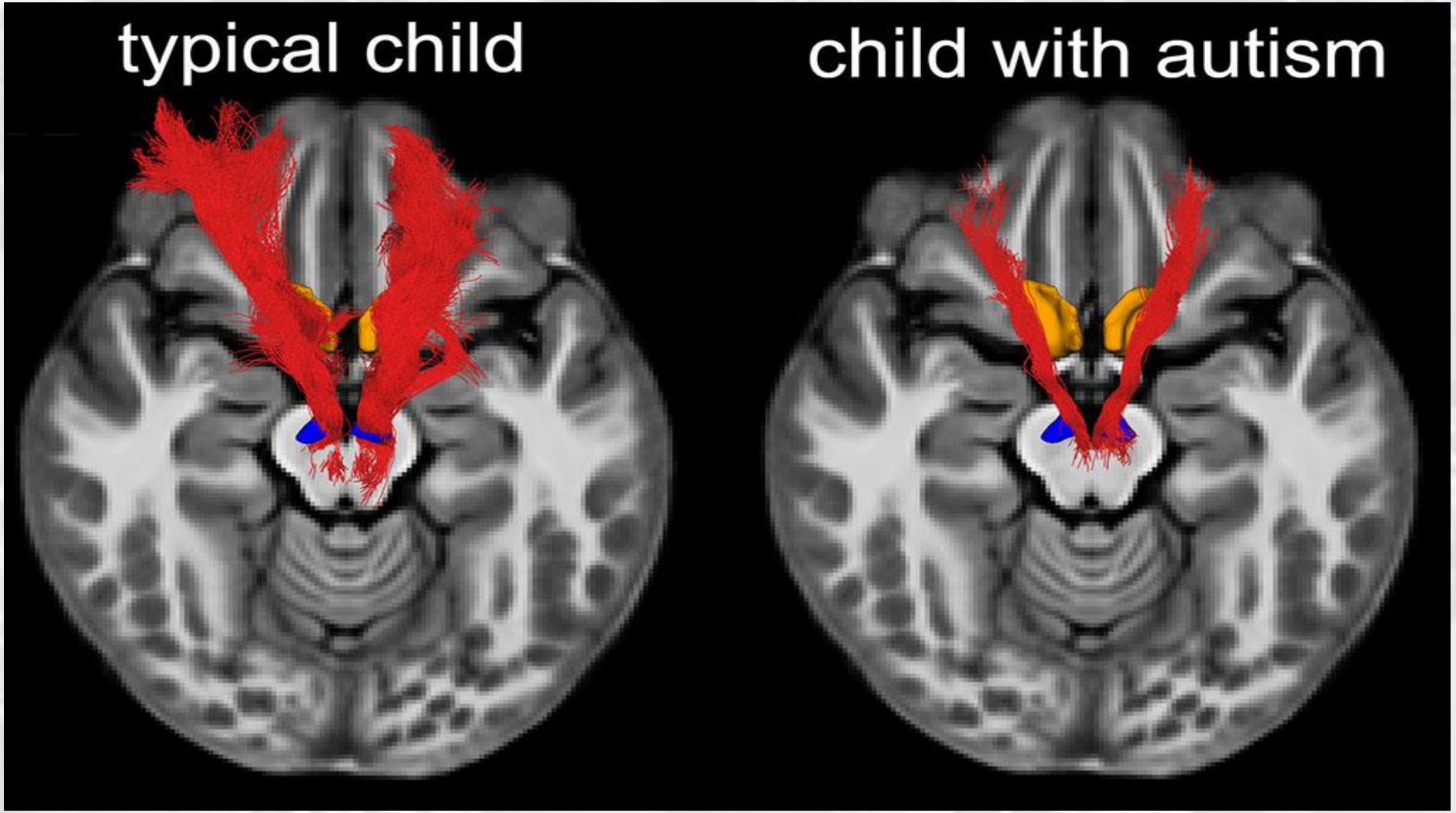
Processing and Autism

Processing is delayed in one or more areas on average from 20 seconds to 2 minutes…

How Well Would You Do Activities

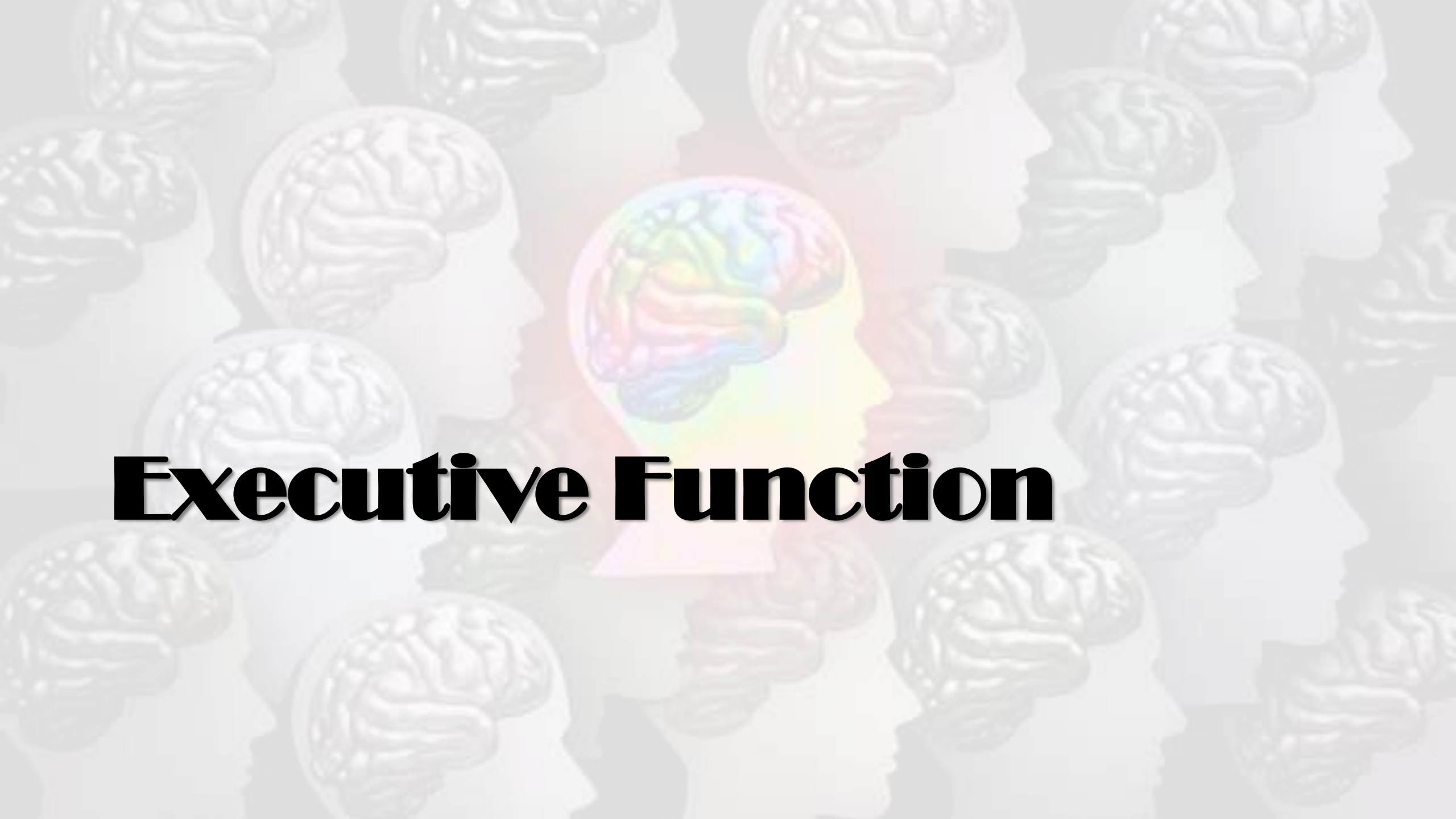
- Spelling Test

Social Motivational



- Children with autism have deficits in a brain pathway that normally makes social interaction feel rewarding.
- Nerve-fibers along the pathway, in red, are less dense in children with autism than in typically developing children.


Strong Brain Activity



Executive Function



ORGANIZE, PRIORITIZE, ACTIVATE WORK

MONITOR AND SELF-REGULATE ACTIONS

UTILIZE WORKING MEMORY & SHORT TERM RECALL

MANAGE FRUSTRATIONS AND MODULATE EMOTIONS

REGULATE ALERTNESS, SUSTAIN EFFORT AND SPEED

FOCUS, SUSTAIN AND ABILITY TO SHIFT TASK ATTENTION

Components of Executive Function

Three Main Components:

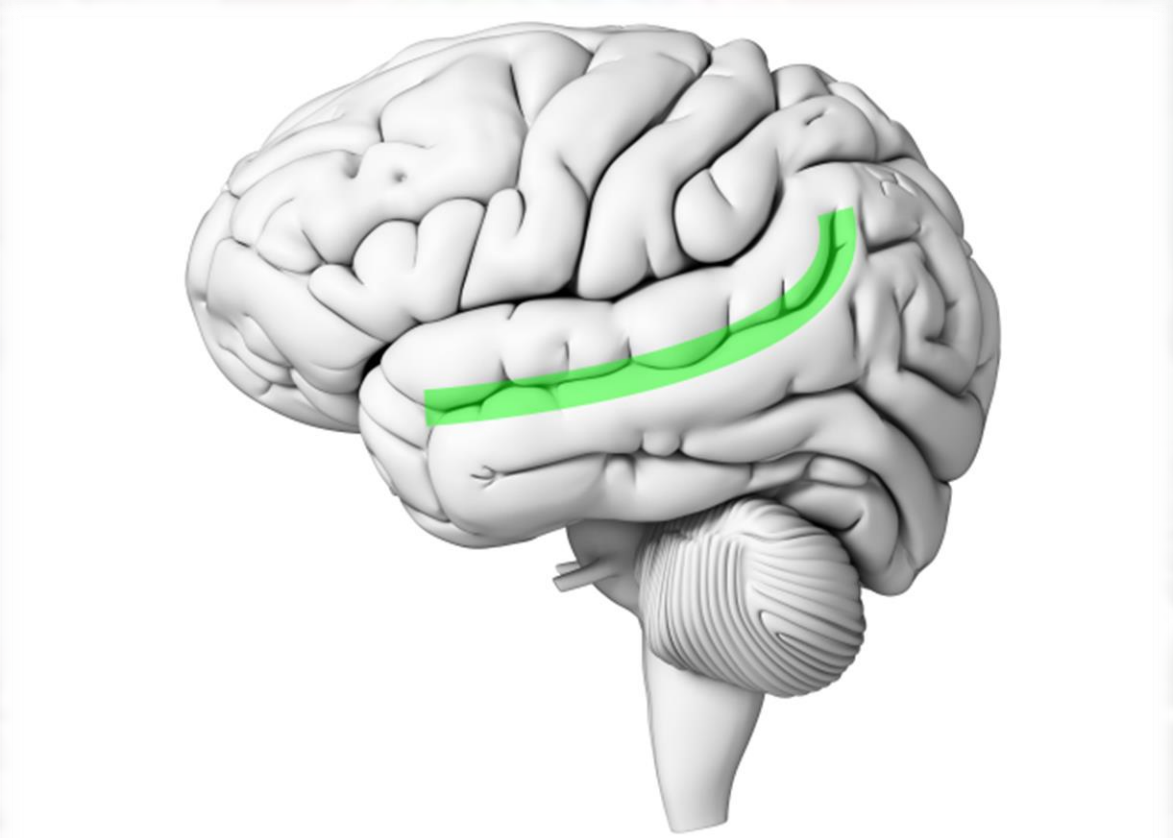
- **Working Memory** – the capacity to hold and work with more than one piece of information at one time
- **Cognitive Flexibility** – the capacity to change behavior(s) to fit the situation or to see a situation form another's point of view or perspective
- **Inhibitory Control** – the ability to control one's own body and resist impulsive reactions to distractions

Memory and Psychological Awareness

Autobiographical Episodic Memory

Social Competence

Superior Temporal Sulcus



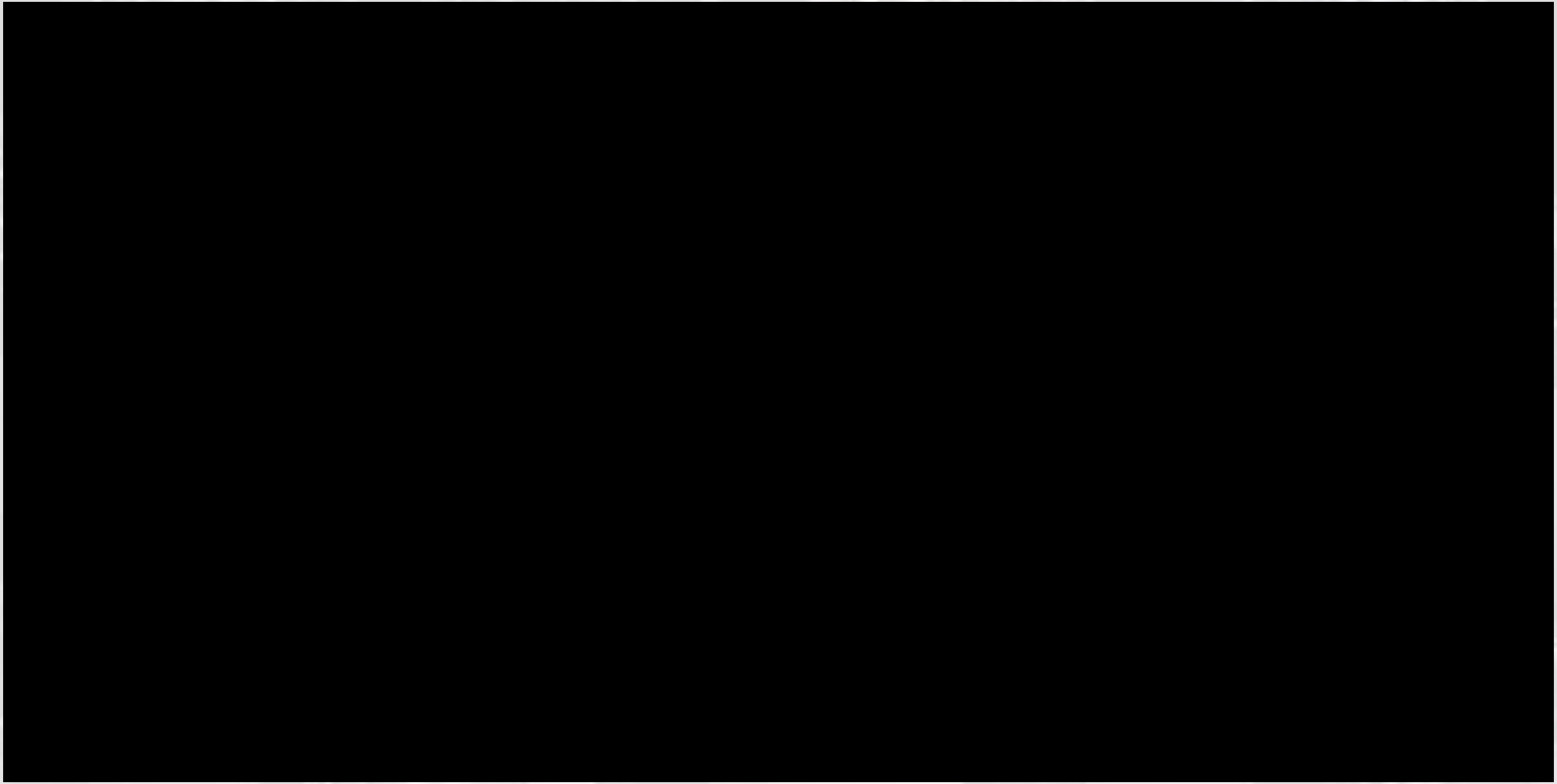
Activities for Executive Function

...and Building Stronger Brains!!



Autism, Behavior, and the Brain

Working on ~~Replacing~~ TEACHING Behavior




Honesty Before
Intervention


We cannot replace a child's behavior if the adults don't replace their behavior first!

...and one more thing...

Children do not work for people they don't like.



The Question…

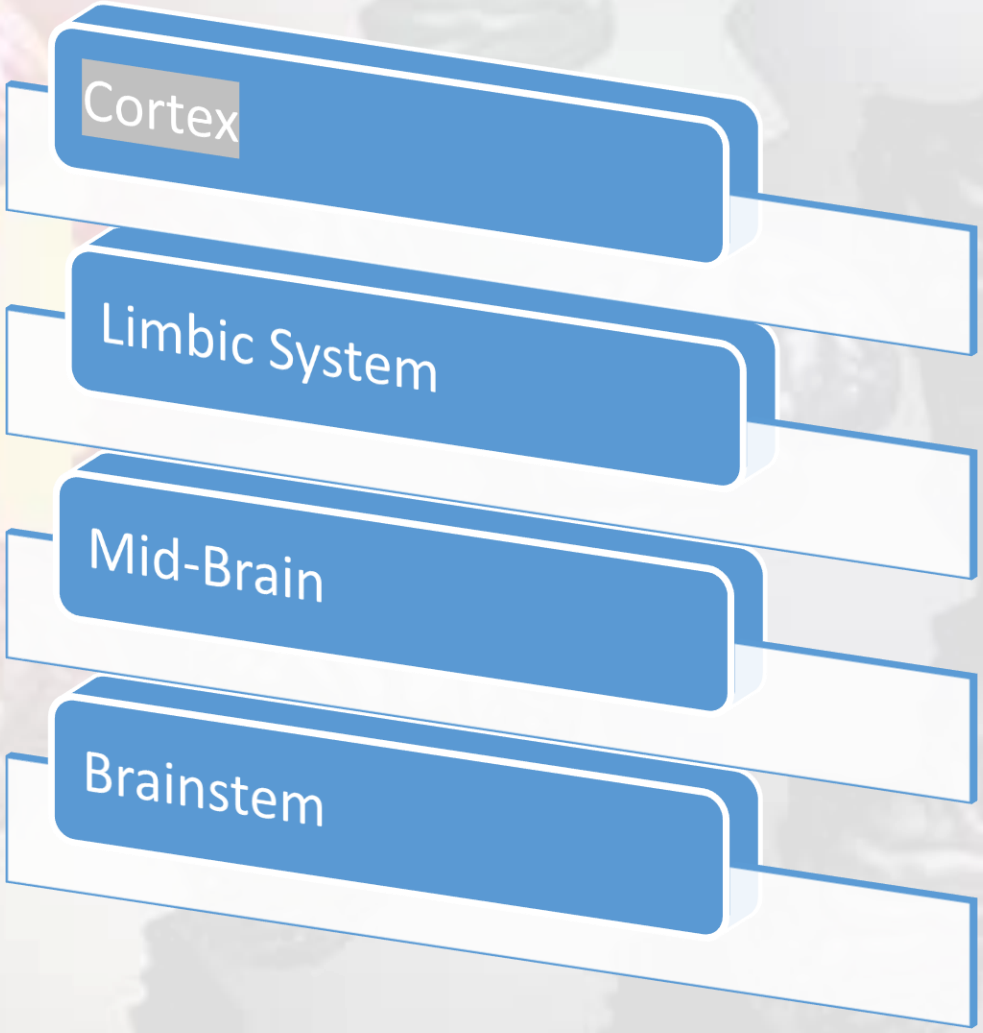
Are we healthy enough and strong enough to work through the child's behavior?



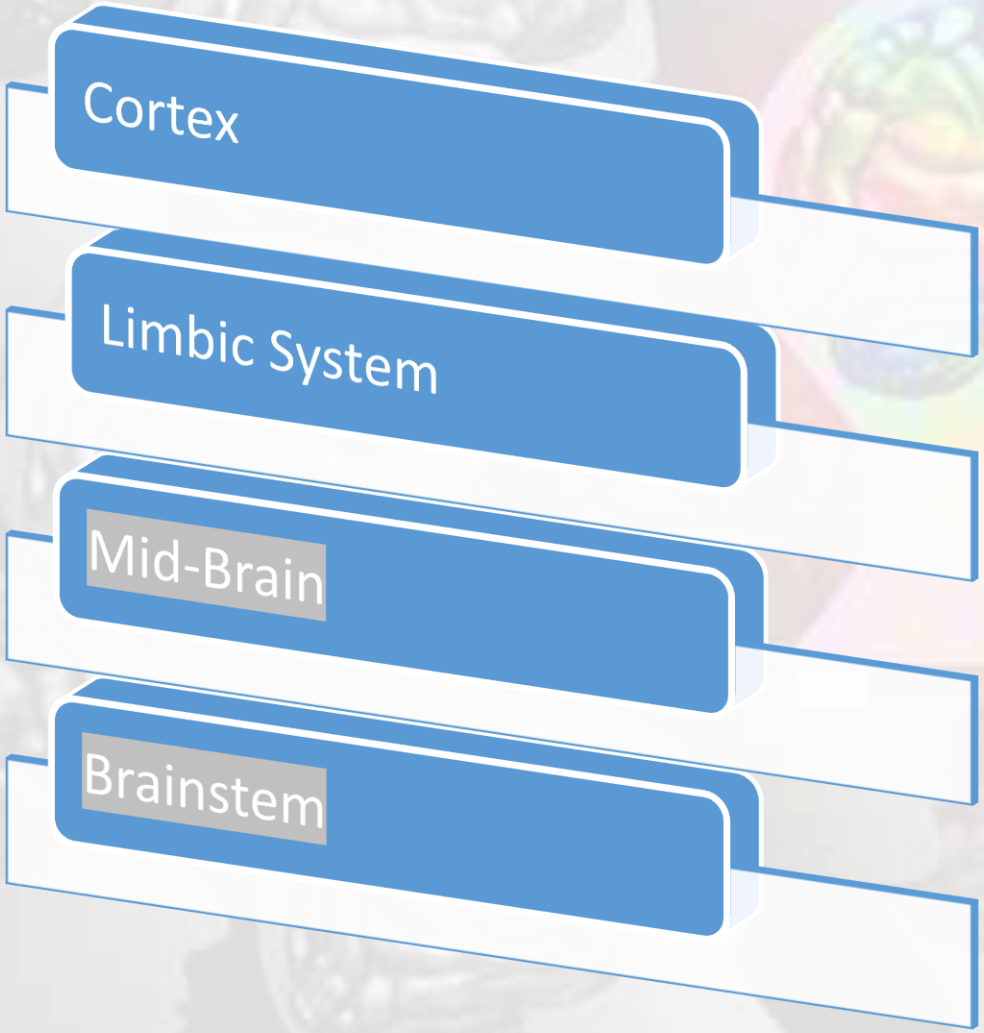

Cortex
Limbic System
Mid-Brain
Brainstem
Interoception – Inside the body
Senses – Outside the body

Uniquely Human

- Cortex – the most uniquely human aspect
- Responsible for thinking, processing, communication, problem solving, regulation, critical thinking, values, beliefs, and so much more
- Extremely important for us…this part of the brain can **“tell time”**
- When our cortex is “online” and active, we can think about the past, look forward to the future…we know which things are in the past and which things are present



Brain Entrance (Where It All Begins)



- Bottom of the brain…
- Controls less complex, mostly regulatory functions (breathing, heart rate, body temp regulation, etc.)
- There are no networks in this part of the brain that can think or tell time…therefore, it is mostly lives in the moment and reacts

Input…Reaction…Oops

- Input from **ALL** our senses comes into our brains in the lower areas first…
- **NONE** of our sensory input goes to the cortex…it always connects to the lower brain first…it gets processed…then matched against previous stored experiences
- Your lower brain can't tell time or know how many years have passed so the stress response gets activated and we have a full-blown threat response…this is important to understand with society, parenting, and children today!
- Your brain does exactly what you would expect it to do considering your life experiences…but what was once **adaptive** now becomes **maladaptive**

Adults…Adults…Adults

- The younger the child the more dependent on the caregiver
- Parents and other adults help interpret the world
- Children experience the world through the filters of these adults
- Many parts of our brain are extremely sensitive to non-verbal relational cues and therefore children are very aware of the emotional tone of an environment…**classrooms and teachers**

To Make A Long Story Short

- Memories to emotional (behavior/social emotional) experiences will be stored in the lower areas of the brain rather than be processed with the cortex…**UNLESS…**
  - adults around the child help process, teach, analyze and support the experience **(lower brain memories are triggered by feelings and sensations, not time and situation…VERY IMPOTANT)**

Things to Consider…

- The ‘Behavior Addiction’…how the brain forms behaviors
- Children and adolescence will learn how to outsource their behavior to adults and objects
- Behavior and social emotional skills MUST be taught (you CAN NOT reward and punish behavior into or out of human beings…we MUST do more than just **train** behavior; we must **change** behavior)
- The learning curve for new behaviors and social emotional skills
    - 5000+ times
    - 10000+ times for certain brains

What Do We Do?

Autism, Brain Health, and The Big Six

- When it comes to our brains, we ALL share the same culture, the human culture…
- These are six areas of life are vital to ALL our brain development, strengthening, and maintenance (especially in autism):

1. Peers and Parents
2. Laughter
3. Movement
4. Play
5. Nature
6. Talking/Communicating

Peers and Parents

- Social Skills
- Life Skills
- Overall Better Outcomes



Hahahahaha!!!

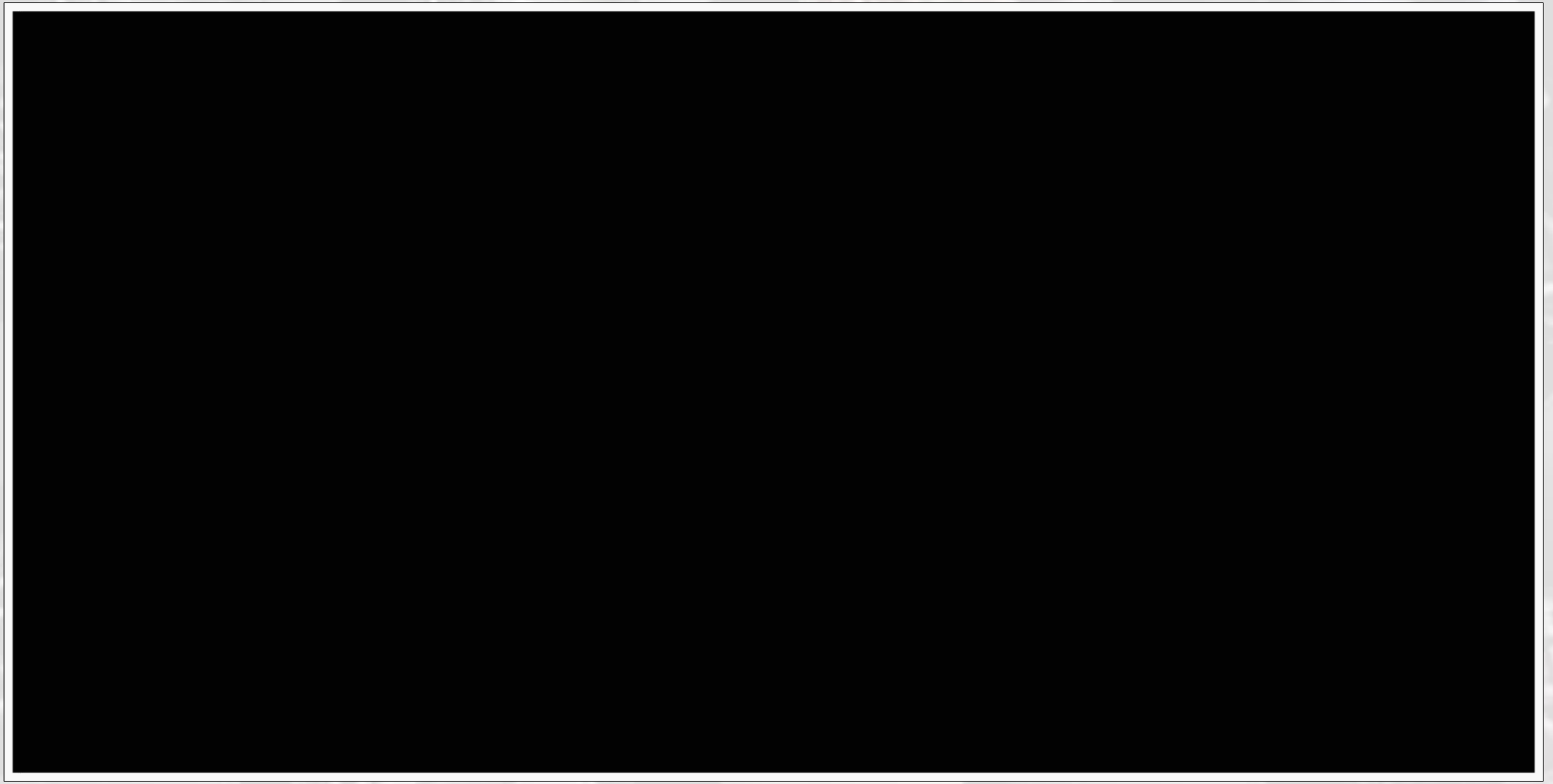
Let’s talk about laughter.

Short-term benefits

- **Stimulate many organs**
  - Enhances your intake of oxygen-rich air, stimulates your brain, heart, lungs and muscles, and releases and amazing chemical cocktail in your brain
- **Activate and relieve your stress response**
  - Cools down your stress response, and it can increase and then decrease your heart rate and blood pressure. The result? A good, relaxed feeling
- **Soothe tension**
  - Stimulates circulation and muscle relaxation

Long Term Benefits

- **Improve your immune system**
  - Negative thoughts manifest into chemical reactions that can affect your body by bringing more stress into your system and decreasing your immunity. By contrast, positive thoughts can actually release neuropeptides that help fight stress and potentially more-serious illnesses
- **Relieve pain**
  - Eases pain by causing the body to produce its own natural painkillers (endorphins, etc.)
- **Increase personal satisfaction**
  - Makes it easier to cope with difficult situations. It also helps you connect with other people
- **Improve your mood**
  - Many people experience depression, sometimes due to chronic illnesses. Laughter helps lessen your depression and anxiety (through natural chemical release) and may make you feel happier



Movement and the Brain

- One of the **MOST VITAL** aspects of learning and behavior. There is more research on this than almost all other education research combined…
- Yet, we still don't pay attention to it…
- More movement = Better learning, better behavior, better health, and better outcomes for our students (All of us)
- Exercise is the single best thing we can do for our brain in terms of learning, mood, and memory (John Ratey)



Movement, Play, and Recess are a MUST not a privilege (for ALL human beings)!!!

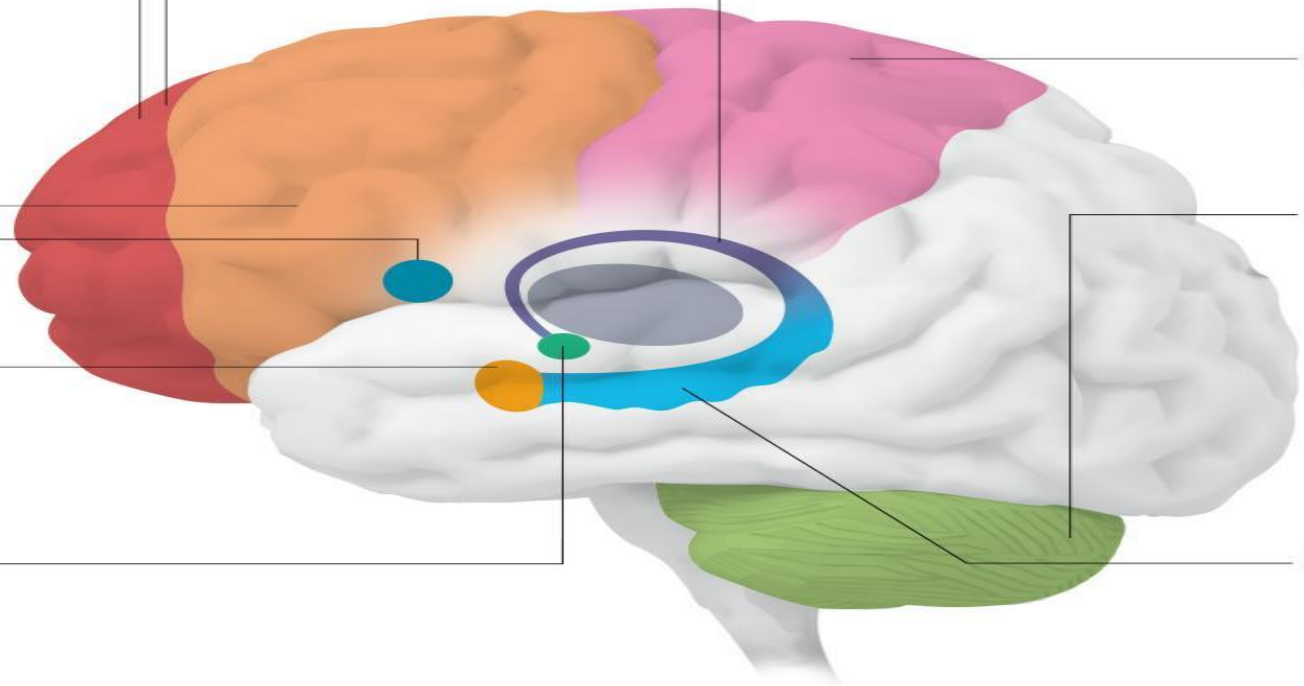
The ultimate brain workout

Different physical exercises can bring specific mental gains, from improving memory to dealing with cravings or reducing stress

LIFTING WEIGHTS
Prefrontal cortex
complex thinking, reasoning, multitasking, problem-solving

YOGA
Frontal lobe
Insula
integrates thoughts and emotions
Amygdala
fear and anxiety

HIGH-INTENSITY INTERVALS
Hypothalamus
appetite regulation, cravings and addiction



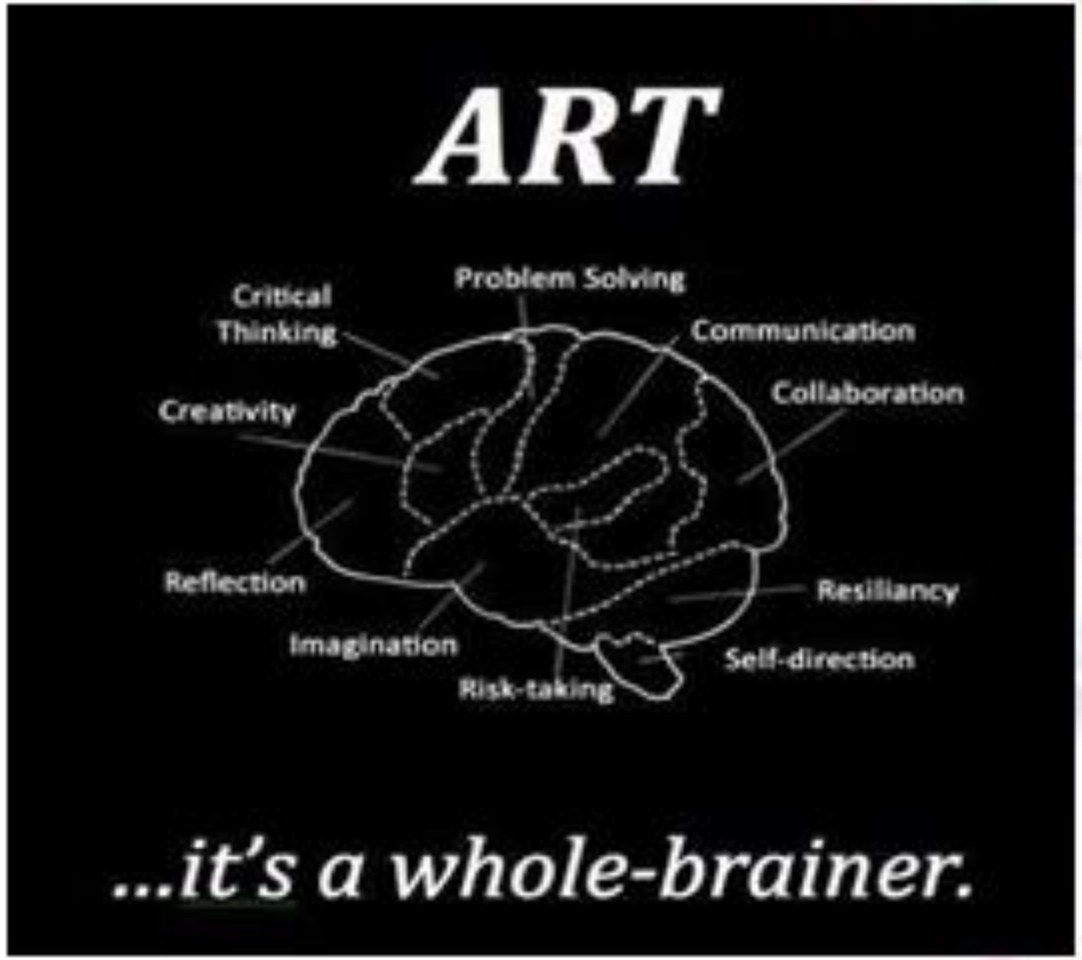
SPORTS DRILLS
Prefrontal cortex
Basal ganglia
attention, switching between tasks, inhibition
Parietal lobe
visual-spacial processing
Cerebellum
attention

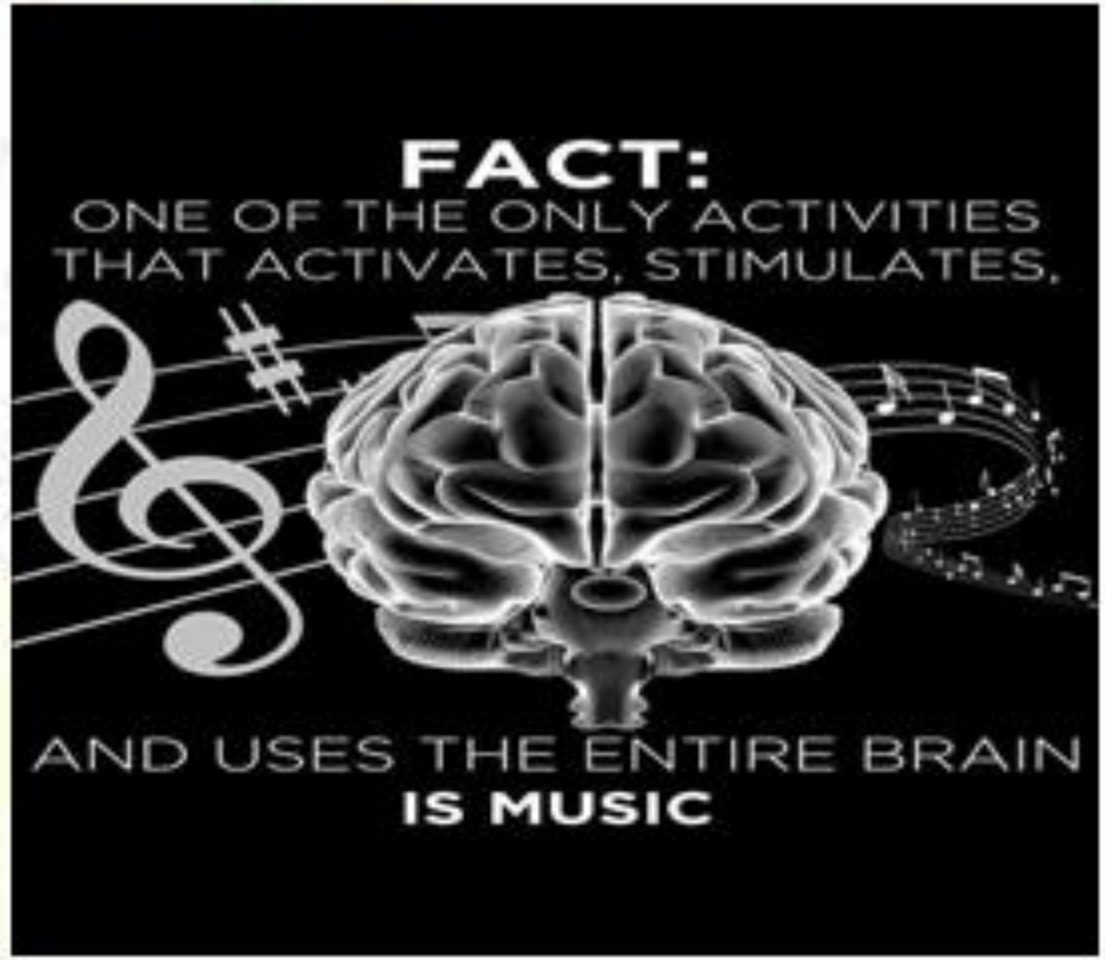
AEROBIC EXERCISE
Hippocampus
memory

Let's Take a Moment to Give Our Respect to a Group of Teachers

They can do more for behavior, social emotional, and learning in their 45 minutes than most of us can in 4 to 5 hours!

Art and Music





Play

Play has been shown to:

- release endorphins
- improve brain functionality (especially areas responsible for cognition)
- BDNF - a key molecule involved in the changes related to learning and memory
- stimulate creativity (number one critical thinking and problem solving activities for ALL human beings)
- studies show that play improves memory and stimulates the growth of the cerebral cortex
- Extremely effective for stress regulation and trauma recovery
- And SO MUCH MORE!!!


YOU CAN DISCOVER MORE ABOUT A PERSON
IN AN HOUR OF PLAY
THAN IN A YEAR OF CONVERSATION.
Plato

Nature

- Being outside in nature immediately lowers stress
- Touching and interacting with plants exponentially decreases stress
- 1440…210…1368…72 (this is just our children)
- Adults = 150
- Vitamin D – What the lack of vitamin D is doing to children's brains.
- ADHD and Nature

Talking…Socializing

- Humans are social beings and need to be in contact with others in order to survive (each individual has their own preference about amount of social interaction, but they all MUST have it…parents, same age peers, and teachers are the critical groups)

- Sociable people favor their brain health

- By socializing, we protect our brain from cognitive impairment and dementia

Life isn't about how you manage Plan A, it's about how you cope with Plan B, as you are creating Plan C…









Thank you!!

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