The Mind/Brain: Crash Course History of Science #30

Crash Course: History of Science
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Scientists in the nineteenth century discovered a lot about life and matter.

But exactly what kind of stuff is the human brain? That one was—and remains—tricky.

The brain sciences—with experiments and therapies tied to biological theories of the body—emerged in the nineteenth century and came into their own in the early twentieth. I'm Hank Green and it's time to look at some… upsetting stuff. [INTRO MUSIC PLAYS] People have always had theories of the mind and psychological disorder, or "madness." Madness was often thought to be a divine punishment, an act of possession by spirits, or the result of an imbalance of the humors. Doctors and priests cared for people dealing with mental disorders.

And as capitalism took off in Europe, the mentally ill were moved from villages, where they were looked after by families, to hospitals in cities—picture Bedlam—run by a new class of professional "mad doctors." But this wasn't psychology or psychiatry as we know it today. In fact, there really wasn't a scientific study of the human brain or the astonishing mental activity it enables. This only got going around the time of the Industrial Revolution, with the rise of the therapeutic asylum, or mental hospital aimed at helping—and studying—the mentally ill.

Doctor Philippe Pinel of the Bicêtre hospital in Paris often gets credit for creating the modern asylum in the late 1700s by ordering the patients to be unchained. Credit should actually go to the hospital superintendent, Jean-Baptiste Pussin—but Pinel did advocate for moral treatment of patients rather than physical restraint. And his generation of asylum doctors marked the beginning of a shift in thought from madness to a medical condition of the mind.

But asylums and early psychiatry were only one part of the story. Nerve doctors treated anxious private patients. And early neurology grew from doctors examining the brains of criminals.

Over the 1800s, proto-neuroscientists shifted from offering moral explanations for madness to material explanations tied to brains. This interest in gray matter came in part from scientists such as Francis Galton who looked for explanations about human behavior in physical bodies, and who sought to make the life sciences more quantifiable and useful. Unfortunately, Galton's version of "useful" was eugenics, or "improving" the human species through selective breeding.

And scientists in the 1800s tended to blur the lines between mental illness, crime, low intelligence, and a difficult childhood. So moral explanations for mental illness snuck back into medicine via "bad brains" instead of religion. Several researchers looked for connections between the physical brain and the mind.

English neurologist John Hughlings Jackson, for example, studied epilepsy and influentially argued that different bodily functions are tied to different regions of the brain. And German doctors Gustav Fritsch and Eduard Hitzig electrically stimulated parts of the exposed brains of dogs, making their paws twitch. This showed experimentally that specific parts of the brain coordinate motor functions.

And then we've got a name you've heard! Russian physiologist Ivan Pavlov focused on conditioned reflexes: he taught dogs to associate the sound of a metronome with being fed, causing them to salivate when presented with the sound alone. Pavlov's stimulus–response work became foundational to the school of psychology called behaviorism.

With this approach, psychologists focused on environmental stimuli that affect how someone behaves rather than what they're thinking and feeling. Meanwhile, Spanish neuroscientist Santiago Ramón y Cajal developed a method of staining brain tissue and discovered that it is made up of—wait for it—individual cells! Just like the rest of the body.

After much painstaking lab work, he convinced the rest of the scientific community of this idea, called the "neuron doctrine" after the name of the brain cell. Around this time, other researchers set up scientific laboratories to study the workings of the human mind. BTW, we're mostly focusing on the mind today, but we'll talk more about the brain after World War II.

German doctor Wilhelm Wundt founded the first psychology lab, at the University of Leipzig, in 1879, establishing psychology as a discipline separate from other sciences. Wundt's student, British psychologist Edward Bradford Titchener, developed a structuralist psychological theory based on Wundt's ideas starting in 1892. Structuralism is a philosophy that tries to understand things by seeing how their parts fit together, regardless of what they do.

Titchener tried to define the "unit elements" of consciousness, hoping to work out a periodic table for the mind. Meanwhile—heavily influenced by Charles Darwin—American philosopher William James developed functionalism theory, writing the Principles of Psychology in 1890. Functionalism is a philosophy that tries to understand things by working out the purpose for them.

Finally, American psychologist G. Stanley Hall, who studied under both Wundt and James, set up the experimental psychology lab at Johns Hopkins and went on to professionalize the whole field. He started the American Journal of Psychology in 1887 and founded the American Psychological Association in 1892.

Thus, by the early 1900s, both the scientists studying brains and nerves, and those studying consciousness and human behavior had set up professional labs to explore shared research questions. But the sciences of the brain and mind became more well known due to the application of psychological theories outside of the lab. Y'all know who I'm talking about, right?

Austrian physician-turned-talk therapist-turned-controversial philosopher Sigmund Freud became so famous that historians sometimes call the twentieth century "the Freudian century." To introduce him, let's head back to 1862, when Europe's most famous brain doctor, Jeanâ€'Martin Charcot, worked at Paris's Salpêtrière hospital, then the largest in the world. Charcot saw patients but was also a big-time brain collector. And he realized that maybe there were other, new ideas worth trying.

His blend of brain research-plus-therapy, the clinico-anatomical method, was the basis for Freud's work. Charcot focused on trying to understand the "laws" governing hysteria—which has a long, problematic history and isn't a disease today. But back in the nineteenth century, it was a way of describing various problems, including loss of motor control, paralysis, unexplained fears, fainting, emotional outbursts, and a host of other ailments.

It was a diagnostic trash can. Plus, a way to describe women with independent ideas! Charcot tried out a lot of methods: he was one of the first users of the camera in medicine, moving toward mechanical objectivity, or trusting instruments over human senses.

A lot of his photos of hysteric patients were lurid and super weird by today's standards. But the point of the history of science isn't to prove how awesome and ethical we are today, but to understand how people in the past made sense of their worlds. Charcot also explored mesmerism, or hypnosis.

He showed that hypnosis can cause physical symptoms, which he took to prove that hysteria was a neurological, not a psychological illness. That is, he thought people with mental illnesses were more likely to be affected by hypnosis because they had bad physical brains. In 1885, the young Freud attended Charcot's lectures on hysteria and became obsessed with mental illness.

Now, it's important to understand the halfway position that Freud occupied in medicine. He couldn't take an M. D. in Germany because he was too… Jewish.

Instead, he became a "nerve doctor," treating neurasthenia, or bad or exhausted nerves—which was the rich-person term for hysteria. But he was open to new ideas. Freud learned a lot from Charcot.

But then he found out that Josef Breuer, a senior nerve doctor in Vienna, was using hypnosis to encourage patients to talk rather than move. Freud started working with talk therapy and realized that many hysterical patients were smart and otherwise "normal." And those suffering from hysterical "paralysis" were paralyzed in ways that didn't make anatomical sense. He decided that hysterical paralysis was not an anatomical problem.

In 1893, Breuer and Freud published Studies on Hysteria, theorizing that mental disorders are not the result of bad biology but bad memories, such as sexual abuse. They suggested that the best therapy was helping them recover those memories, which were often suppressed. Breuer and Freud fell out, but from their work together, Freud developed a new form of therapy, psychoanalysis, that caught on worldwide.

Help us out, Thought Bubble: Psychoanalysis was based on talking about early childhood experiences, relationships with parents, early sexual encounters, and dreams. The couch became a therapeutic tool. And dreams became important for therapists after Freud's influential 1900 book, Interpretation of Dreams. Through his work listening to patients and trying to decode their anxieties, Freud also opened up the study of sexuality—or, to coin another big question: where do funny feelings come from? For Freud the answer was a form of psychic energy called libido that floated around the brain and had to go somewhere. Eventually, Freud's work led him to develop a three-part framework for how the human mind functions and what it even is: At the bottom, there is a fairly animalistic layer called the id or unconscious drives, deep-seated fears and desires. Above that sits the ego, or the waking, conscious mental interface with reality. Hey, it me! And finally, metaphorically on top of the ego sits the superego, the mind's internalized censor and the voice of society, religion, and moral norms. For Freud, our minds are the outcome of a conflict between these basic desires, rational desires, and social desires. This "iceberg theory" of consciousness—that we only understand a small part of our own minds—has had an enormous influence on popular culture. Thanks Thought Bubble.

Freud emphasized that this was not an anatomical model, but a medical one, intended to help therapists access their patients' unconsciousness, and a sociocultural one that accounted for… all of history and religion. To Freud, civilization represses sexual and aggressive drives, so it's a necessary evil. But… was this sort of theorizing even still science? Regardless, psychoanalysis blew up. And Freud treated it as a foregone success: in 1914, he published—maybe a little prematurely—On the History of the Psychoanalytic Movement.

Something else happened in 1914: the Great War, or World War I, broke out. Over the next four years, thousands of soldiers returned from the front complaining of sensory and motor disorders and loss of memories, but with no obvious physical causes. This became "shell shock," later rethought of as post-traumatic stress disorder. Talk therapists played a role in treating soldiers, and psychiatrists found a steady source of patients.

Freud also continued to collaborate with other psychologists. His Swiss colleague Carl Jung invented the word association test and the theory of the collective unconscious, or a deep part of the mind supposedly derived from ancestral memory and myth, not individual experience. And Freudian ideas entered mainstream psychiatry through Swiss psychiatrist Eugen Bleuler, who coined the term "schizophrenia." The mind sciences found perhaps an even more fertile home in industry. Advertisers including Freud's nephew, Edward Bernays, adopted theories of mind and behavior in order to sell consumers increasingly mass-produced goods. And J. B. Watson—the founder of behaviorism—became an advertising executive. In a way, Freud helped sell Fords. And other industries looked to theories of mind in order to make their organizations run more smoothly.

Next time—let's get radioactive with a legit family of geniuses: it's time to meet Marie Curie. Crash Course History of Science is filmed in the Dr. Cheryl C. Kinney Studio in Missoula, MT and It's made with the help of all of these nice people. Our animation team is Thought Cafe. Crash Course is a Complexly production. If you want to keep imagining the world complexly with us, check out some of our other channels like The Financial Diet, SciShow Space, and Mental Floss. If you'd like to keep Crash Course free for everyone, forever, you can support the series at Patreon, a crowdfunding platform that allows you to support the content you love. Thank you to all of our patrons for making Crash Course possible with their continued support.