

The God Chemical: Brain Chemistry And Mysticism

by [Barbara Bradley Hagerty](#)



Barbara Bradley Hagerty/NPR

Fred Harvey, an 87-year-old roadman, or high priest, on the Navajo reservation at Lukachukai, Ariz., led a peyote ceremony. Using peyote, a cactus that induces visions when ingested, has been central to the Navajo religion for hundreds of years.



Mika Halpern

Organizers set up a teepee for the peyote ceremony, which lasted 11 hours.

[All Things Considered](#), May 18, 2009 · For much of the 20th century, mainstream science shied away from studying spirituality.

Sigmund Freud declared God to be a delusion, and others maintained that God, if there is such a thing, is beyond the tools of science to measure.

But now, some researchers are using new technologies to try to understand spiritual experience. They're peering into our brains and studying our bodies to look for circumstantial evidence of a spiritual world. The search is in its infancy, and scientists doubt they will ever be able to prove — or disprove — the existence of God.

I spent a year exploring the emerging science of spirituality for my book, *Fingerprints of God*. One of the questions raised by my reporting: Is an encounter with God merely a chemical reaction?

Peyote Healing

The search for that answer led me to my first peyote ceremony, on a mountaintop on the Navajo reservation at Lukachukai, Ariz.

While Fred Harvey, an 87-year-old roadman, or high priest, warmed up his voice, members of his family prepared the peyote, a cactus that induces visions when ingested. Using peyote to touch the spiritual world has been central to the Navajo religion for hundreds of years.

Andy Harvey, a ceremony participant, said peyote serves as a mediator between the human world and the divine.

"Sometimes we ask the peyote to help us cleanse the illnesses away and cleanse our mental being, our spiritual being," he said. "And we believe that's what peyote does, too. That's why we call it a sacrament, a sacred herb."

At 9 p.m., 32 of us crawled into the teepee; for the next 11 hours, the young men drummed, the roadman prayed, and everyone but me ingested a lot of peyote. Sometime around midnight, the subject of the ceremony — a Navajo woman named Mary Ann — spoke up.

"I want to confess to the fire," she said.

She said she had suffered from shingles for the past two months, and she needed the peyote to heal her. She said she believed she had harmed a man some 20 years earlier, and his spirit had been plaguing her ever since.

"I need him to forgive me," she cried. "I know I'm in pain because he hasn't forgiven me."

Two more hours had passed when Mary Ann suddenly cried, "The shingles are gone! The peyote has healed me!"

After the ceremony, Mary Ann said she was, in her words, "too peyoted up" to talk. I called her on the phone two months later. She said while in the teepee, she saw the spirit of the man she had harmed and asked him for forgiveness.

"He came in front of me, and he just left me," she said. "And that's when my pain stopped. He forgave me."

Perhaps. Or perhaps the trinity of prayer, drumming and drug relieved her stress — and her shingles.

Lessons From The '60s

Scientists have long been intrigued by mystical experiences like Mary Ann's. A person prays and gets better. A car crash victim feels himself floating above his body. For years, scientists have wondered why these things occur — or even if they're real. So they're taking drugs like peyote out of the teepee and into the laboratory to find out more.

The first major rigorous study of psychedelics and spirituality occurred on Good Friday in 1962. In the basement of Marsh Chapel at Boston University, researchers from Harvard gave 10 divinity students LSD to see if the sacred setting, combined with drugs, would spark a mystical experience. It did. Soon afterward, researchers at other prominent universities began administering psychedelic drugs to volunteers in controlled settings.

By the end of the 1960s, the U.S. government had had enough of Timothy Leary's call to "turn on, tune in, drop out" and were concerned that a generation was conducting its own uncontrolled experiments with drugs and spirituality. In the early '70s, the experiments ended.

Until now.

A couple of months after the peyote ceremony, I follow Roland Griffiths into his mushroom mecca in the middle of Johns Hopkins University Medical Center in Baltimore.

The lighting is low, the carpeting plush. There's a cross on the wall, a statue of Buddha, a Shinto shrine. In the middle of the room is a sofa where volunteers can lie down after they've ingested a capsule of psilocybin, the psychedelic ingredient in mushrooms. Griffiths, a neuropharmacologist, is the lead investigator in the first major study of drugs and spirituality since the 1970s. Why, I ask, would he launch such controversial research?

"I was just curious," Griffiths says simply.

Finding The Mystical In A Mushroom Trip

Actually, Griffiths says that when he took up meditation 15 years ago, he began thinking differently about the nature of reality. He wondered: What if he could study what happens to the brain when people enjoy spiritual experiences? Griffiths recruited 36 people. They were all middle-aged and stable, had an active spiritual practice — whether Christian, Jewish or other — and were willing to take the trip of their lives. Among them was 56-year-old Karin Sokel.

"They asked me to lay down with headphones and the most powerful music I've ever heard," Sokel recalls. "I was blindfolded, and I began to have my experience."

Sokel was involved in five sessions, and she describes them as the most profound experiences of her life.

"I know that I had a merging with what I call oneness, I am," she says. "There was a time that I was being gently pulled into it, and I saw it as light. ... It isn't even describable. It's not just light; it's love."

Sokel's words echo those of mystics through the ages, who talked of a physical union with God, a peek into eternity or an out-of-body experience. Griffiths says 70 percent of the subjects had full-blown mystical experiences, which Griffiths calls "remarkable."

Griffiths' research offers clues about the mechanics of spiritual mystery, says neuroscientist Solomon Snyder.

Serotonin And The Mechanism Of Mysticism

"If we assume that the psychedelic, drug-induced state is very much like the mystical state," Snyder says, "then if we find out the molecular mechanism of the action of the drug, then you could say that we have some insight into what's going on in the brains of mystics."

Snyder, who is chairman of the neuroscience department at Johns Hopkins and was not involved in the study, says scientists suspect that a key player in mystical experience is the serotonin system. The neurotransmitter serotonin affects the parts of the brain that relate to emotions and perceptions. Chemically, peyote, LSD and other psychedelics look a lot like serotonin, and they activate the same receptor.

Think of that serotonin receptor as a bouncer at a nightclub. The party's a bit tame, and when the bouncer spots the fun chemical — the active ingredient in psilocybin — he lets Mr. Fun into the club. Suddenly, the party picks up and the brain chemicals are burning up the floor.

Let the spiritual experience begin.

New Avenues To Study Spirituality In The Brain

Of course, it's more complicated than that. There are other chemicals and receptors at play, and, of course, mystical experience happens without drugs — through prayer, meditation, chanting and fasting.

But Griffiths says this study will open new vistas into the science of spirituality. Until now, he says, we couldn't systematically study mystical states.

"You can't just say, 'Well, come into the laboratory and pray for two hours, and then we're going to image your brain because we know you'll have a mystical experience

then!" he says. "We're talking about rates of experience that may occur once in a lifetime or once every year or two."

But if you can chemically induce the equivalent of a spiritual experience, he says, you can slide a person into a brain scanner and observe which parts of the brain light up and what neural networks are used.

LSD And Life After Death

Griffiths has now launched other studies that pick up work begun a half-century ago.

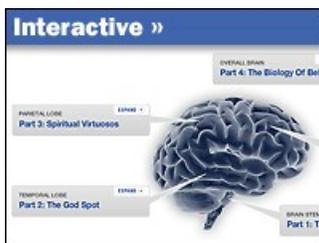
In the 1950s and '60s, researchers studied the effect of LSD trips on patients with end-stage cancer. Many of those who enjoyed mystical experiences, researchers found, returned from their trips believing that life continues after death, and with reduced pain — or at least a different perspective on pain. Griffiths is now [recruiting patients](#) to test whether a synthetic spiritual experience might aid them in any way.

Still, Griffiths says all the studies in the world can't answer his central question about spirituality: "Why does that occur? Why has the human organism been engineered, if you will, for this experience?"

It's a question that haunts other scientists, as well. They want to know: Is there a sweet spot for spirituality in the brain?

Are Spiritual Encounters All In Your Head?

by [Barbara Bradley Hagerty](#)



Barbara Bradley Hagerty/NPR

Barbara Bradley Hagerty tried on Michael Persinger's "God helmet" at Laurentian University to see if he could manufacture a spiritual experience by manipulating her temporal lobes.

“For the next 30 minutes, I listen to magnetic fields shift over my skull. Occasionally, I report seeing images, or a dark forest. ... At one point, Persinger predicts I am right on the verge of feeling the 'Sensed Presence.' But it never happens. There were several times when Persinger predicted I would see an image, or a face -- and I did. To Persinger, this is evidence that God and all spiritual experience are a product of your brain.”

Barbara Bradley Hagerty



According to Orrin Devinsky, who directs the epilepsy center at New York University, neurologists suspect some of the religious giants — like Moses — were epileptics. When Moses saw the burning bush, it could have been God — or a seizure, he says. "Whatever happened back there in Sinai, Moses' experience was mediated by his temporal lobe," Devinsky says. iStockphoto.com

[All Things Considered](#), May 19, 2009 · According to polls, there's a 50-50 chance you have had at least one spiritual experience — an overpowering feeling that you've touched God, or another dimension of reality.

So, have you ever wondered whether those encounters actually happened — or whether they were all in your head? Scientists say the answer might be both.

If you're looking for evidence that religion is in your head, you need look no further than Jeff Schimmel. The 49-year-old Los Angeles writer was raised in a Conservative Jewish home. But he never bought into God — until after he was touched by a being outside of himself.

"Yeah," Schimmel says, "I was touched by a surgeon."

About a decade ago, Schimmel had a benign tumor removed from his left temporal lobe. The surgery was a snap. But soon after that — unknown to him — he began to suffer mini-seizures. He'd hear conversations in his head. Sometimes the people around him would look slightly unreal, as if they were animated.

Then came the visions. He remembers twice, lying in bed, he looked up at the ceiling and saw a swirl of blue and gold and green colors that gradually settled into a shape. He couldn't figure out what it was.

"And then, like a flash, it dawned on me: 'This is the Virgin Mary!' " he says. "And you know, it's funny. I laughed about it, because why would the Virgin Mary appear to me, a Jewish guy, lying in bed looking at the ceiling? She could do much better."

Schimmel became fascinated with spirituality. He became more compassionate, less ambitious. And he wondered: Could his new outlook have to do with his brain? The next visit to his neurologist, he asked to see his most recent MRI.

"My left temporal lobe looked completely different from the way it did before the surgery," he says.

Gradually, it had become smaller, a different shape, covered with scar tissue. Those changes had sparked electrical firings in his brain. Schimmel's doctor told him he had developed temporal lobe epilepsy — a disease that has fascinated doctors for centuries.

Did Paul Hear Jesus, Or Was It Hallucination?

Some 2,500 years ago, notes Orrin Devinsky, who directs the epilepsy center at New York University, Hippocrates wrote one of the very first texts we have on epilepsy — and he named it "On the Sacred Disease."

The disease was considered sacred because the ancients thought that sufferers were possessed by demons, or blessed with divine messages and visions. Devinsky says neurologists suspect some of the religious giants were epileptics themselves. Did Paul hear Jesus on the road to Damascus, or was he experiencing an auditory hallucination? What about Joseph Smith and the two angels? Muhammad? Joan of Arc? And what about Moses and that burning bush?

"Assuming for now a more rational scientific view, he was having a visual hallucination and he heard God's voice," Devinsky observes.

It could have been God; it could have been a seizure. But one thing Devinsky does believe is "whatever happened back there in Sinai, Moses' experience was mediated by his temporal lobe."

The temporal lobes run along the sides of the brain, and deep within them is something called the limbic system. This system handles not just sound, smell and some vision but also memory and emotion.

When people have a seizure in the temporal lobe, it's as if the normal emotions have an exclamation point after them, because so many nerve cells are firing in rhythm. People may hear snatches of music — drawn from their memory bank — and in rare cases, interpret it as music from heavenly spheres. They may see a glimpse of light and think it's an angel.

"These patients give us clues as to what parts of the human brain are involved when all of us have a numinous experience," says Jeffrey Saver, a neurologist at UCLA.

Saver says when people with no brain dysfunction have numinous, or spiritual, experiences, it's the same limbic system being activated — but with the volume turned down.

The Quest For The 'Sensed Presence'

This made me wonder: If God uses the temporal lobe, can neurologists make God come and go at will? Well, they can make ecstatic seizures go away with surgery or medication. But what about summoning God? Could a scientist manufacture a spiritual experience by manipulating my temporal lobes?

That question led me to Michael Persinger's laboratory in Sudbury, Ontario. It's 6:30 on a Saturday evening, and Persinger, a neuroscientist at Laurentian University, has pasted eight electrodes on my scalp. He eases a modified motorcycle helmet with its own sensors onto my head. He calls it the "God helmet."

The helmet is supposed to stimulate my right temporal lobe with weak magnetic fields, and create the illusion of God in my head. Well, not God exactly, but a sensed presence, a feeling that another being is in the room.

When the helmet is in place, Persinger covers my eyes with goggles stuffed with napkins. I sink deeper into the threadbare, overstuffed chair, feeling like a teenager hanging out in someone's basement. He leaves me in the chamber and returns to the control room, where I've placed a recorder.

For the next 30 minutes, I listen to magnetic fields shift over my skull. Occasionally, I report seeing images, or a dark forest. I've placed a recorder in the control room, which is picking up both his comments and mine. At some point, I say, in an almost incomprehensibly muffled words, "There's kind of a roiling darkness, like a battle of darkness; it's off to my left."

Persinger observes, excited: "You've just reported the actions on your left. And now you are beginning to experience — and my compliments to you — what is called 'The black,' or 'The dark of the dark.' "

Of course, I couldn't hear him say that. He was talking into my recorder. At one point, Persinger predicts I am right on the verge of feeling the "Sensed Presence." But it never happens. There were several times when Persinger predicted I would see an image, or a face — and I did. To Persinger, this is evidence that God and all spiritual experience are a product of your brain.

"What is the last illusion that we must overcome as a species?" he asks theatrically. "That illusion is that God is an absolute that exists independent of the human brain — that somehow we are in his or her care."

'I'm A More Decent Human Being Because Of It'

Believers are certainly going to take issue with that. And so do many scientists. I put the question to New York University's Devinsky. Does the fact that we can track spiritual feelings in our temporal lobe mean that there's nothing spiritual going on?

"No," he says simply.

Think about a man and woman who are in love, Devinsky says. They look at each other, and in all likelihood, something fires in their temporal lobes.

"However, does that negate the presence of true love between them?" he asks. "Of course not. When you get to spirituality, as a scientist I think it really becomes extremely difficult to say anything other than, 'It's possible.' "

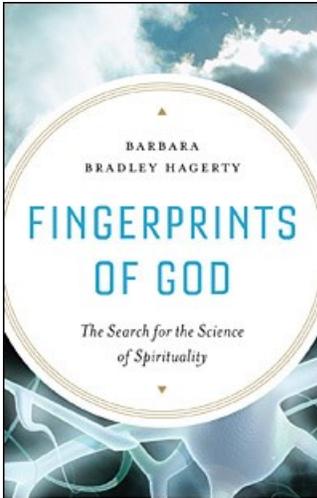
As for Schimmel, the fellow with temporal lobe epilepsy, he finds it hard to believe that his new faith and love for his fellow man come merely from an electrical impulse that's gone awry.

"But I'll tell you what the real bottom line is for me," says Schimmel, who has taken up Buddhism to harness his spiritual life. "I don't care where it comes from. I'm just a happier person, and I'm a more decent human being because of it."

Searching For The God Spot

Excerpted From 'Fingerprints Of God'

by [Barbara Bradley Hagerty](#)



NPR.org, May 17, 2009 · The sun was still high in the northern Canadian sky when I arrived at Laurentian University early in the evening on July 8, 2006. I had traveled to the remote town of Sudbury, Ontario, to meet Dr. Michael Persinger, an American researcher who had gained some notoriety in neuroscience circles — and among journalists — for his experiments in spirituality. Several years earlier, he had produced the "God helmet," a reconstructed motorcycle helmet that was supposed to evoke mystical experiences in its wearer. According to Persinger, the helmet would use weak magnetic fields to stimulate parts of the brain — in particular, the temporal lobe. This, in theory, would evoke a "Sensed Presence," the feeling that a nonmaterial being was in the room. In other words, through the wonders of neuroscience, the helmet could

summon counterfeit angels or demons on demand. I wanted to see if it would work its magic on me.

A bouncy brunette Ph.D. student named Linda St. Pierre greeted me at the research laboratory. She immediately sat me down and gave me a battery of tests to gauge my personality—and, in particular, to see whether I was prone to epilepsy, religiosity, or suggestibility. Questions like: Do you have a feeling that there is something more to life? Are you afraid of mice? Do people tell you that you blank out (a sign of epilepsy)?

Do you believe in the second coming of Christ? And (my favorite): Have you been taken aboard a spaceship? As I was completing the tests, the man himself appeared.

Michael Persinger was ramrod slim, taut, with a puckish expression. He wore a dark blue three-piece suit, with a gold watch and chain tucked into his vest. I liked him immediately.

"I heard a rumor," I said, "that you wear a three-piece suit when you mow the lawn."

"True!" he admitted, seeming pleased that this eccentricity had made its way back to the States.

"Interesting. May I ask why?"

"For comfort. Three-piece suits are so versatile. I take off the jacket when it's hot, and put it on when I'm cold."

"How long have you been doing this?"

"Since I was in high school at least."

I had boned up on Persinger's theories about spiritual experience, and they boiled down to this: spiritual experience is a trick of the brain. It can be triggered by head injuries and

brain dysfunctions such as epilepsy, by the earth's magnetic fields, and by machines like his "God helmet."

Persinger laid out his theory about how, precisely, the brain creates spiritual experience. It was like listening to Mr. Spock in a Star Trek episode — he peppered his theories with just enough acceptable science to make them plausible. The left hemisphere of the brain is associated with language, he explained, and thus the sense of "self." The right side is more involved with "affective emotional patterns," or feelings and sensations.

"When you stimulate the left hemisphere, you're aware of your 'self' — of you as an individual," Persinger explained. "So the question to ask is, What is the right-hemispheric equivalent of that left-hemispheric sense of self? And the answer is, the 'Sensed Presence': the feeling of another entity, of another sentient being that has emotional, meaningful, personally significant, and expansive temporal and spatial properties."

If you stimulate the right side of your brain in a certain way, he said, you sense someone nearby. In this way, Persinger claimed to create "the prototype of the God experience." Persinger claimed that fully 80 percent of the 2,000 or so subjects who have donned the God helmet report feeling a sensed presence, as well as dizziness, vibrations, spinning, and visions.

Even better, Persinger believed he had found the sweet spot for spiritual experience: the right temporal lobe of the brain. The temporal lobe, which runs along the side of your head near the ears, is involved with memory, emotions, and meaning, as well as hearing and language comprehension.

Why zero in on the right temporal lobe? I asked.

"Mystical experiences are in large part associated with temporal lobe function," he said. "The visual experiences, the hearing, knowing, vestibular [balance] effects, the smell."

Persinger explained that the temporal lobe (and, in his view, not the presence of God) explains why the mystics of old were said to smell fragrant flowers.

"In fact, their sweat emits it," he said. "Areas of the temporal lobe probably affect the metabolism in such a way that your sweat has a certain smell, and many of the classic mystics are often described as having a smell about them that is very fragrant, like roses, and all of this is tied to temporal lobe function."

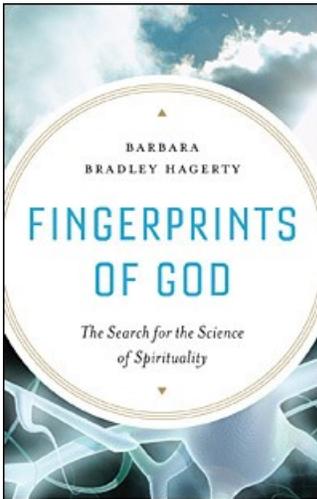
I would learn much more about the temporal lobe in the coming months. For now, I was eager to test the God helmet.

Courtesy of Riverhead Books, a division of Penguin Group (USA)

Isn't God A Trip?

Excerpted From 'Fingerprints Of God'

by [Barbara Bradley Hagerty](#)



[NPR.org](#), May 17, 2009 · Those who say life is short have never attended a peyote ceremony.

This thought occurred to me just after midnight on July 23, 2006. Thirty-one of us formed a circle around a fire in an enormous tipi we had erected on top of a mountain near Lukachukai, Arizona. Thunder and lightning ripped through the sky, and heavy rain lapped under the edges of the tent, soaking our cushions and turning the dirt floor into a muddy paste. My companions sat cross-legged on the floor, motionless, gazing at the flames with sleepy eyes dilated by the mescaline from the sacred herb peyote. Three strapping young men with long black hair moved around the circle, pounding on a water drum and singing an urgent chant, which sounded to my untrained ears

like, Doo DOO. I understood nothing, since they sang in the Navajo language, Dine, but I felt the power of the chant like ropes wrapped tight around my body. I could not move, only breathe.

But I wanted to move. I was desperate to move. I had been sitting for three-and-a-half hours on a thin, wet cushion. The only relief came in shifting from cross-legged to a kneeling position, and then for but a moment. Unlike my happy and stationary co-participants, I was not in fact stoned. I was an "observer" — an observer of one of the only forms of drug-induced spirituality sanctioned by U.S. law. Psychedelic drugs such as LSD, psilocybin (mushrooms), and mescaline had been outlawed by the "war on drugs" in 1971, ending most of the emerging research on the states these drugs seemed to uncork. Only peyote and ayahuasca used in Native American religious ceremonies are permitted, which is how I found myself sitting in a tipi, bobbing my head to Navajo chants with a silly grin, wet and sore and as close as I could legally come to observing mystical states created by Schedule I drugs.

Well, almost as close. I could have ingested enough peyote to reach an altered state myself. But I had opted out. Okay. I took a little. The law permitted Native Americans to ingest peyote for religious purposes only, and there appeared to be no loophole for NPR. More important, I thought the peyote might actually interfere with my work, since violent vomiting is common for the uninitiated. I then reminded myself that I had a stepdaughter, and tripping on sacred mushrooms might not be the best message to send a twelve-year-old. Whole truth be told, I also worried that the peyote would deliver on its promise and thrust me into an enlightened spiritual state. I fretted that God might be reduced to a

chemical, making my own daily commitment to spiritual practices look a bit archaic. All that prayer and study, when I could just swallow a bit of mescaline — a little like using the Pony Express in the age of e-mail.

Once in the tipi, I found that skipping the altered state was, from a culinary point of view, less of a sacrifice than I had imagined. When the peyote man first came around with his coffee can full of dark brown sludge and spooned the peyote paste into my mouth — using the same teaspoon for everyone, I noticed — I nearly choked on the acrid taste and lima-bean-like texture. Just as I was recovering from the paste, another man thrust a silver bowl in front of me. I reached into what felt like a mass of writhing worms and plucked out a peyote button, the cactus herb itself. I held the soggy yellow button reverently in my hand until he had moved on, and then quietly dropped it on the dirt behind me. I looked up to find a third man kneeling before me with a jug of green liquid — peyote tea — which he pressed to my lips before I could brace myself.

The trinity of peyote would return every two hours or so, but after the second circuit I politely declined, leaving myself in a wired but not altered state. At just after midnight, the drumming ceased, catapulting us into silence, save for the hiss of the fire. Eventually the Navajo woman in the place of honor cleared her throat, and we all turned to gaze at her.

"I want to thank you for praying with me," Mary Ann began in a reedy voice. "I know that the peyote and your prayers will heal me. Now I want to tell you something I have never told anyone." She paused, looking around the circle. "I need to confess to the fire."

Courtesy of Riverhead Books, a division of Penguin Group (USA)