SMART NEWS

New Research

# Some People's Brains Can Sense Earth's Magnetic Field—but No, It Doesn't Mean We Have Magnetoreception 'Superpowers'

A new experiment reveals signs our brains may respond to changes in Earth's magnetic field, but it's unclear whether it impacts behavior

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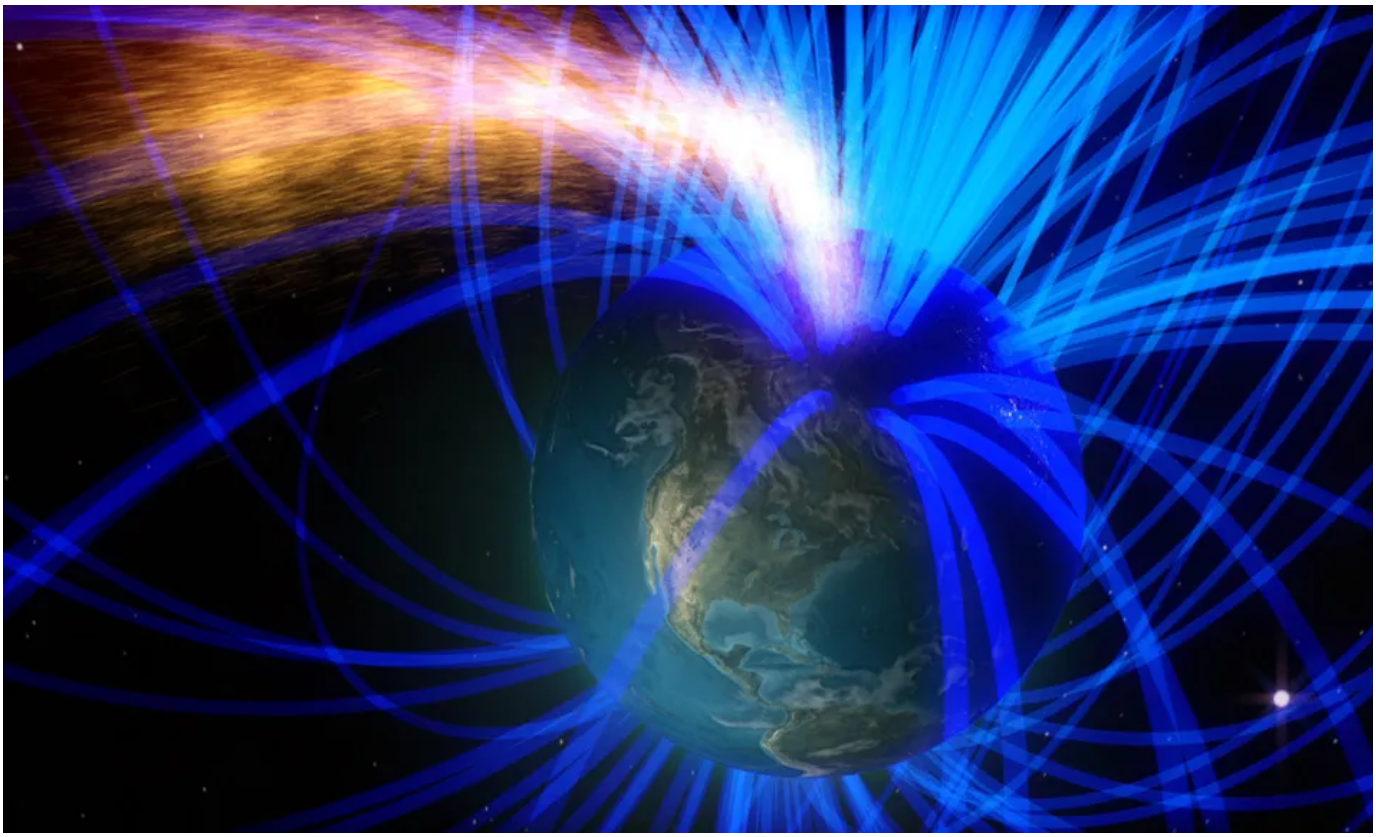

NASA's Goddard Space Flight Center

There's a pretty long catalogue of animals that appear to possess magnetoreception, or the ability to detect Earth's magnet fields, including pigeons, dogs, trout, bees, turtles and salamanders. But researchers have never been able to determine if humans have this hidden superpower as well, despite decades of attempts. A provocative new study, published in the jour *eNeuro* suggests our brains may indeed detect magnetic fields—at least in some people, though it's not possible to say if it

affects human behavior in any way. (Despite some claims of human's having a newly discovered magnetic "superpower," w not cousins of the Marvel villain Magneto all of a sudden.)

Currently, scientists are still trying to figure out just how magnetoreception works in animals. Eric Hand at *Science* reports tl most of what we know about magnetic sense comes from behavioral studies of animals, which change the way they orient themselves or navigate if the magnetic field is manipulated. (Dogs will orient themselves along the north-south axis of Eartl magnetic field when they poop.) Finding out just how that magnetic field sense works on a biological level has been more o challenge.

There are currently two major hypotheses. One involves cryptochromes, specialized proteins in the retina, that somehow communicate magnetic information to the brain. The other hypothesis is that microscopic particles of the mineral magnetit in certain receptor cells in the ear or behind the nose and work as biological compasses.

George Dvorsky at *Gizmodo* reports that lead researcher of the new study Joseph Kirschvink, a geophysicist from CalTech w has been investigating magnetic fields and magnetoreception for decades, decided to bypass questions about how the sen might work and focus on whether there were signs of magnetoreception in the brain at all.

“Our approach was to focus on brainwave activity alone,” Kirschvink tells Dvorsky. “If the brain is not responding to the mag field, then there is *no way* that the magnetic field can influence someone’s behavior. The brain must first perceive somethir order to act on it—there is no such thing as ‘extra-sensory perception.’"

To study the brain waves, the team constructed an elaborate chamber designed to block all outside magnetic activity, elect impulses, and sound. Electrical coils inside the chamber produced a magnetic field that could be manipulated by researche For the experiment, the team studied 34 individuals who wore a special device that monitored their brain waves. The subje each sat in total darkness for an hour as researchers rotated the artificial magnetic field around them looking for signs that brain detected the movements.

The experimenters recorded dips in the amplitude of alpha brain waves in a third of the participants. The dips were most pronounced with a 25 percent change in amplitude when the magnetic field in front of the subject was pointed north and s from the northeast to northwest in a counterclockwise motion. People did not seem to respond to magnetic fields pointed south. Weeks later, four participants were retested with the same results.

Dvorsky reports that typically, alpha brain waves are usually produced by neurons when they aren’t processing any sensory information. The brain waves tend to decrease when some sort of stimulus is introduced. So the drop in alpha waves is an indication that the brain may be processing some sort of information from the magnetic fields.

Magnetoreception expert Peter Hore from the University of Oxford who studies navigation in birds, tells Maria Temming at *Science News* that the results seem plausible. But they need replication, including a similar experiment in the Southern Hemisphere before he’ll be completely convinced.

“It’s kind of intriguing to think that we have a sense of which we’re not consciously aware,” Hore, who was not involved in th study, says “[But] extraordinary claims need extraordinary proof, and in this case, that includes being able to reproduce it i different lab.”

But not everyone thinks the alpha waves indicate any sort of undetected sense. “If I were to … stick my head in a microwave switch it on, I would see effects on my brain waves,” Thorsten Ritz, a biophysicist at University of California, Irvine, not invol the study, tells Kelly Servick a *Science*. “That doesn’t mean we have a microwave sense.”

Margaret Ahmad, a biologist at the Sorbonne University in France, tells Servick that magnetic fields are known to affect hun

and mammalian cells in a dish.

“I’m not surprised there’s an effect,” Ahmad, who was not involved in the study, says. “There’s something in a cell that is diff in the presence of a magnetic field. We see this effect in human embryonic kidney cells; you’re not going to convince me tha effect in brain cells is of any greater or lesser significance.”

Kirschvink, for one, does think the data is the first sign of magnetoreception. “Aristotle described the five basic senses as including vision, hearing, taste, smell, and touch,” he says in a press release. “However, he did not consider gravity, tempera pain, balance, and several other internal stimuli that we now know are part of the human nervous system. Our animal ance argues that geomagnetic field sensors should also be there representing not the sixth sense but perhaps the 10th or 11th human sense to be discovered.”

In an article at *The Conversation,* he and his coauthors say there are many questions that the study raises, including whethe individuals with weak or strong responses to the magnetic fields have varying navigational abilities, whether people can be trained to sense magnetic fields and whether people with a strong response to the field can actually be trained to feel it.

But that is putting the cart before the horse: critics say these results need to be analyzed and replicated before we even co near, say, trying to train pilots to sense true north—and it may not be even worth the effort. Our increasing reliance on GPS technology suggests that even if we can detect magnetic fields, few of us will ditch our cell phones for magnetic intuition ur it helps us find the closest Starbucks faster.



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