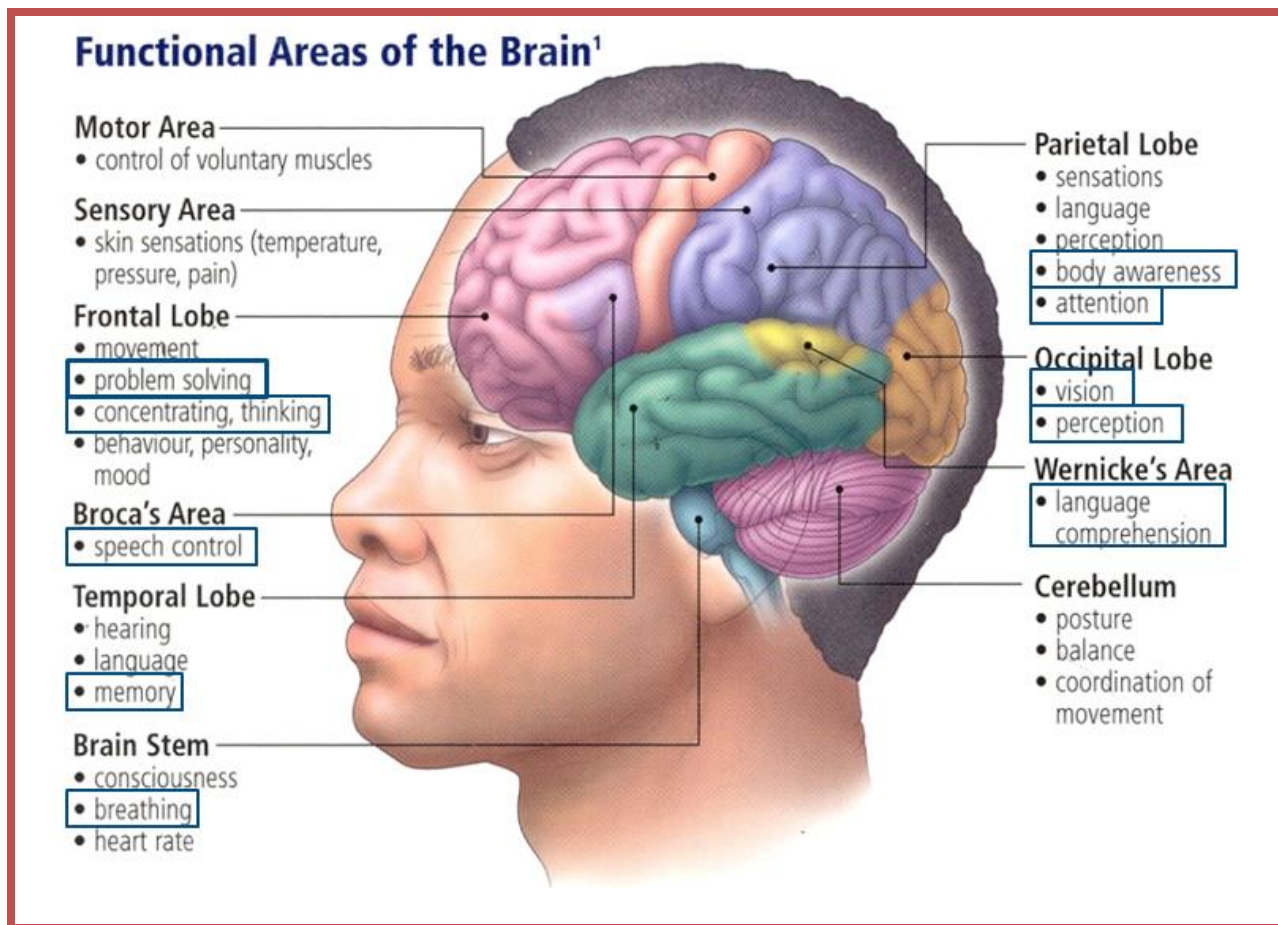


## Brain and Mindfulness Practices

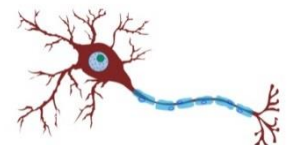
It is important to understand parts of the brain and their function. Watch

<https://www.youtube.com/watch?v=4eDXAAVyIJs> (15:37 min) video and below is a summary for your reference.



## Learning

1. Learning is based on our perceptions of visual and auditory stimuli
2. (Beau Lotto)
  - Creation of all new perceptions begins with a question or a step into uncertainty.
  - Our brains constantly try to redefine normality which is based on our ecology and our meaning of definitions.
3. Learning occurs by mirroring what we see (using mirror neurons, Dr. Ramachandran)
4. A mirror neuron is activated when an animal acts and observes the same action performed by another.
5. First seen in 1992, and now neurologists think is important in understanding intention as well as action.
6. These neural actions are involuntary and automatic.



## Perception and Learning

1. Light bounces from a stimulus during the first few tenths of a second to occipital cortex that then sends rep of this image in two directions...
  - a. The hippocampus (storage for long-term memory) for evaluation as threat or opportunity
  - b. The prefrontal cortex and other parts of the brain for more sophisticated and time-consuming analysis
2. If perceived as a threat, signal goes to amygdala/fight-or-flight neural system.
3. At the same time, prefrontal cortex is pulling information from long-term memory to access...
4. Primary neurotransmitters

NAME	Function
Glutamate	excites receiving neurons
GABA	inhibits receiving neurons

5. Other neurotransmitters

NAME	Function
Serotonin	Regulates moods, sleep, and digestion
Dopamine	Involved with rewards and attention; promotes approach behaviors
Norepinephrine	Alerts and arouses
Acetylcholine	Promotes wakefulness and learning; helps encode new memories in the hippocampus
Cortisol	Stress hormone released by adrenal glands; stimulates the amygdala and inhibits the hippocampus

- Dopamine is released when you just perceive reward.
  - If the reward is less than expected, dopamine levels drop, leading to unpleasant feelings, and we look for things to change these bad feelings (processed by the anterior cingulate cortex which is center of logic)
6. Hypothalamus regulates the endocrine system and the autonomic nervous system.
  7. Lack of food depletes energy needed to produce hormones regulating brain function.
  8. Weighs 2% of body weight but uses 20% of oxygen.
  9. When neuromodulators like opioids (including endorphins), oxytocin, and norepinephrine surge into your synapses, they strengthen the neural circuits that are active making them fire together wire together for future.
  10. When you succeed at a problem after several tries, there is a wave of pleasure chemicals, which help cement the synaptic connections that created the specific action, highlighting whatever triggered it leading to wanting to strengthen that behavior.
  11. Rewards need to be substantial; otherwise not worth the effort.
  12. Problem-solving past experiences automatically prime us in a particular state of mind.
  13. Rapid-fire instructions causing a stress state makes the brain release adrenaline and cortisol, decreasing short-term memory.
  14. Chronic stress over time then starts affecting learning and memory.



## Mindfulness Practice 2

If you suffer from anxiety or fear during math tests or otherwise, the same process of observation applies. Imagine being on an exam and panicking or being stuck.

# Stop!

## Put the exam face down on the desk.

- Observe your breath
- Watch the “in” and “out” breath
- Slow down the “out” breath
- Slower the breath the calmer you will feel.

### Breath Practice

(Sit straight in your chair)

- “Breathing in” feel alert
- “Breathing out” feel relaxed

Repeat above two steps for 5 times or more

- “Breathing in” feel calm
- “Breathing out” feel peace

Repeat above two steps for 5 times or more

- “Breathing in” feel confident
- “Breathing out” feel relaxed

Repeat above two steps for 5 times or more

## Mindfulness Practice 3: Body Scan

Body Scan <https://www.youtube.com/watch?v=vdm06g3AmwY> (17:29 min)

For this practice you be seated, or lying down.

*(Do not operate machinery during or right after, give yourself a few minutes to come back to neutral afterwards.)*

- Sit tall so your chest is tall and wide as it can be.
- Put your palms in any of the following positions.



- You can either close your eyes gently or focus on a spot in front of you on a blank wall or on the ground.
- Take a few breaths to bring focus to your body and be present here and now.
  - We will now scan the body in your mind's eye by bringing attention to various body parts starting with your left big toe. Move through the whole body as fast as slow as you would like.
  - Before beginning, start with scanning the whole body to see how it feels
  - We will start with focus on the left big toe and just pay attention don't try to change anything just observe. (Everything under observation changes. "*Heisenberg's uncertainty principle*")

See next page...

Left Leg	Right Leg
<ul style="list-style-type: none"> <li><input type="checkbox"/> Focus on the left big toe</li> <li><input type="checkbox"/> Move to your left second toe on the left leg, then the middle toe, fourth toe, and little toe.</li> <li><input type="checkbox"/> Take your attention now to your whole left foot.</li> <li><input type="checkbox"/> Observe your left ankle</li> <li><input type="checkbox"/> Observe your left calf</li> <li><input type="checkbox"/> Observe your left knee.</li> <li><input type="checkbox"/> Observe your left thigh.</li> <li><input type="checkbox"/> Observe your left hip.</li> </ul> <p>See if your left leg feels differently than the right after this observation</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Now move your attention to your right big toe, then your right second toe on the right middle toe, fourth toe, and little toe.</li> <li><input type="checkbox"/> Take your attention now to your whole right foot.</li> <li><input type="checkbox"/> Observe your right ankle</li> <li><input type="checkbox"/> Observe your right calf</li> <li><input type="checkbox"/> Observe your right knee.</li> <li><input type="checkbox"/> Observe your right thigh</li> <li><input type="checkbox"/> Observe your right hip</li> </ul>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Observe your hips and abdomen. Your abdomen has many important organs located here just observe.</li> <li><input type="checkbox"/> Observe your stomach and your diaphragm.</li> <li><input type="checkbox"/> Observe your ribs and chest cavity.</li> <li><input type="checkbox"/> Feel the breath moving through your lungs.</li> <li><input type="checkbox"/> Feel the shoulders</li> </ul>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> Focus on the thumb of your left hand and again just pay attention don't try to change anything just observe.</li> <li><input type="checkbox"/> Move to your left second finger, then the middle finger, fourth finger, and pinky.</li> <li><input type="checkbox"/> Take your attention now to your whole left hand.</li> <li><input type="checkbox"/> Observe your left wrist</li> <li><input type="checkbox"/> Observe your left forearm and upper arm</li> <li><input type="checkbox"/> Scan your whole arm.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Focus on the thumb of your right hand and again just pay attention don't try to change anything just observe.</li> <li><input type="checkbox"/> Move to your right second finger, then the middle finger, fourth finger, and pinky.</li> <li><input type="checkbox"/> Take your attention now to your whole right hand.</li> <li><input type="checkbox"/> Observe your right wrist</li> <li><input type="checkbox"/> Observe your right forearm and upper arm</li> <li><input type="checkbox"/> Scan your whole arm.</li> </ul>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Observe your shoulders (a lot of tension can be stored in your shoulders and neck). Don't try to change anything just observe.</li> <li><input type="checkbox"/> Observe your left and right ears.</li> <li><input type="checkbox"/> Open your mouth slightly to reduce tension in your jaw.</li> <li><input type="checkbox"/> Relax the tongue on the bottom pallet</li> <li><input type="checkbox"/> Feel the vastness of your mouth cavity, your teeth, gums and roof of your mouth, the moistness of your mouth.</li> <li><input type="checkbox"/> Feel your cheek bones and muscles</li> <li><input type="checkbox"/> Feel your nose and breath that moves through it</li> <li><input type="checkbox"/> Feel your eyes</li> <li><input type="checkbox"/> Observe your forehead and top of your head.</li> <li><input type="checkbox"/> Now move your attention to the whole face and head.</li> <li><input type="checkbox"/> Observe the back of your head, neck, back, glutes, thighs, calves, ankles</li> </ul>	

- Now observe your whole body now and see if there is any part that calls your attention
- If it does, take your focus there.
- Now just sit as a whole person and observe your breath as it moves in and out of your body leaving your relaxed, focused and peaceful.
- Remember this feeling is always within your grasp. Just observe.
- Slowly after three breaths gently open your eyes if they were closed
- Resume normal activity as you feel ready.
- This can be done as fast or slow as you want and will be a way to get your body to turn itself into a more calmer relaxed place.

## Mindfulness Practice 4: Exams and Visualizing Success

1. Exam Part 1 <https://www.youtube.com/watch?v=NllnoZeJ2X4> (5:13min)
2. Exam Part 2 [https://www.youtube.com/watch?v=14g0h3AA9\\_o](https://www.youtube.com/watch?v=14g0h3AA9_o) (4:54min)

You prepared your subject matter but now you want to take exams with fear and anxiety hindering your progress.

Before going to the exam

- The previous night sit quiet and focus on your breath. Visualize the exam and you being successful. Feel it in your body and mind. Be with this feeling and assimilate this vision in every pore of your being.
- Visualize all you have learnt in a tool box ready to be used and store it in your mind.
- Imagine this success in your body and mind before you fall asleep.
- Wake up and relive this feeling again.
- Once you are in the classroom and get the exam. Again don't start the exam right away. Sit and pause and connect to your vision of success. Then breathe in and out and become conscious of your mind state.
- Breathing in just connect to your in breath.
- Breathing out just connect to your out breath.
- Slow the breath and visualize success.
- Visualize you doing the homework and the ease with which you solved the problems.
- Stay connected to your breath the whole time visualize "confidence", "success"
- Then start your exam
- If on the exam you encounter a problem you cannot do "Stop". Pause take a deep breath or two, move to a question you know how to do.
- Do the breathing and visualizing exercise again and focusing as long as you need.
- Once calm go to a different part of the exam and do that problem. Once you are done with all the problems you know.
- Then come back and work on the one that stressed you out. Even if you feel "I don't know how to do this"
- Close your eyes and blurt the first thing that comes to your head write it down. See if it will help in solving the problem.
- You can do this, especially if you have been staying with the homework.
- Then later come back to the problem you were stuck on and open your tool box to see what in it you can use.
- Give it your best shot as that is all we can expect from our selves. Stop the commentary that goes in your head, stop the judgement and let your brain do what it does best.

# THINK!