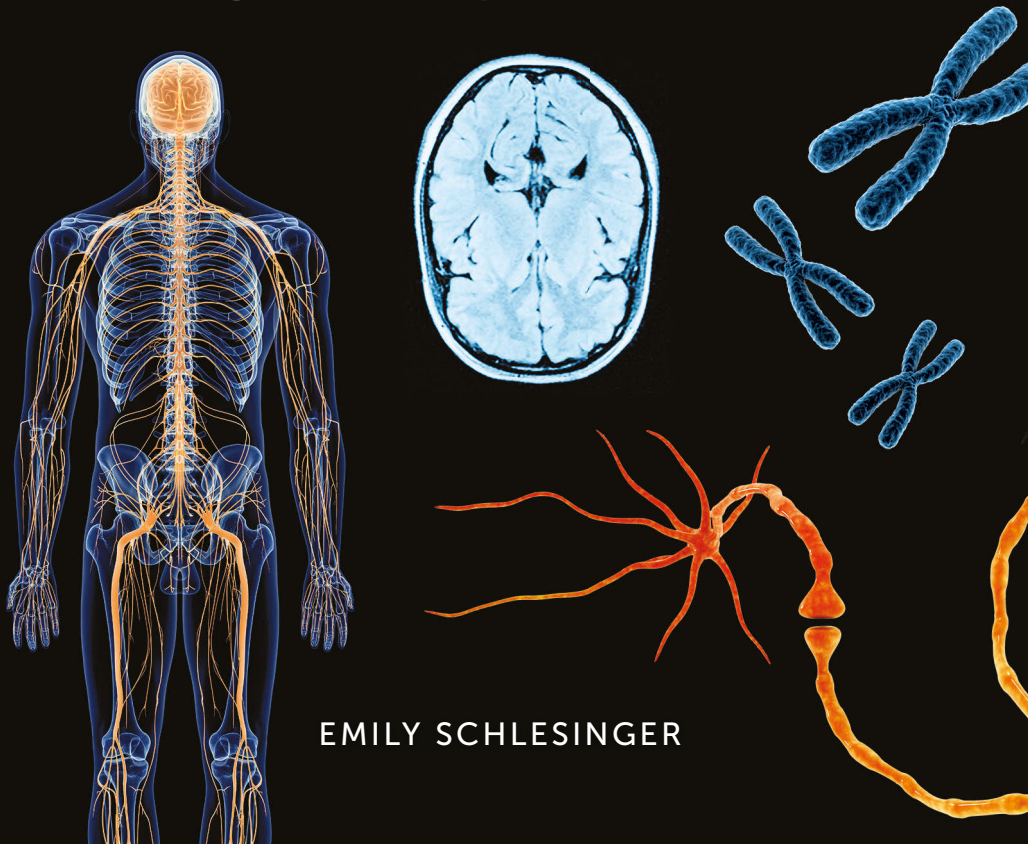


# NEUROSCIENCE



EMILY SCHLESINGER

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Nathan Copeland



# MIND CONTROL

Nathan Copeland can play video games with his mind. It all started with a car accident. He was just 18. The crash left him paralyzed. He could not move his arms or legs. Scientists later contacted him. They had a question. Did Nathan want to be part of an experiment? He said yes.



Nathan Copeland controlling a remote robotic arm with his brain



Four machines were planted in his brain. These are called Utah arrays. They have electric wires. Each is hooked up to the brain. They go in different parts. Nathan thinks. His brain sends out signals. These go through the wires. They make a pattern. A computer reads this. Then it does what he wants.

A video of Nathan went viral. He is playing a game. It is *Final Fantasy XIV*. His character raids dungeons. It fights off beasts. **Brain waves** do the work.



His thoughts can also control a robotic arm. It can move objects. Nathan helps around the house. The hand sends messages back to him. They go to his **sensory cortex**. This hacks into his sense of touch. He can “feel” what the hand is doing. Nathan calls himself a cyborg. His brain is part machine.

Former U.S. president Barack Obama fist-bumping the robotic arm of Nathan Copeland during the White House Frontiers Conference, 2016



Founder of the Gazzaley Lab UCSF  
Neuroscience Imaging Center studying  
neural mechanisms through gaming



**Fast Fact**

Some video game companies are developing electrodes that sit on the scalp. Players can navigate by thought control without needing a brain implant. This technology is still in its testing phase and is not yet available for public use.

He is not the only one. There is a woman in Spain. Her name is Berna Gómez. She was blind. But now she sees. A machine was put into her sensory cortex. It takes in information. This comes from a camera. The data goes right to her brain. This lets her see lines and shapes. She does not use her eyes.

All of this is possible because of **neuroscience**. This is the study of the brain. It also includes the **nervous system**. The work combines many fields. Biology and psychology are two. People use math and computers. The tools are high tech.



Now we can ask big questions. How do we think? Why do we feel? What makes us act? Neuroscientists work to find answers.

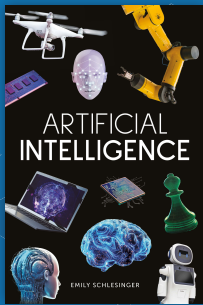




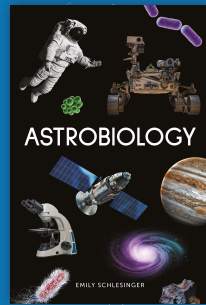


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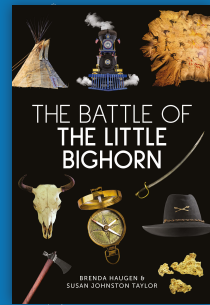
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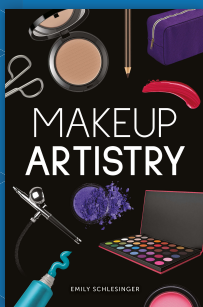
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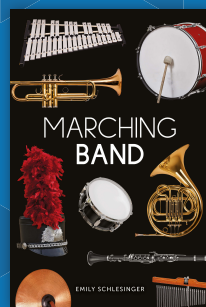
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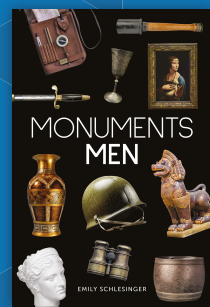
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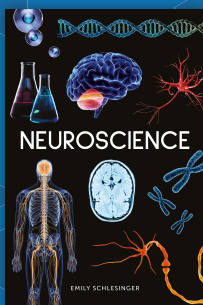
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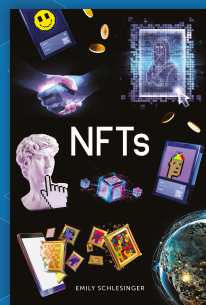
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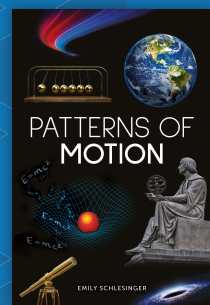
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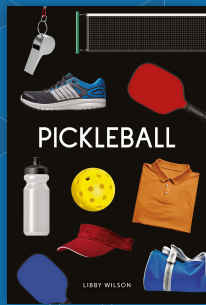
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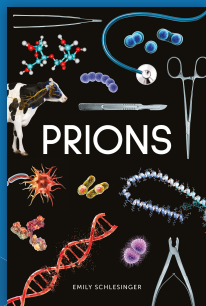
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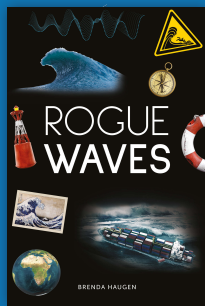
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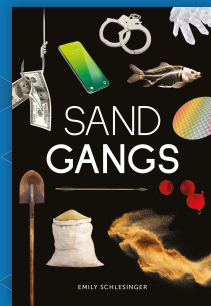
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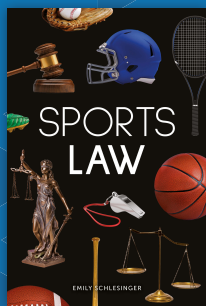
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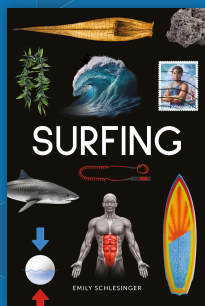
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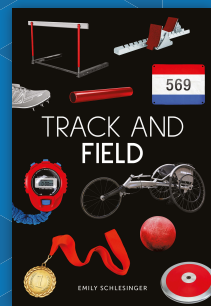
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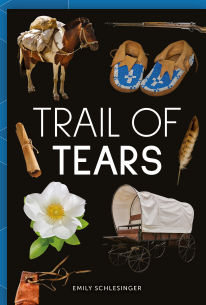
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SCIENCE

# NEUROSCIENCE

The human brain is squishy, jiggly, and weighs approximately three pounds. Yet it is the most complex thing in the known universe. Discoveries about the human brain have led to extraordinary medical treatments, and scientists are learning more and more about this small, yet vital organ every day.



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