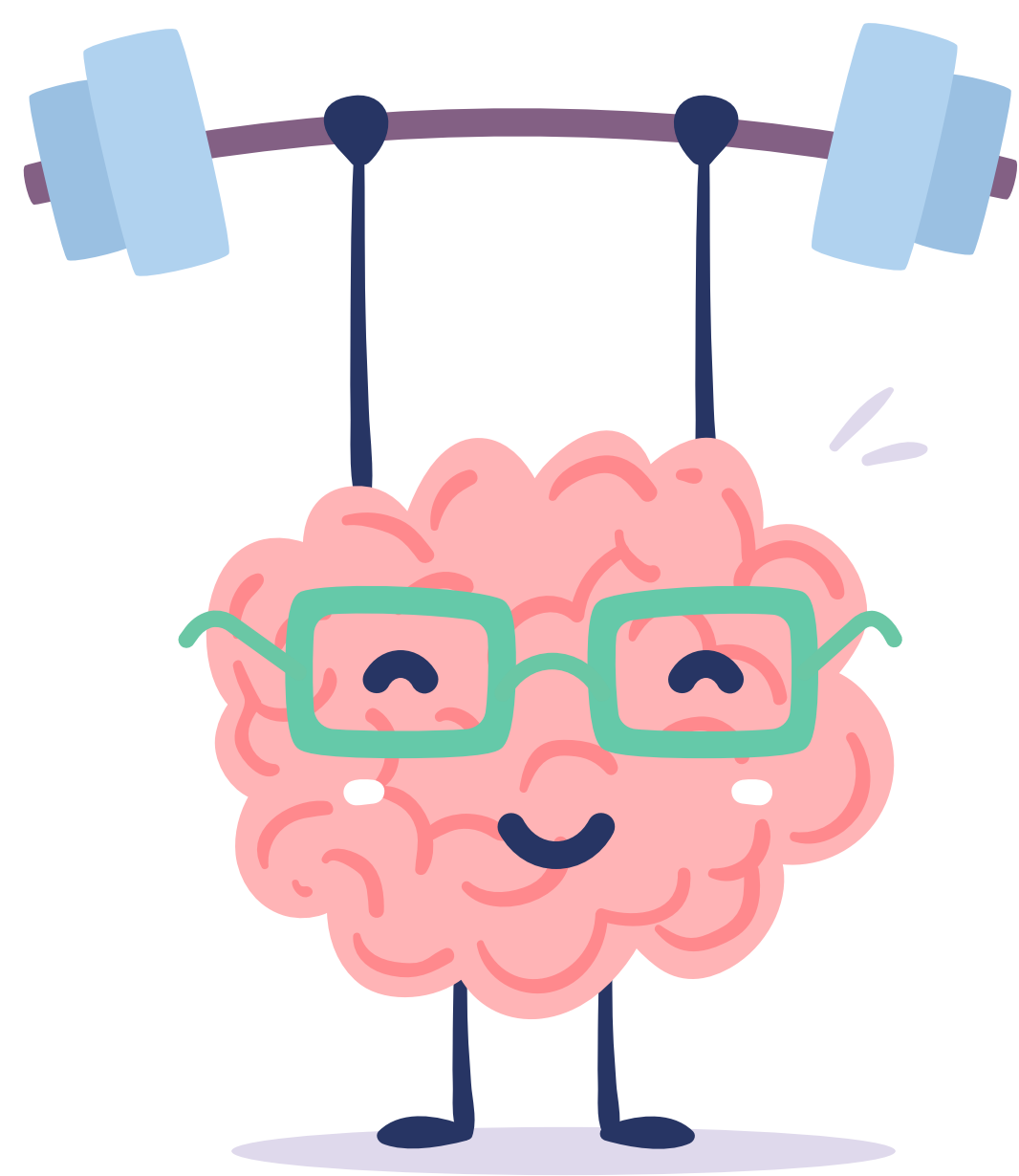


# Neuroplasticity + The Resilient Brain



The brain doesn't only develop in childhood, as was once believed, but continues to grow and change through adulthood—though to a lesser degree.



## What is Neuroplasticity?

### *Neuroplasticity:*

The biological, chemical and physical ability of the brain to change with experience and adapt to its environment.

**The brain has a remarkable capacity to:** reorganize pathways, build new connections and even create new neurons!

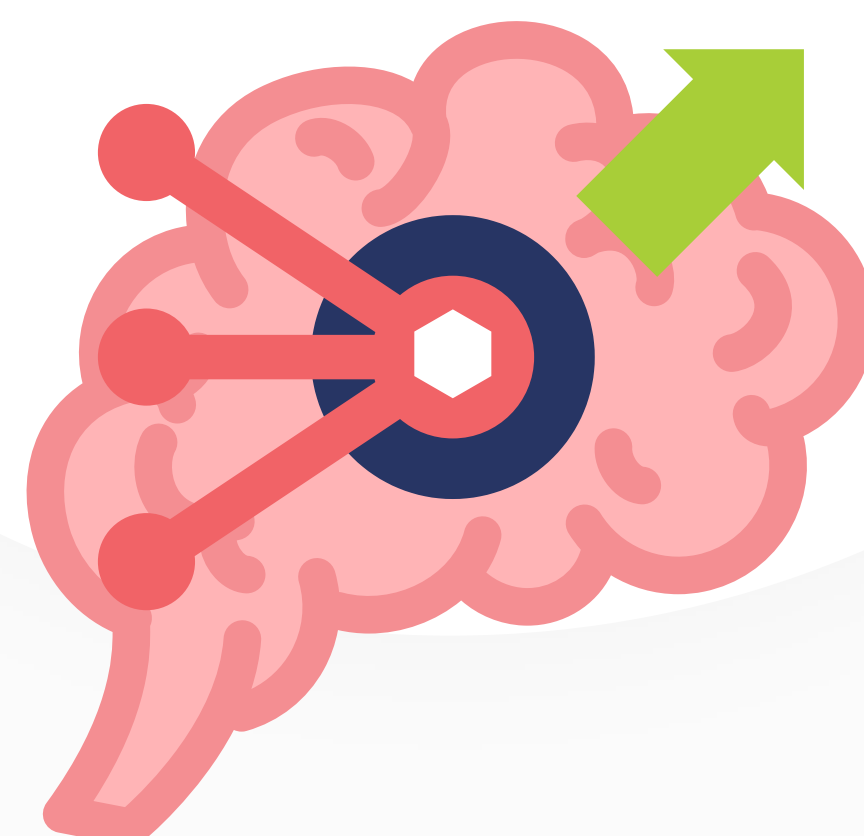
**Neuroplasticity occurs in response to:** learning new things, practice/ repetition, environmental influences, or stress, injury and disease.

## How Does Neuroplasticity Work?

### Two Types of Neuroplasticity

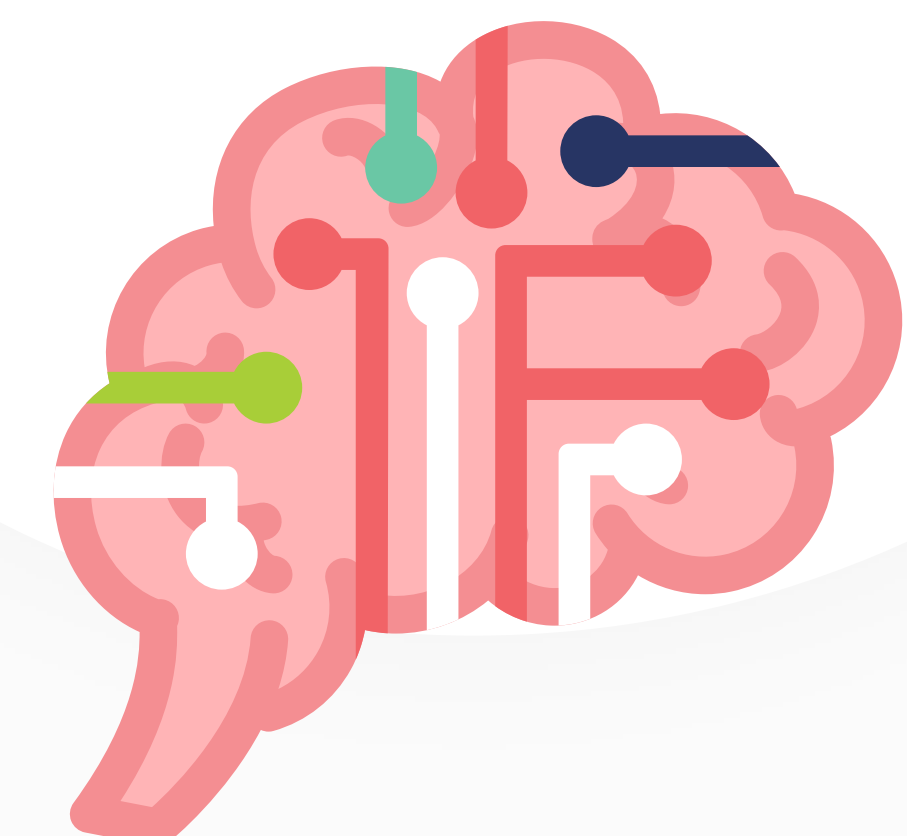
#### *Functional*

The ability to move functions from a damaged area of the brain to another undamaged area after injury.



#### *Structural*

The brain's ability to reorganize its neuronal connections and to actually change its physical structure in response to learning and experience.






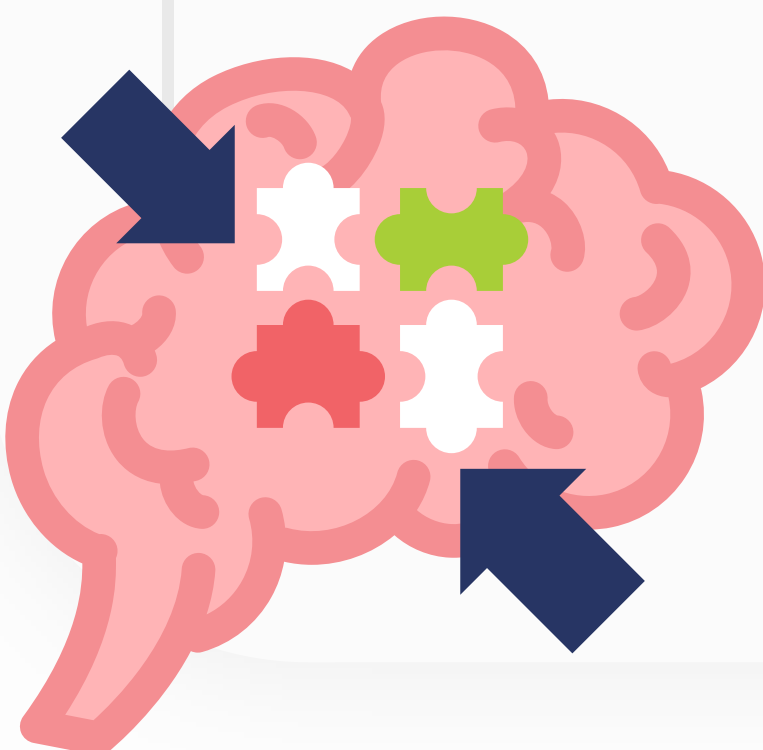
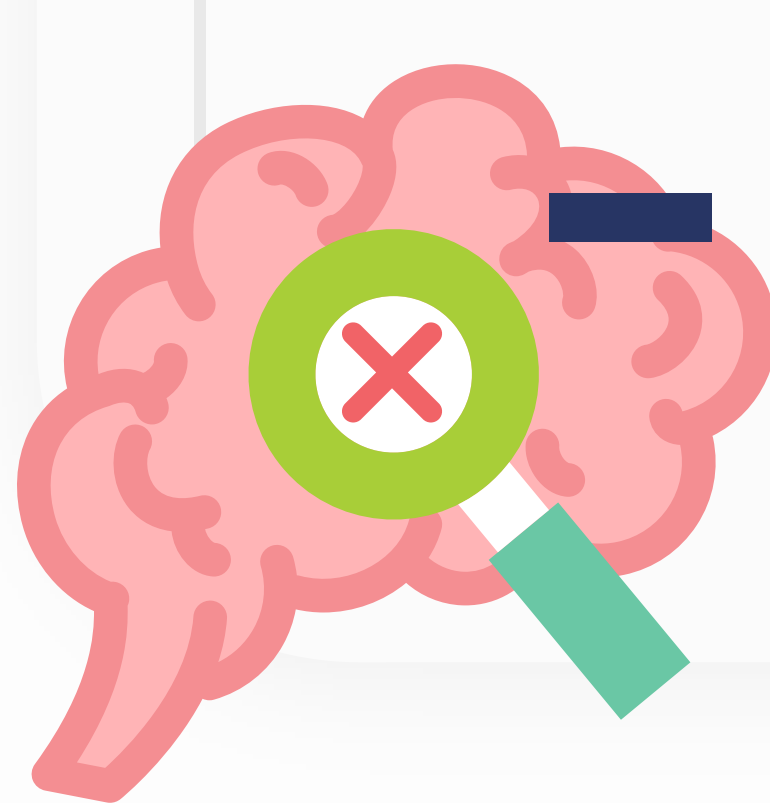
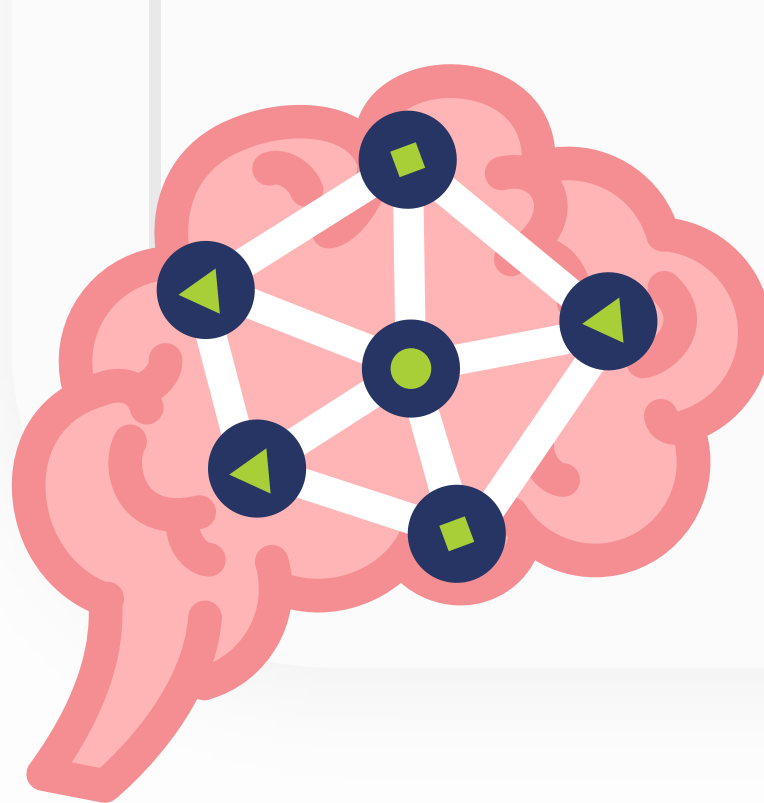
# How Change Happens in the Brain



## Quick Intro to Terms:

The nervous system is comprised of two main cell types:

**Neurons** receive and send electrical signals, called **neurotransmitters**, to other cells through thin, tail-like **axons** across a small gap or **synapse**. **Glial cells** insulate the neurons and are key to transmitting these messages all over the body.

Neurogenesis	Neural Connections	Synaptic Pruning	Myelination
<ul style="list-style-type: none"><li>» The creation of new neurons</li><li>» The most basic level of neuroplasticity</li><li>» Once believed to end in childhood, new research shows even adults can create new neurons, at least in certain parts of the brain</li><li>» Unused neurons grow weak and die (apoptosis)</li><li>» Glial cells support neurons in regenerating and remodeling</li></ul> 	<ul style="list-style-type: none"><li>» New experiences and skills instigate new neural connections</li><li>» When neurons fire together, they wire together—they become physically connected</li><li>» If you repeat something consistently (from thoughts and actions to learning a new skill), you create new neural pathways; these alter your brain to connect the relevant parts</li><li>» This is also known as experience-dependent plasticity</li></ul> 	<ul style="list-style-type: none"><li>» The disposal of unused and unnecessary neural connections</li><li>» The pathways we use most often get strengthened and preserved</li><li>» Research suggests imbalanced pruning plays a role in some psychiatric and neurodegenerative issues like schizophrenia (over-pruning) and autism (under-pruning)</li></ul> 	<ul style="list-style-type: none"><li>» Glial cells coat the neuron in myelin, which acts like insulation around electrical wires and speeds communication by 300 times</li><li>» The brain performs <i>myelination</i>, adding more layers to the neural pathways that are repeatedly used</li><li>» It then chooses the fastest (most myelinated) pathways—creating <i>new</i> habits and automatic reactions</li><li>» Research indicates that repetition, even in your imagination, increases myelination of those neurons</li></ul> 



# The Good and the Bad of Plasticity



## Positive (+)

The resiliency of the brain allows us to:

- Recover from injury + disease
- Learn new things, as well as new ways of handling conflict + stress
- Overcome many mental health issues such as depression, anxiety, ADHD, OCD + addiction

## Negative (-)

Because the brain doesn't differentiate between "good" and "bad," it will learn whatever is repeated, including:

- Both helpful + unhelpful thoughts, responses + habits
- Depressive, anxious, obsessive or over-reactive patterns

## Ways to Build a More Resilient Brain

### Fascinating Brain Facts

- The brain contains roughly 86 billion brain cells!
- At birth, each neuron has about 2500 synapses; by age 3, they have 15,000 synapses! The average adult has only about half that number.
- Roughly half of your brain is gray matter—where neurons are created and live—and the other half is white matter—myelin insulation.
- 90% of brain cells are glia.
- The average brain generates about 50,000 thoughts per day—and 70% of these tend to be critical and negative.
- Your brain's pattern of connectivity is as unique as your fingerprints!

- Quality social interactions
- Meditation
- Sleep
- Lifelong learning
- Mental & physical exercise
- Stress reduction
- Healthy nutrition/diet
- New experiences & habits
- Therapeutic interventions
- Emotional regulation

 **Dr. Diane Poole Heller**  
SOMATIC ATTACHMENT & TRAUMA EXPERT

## Neuroplasticity + The Resilient Brain

### About Diane Poole Heller

Diane Poole Heller, PhD is an internationally recognized speaker, author and expert in the field of attachment theory and trauma resolution. Diane strongly believes that by healing ourselves, we heal our families, our communities and the world.

Her signature series on adult attachment, DARE (Dynamic Attachment Re-patterning experience), provides therapists and individuals with the skills and tools they need to facilitate healing from trauma and to create more fulfilling adult relationships.

