INTRODUCTION TO PSYCHOLOGY

Psychology is the study of human behavior. It covers everything that a person thinks or feels. Since it is all-encompassing, you will find psychologists in every field of study under the sun. *The history of psychology originated in the antiquities. Yet, it only became a recognized field on its own in the mid-1800's* and for this reason, it is known as a fairly new discipline of study.

From the field of science, Hippocrates, known as the father of medicine, was one of the greatest influences on modern-day psychology. Similarly, *Socrates, Plato, and Aristotle, the great ancient Greeks philosophers, were among the greatest influences on modern-day psychology from the philosophical perspective*. As a result of the tremendous influence of both these fields on psychology, there once was an ongoing debate as to whether psychology was a science or a philosophy.

Psychology is not a hard science like chemistry or physics. It is known as a soft science because it does not postulate scientific laws governing nature. Human nature is so complex; people don't always react in the same way, thus making it extremely difficult to establish "laws". *For a science to be called a pure science or "hard" science, you must have laws that you can prove over and over again. For example, gravity is a law of nature.* If you let go of a pencil in midair it will always fall--according to a law of physics. But *in defense of the field, psychology does use the scientific method.*

The field of psychology became a recognized discipline in Europe in the mid-1800s. The first psychologists were German. They scientifically studied the physical reactions of the body when experiencing pain and formulated theories about reaching pain thresholds, etc. They also studied how people learn with regards to their thinking processes, again by using the scientific method. *Later, people like Dr. Sigmund Freud, who was a medical doctor, proposed theories about human nature with* *regard to how humans think and feel* which he combined that with the scientific (medical) knowledge of the day.

As a result, the division in psychology became apparent way back then. *You had the scientists (the learning people), who were strictly concerned with physical aspects*; and *the clinicians, such as Freud, who studied the philosophical aspect and combined it with scientific study*.

Today in universities you can choose to go into scientific psychology, which is pure research work, or clinical psychology where you will have patients and treat their various concerns.

1 Psychology

[Adapted from Crash Course Psychology with Hank Green, written by Kathleen Yale, edited by Blake de Pastino, with psychology consultant Dr. Ranjit Bhagwat]

When hearing the word psychology, most people probably think of a therapist listening to a patient unpacking the details of his day while reclining on a couch. Maybe that therapist is wearing glasses, chewing on a cigar, stroking his whiskered chin.

Admit it! If you are thinking about psychology, you're probably picturing Freud.

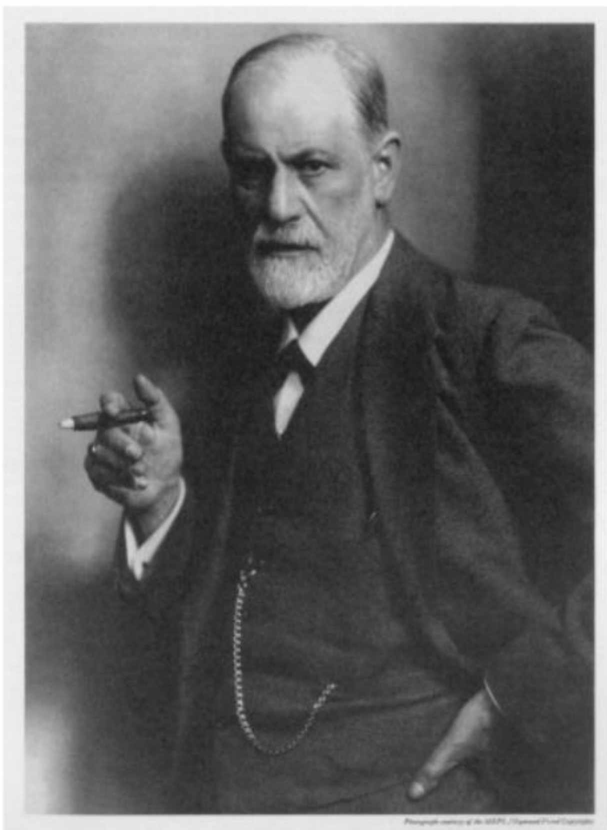
Sigmund Freud was one of the most tremendously influential and controversial thinkers of his time, maybe of all time. *His theories helped build our views on childhood, personality, dreams and sexuality*. And his work fueled a legacy of both support and opposition.

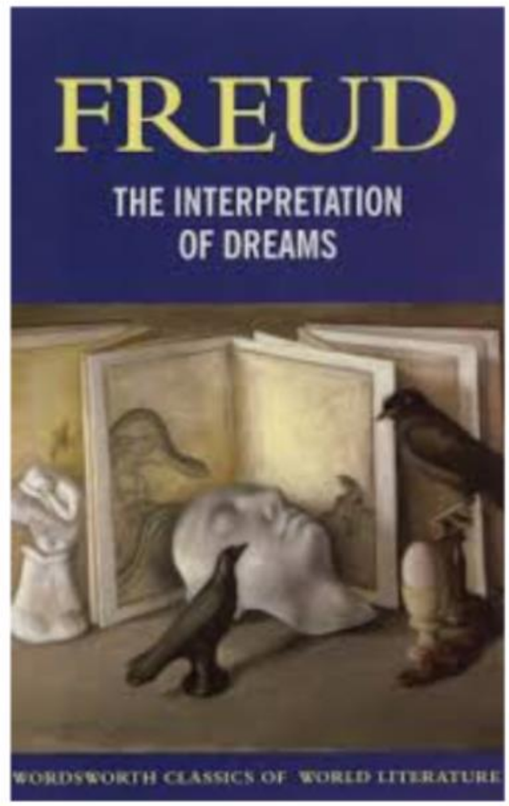
His life was long and spanned an important swath of history from the American Civil War to World War II. But like most great scientists, Freud developed his revolutionary ideas by building on the work of others, and of course innovation in the field didn't stop with him.

Sigmund Freud began his medical career at a Viennese hospital, but in 1886, he started his own practice, specializing in nervous disorders. During this time, *Freud witnessed his colleague Josef Breuer treat a patient called Anna O with a new talking cure.* Basically, he just let her talk about her symptoms. *The more she talked and pulled up traumatic memories, the more her symptoms were reduced. It was a breakthrough, and it changed*

Freud forever.

From then on, *Freud encouraged his patients to talk freely about whatever came to mind, to free associate.* This technique provided the basis for his career, and an entire branch of psychology.



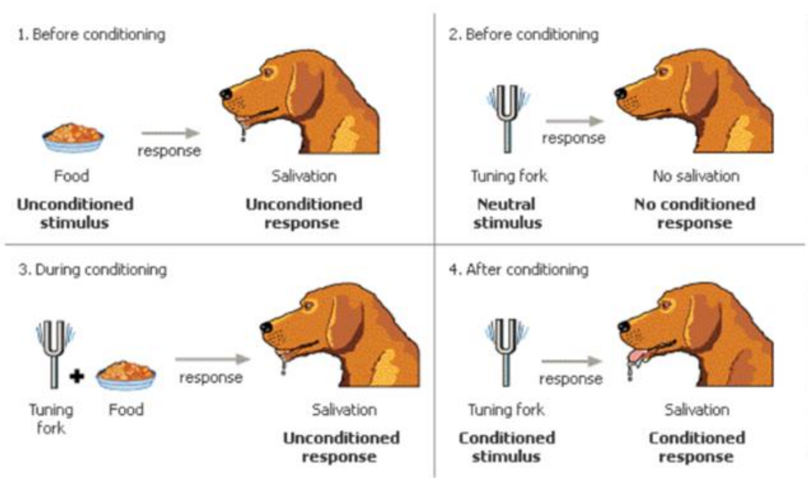


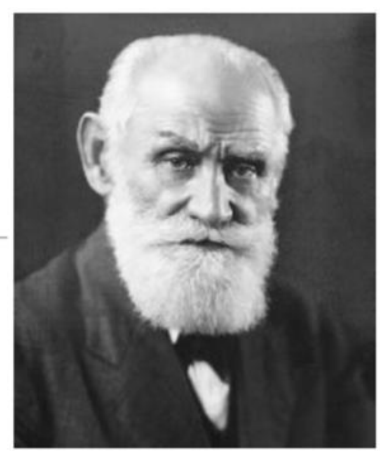
In 1900 he published his book The Interpretation of Dreams, where he introduced his theory of psychoanalysis. Now, you probably think of psychoanalysis as a treatment -- the whole patient on the couch scenario. And that's definitely part of it. But Freud's concept was actually a lot more complex than that, and it was revolutionary.

After The Interpretations of Dreams, *Freud went on to publish* *over 20 more books and countless papers with an iconic cigar in hand all the while. He believed smoking helped him think, but it also helped him get jaw cancer.* During the last sixteen years of his life, he underwent at least thirty painful operations while continuing to smoke. *******

By the late 1930s, the Nazis had taken over Austria, and Freud and his Jewish family narrowly escaped to England. *By September 1939, the pain in his cancerous jaw was too great and a doctor friend assisted him in suicide through morphine injection. He was eighty-three.*

The next big shake-up rolled in during the first half of the 20th century when behaviorism gained a higher profile. *Heavy hitters like Ivan Pavlov, John B. Watson, and B. F. Skinner were key players here. They focused on the study of observable behavior.*





You may remember Skinner as the dude who put rats and pigeons and babies in boxes and conditioned them to perform certain behaviors. Right around when Freud escaped to England, *Skinner published his Behavior of Organisms,* *ushering in the era of behaviorism which remained all the rage well into the 1960s.*

By the mid-20th century, other major forces in psychology were also brewing -- schools we'll explore later in this course including humanist psychology, which focuses on nurturing personal growth; cognitive science and neuroscience, all of which contributed their own unique takes on the study of mind.

Today's formal definition of psychology, the study of behavior and mental processes, is a nice combination that pulls from all these different schools of thought. *It recognizes the need for observing and recording behavior, whether that's screaming, crying or playing air saxophone to an imaginary audience,* but it also gives credit to our mental processes: what we think and feel and believe while we're tearing it up on our invisible instruments.

Because again, the point I really want you to take home is that psychology is an integrative science. Yes, folks still get grumpy and disagree plenty, but the essence of the discipline has everything to do with creating different ways of asking interesting questions and attempting to answer them through all kinds of data-gathering methods. The human mind is complicated. There is no single way to effectively crack it open; it must be pried at from all sides.

#2 Psychological Research

[Adapted from Crash Course Psychology with Hank Green, written by Kathleen Yale, edited by Blake de Pastino, with psychology consultant Dr. Ranjit Bhagwat]

In most ways, psychological research is no different than any other scientific discipline, like *step one is always figuring out how to ask general questions about your subject and turn them into measurable, testable propositions. This is called operationalizing your questions.* So you know how the scientific method works, *it starts with a question and a theory. In science, a theory is what explains and organizes a lot of different observations, and predicts outcomes.* And when you come up with *a testable prediction, that's your hypothesis.*

Once your theory and hypothesis are in place, you need a clear and common language to report them with, or *a* hypothesis *will allow other researchers to replicate the experiment.* And replication is key. You can watch a person exhibit a certain behavior once, and it won't prove very much, but if you keep getting consistent results, you're probably on to something.

This is a problem with one popular type of psychological research: case studies, *which take an in-depth look at one individual. Case studies can sometimes be misleading, because by their nature, they can't be replicated.* Still, they're good at showing us what *can* happen, and end up framing questions for more extensive and generalizable studies. Like, say, the smell of coffee makes Carl suddenly anxious and irritable, That obviously doesn't mean that it has that same effect on everyone

Another popular method of psychological research is naturalistic observation, *where researchers simply watch behavior in a natural environment*, whether it is chimps poking ant hills in the jungle, kids clowning in a classroom, or drunk dudes yelling at soccer games. The idea is to let the subjects just do their thing without trying to manipulate or control the situation. *Like case studies, naturalistic observations are great at describing behavior, but they are very limited in explaining it.*

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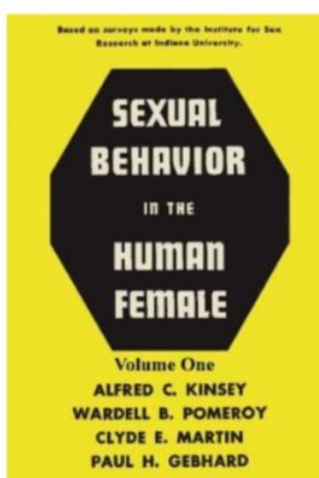
Psychologists can also collect behavioral data using *surveys* or interviews, asking people to report their opinions and behaviors. *Sexuality researcher* Alfred Kinsey famously used this technique when he surveyed thousands of women on their sexual history and published his findings in a revolutionary text entitled *Sexual Behavior in the Human Female.*



So once you've described behavior with *surveys, case studies,* or *naturalistic observation* you can start making sense out of it, and even predict future behavior. One way to do that is to look at one trait or behavior is related to another, or how they correlate.

An example is Bob who seems to think that his refrigerator is actually some kind of time machine that can preserve food indefinitely. Let's say he has just eaten some questionable leftovers, pizza that had a little bit of fungus on it. But, he was hungry, but now he starts seeing things, green armadillos with laser beam eyes.

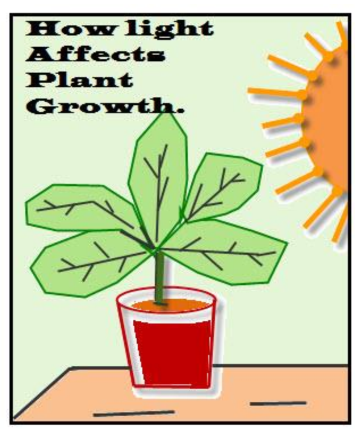
We could deduce that eating unknown fungus predicts hallucination, that's a correlation. *But, correlation is not causation.* Yes, it makes sense that eating questionable fungus would cause hallucinations, but it's possible that Bob was already on the verge of a psychotic episode, and that those fuzzy leftovers were actually harmless. It's tempting to draw conclusions from correlations but it's super-important to remember that *correlations predict the* possibility *of cause-and-effect relationships, they cannot* prove *them.*

To really get to the bottom of cause-and-effect behaviors, you're gonna have to start experimenting. *Experiments allow investigators to isolate different effects by manipulating an independent variable, and keeping all other variables constant.* This means that they need at least two groups: the experimental group, which is gonna get messed with, and the control group, which is *not* gonna get messed with.

Just as surveys use random samples, experimental researchers need to randomly assign participants to each group to minimize *potential confounding variables, or outside factors that may skew the results. You don't want all grumpy teenagers in one group and all wealthy Japanese surfers in the other, they gotta mingle.*

So let's put these ideas into practice in our own little experiment. Like all good work, it starts with a question. My friend Bernice and I were debating were debating caffeine's effect on the brain. Personally, she convinced that coffee helps her focus and think better but I get all jittery and can't focus on anything. So we decided to use some critical thinking.

So let's figure out our question: "Do humans solve problems faster when given caffeine?" Remember: keep it clear, simple, and eloquent so that it can be replicated. "Caffeine makes me smarter" is not a great hypothesis. A better one would be, say, "Adult humans given caffeine will navigate a maze faster than humans not given caffeine." *The caffeine dosage is your* independent variable, *the thing that you can change.* You have control over this. *Your result, or your* dependent variable, *is the thing that can change, such as the speed at which the subject completes a paper and pencil maze.*



Go out on the street, wrangle up a bunch of different kinds of people and randomly assign them into three different groups. *The control group gets a* placebo *or something that should not affect them at all (in this case decaf).* Experimental group one gets a low dose of caffeine. Experimental group two gets a very high dose, more than a quad shot of espresso dunked in a Red Bull. Once you dose everyone, you let them do their mazes and wait at the other end with a stopwatch.

What is left is to measure your results from the three different groups and compare them to see if there were any conclusive results. If the highly dosed folks got through twice as fast as the low dose and the placebo groups, then the hypothesis was correct.

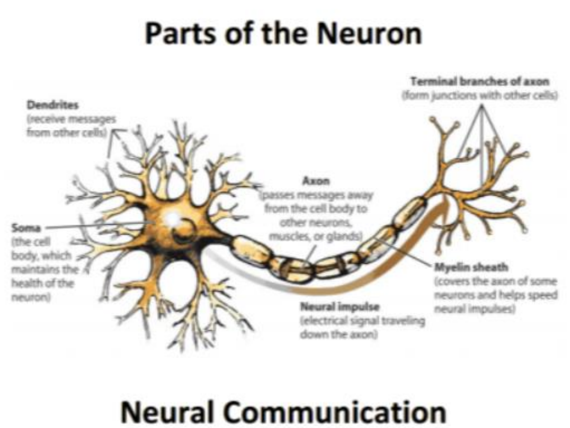
Because we've used clear language and defined our parameters, other curious minds can easily replicate this experiment, and we can eventually pool all the data together and have something solid to say about what caffeine can do to cognition– or at least the speed at which you can navigate a maze.

#3 The Nervous System

[Adapted from Crash Course Psychology with Hank Green, written by Kathleen Yale, edited by Blake de Pastino, with psychology consultant Dr. Ranjit Bhagwat]

Neurons or nerve cells are the building blocks that comprise our nervous systems. Neurons share the same basic makeup as our other cells, but they have electrochemical mojo that lets them transmit messages to each other. Your brain alone is made up of billions of neurons. You actually have several different types of neurons in your body, from ones that are less than a millimeter long in your brain to ones that run the whole length of your leg!

No matter how big a nerve is, they all have the same three basic parts: the *soma*, *dendrites*, and *axon*. *The soma is the neuron's life support; it contains all that necessary cell action* like the nucleus, DNA, mitochondria, ribosomes, and such. *The dendrites, as bushy and branch-like as the trees they're named after, receive messages and gossip from other cells.* They're the listeners. *The axon is the talker. This long, cable-like extension transmits electrical impulses from the cell body out to other neurons or glands or muscles.*



Neurotransmitters
Neurons transmit signals. The dendrites pick up the signals, shooting an electrical charge down the axon towards the neighboring neurons. *The contact points between neurons are called synapses. They're less than a millionth of an inch apart.* And that microscopic cleft is called the synaptic gap. So, when *an action potential runs down to the end of an axon, it activates the chemical messengers that jump that tiny synaptic gap,* flying like that little air kiss and landing on the receptor sites of the receiving neuron. Those messengers are neurotransmitters.

So neurons communicate with neurotransmitters which in turn cause motion and emotion; they help us move around, learn, feel, remember, stay alert, get sleepy, and pretty much do everything we do.

Some of them just make you feel good, like the endorphins we get flooded with after running ten miles, or falling in love, or eating a really good piece of pie. We've got over 100 different kinds of these brilliant neurotransmitters, some are *excitatory* and others are *inhibitory*. *Excitatory neurotransmitters rev up the neuron, increasing the chances it will fire off an action potential.* Norepinephrine is one you're probably familiar with, it helps control alertness and arousal. *Inhibitory neurotransmitters on the other hand, chill neurons out, decreasing the likelihood that the neuron will jump into action.* You have probably heard of serotonin which affects your mood and hunger and sleep. Low amounts of serotonin are linked to depression and a certain class of anti-depressants help raise serotonin levels in the brain.

Methamphetamine is an example of an Excitatory *neurotransmitters, and marijuana would be an example of an Inhibitory neurotransmitter.* Some neurotransmitters like acetylcholine and dopamine play both sides and can both excite or inhibit neurons depending on what type of receptors they encounter. Acetylcholine enables muscle action and influences learning and memory. Dopamine, meanwhile, is associated with learning, movement, and pleasurable emotions. Excessive amounts of it can be linked to addictive and impulsive behavior.

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So neurotransmitters are basically your nervous system's couriers. But they aren't the only chemical messengers delivering the news; they've got some competition brewing in the endocrine system. And if you've been through puberty, you know what I'm talking about, hormones. *Hormones affect our moods, arousal, and circadian (or our 24 hour) rhythm. They regulate our metabolism, monitor our immune system, signal growth, and help with sexual reproduction*. You could say that most of them boil down to the basics. Attraction, appetite, and aggression.

Endocrine system

Whereas neurons and synapses flick on and off, sending messages with amazing speed, *the endocrine system likes to take its time, delivering the body's slow chemical communications through a set of glands. These glands secrete hormones into the blood stream where they're ferried to other tissues especially, the brain.*

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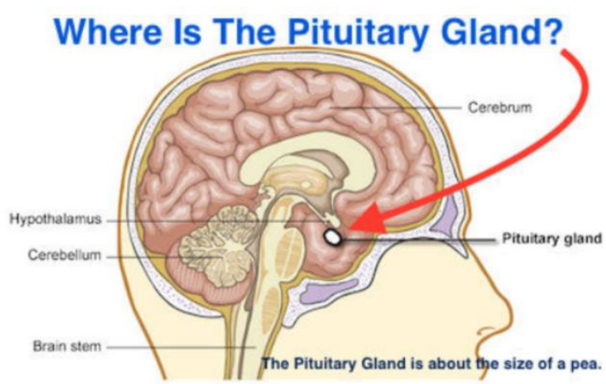
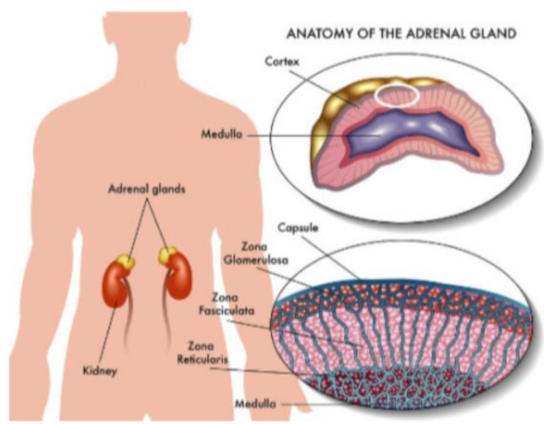
So while the nervous and endocrine systems are similar, in that they both produce chemicals destined to hit up certain receptors. But they operate at very different speeds. It's like, if the nervous system wants to get in touch with you, it sends you a text. But if the endocrine system has a message, it will like lick the stamp, then fold it up and put and mail it to you with the Post Office. But fast isn't always better, and your body will remember that letter longer than the text. Hormones linger. Which helps explain why it takes some time to simmer down after a moment of severe fright or anger.

Glands

Our endocrine systems have a few important hormone brewing glands. *We've got* adrenal glands *snuggled up against our kidneys that secrete adrenaline, that famous fight or flight hormone* that jacks up your heart rate, blood pressure and blood sugar, giving you that tidal wave of energy. *The* pancreas *sits right next to the adrenal gland, and oozes insulin and glucagon hormones that monitor how you absorb sugar, your body's main source of fuel. Your* thyroid *and* parathyroid *glands at the base of your throat secrete hormones that regulate your metabolism and monitor your body's calcium levels.* If you have testicles, they're secreting your sex hormones like estrogen and testosterone, and if you've got ovaries, they're doing that job.





There is one gland that rules them all, *the pituitary gland. Although it's just a little pea sized nugget hidden deep in the brain, it is the most influential gland in this system. It releases a vital growth hormone that spurs physical development and that love hormone,* oxytocin, *that promotes warm, fuzzy feelings of trust and social bonding.* What really makes the pituitary the master gland is that its secretions boss around the other endocrine glands. *But even the pituitary has a master in the* hypothalamus *region of the brain, which we will talk more about next episode.*

How It All Works Together

If by screaming loudly I managed to scare you, I'm illustrating a point. You have no control over being scared, but maybe now you do understand a little more clearly how your nervous and endocrine systems worked together to call the shots.

First, the sensory input from your eyes and ears went to your brain. Then It ran down the chain of command from your pituitary to your adrenal glands, to the hormone adrenaline, to the rest of your body and then back to your brain, which then realized that I was just messing with you. Your brain then told everybody to just calm down for once!

The whole deal is a feedback loop: your nervous system directs your endocrine system which directs your nervous system, brain, gland, hormone, brain.

In our next lesson, we're gonna get all up in your brain, and delve deeper into the different components of your nervous system, find out what your brain is, and learn about how much of your brain, if any, you actually use.

#4 Meet Your Master: Getting to Know Your Brain

[Adapted from Crash Course Psychology with Hank Green, written by Kathleen Yale, edited by Blake de Pastino, with psychology consultant Dr. Ranjit Bhagwat]

In the early 1800's, German physician, Franz Joseph Gall spent a lot of time running his fingers over the scalps of strangers. He wasn't a hairdresser, he wasn't a masseuse, he wasn't just like a big fan of heads. *He was a phrenologist, he was the first phrenologist. Gall believed that a person's personality was linked to their skull morphology,* that its bumps and ridges indicated aspects of their character. Amazingly this "science" actually caught on, was widely practiced for decades, and Gall became something of a celebrity.

Eventually, phrenology was dismissed as a cult pseudoscience because it turns out your cranial contours tell us exactly nothing about what's happening inside the brain. And yet! Gall was actually on to something big, something that we knew nothing

Franz Gall - Phrenology

about. Remember, at this point we were just starting to get consensus that the brain was the source of self and not like the soul or the heart or whatever. *His lasting and correct proposition was that different parts of the brain control specific aspects of our behavior*.

As we learned previously, there is a strong link between biological activity and psychological events. But in addition to the interplay of chemicals like neurotransmitters and hormones, a lot of this has to do with that *localized parts of the brain have specific functions, like vision, movement, memory, speech, and even facial recognition.* Function, in other words, is localized.

Poke my brain over here and my arm would twitch, poke here and I'd remember my first kiss, do it up her and suddenly I'd be filled with a tremendous Hulk-like rage!   This is the link between the brain, that physical hunk of gunk between the ears, and the mind, the thing that is us, our consciousness, our behavior, our decisions, our memories, ourselves. Some neuroscientists like to say that the mind is what the brain does, so one of the driving questions of psychology is "How do our brains' functions tie to the behavior of the mind?"

To get a handle on just how physical the roots of your mind and personality are, let me tell you a story. The curious case of Phineas Gage. *In 1848, a fellow named Phineas Gage was working on the railroad, tamping gunpowder into a blasting* *hole with an iron rod, when the gunpowder ignited. The resulting explosion caused the rod to shoot like a bullet up through his left cheek and out of the top of his head.* There's brain in between those two places, by the way. Amazingly, he stood up after the accident, and walked over to a cart, described what had happened, and then they drove him back to his house, all while he was conscious.

After a few months of convalescing, his friends were saying that Phineas was no longer like himself. Yes he had his memories and his mental abilities, and he walked and talked and looked the same, minus an eyeball, whereas the old Phineas was mild-mannered and soft-spoken, the post-spike-to-the-brain Phineas was surly and mean-spirited and vulgar. Phineas is a great, if extreme, example of how function is localized in the brain and how physical and biological factors can be reflected in psychological ways. Of course he is also an excellent example of how individual studies are not particularly useful, especially since we have very little data on what Phineas was actually like before or even after his accident.

Now you might have heard that we only used about 10 percent of our brains, and if that were true, Phineas could have lost a quarter of his and still be fine. But in reality, brain scans show that nearly every region of the brain lights up during even simple tasks like walking and talking. Not only that, but the brain itself requires 20 percent of all the body's energy, and it would make little evolutionary sense to throw much energy away at something that is only minimally active.

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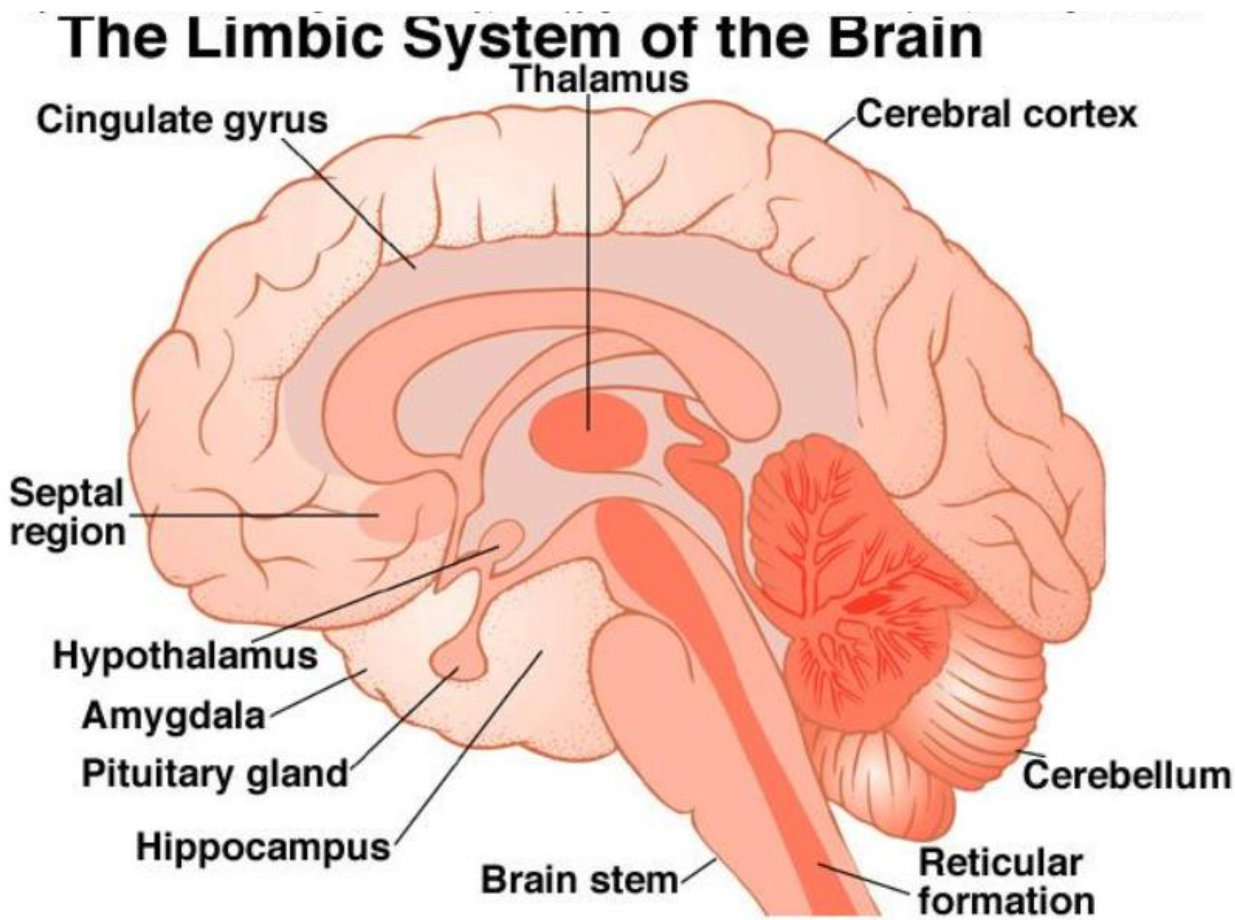
More complex animals like many mammals possess brains that feel, remember, reason, and predict. These animals don't have all new systems. They have new brain systems built upon old brain systems. The brain is kind of like a set of Russian nesting dolls. The outermost wooden doll is the newest, most detailed and most complex, but as you go deeper, the dolls become older and smaller, and simpler, and more generic. The innermost wooden doll, *the* medulla, *is the oldest, most basic.* It's like a fossil in your head.   This inner core of the brain, sometimes called the "old brain" still performs for us much as it did for our early evolutionary ancestors. In the, old brain functions happen automatically without any conscious effort: the beating of hearts, the breathing of lungs, that sort of thing. *The* pons *is perched on the medulla, and it helps coordinate movement.* Above the pons, at the top of the brainstem, is *the thalamus, a pair of egg-shaped structures that take in sensory information* related to seeing, hearing, touching, and tasting. *The* reticular formation *is a finger-shaped nerve network inside the brain stem that's essential for things like sleeping and walking and pain perception;* other important functions. *The baseball-sized* cerebellum, *or "little brain", swells from the bottom of the brain stem and is responsible for non-verbal learning and memory,* and the perception of time. For higher functions, we look to the *limbic system*. This includes the *amygdala*, *hypothalamus*, and *hippocampus*. Sort of a border region of the brain separating the old brain and the newer, higher cerebral areas.



The amygdala consists of two lima bean-sized clusters of neurons and is responsible for memory consolidation as well for fear and aggression. Stimulate one area of the amygdala, and a docile family dog suddenly morphs into a blood thirsty fighter. Shift that electrode over just a tiny bit and that dog will be cowering at butterfly shadow puppets. *The hypothalamus keeps your whole body steady, regulating body temperatures, circadian (24 hour) rhythms, and hunger, and helps govern the* *endocrine system,* especially the pituitary gland. Rats implanted with electrodes in the reward center of their hypothalamuses and given ways to self-stimulate those areas will essentially reward themselves until they collapse or die. *The final part of the limbic system is the hippocampus, central to learning and memory, and if it's damaged, a person may lose their ability to retain new facts and memories.* The two hemispheres of your cerebrum make up about eighty-five percent of your brain weight, and oversee your ability to think, speak, and perceive. *The left and right hemispheres govern and regulate different functions, giving us a split brain, connected by a structure called the* corpus callosum. So, for instance, language production is controlled largely by the left hemisphere, while certain creative functions are controlled by the right. This has nothing to do with right or left handedness or people having dominant sides of their brain being more analytical or creative or whatever - that's part of what we call pop psychology. Some tasks are distributed to one side, but the sides are deeply and constantly connected. A statement as general as "artistic people use their right brains" is as useless as saying "artistic people have particularly bumpy heads".

Finally, covering the left and right hemispheres, we have the *cerebral cortex.* You've probably seen enough brain diagrams to know that the cerebral cortex's left and right sides are subdivided into four lobes: the *frontal, parietal, occipital,* and *temporal,* all separated by especially prominent folds, or fissures. The frontal lobes, just behind your forehead, are involved in speaking, planning, judging, abstract thinking. The parietal lobes receive and process your sense of touch and body position. At the back of your head, the occipital lobes receive information related to sight. The temporal lobes just above your ears process sound, including speech comprehension. Each hemisphere controls the opposite side of the body, so my left temporal lobe processes sounds heard through my right ear.