

The Layers of the Brain

Phineas Gage worked on a railroad construction crew in Vermont during the mid-1800s.

While his crew was blowing up rocks using blasting powder to clear the way for a new rail line, a 13-pound iron rod was accidentally shot out from the explosion. It went through his cheek, left eye socket, and out the top of his head.

Remarkably, Gage survived the incident but the left frontal cortex of his brain did not. Along with the metal rod, it landed about 80 feet away.

Although he survived the horrific accident, he was a changed man. The 25-year-old was once an even-keeled young man but his temperament changed dramatically. He became profane and impatient. The doctor who treated him claimed, "The equilibrium or balance, so to speak, between his intellectual faculties and animal propensities, seems to have been destroyed."

Friends said he was "no longer Gage."

He was unable to perform his construction work so he was used as entertainment fodder in a P.T. Barnum show.

Then something amazing happened.

After a few years, he started getting better. His behavior became more appropriate. He was employed as a stagecoach driver, a job that required focus. Many of the personality functions that were lost in the accident were taken on by the remaining cortical tissue in his brain.

Gage is widely cited as one of the first cases in neuroscience which allowed doctors and researchers to better understand the different areas and functions of the human brain.

The frontal cortex is the part of the brain that helps you make the hard decision when you take the time to think things through. It's the analytical part of the brain -- language, muscle memory,

mathematical skills, pattern recognition, and strategic actions occur here.

Paul MacLean, a neuroscientist in the 1960s, came up with 3 layers of the brain, with the cortex being in the final group:

1. The ancient part of the brain that performs automatic functions. When you're cold, the brain from this region causes the body to shiver.
2. The more recently evolved emotional part of the brain. When you witness something horrific, you shiver because of the emotions it brings to mind.
3. The cognitive part of the brain.

Here are a few ways these layers manifest along with some implications:

Your brain hates uncertainty. In one study, subjects were told they would be shocked but would have to wait an unknown amount of time to receive it. People hated the fact that they didn't know when it was coming, so many actually chose to receive an even stronger shock immediately instead of waiting.

Financial implications: Uncertainty is the one constant in the markets. Get used to it because your brain innately fights that state.

Your environment can impact your actions. Robert Sapolsky details how your innate personality and environment can impact your actions in his book, [Behave: The Biology of Humans at our Best and Worst](#):

Fear and aggression are not inevitably intertwined— not all fear causes aggression, and not all aggression is rooted in fear. Fear typically increases aggression only in those already prone to it; among the subordinate who lack the option of expressing aggression safely, fear does the opposite.

This is like the theory that not all rich people are a-holes, but if you are an a-hole, becoming wealthy will make you an even bigger jerk.

Financial implications: Everything is situationally dependent. Understand your own risk profile, time horizon, and personality traits so you don't make financial decisions based on what someone else is doing.

There's a reason people make mistakes when they're young. The frontal cortex is not fully developed until people reach their mid-20s. This doesn't excuse bad behavior, but it does explain why most of us make some of our most irrational decisions when we are young (hand up on this one).

Financial implications: Get your financial mistakes out of the way when you're young and have an enormous amount of human capital but little in the way of financial capital.

It's easier to go along with the crowd than against it. It takes less than 200 milliseconds for your brain to register that a group of people picked a different answer than you and less than 380 milliseconds for your brain to want to change your opinion to get along. So in less than a second, our brains decide to go along to get along.

Financial implications: The crowd is right more than most assume in the markets but there is such a thing as reversion to the mean. Crowd psychology matters most at the extremes. Strong views, weakly held is a good way to approach most things.

Your brain needs a break from time-to-time. Like muscles, the brain can get tired from too much stimulation. This is why willpower alone is not enough to change your behavior as self-control is a finite resource. Overexerting yourself is how mistakes happen. Studies show that increased effort by the frontal cortex can make people less charitable, and more likely to lie because they can't fight those urges anymore.

Financial implications: You need systems and rules in place to allow your brain to rest. This is the benefit of putting systematic rules in place to guide your actions and documenting your decision-making criteria.

The anticipation of a reward is more important than the reward itself. Dopamine in the brain does not come from receiving a reward but rather from the anticipation of receiving a reward. In some ways, this is a good thing, because it keeps us alive. It helps us think about the future. In other ways, that dopamine rush can work against us because we begin to feel entitled to something that was once one of life's little joys. Dopamine tends to fire when something good *and* unexpected happens. Becoming addicted to the feeling we receive from the dopamine hit makes us continuously feel the need to seek out the new and exciting to get a rush. This is why we can become dissatisfied even when we achieve the goals we set out for.

Financial implications: The reason people love to gamble, chase fad investments, buy penny stocks or trade Dogecoin is that we crave that dopamine hit. There's nothing wrong with taking some chances in your portfolio but do so in moderation to keep yourself honest.

If you would like to learn more about the brain and how it works in concert with our surroundings to impact the decisions we make, I highly recommend this book by Sapolsky:

[Behave: The Biology of Humans at our Best and Worst](#)