

Your Child's Amazing Brain and The Brain Science of Mindfulness

Marc Milstein PhD

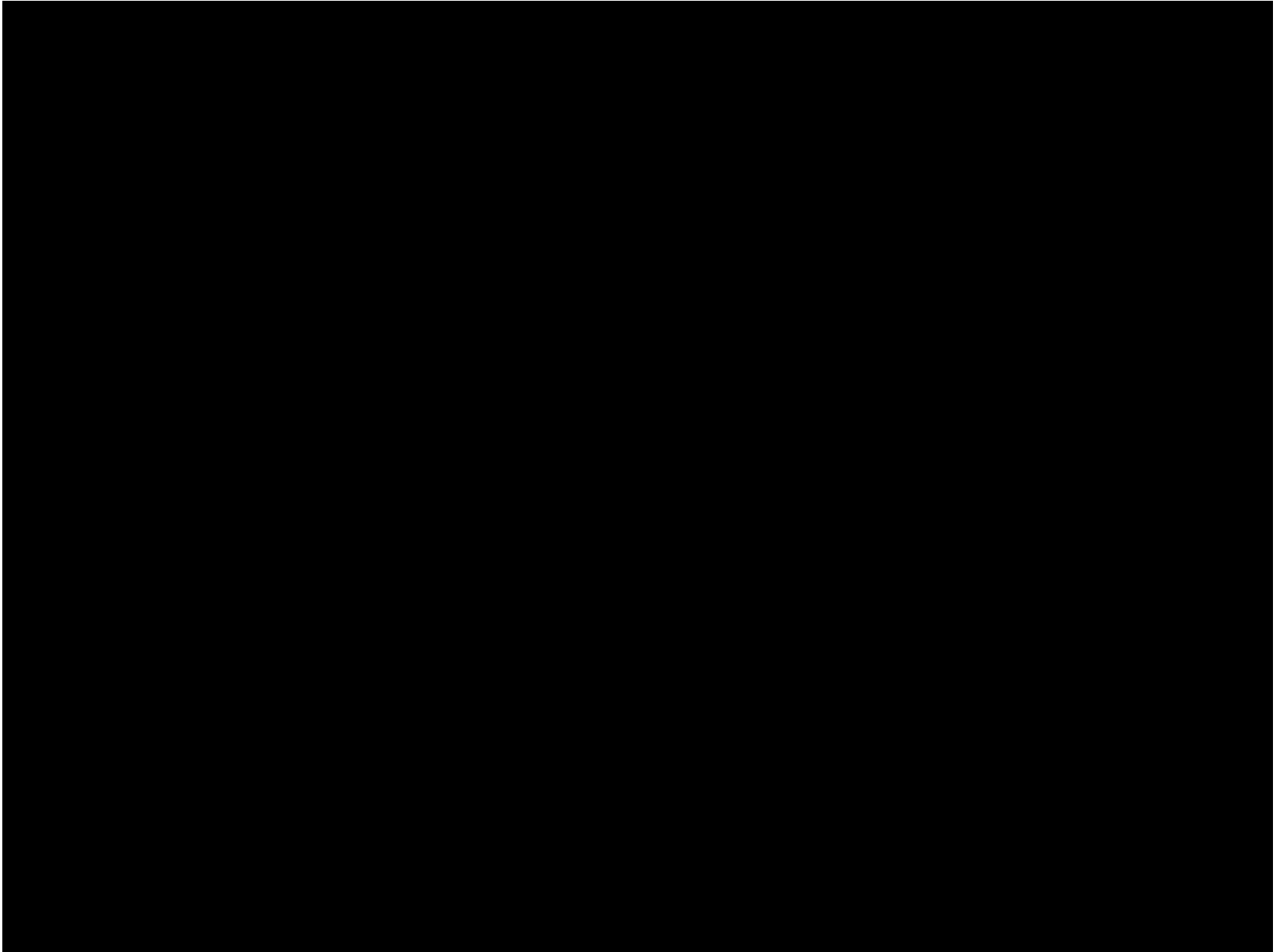
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Cucumbers and Grapes



Nature **425**, 297-299 (18 September 2003) | doi:10.1038/nature01963; Received 14 May 2003; Accepted 23 July 2003
Monkeys reject unequal pay
Sarah F. Brosnan¹ & Frans B. M. de Waal¹

Cucumbers and Grapes



What Does This Have To Do With My Brain?

You Have 3 Brains!

Midbrain

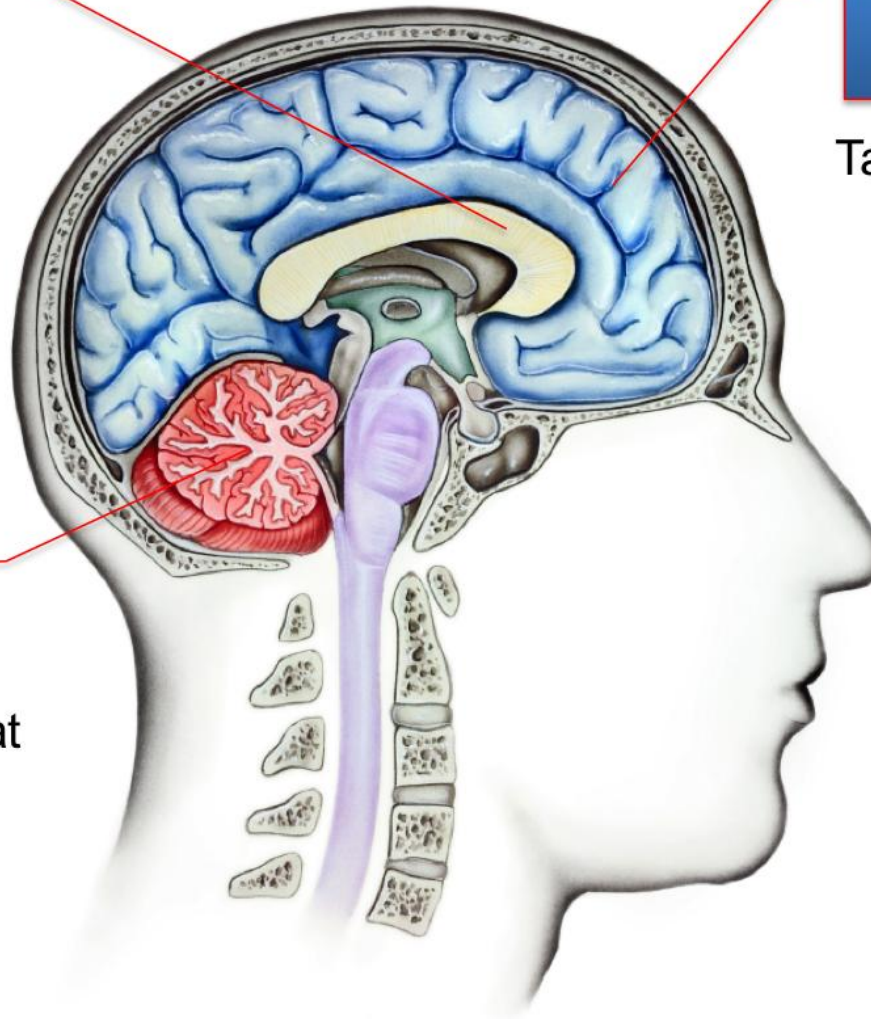
Feel – Remember
Interact with others

Neocortex

Talk – Think – Move
Create - Learn

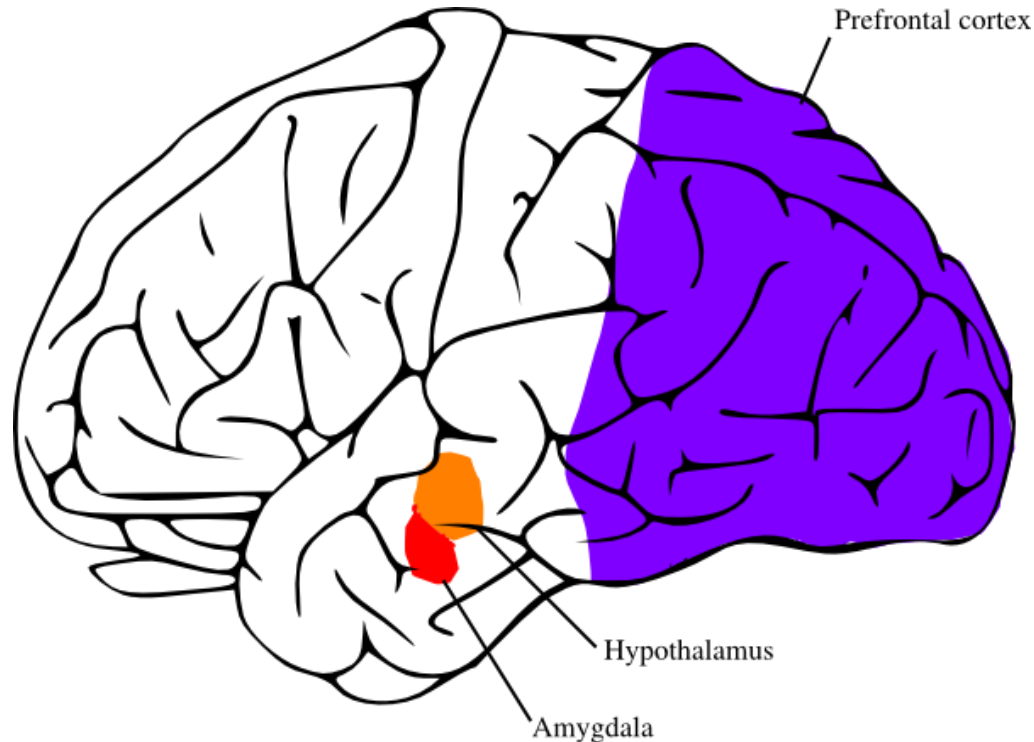
Reptilian Brain

Survive – React – Repeat
Repeat-Repeat



What happens in your brain is similar to what happens in an animal's brain at the initiation of anger

What Is Going On In The Brain During Emotion? (Your Brain and An Animal's Brain)



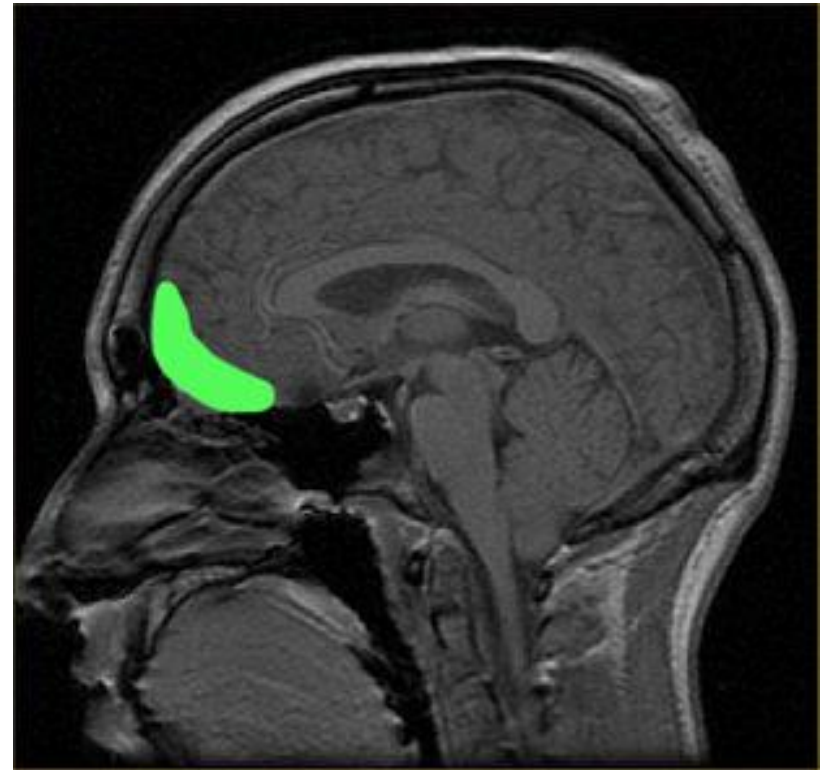
The **amygdala**, the part of the brain that deals with emotion is activated.

Then what?

Another Part Of The Brain Becomes Active – Orbital Frontal Lobe

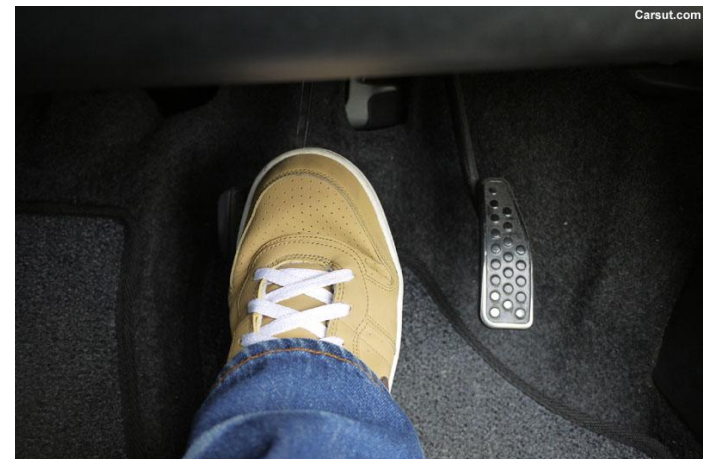
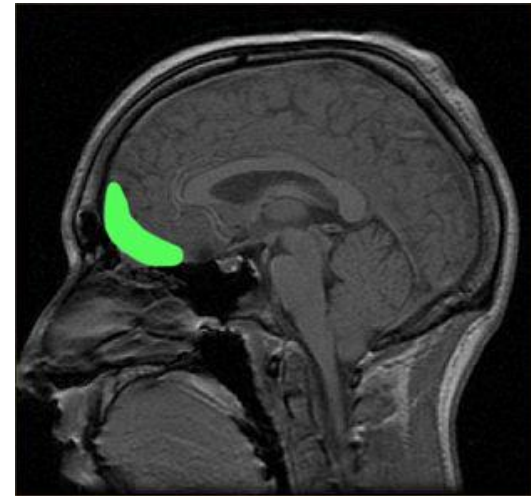
Blood flow is increasing to the frontal lobe, specifically the part of the brain that's over the left eye.

Why?

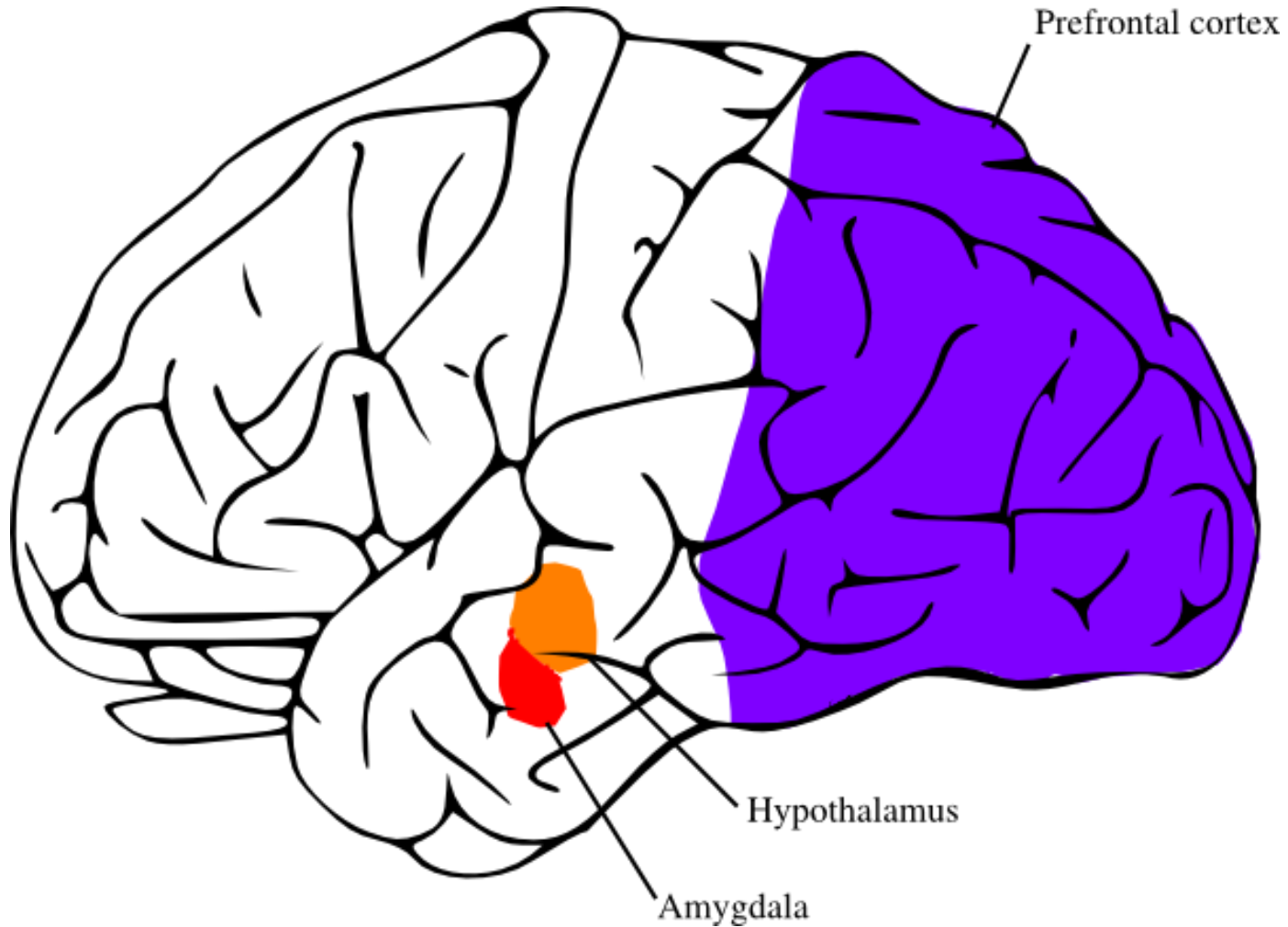


What Does The Orbitofrontal Cortex Do?

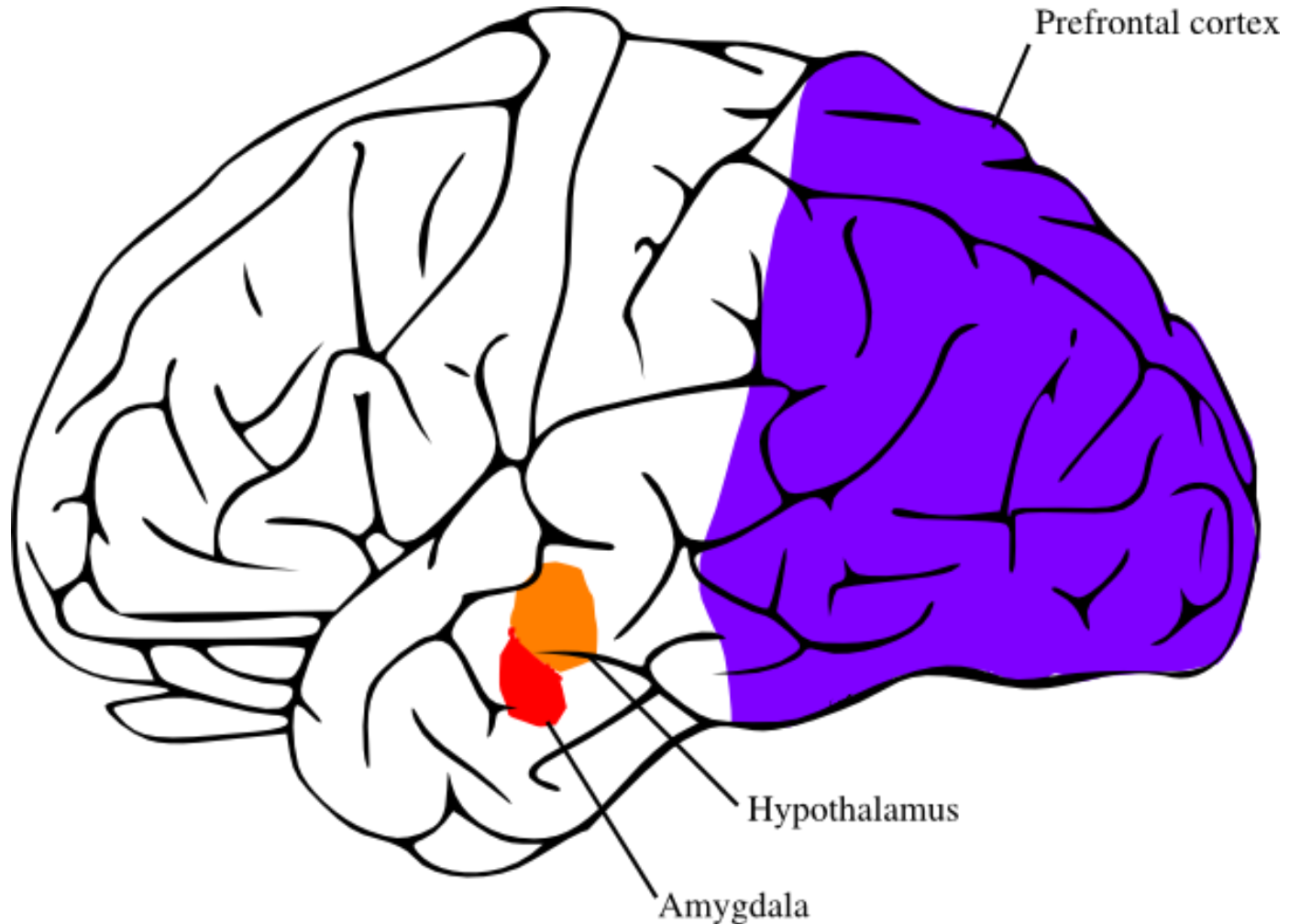
- **OFC is the brakes!**



A Battle Inside Your Brain!

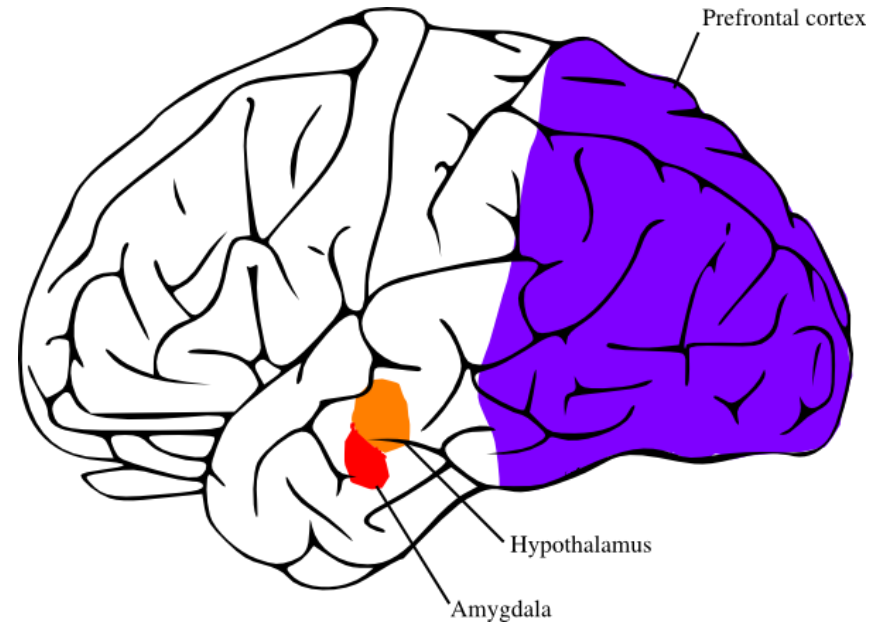


When Does The Frontal Cortex Fully Develop?



This Understanding Sheds Light On...

Children's Behavior Makes Sense.

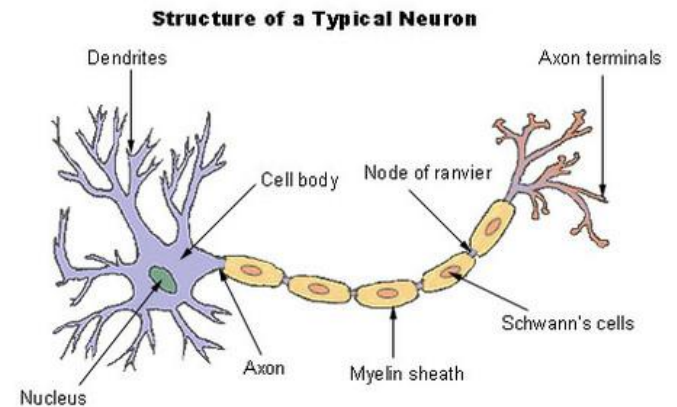


Sometimes It's Not Kids...

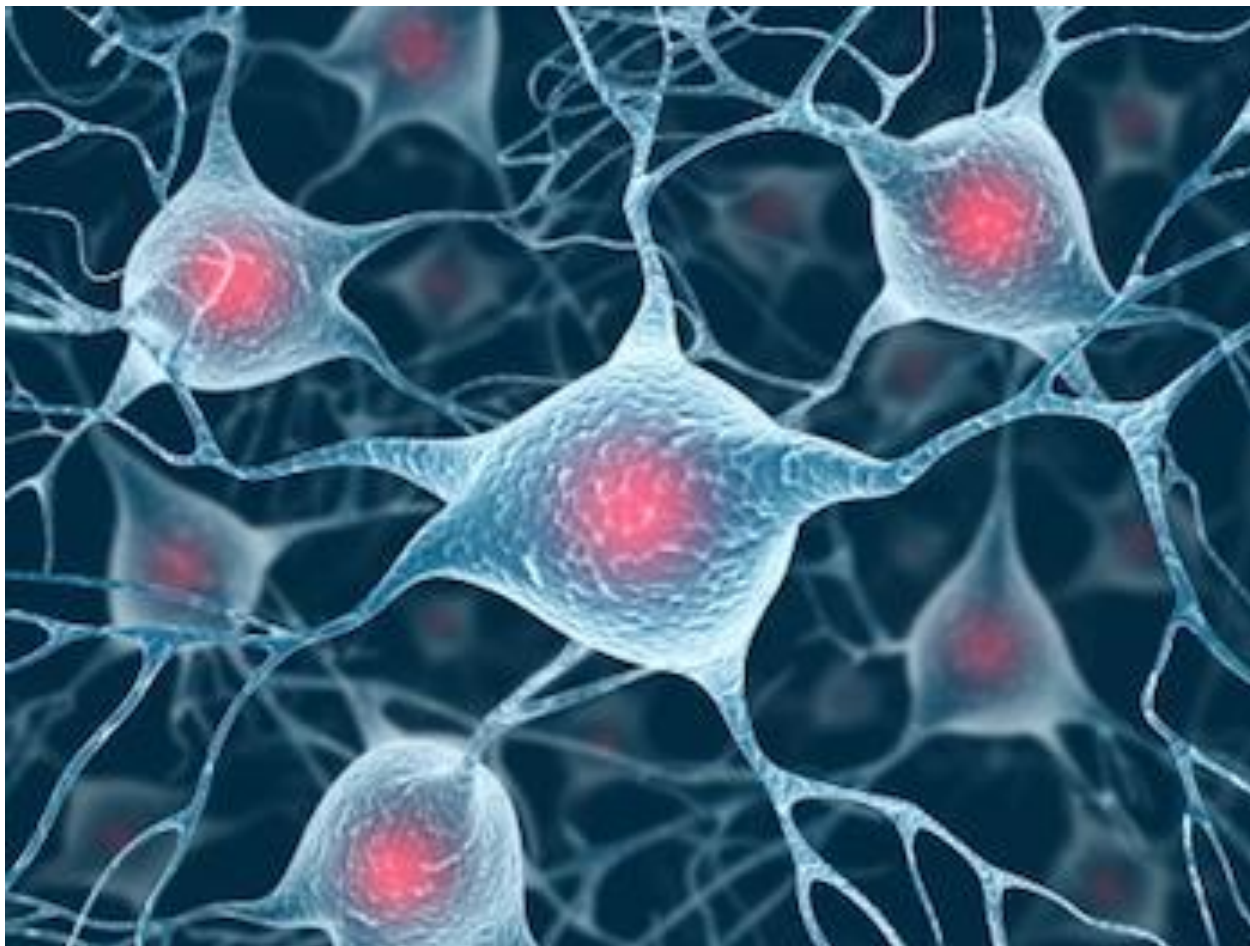


A Little Bit About Your Child's Amazing Brain....

About How Many Brain Cells Does An Adult Have?



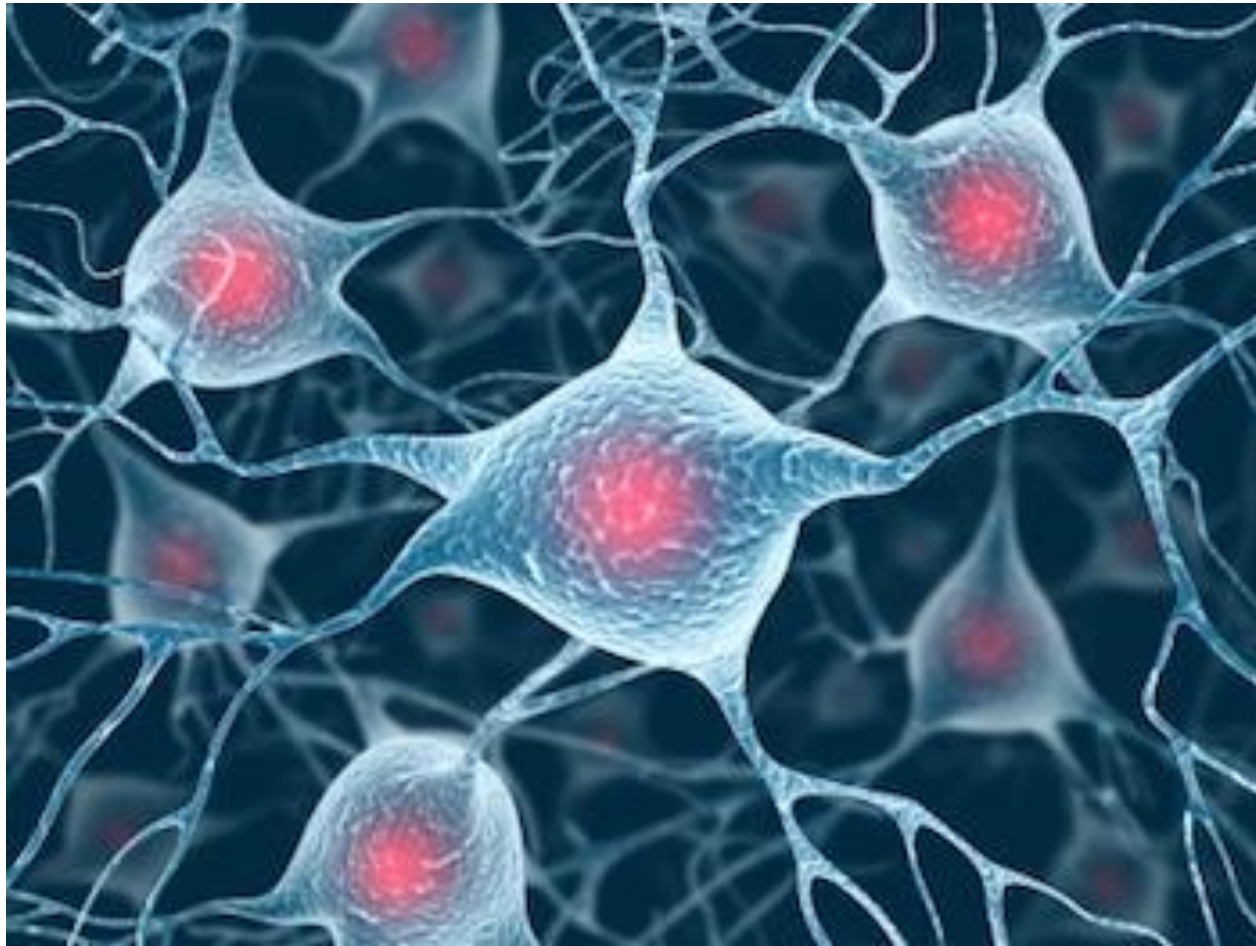
80 to 100 Billion



How Many Brain Cells Does A Newborn Have?

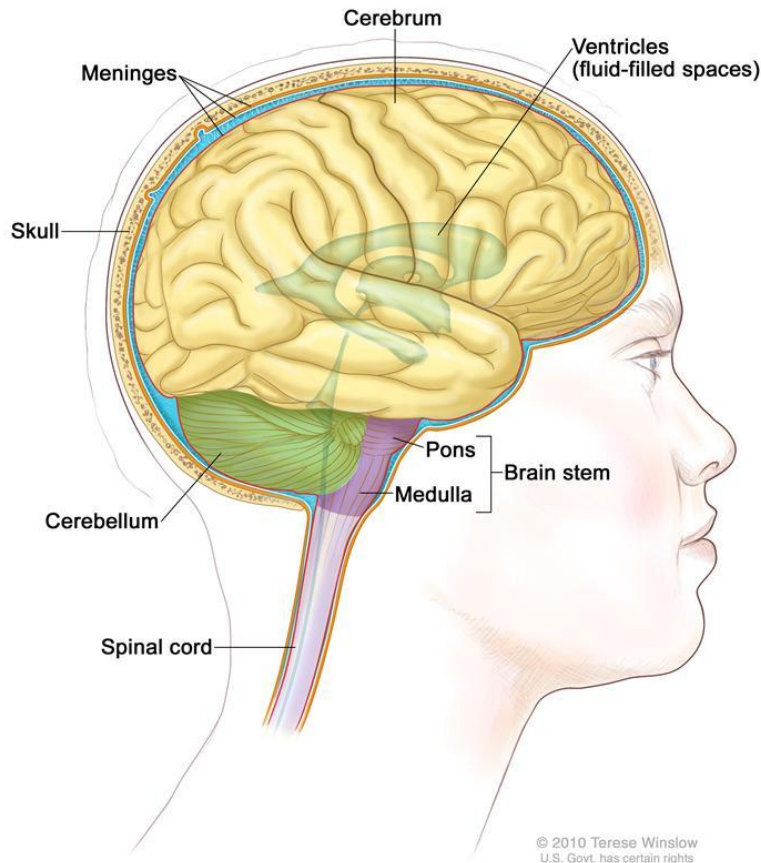


Very Close To 80 to 100 Billion

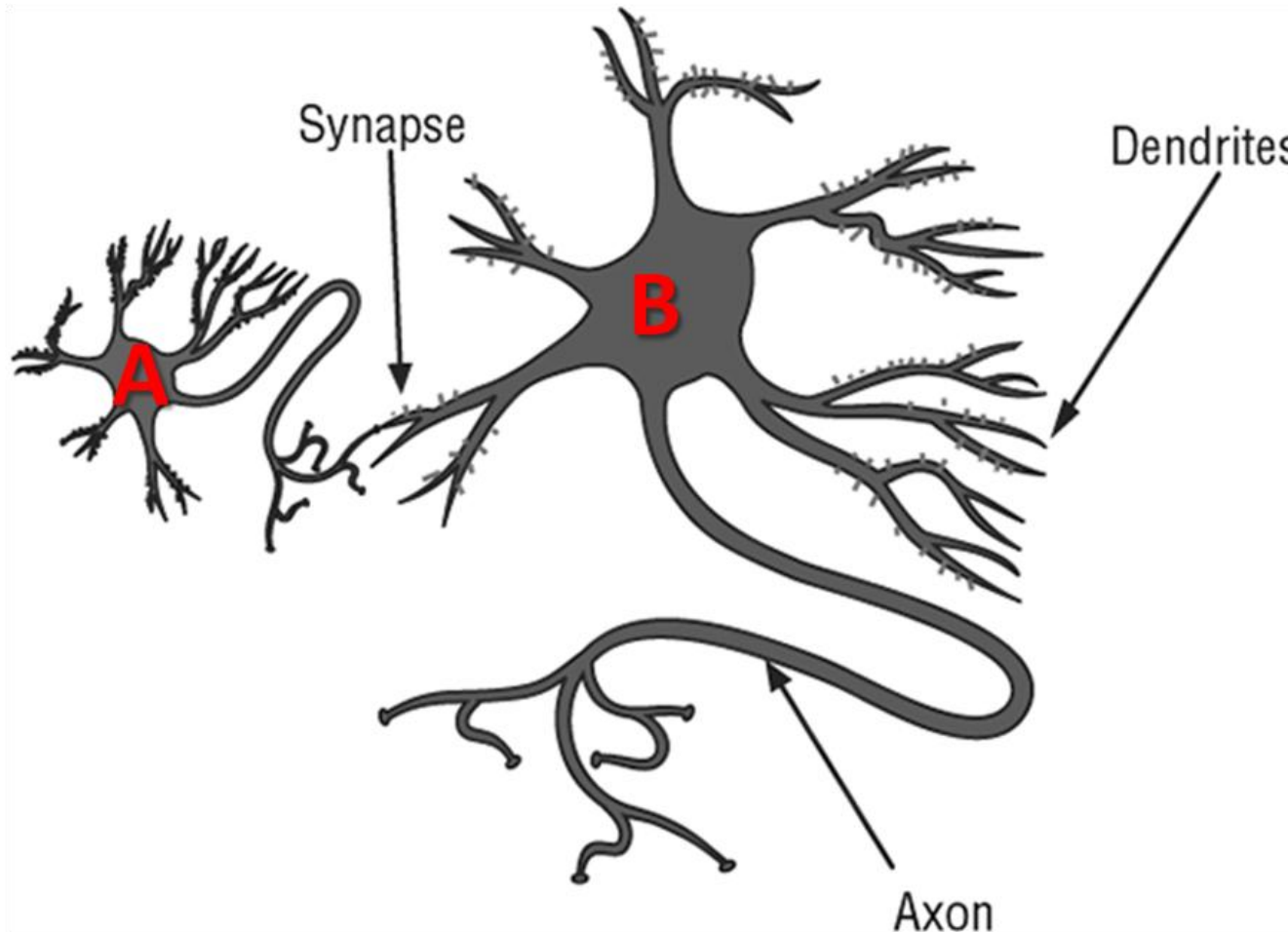


Wait!!! What???

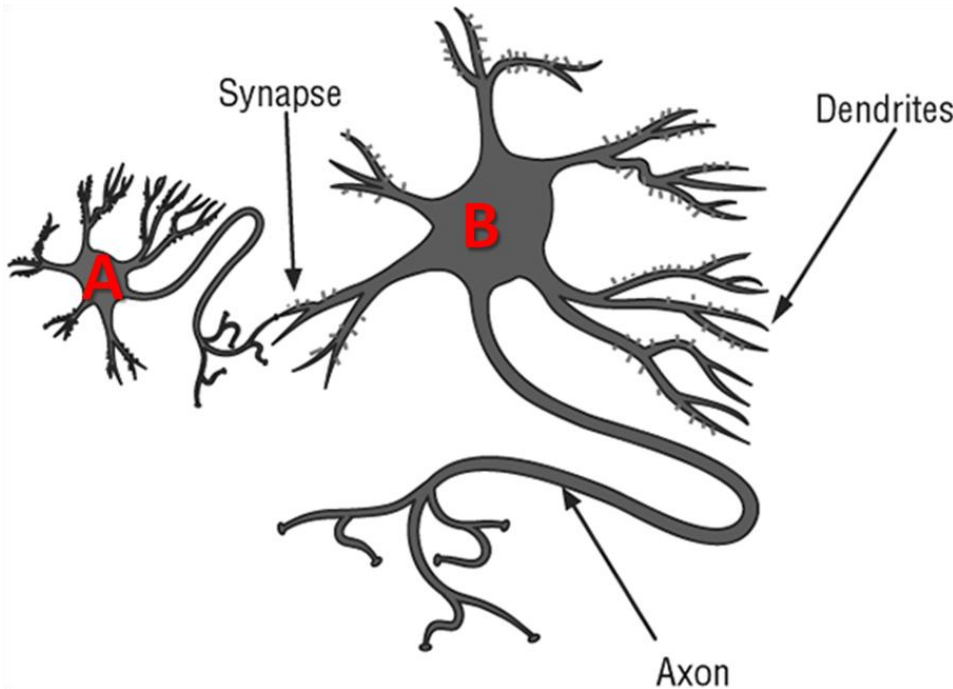
Adult Brain 4x Size But Same # of Brain Cells



How Many Connections In An Adult Brain?



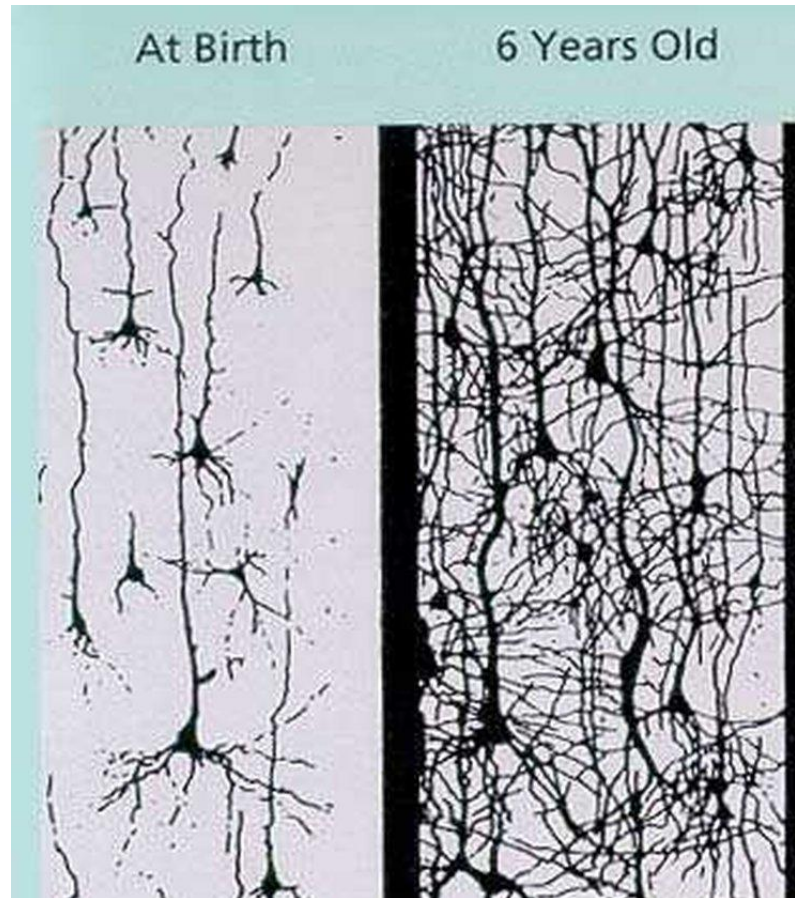
100 Trillion



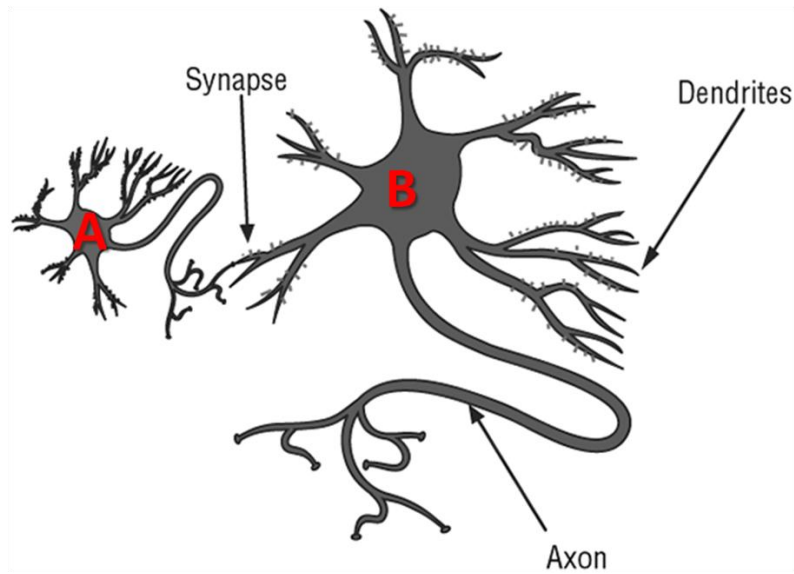
Each brain cell can connect with about 10 to 15 thousand other cells

You Are Born With Most Of Your Brain Cells.

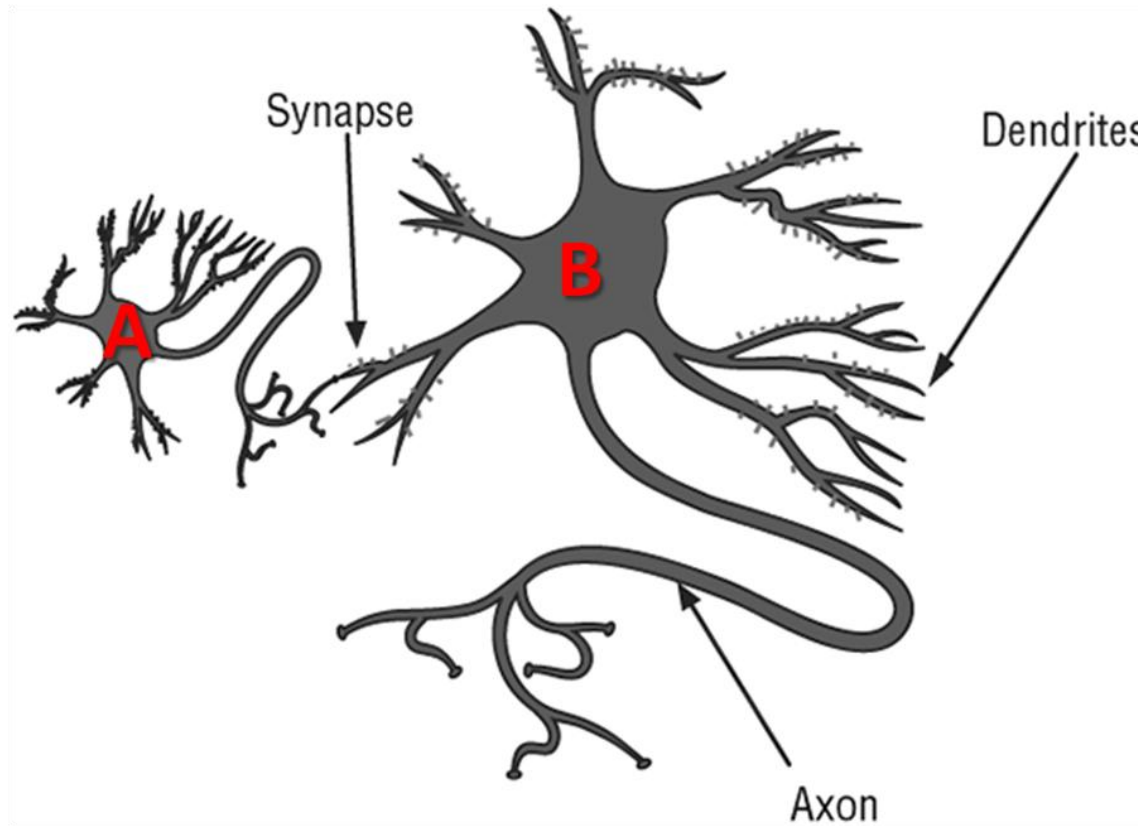
But NOT The Connections



Connections Form Based On Activity



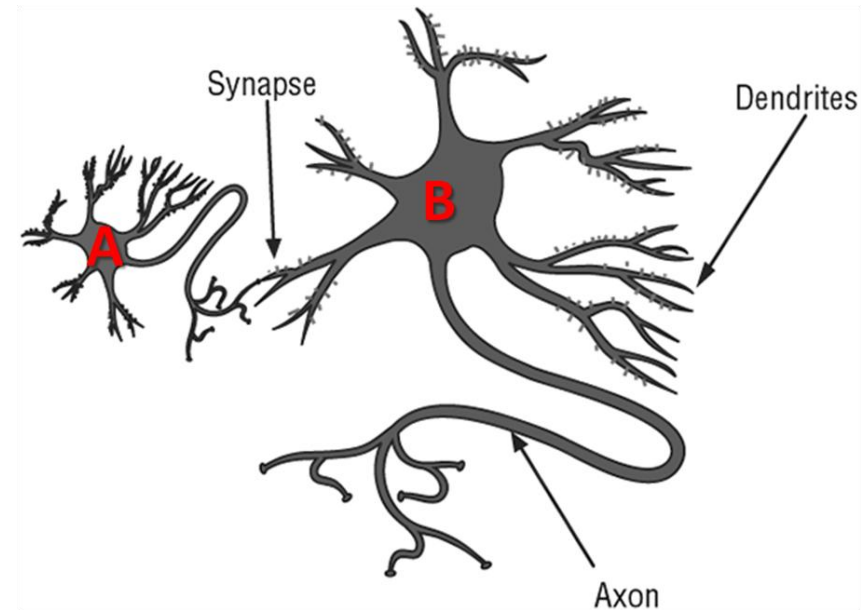
How Many Connections Does A 3 Year Old Have?



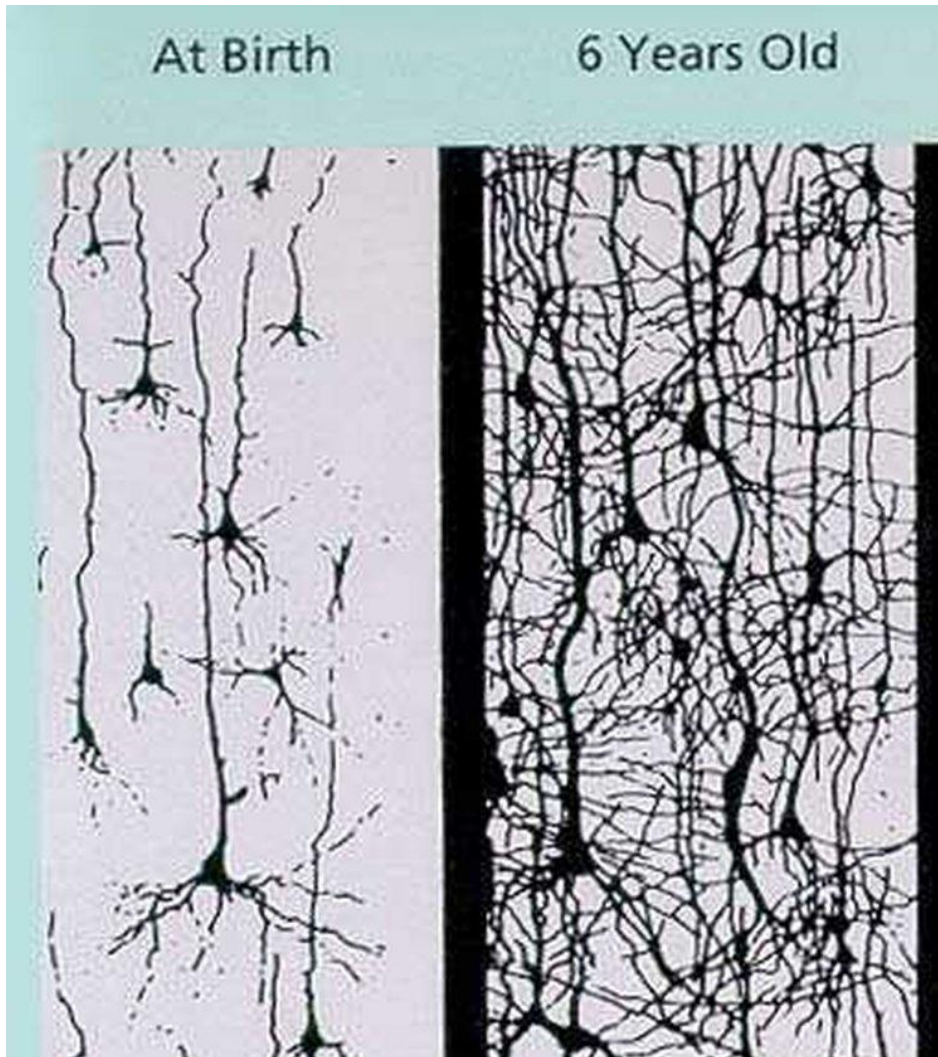
1000 Trillion!!!!

That's A Quadtrillion.....

- A 3 Year old has more connections than an adult. Remember born with few connections.
- 10 to 20 thousand connections are being made a SECOND in early life.



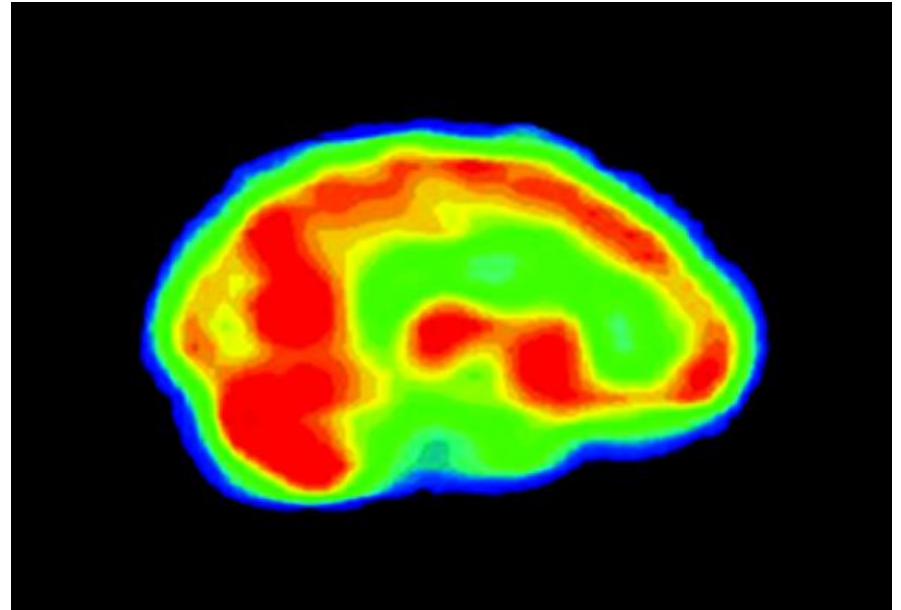
This Is Called Synaptic Exuberance



- Peaks throughout middle childhood (4-8 years of age).

A Child's Brain Is Working Hard

- Between age 4 and 9 a child's brain actually becomes twice as active as an adult brain.
- This activity remains at twice the level of an adult until the child reaches the age of nine or ten.

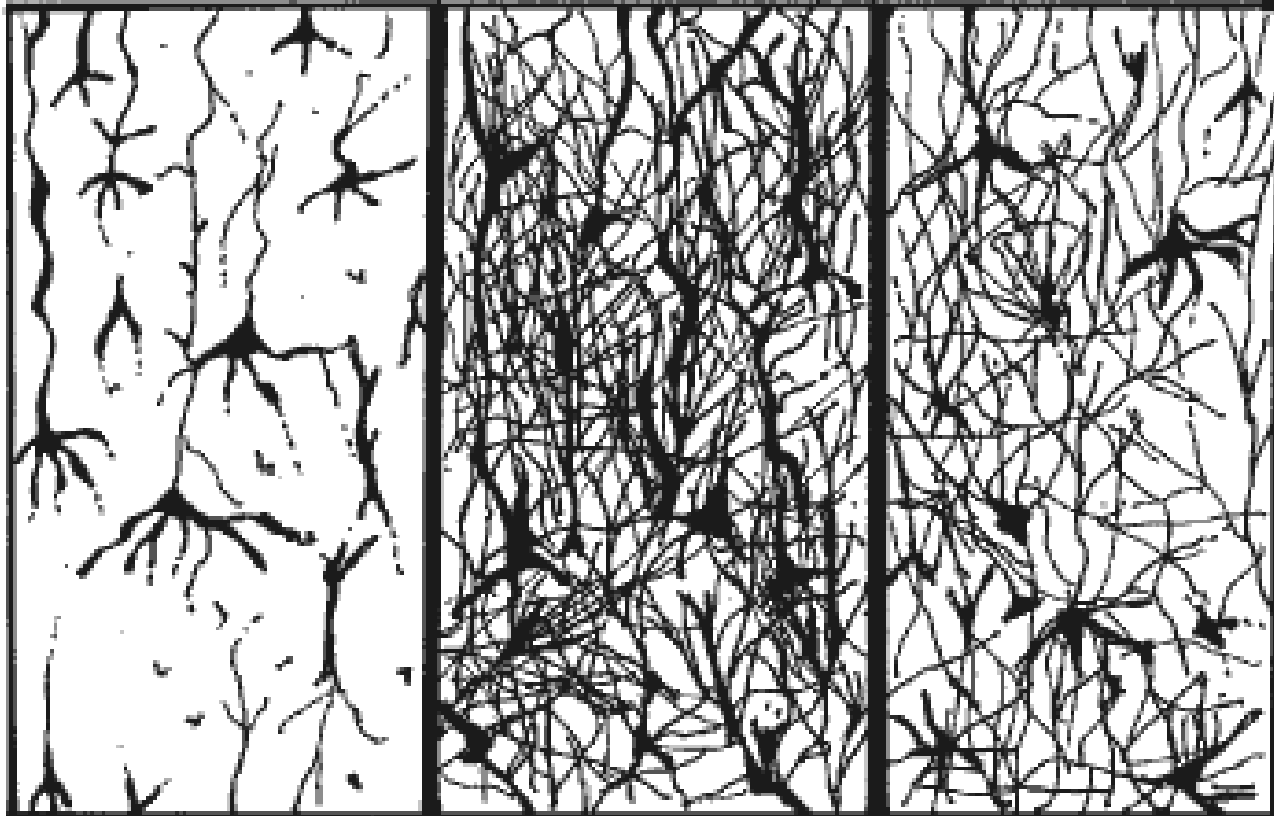


Some Call The Child's Brain...

All gas...no steering!



Then The Brain Decides Which Connections Are Important The Pruning Process

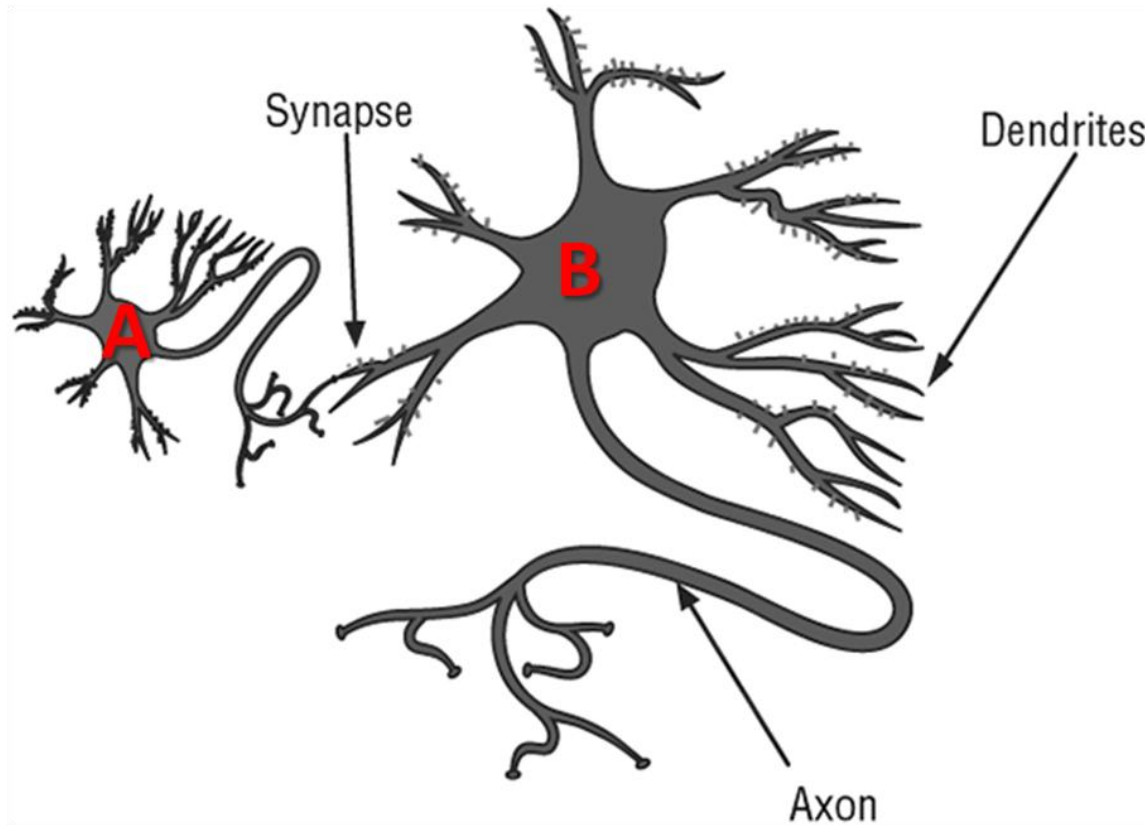


at a child's birth

at 7 years of age

at 15 years of age

You Prune Your Brain For The Rest Of Your Life. Just Not To The Same Degree



When is a lot of your brain pruning taking place???

Every Night While You Sleep You Prune Your Brain



Forgetting helps you remember!!!!

How Does Mindfulness Fit Into All Of This?

What Is Mindfulness?

Mindfulness Is The Opposite Of Mind Wandering

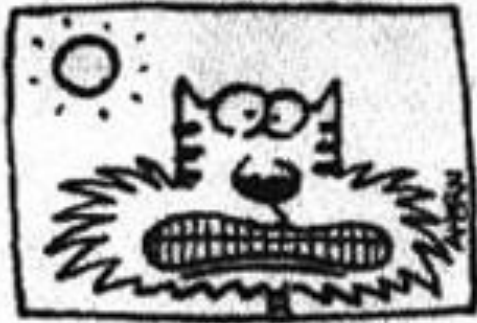
- Mindfulness is being in the present moment.
- The cliché is “Be here now.”

Why Is There So Much Interest In Mindfulness?



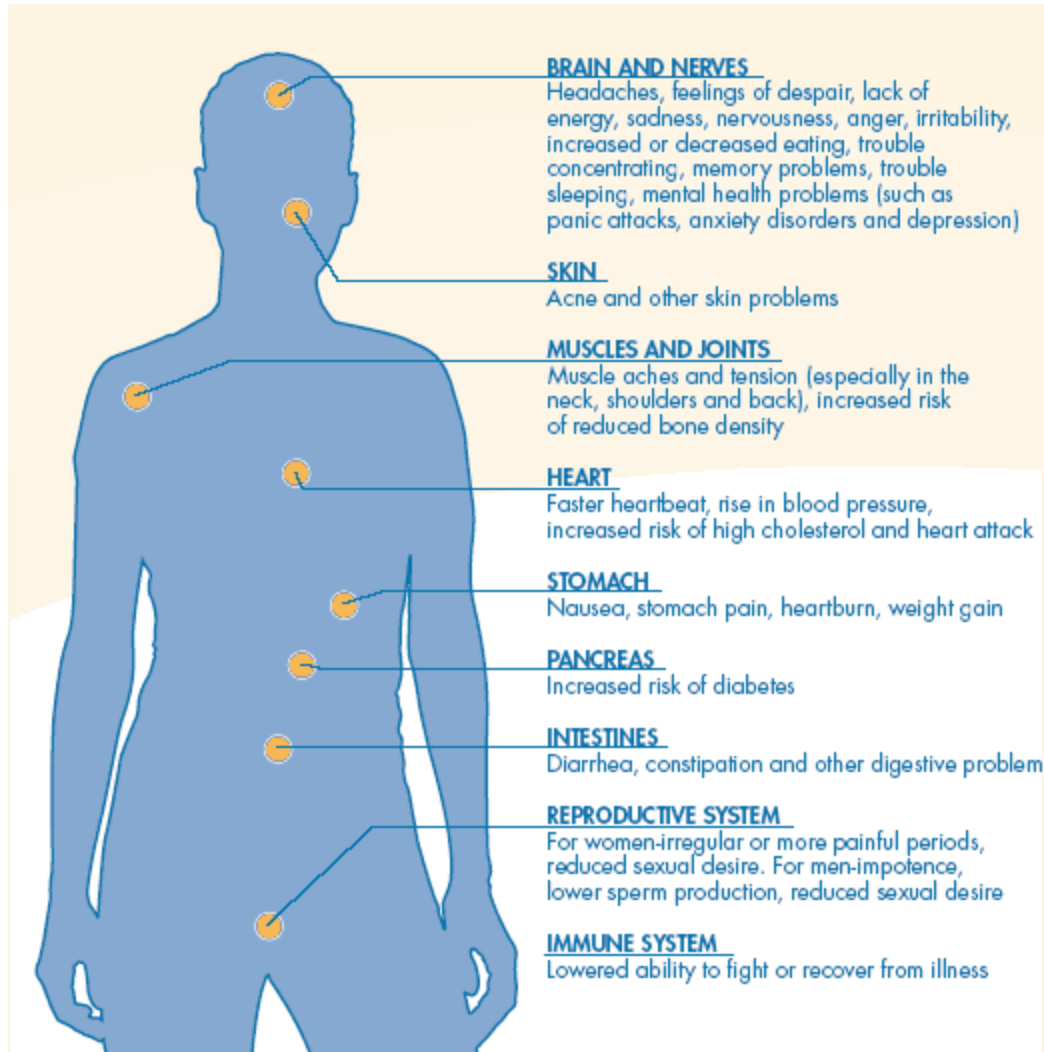
Why Mindfulness?

THERE ARE ONLY
TWO TIMES
I FEEL STRESS:



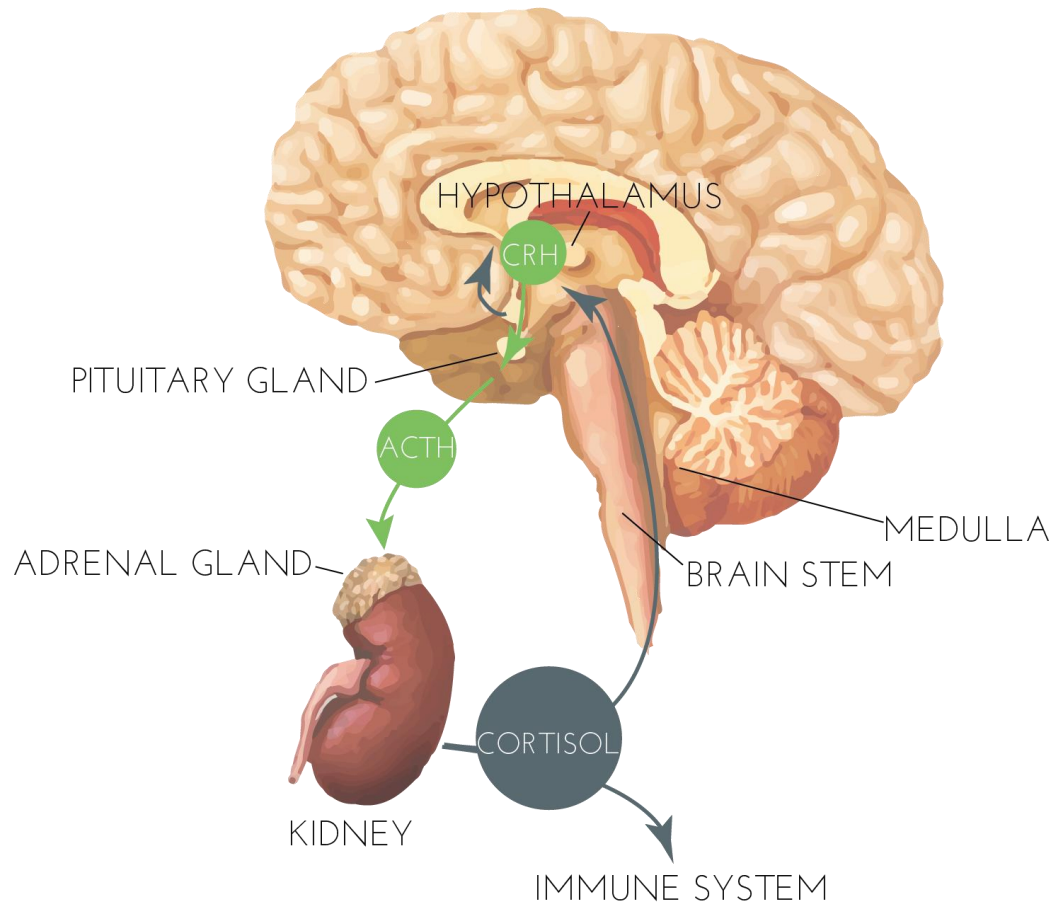
DAY AND NIGHT.

Impacts Of Chronic Stress



Can A Little Bit Of Stress Be A Good Thing?

STRESS RESPONSE SYSTEM



Acute Stress Motivates

- A little bit of stress, known as “acute stress,” can be exciting—it keeps us active and alert.



Intermittent Stress Is A Good Thing

- Without a little bit of stress we probably wouldn't do much of anything.



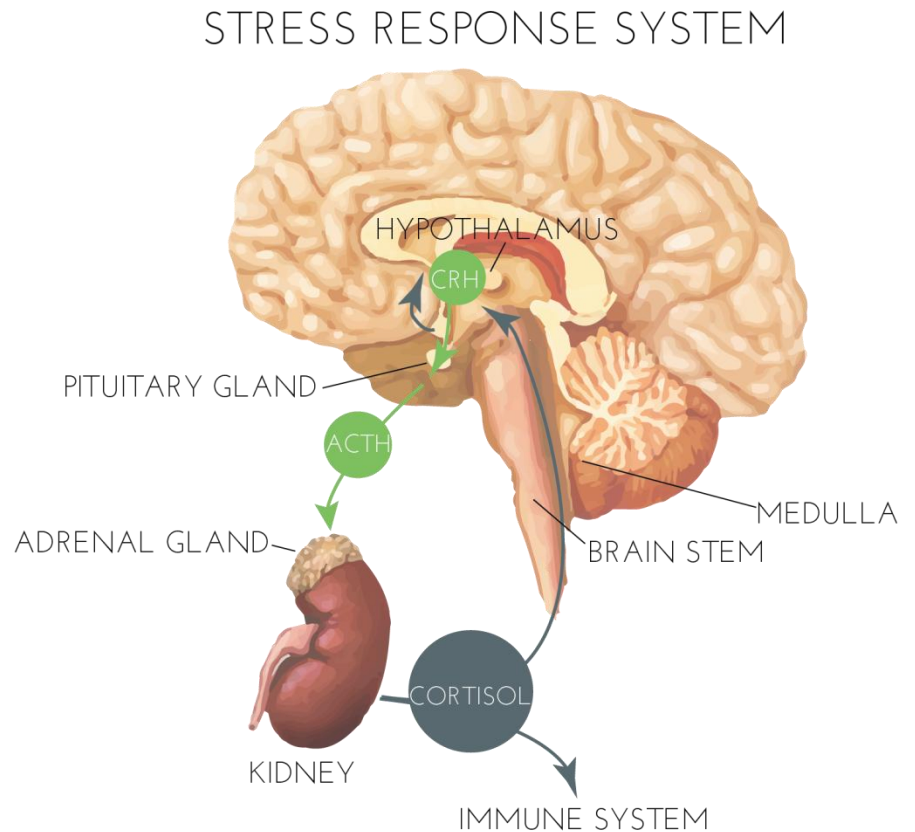
Stress Free Is NOT Realistic And Not Ideal



What Does A Little Bit Of Stress Do To Our Brain?

The onset of stress entices the brain into growing new cells responsible for improved memory.

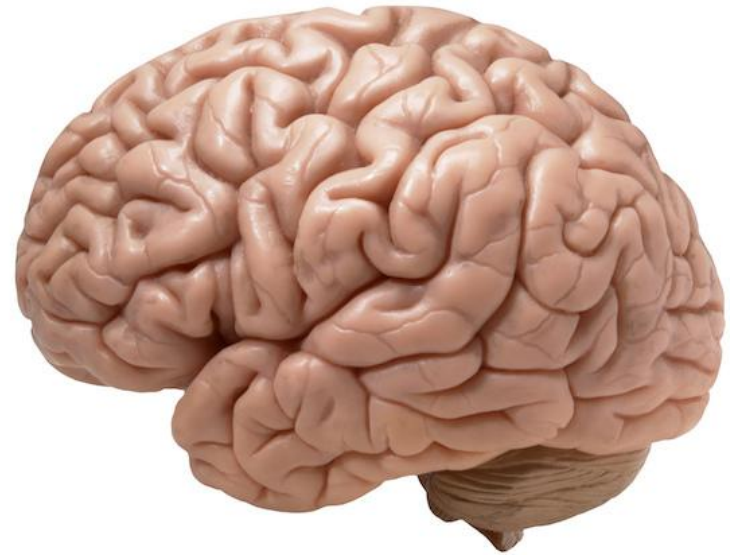
What happens if the stress continues?



The study, led by post-doctoral fellow Elizabeth Kirby. UC Berkeley.

What If The Stress Continues?

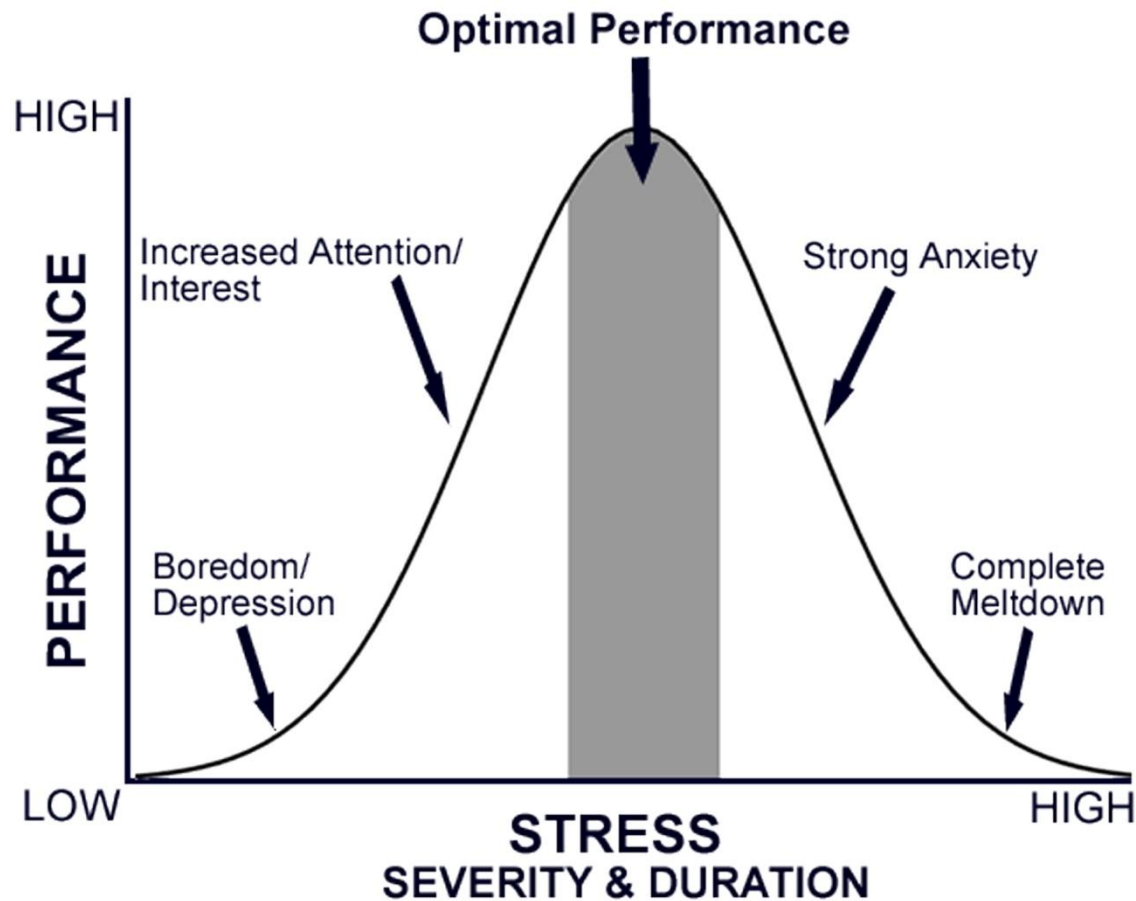
If the stress continues into a prolonged state, it suppresses the brain's ability to develop new cells.



[Acute stress enhances adult rat hippocampal neurogenesis and activation of newborn neurons via secreted astrocytic FGF2](#)

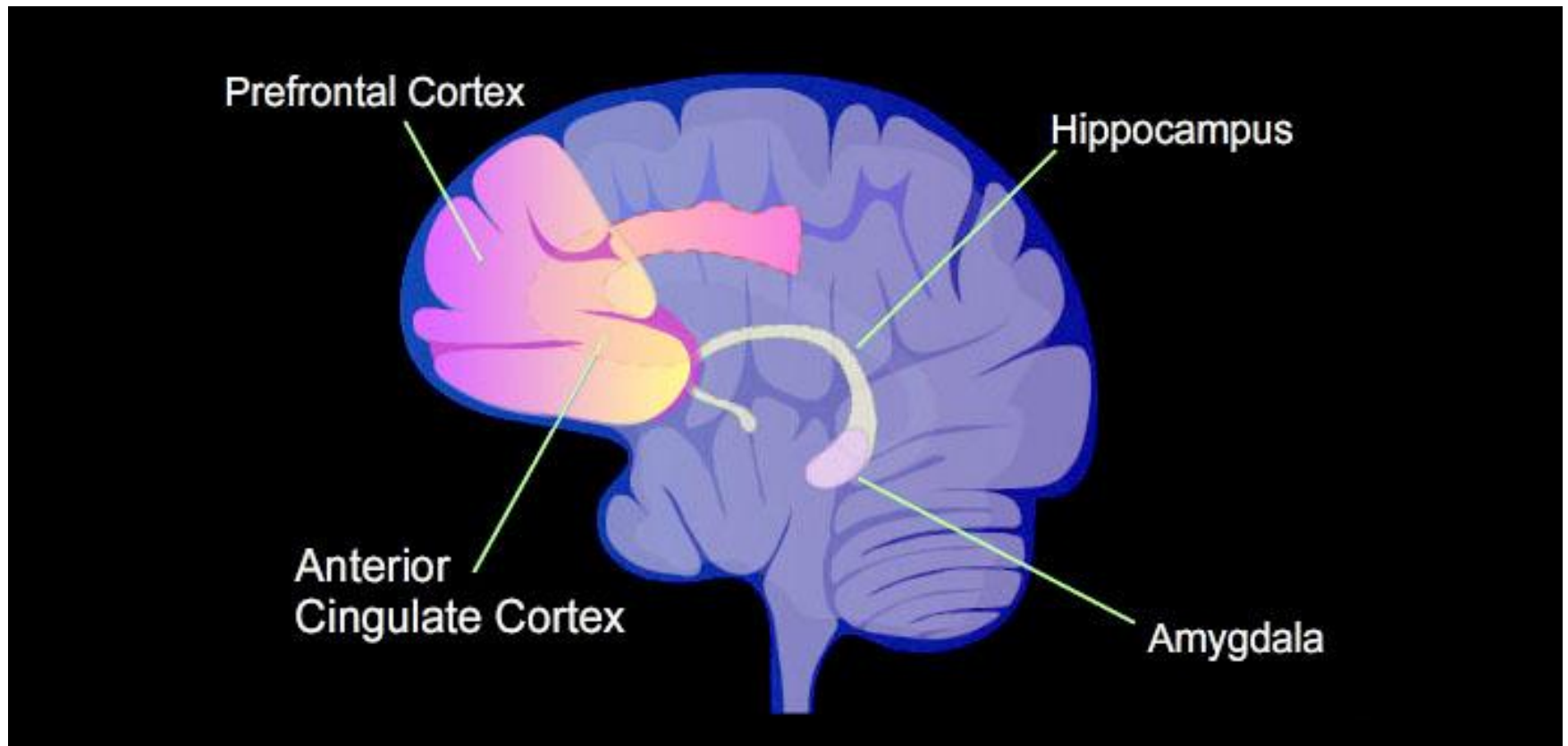
The study, led by post-doctoral fellow Elizabeth Kirby. UC Berkeley.

How Successful People Deal: Strategies To Cope With Stress



Concern with “helicopter parenting.”

The Brain Learns To Deal With Stress Through Practice (But The Right Practice)



A Unique and Interesting Study: Mind Wandering and Mindfulness

- Cell phone study
- 50% of the people's minds were wandering. What does that mean?



Matthew A. Killingsworth, Daniel T. Gilbert
A Wandering Mind Is an Unhappy Mind *Science* 12
November 2010:

Vol. 330 no. 6006 p. 932

But Can You Measure Happiness In The Brain?

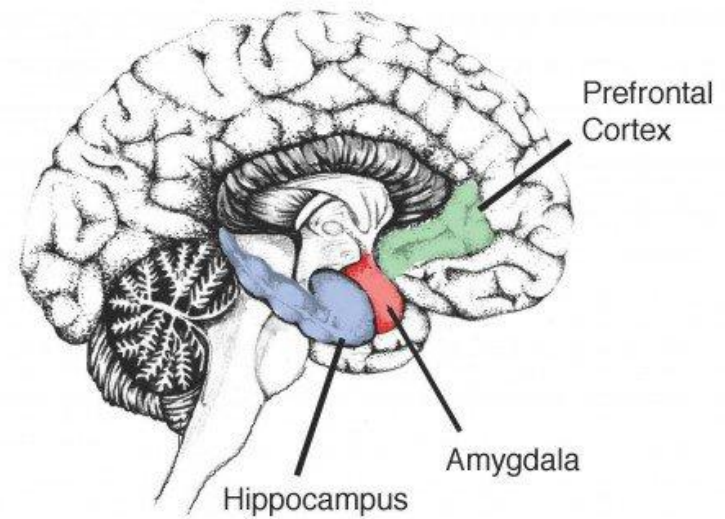


Finding Bliss In The Brain

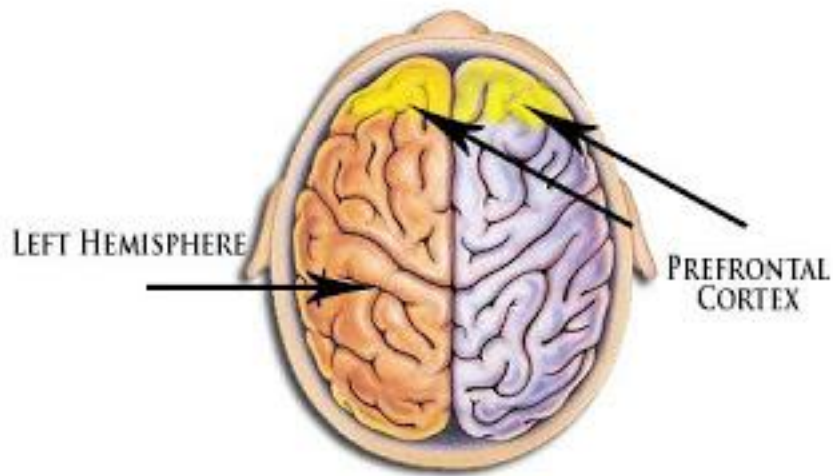
- Happiness is actually a measurable state using an MRI.



- How an MRI works?



Left Prefrontal Cortex Is More Active When People Feel Happy



Tested thousands of people....

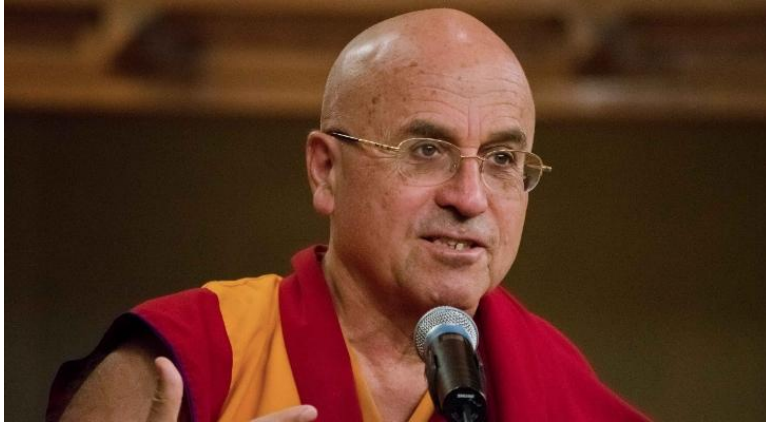


Dr. Richard Davidson at the University of Wisconsin

Is This The World's Happiest Man?



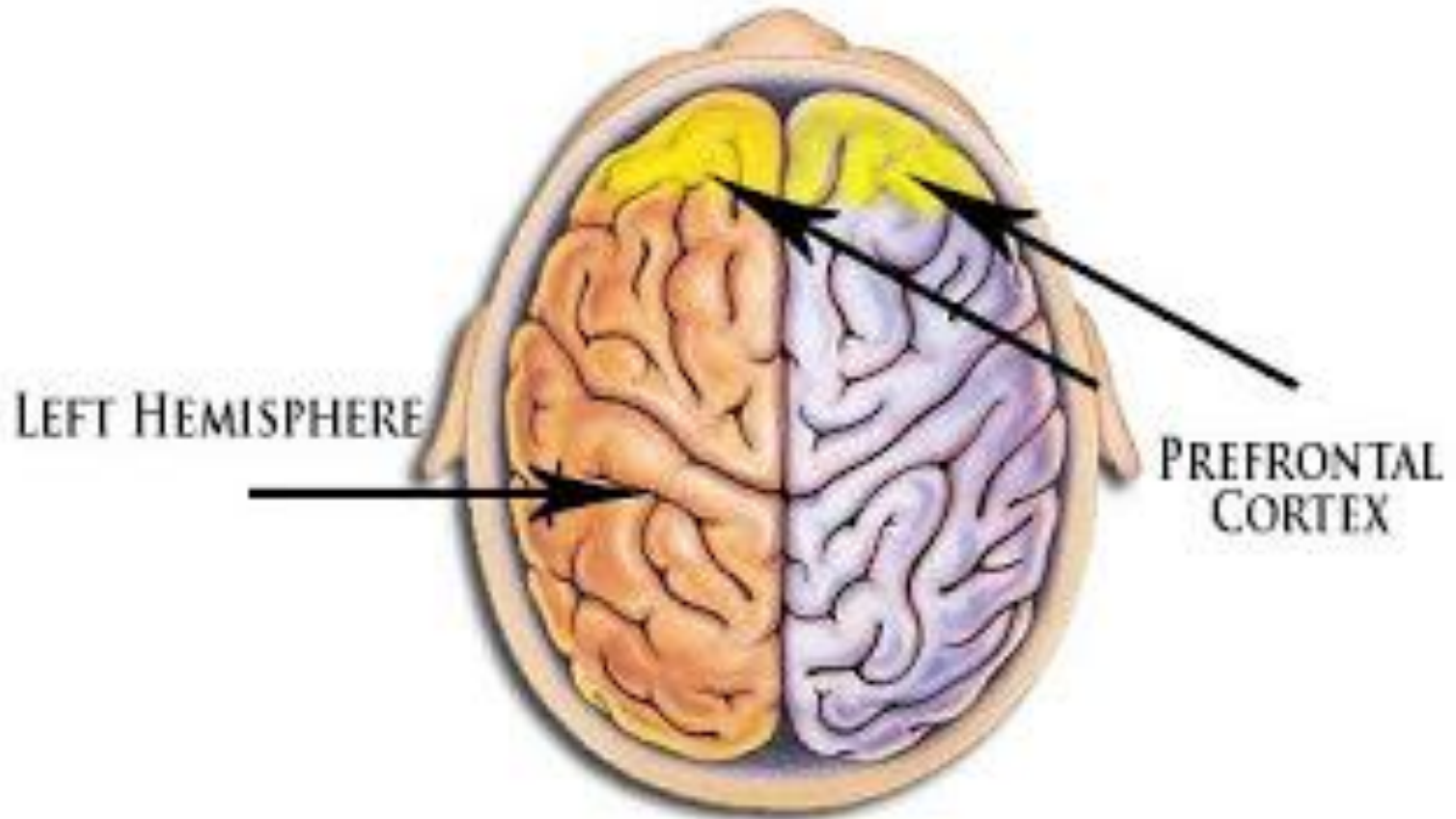
“The World’s Happiest Man” Is A Buddhist Monk....



Matthieu Ricard was a volunteer subject in a study performed at the University of Wisconsin–Madison's on happiness, scoring significantly beyond the average obtained after testing thousands of other volunteers.



Why Is Ricard's Left Prefrontal Cortex So Active?



What Do Monk's Do?

They Meditate

What Is Meditation?

- Meditation is not doing nothing...
- Meditation is an active training of the mind to increase awareness, and different meditation programs approach this in different ways.



Mindfulness Is A Core Element Of Meditation

2 key elements:

- **Maintaining attention on the immediate experience**
- **Attitude of acceptance towards the experience.**



Monks Practice Mindfulness: Put A Bunch Of Monks In Brain Scanners



**Monks Seem To Have Robust Connections In Scattered
Parts Of Their Brain**

I Would Bet You...

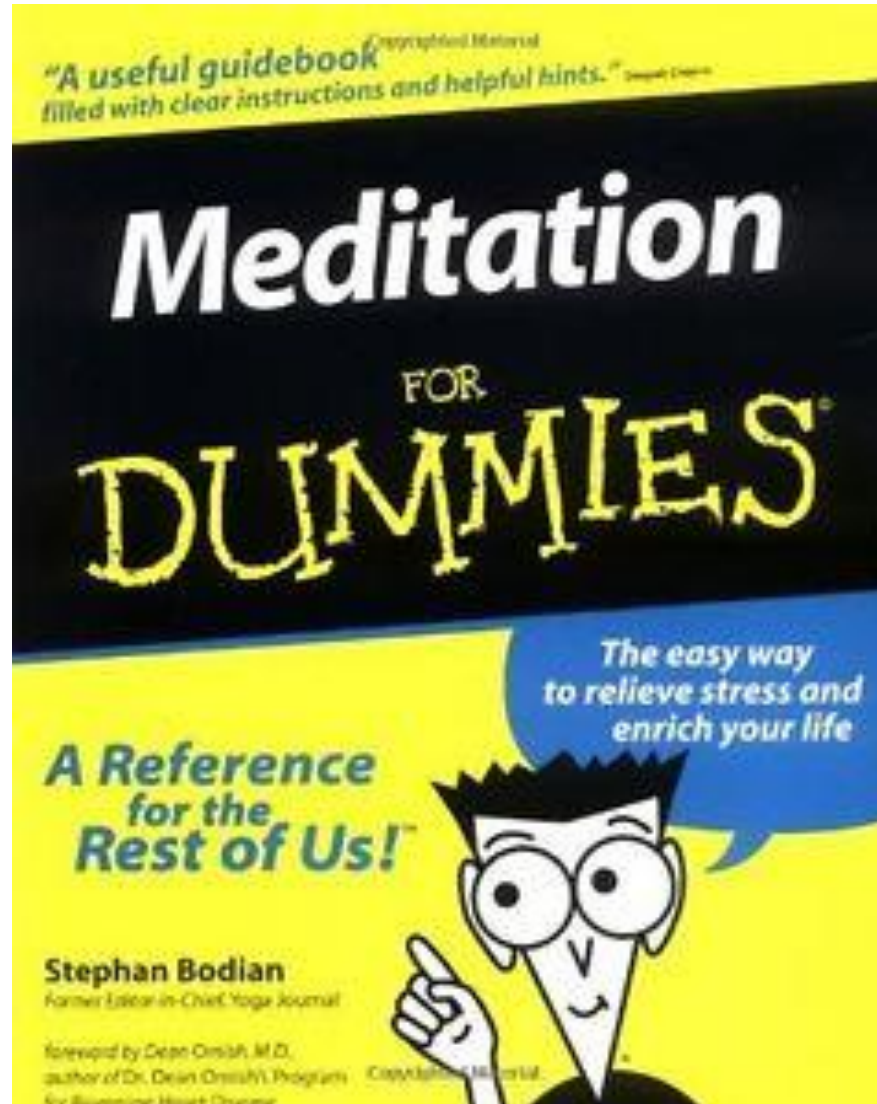
How Many Hours Have The Monks Meditated By The Time They Were Involved In These Studies?



34,000 hours!

- That's 11.5 years of meditating 8 hours a day, every day!
- That's A LOT of meditating!!!!

Is There A Cliff Notes Version???



Harvard Study: Is There A Shortcut? Like Eight Weeks?

- Images were taken of the brain structure of study participants two weeks before and after they took part in the eight-week mindfulness based meditation program.
- **Participants had never meditated.**



Experimental Set Up

- Weekly meetings and audio tapes for mindfulness.
- Kept track of how much they meditated.
- A set of MRI brain images was also taken of a control group of nonmeditators over a similar time interval.

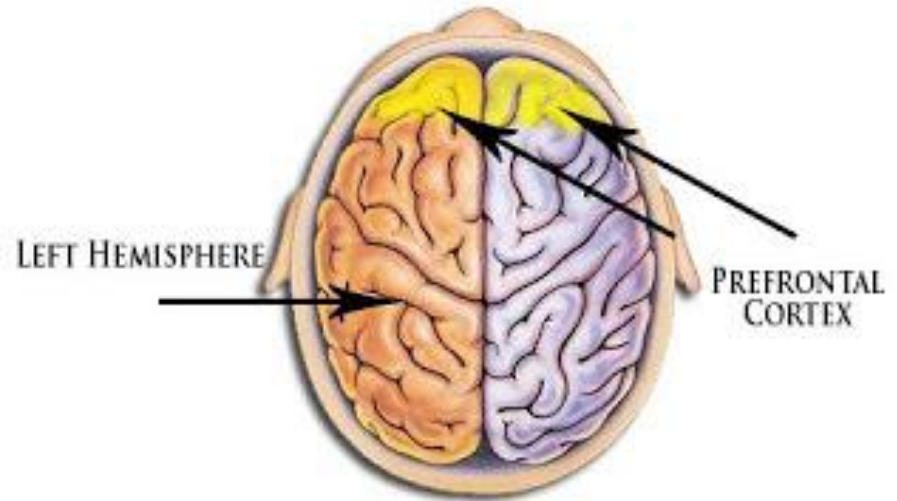


What Are These Meditators Actually Doing????

- Breathe in calmness, breathe out anxiety.
- There are other versions. Concentration, loving kindness, choiceless awareness.
- NOTE: no difference in effectiveness found between these different types of meditation. All equally effective.

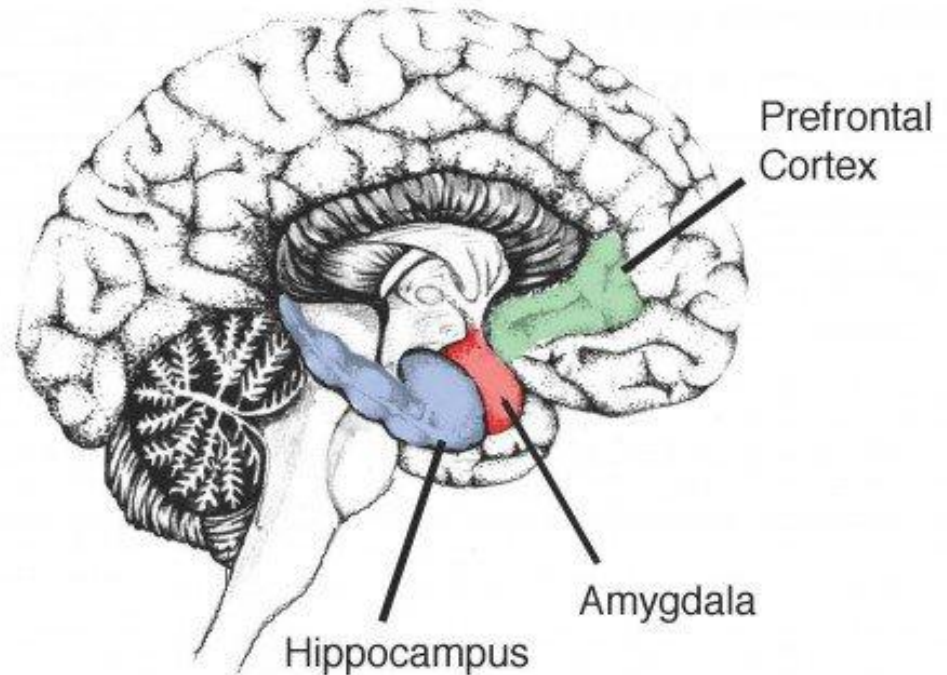
27 Minutes A Day Of Practicing Mindful Meditation

- They reported that they felt less stressed.
- But were there any changes in their brain?



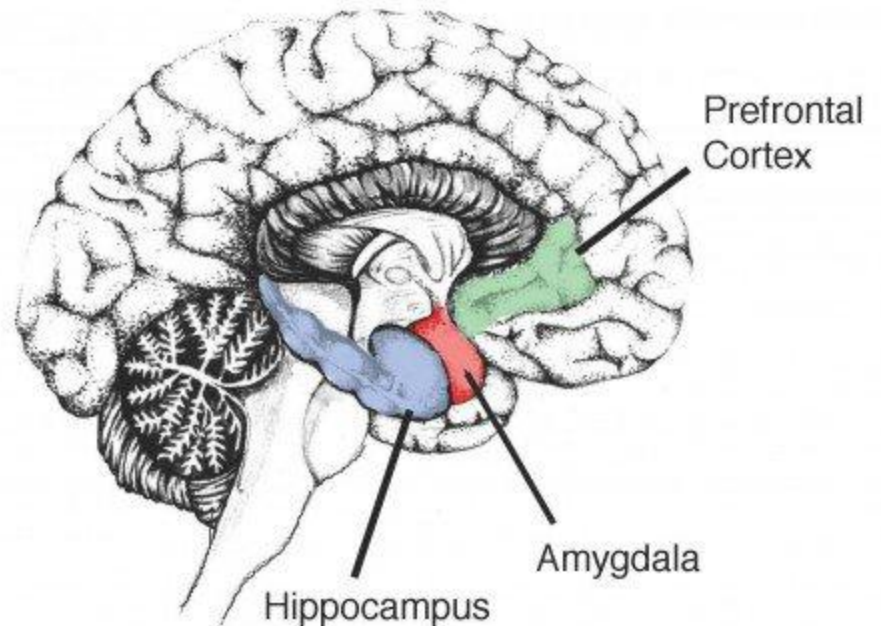
Hippocampus Grows

- Hippocampus, known to be important for learning and memory, and in structures associated with **self-awareness, compassion, and introspection.**
- **Hippocampus is working like a muscle.**



Emotional Part Of The Brain Shrinks

- Participant-reported reductions in stress also were correlated with decreased gray-matter density in the amygdala, which is known to play an important role in anxiety and stress.



What Does This Mean?

**You Don't Need 34,000 Hours of
Meditation To See A Change In The
Brain....**

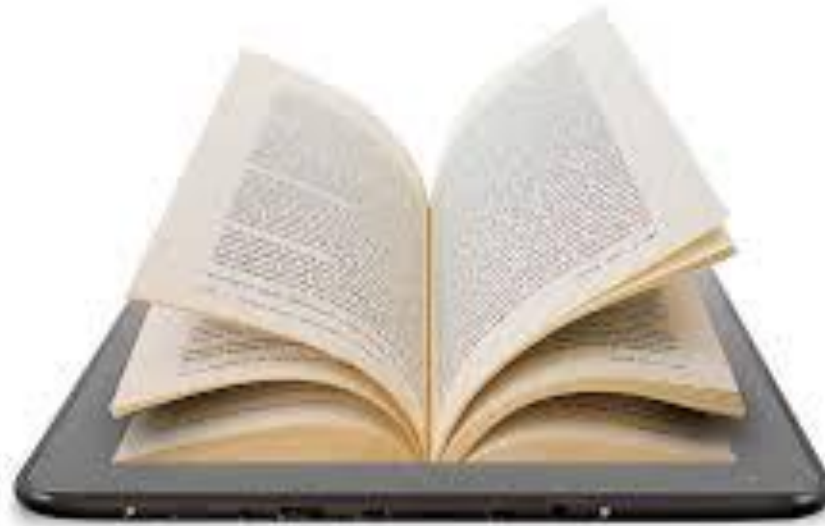
How Much Mindfulness?

- Just 25 minutes of mindfulness meditation for 3 consecutive days alleviated stress.



J. David Creswell, Laura E. Pacilio, Emily K. Lindsay, Kirk Warren Brown. **Brief mindfulness meditation training alters psychological and neuroendocrine responses to social evaluative stress.** *Psychoneuroendocrinology*, 2014; 44: 1 DOI:[10.1016/j.psyneuen.2014.02.007](https://doi.org/10.1016/j.psyneuen.2014.02.007)

Ever Had The Experience Of Reading The Same Page Over and Over



Practicing Mindfulness Keeps Our Brains From Wandering

Guess Who Is Meditating?

The Marines!



And many other groups (athletes, CEOs school children, tech companies.....
From Kobe Bryant to Ariana Huffington)

JAMA Did A Meta-Analysis

- **What's real and what's hype?**



Meditation Programs for Psychological Stress and Well-being. A Systematic Review and Meta-analysis

Madhav Goyal, MD, MPH¹; Sonal Singh, MD, MPH¹; Erica M. S. Sibinga, MD, MHS²; Neda F. Gould, PhD³; Anastasia Rowland-Seymour, MD¹; Ritu Sharma, BSc⁴; Zackary Berger, MD, PhD¹; Dana Sleicher, MS, MPH³; David D. Maron, MHS⁴; Hasan M. Shihab, MBChB, MPH⁴; Padmini D. Ranasinghe, MD, MPH¹; Shauna Linn, BA⁴; Shonali Saha, MD²; Eric B. Bass, MD, MPH^{1,4}; Jennifer A. Haythornthwaite, PhD³

JAMA Intern Med. 2014;174(3):357-368.

Anxiety and Depression and Pain....

- Practicing just 30 minutes of meditation per day significantly decreases the symptoms of anxiety and depression and pain.
- An 8-week training program in mindfulness meditation – where participants have to focus on the current moment.
- Improvements continued over the six months following the training.



Meditation and Anti-depressants?

For depression and anxiety, the effects of meditation were as strong as for those achieved by taking antidepressant medication.



Is This The Only Type Of Mindfulness?



Simple Mindfulness At Home

- **Take a mindful walk**
- **Establish a gratitude practice**
- **Practice mindful eating**

A Modern Dinner.....



How much screen time is the average child getting?



Seven Hours A Day....

- An average of seven hours a day on entertainment media, including televisions, computers, phones and other electronic devices



American Academy of Pediatrics Recomendation

- Children and teens should engage with entertainment media for no more than one or two hours per day, and that should be high-quality content.
- APA also encourages other healthy habits, such as reading, sports or playing outside.



Screens and The Brain

Developing brain needs:

eye contact

conversation

daydream

Stimulation and be boredom

Fresh air

IMPACT of Screens on SLEEP



Benefits Of Mindfulness

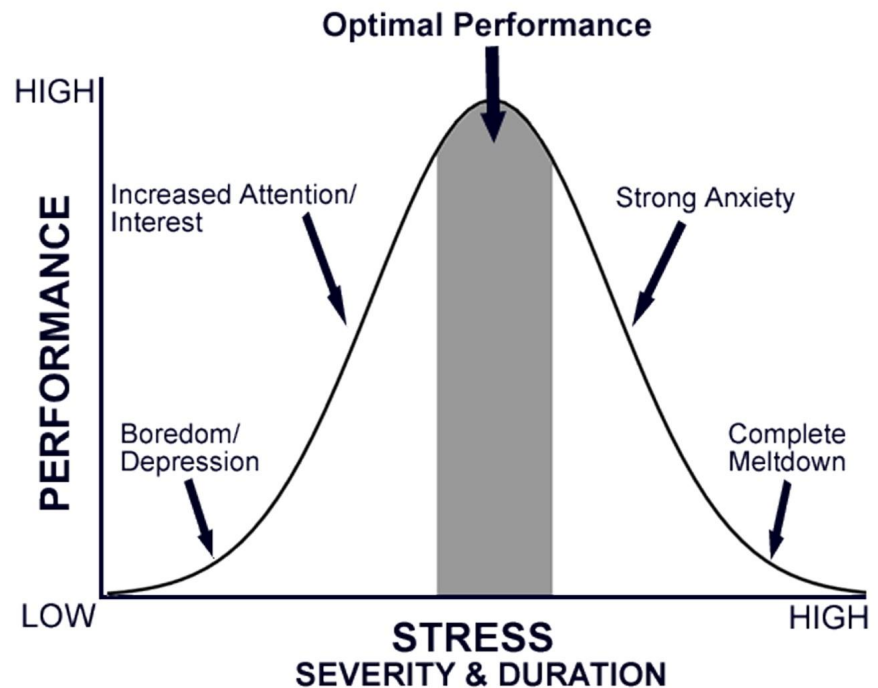
- Kids are growing up in a challenging fast paced world.
- Develops the prefrontal cortex **OVER TIME.**

Remember expectations....



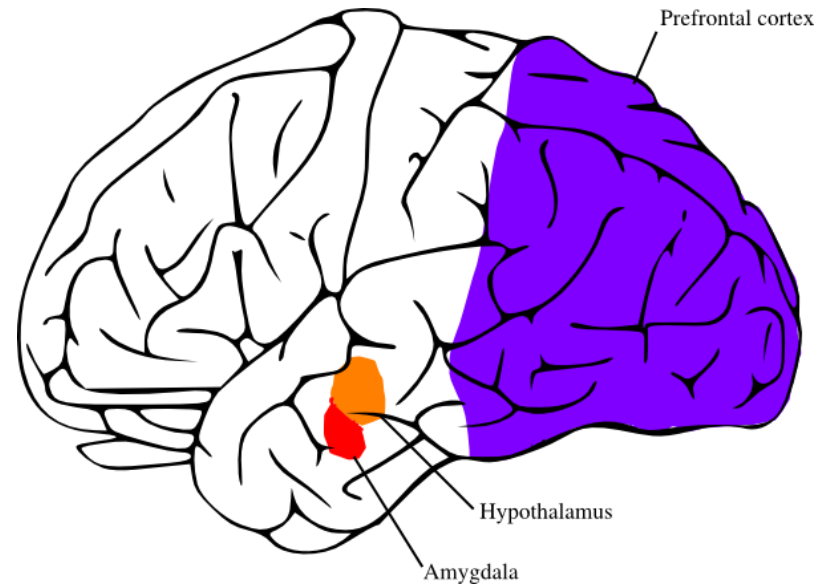
Remember Bits Of Stress Are Normal And Healthy

- Mindfulness gives an efficient way to manage stress so one does not become overwhelmed.
- We learn by mistakes and by failing.
- We don't have much control over what causes us stress and anxiety but we have a lot of control over how we respond.

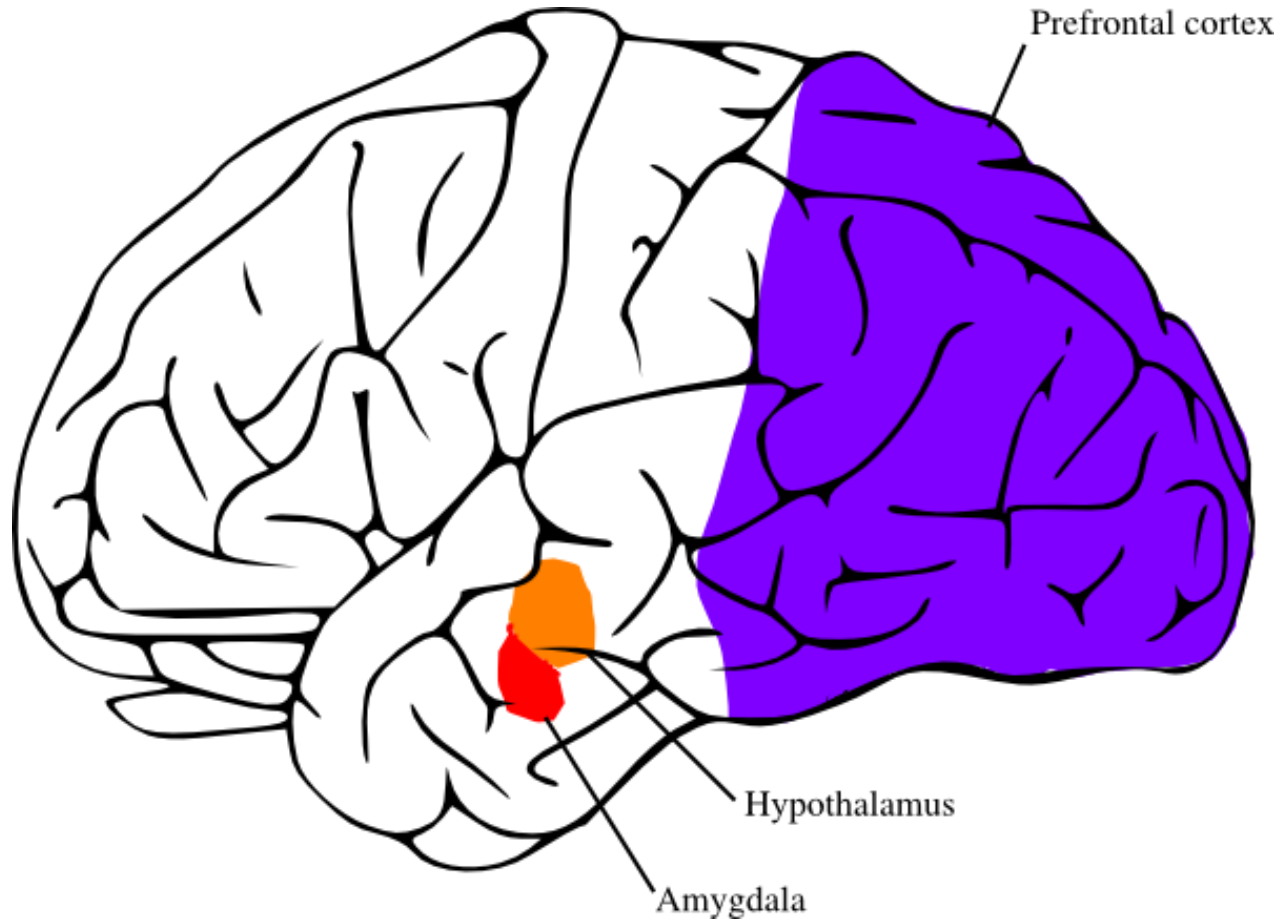


Benefits Of Mindfulness To Kids

- Increasing focus and attention.
- Being aware of when one is about to get upset.
- A way to self soothe.
- **Emotional regulation and cognitive focus**



Our Communal Brain



From brain development to mindfulness

Mindfulness Is A Gift To Your Children and.....

Thanks!

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www.drmlsteineducation.com