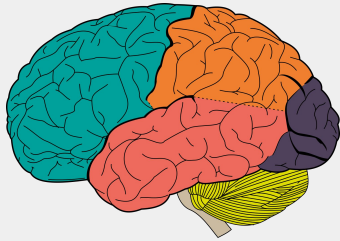


# BRAIN



## FRIENDLY LEARNING



JOLT  
BLAPS



ADVANCE  
EXPLAIN



MYSTERY  
DEMONSTRATE

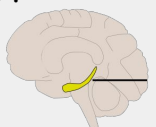


### Talking stick

The JOLT is based loosely on the principle of the Native American talking stick – only the one holding the stick may speak. It combines an energiser requiring rapid thought, movement and respecting the person holding the stick<sup>1</sup>.

### Rapid thinking & Quick Recall

The hippocampus is largely responsible for knowledge recall. During learning, a strong hippocampal activation makes the information easier to remember and recall. In clinical tests, game play has been shown to stimulate these conditions<sup>2</sup>.



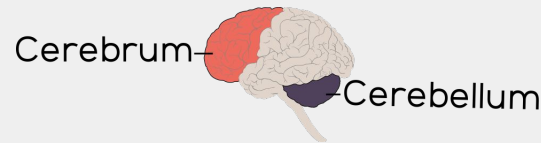
Hippocampus

*"The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honours the servant and has forgotten the gift."*

**Albert Einstein**

### Movement

A pathway has been traced from the cerebellum back to parts of the brain involved in memory, attention, and spatial perception. Amazingly, the part of the brain that processes movement is the same part of the brain that processes learning. The Motor Cortex is responsible for conscious movements throughout your body. It's basically the command center that allows you to move your tongue, lips, jaw, eyes, hands, feet and other parts of your body<sup>3</sup>.



### Novelty

For many years, researchers have known that dopamine is important for arousal, movement, mood and executing activities with haste and vigour<sup>4</sup>. New, Exciting and Rewarding (NEAR)- stimulates increased dopamine levels. The brain reacts to novelty by releasing dopamine motivating us to go exploring in search of a reward<sup>4</sup>. Dopamine is central to learning. When the brain is rewarded unexpectedly, dopamine surges, prompting the "Limbic" reward system to take note in order to remember how to replicate the positive experience. In contrast, negative encounters deplete dopamine as a signal to avoid repeating them. This is a key learning mechanism which also involves memory-formation and motivation.

### Response Expectancy Theory

The ADVANCE describes a positive action or behaviour - a positive suggestion creating a feeling of self worth. There is reasonable research evidence now to show that "expectancies can directly alter our subjective experience of internal states". As a result, we also modify our behavior to produce a particular outcome when we anticipate it<sup>5</sup>.

### Adaptive behaviour

The ability to detect causal effect of our actions determines our adaptive behaviour - a collection of social and practical skills which enable us to function effectively in our everyday lives. Considering the consequences of behaviour allows the acquisition and performance of new, more constructive behaviour – and therefore better decision making<sup>6</sup>.

### Explanation

The Frontal Lobe is in the front part of your brain. It's the part of your brain responsible for thinking, decision making, reasoning, planning, organizing, problem solving, personality, social behaviour and language<sup>7</sup>.

### Active Learning

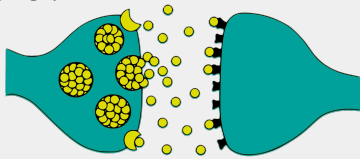
The integration of multiple regions of the brain requires active learning. When students take the skills they have learned in theory and put them in practice, this creates a deeper cognitive link to the material, making it easier for students to learn<sup>8</sup>. Finally, using role-play as a training tool helps students change behaviors and use best practices in real-world settings<sup>8</sup>.

## Mistakes

Moser found that when people make a mistake the brain has two potential responses.

1. ERN response, is increased electrical activity that is thought to occur when the brain experiences conflict between a correct response and an error. Interestingly, this brain activity occurs whether or not the person making the response knows they have made an error.
2. Pe, is a brain signal thought to reflect conscious attention to mistakes. This happens when there is awareness that an error has been made and conscious attention is paid to the error.

Researchers identified specific neurons in the medial prefrontal cortex, called self monitoring error neurons, that fire immediately after people make a mistake<sup>9</sup>.

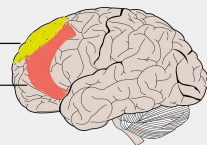


## Creativity

"We think what we see is a relaxation of 'executive functions' to allow more natural de-focused attention and uncensored processes to occur that might be the hallmark of creativity," says Braun. The areas in our brain, that we use to make decisions (dorsolateral prefrontal cortex) is largely inactive. The "medial prefrontal cortex" area, which is responsible to learn association, context, events and emotional responses however was extremely active<sup>10</sup>.

Dorsolateral Prefrontal Cortex

Medial Prefrontal Cortex



The more dopamine that is released, the more creative we are. So this seems to be the magic combination: If you are in a relaxed state of mind, easy to distract and full of dopamine, your brain is most likely to give you your best, most creative ideas.

## The inferior frontal gyri

Located in the lower back portion of the frontal lobe on each side of the brain. Creativity depends on thinking skills that rely on the use of baseline knowledge combined with innovative thinking. Interaction between the inferior frontal gyrus on the right and left sides of the brain facilitates creative thinking<sup>11</sup>.

## Social, Mood & Empathy

The frontal lobe, particularly the region located farthest to the front called the prefrontal cortex, is involved in sophisticated interpersonal thinking skills and the competence required for emotional well-being. In general, both the left and right sides of the prefrontal cortex are equally involved in social and interactive proficiency<sup>11</sup>.

The limbic system is located centrally and deep within the brain. It consists of several small structures called the hippocampus, amygdala, thalamus and hypothalamus. The limbic system is involved in emotional memory and mood control<sup>11</sup>.



While the limbic system is involved with feelings, which are often thought of as being spontaneous, the control of feelings and emotions requires high-level cognitive skills and interaction of the limbic system with the other parts of the brain involved in thinking<sup>11</sup>.

The "love molecule," oxytocin, is the chemical foundation for trusting others. Activated by positive social interactions, it makes us care about others in tangible ways, and it motivates us to work together for a common purpose<sup>12</sup>.

By making students take on the role of another person, they practice empathy and perspective taking. This can lead to more self-reflection and awareness on the part of the student<sup>13</sup>.

## Mirror Neurons

Humans, primates, some birds, and possibly other animals have mirror neurons that fire in the same pattern whether performing or just observing a task. These mirror neurons clearly play an important role in learning motor tasks involving hand eye coordination, and possibly also acquisition of language skills, as well as being required for social skills. The exact processes involved are only just being discovered.

Just as the same mirror neurons fire when observing and doing certain tasks, so other mirror neurons may be triggered both when experiencing a particularly emotion and when observing someone else with that emotion<sup>14</sup>.



References:

1. Locust, C. 1998
2. Foerde & Shohamy. 2011
3. <http://www.lifeinharmony.me/anatomy-of-brain-memory/anatomy-of-brain-memory-i-dorecall-the-neuroscience-learning-part-i>
4. <https://neurosciencenews.com/dopamine-learning-reward-3157/>  
<https://www.scilearn.com/blog/dopamine-learning-brains-reward-center-teach-educators>
5. <https://mamidala.wordpress.com/2013/07/28/how-does-the-power-of-suggestion-influence-students-performance/>
6. Dickinson and Balleine. 1993; Balleine and Dickinson. 1998, 2000
7. <http://www.thisisallaboutyou.com/the-4-critical-parts-of-your-brain-you-need-to-know-why/>
8. Beard, et. al., 1995, McEwen, et. al., 2014; Johnson & Johnson, 1997
9. <https://www.youcubed.org/evidence/mistakes-grow-brain/>  
<https://neurosciencenews.com/neuron-mistakes-10314/>
10. <https://open.buffer.com/shower-thoughts-science-of-creativity/>
11. <https://www.livestrong.com/article/145593-parts-of-the-brain-associated-with-thinking-skills/>
12. <https://www.psychologytoday.com/us/experts/paul-j-zak>
13. Westrup & Planander, 2013; Sogunro, 2004
14. <https://www.sciencedaily.com/releases/2008/12/081219073047.htm>