

Excerpts from Suggestible You: The Curious Science of Your Brain's Ability to Deceive, Transform, and Heal (by Erik Vance)

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The practitioner began reassuring Dee, saying, “It doesn’t matter whether this religion works or not. God loves your child.” Over the next couple of minutes, everything changed for Dee. She let go of herself and put her trust in God. The world was transformed from a place where her son was dying and her community was helpless to save him into a world in which everything was perfect and God’s love enveloped her family like a warm, comforting blanket. Dee walked into the next room and saw what most people would describe as a miracle. Her child was sitting up, happy in his father’s arms, his color returned, a smile on his face.

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Christian Science is an American religion founded in 1866. Its charismatic founder, Mary Baker Eddy, claimed to have discovered the true meaning of Scripture: that all Christians have the ability to heal, just as Jesus did. Roughly speaking, Christian Scientists believe that all matter—your car, this book, or a shot of antibiotic—is superseded by a deeper reality reflecting the mind of God. In that reality, everyone and everything is perfect. Thus a healing comes not by changing the body but through glimpsing a more perfect, truer version of yourself.

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[M]ore than 2,000 Christian Scientists claim to have been spontaneously healed of medically diagnosed conditions across the spectrum: polio, bone cancer, ruptured appendixes, goiter, crossed eyes.

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These people aren't lying, and they aren't fooling themselves. Something else is happening. Something was giving me the power to heal myself as a child.

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In 1996, the philosopher and artificial intelligence pioneer Daniel Dennett wrote, "A mind is fundamentally an anticipator, an expectation-generator."

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The world, it turns out, is not what it seems. More important, it's not what we expect it to be, and in that fact lies unimaginable power.

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Maybe physicians needed to find a cure that came in a package similar to the disease itself. "Similia similibus curantur," he said: Like cures like.

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Grams's homeopath recommended belladonna, or deadly nightshade, a poisonous bush used throughout history for political assassination.

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there is no scientific reason why deadly nightshade, let alone highly diluted deadly nightshade, should have helped Grams's panic disorder when prescription drugs had failed. But it did: Her symptoms dissipated.

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But the more she dug into the scientific literature, the more she learned that the homeopathic treatments she had been administering showed zero merit in careful scientific tests.

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What's going on here? Homeopathy improved the health of Grams, her patients, and hundreds of thousands of other people and is one of the most popular forms of alternative medicine in existence. How does it work so well if it's not real?

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Around 1025, the legendary Persian doctor and mathematician Avicenna wrote his Canon of Medicine, which lays out parameters for clinical tests of new drugs that are surprisingly in sync with modern standards.

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Today's laboratory experiments follow similar rules—except sadly we substitute mice for lions. (Just imagine how much more interesting lab work would be.)

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Mesmer observed that, like the tides in the sea and the planets in the sky, the human body was awash in magnetism. He reasoned that the same forces that drew metal objects together created a sort of invisible “universally spread fluid” that swirls around us (kind of like the Force from Star Wars).

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[Y]ou eating from the forbidden fruit of knowledge, so that the next time you pop an Advil, you won't feel anything until it kicks in? Never fear. Classical conditioning happens largely on an unconscious level. You can no more prevent your placebo response than Pavlov's puppy can keep from drooling. This has even been shown in the laboratory.

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This theater plays out in thousands of ways. For instance, depression patients respond better to yellow placebo pills than to blue ones. Bigger ones work better than smaller ones, but only to a certain point (at which the pill is just too big to believe, I suppose). Fake injections work better than fake pills. And if you're French, suppositories work better than either. Take a quiet moment to ponder the significance of that.

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Soon drug testing would have to be 1. randomized (distributed to patients randomly), 2. double-blind (neither patients nor doctors would know who got what), and 3. placebo-controlled (shown to be more effective than a placebo).

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For the first time in history there was a law stating that, to be allowed on the market, a drug had to beat something. From here on, every new pharmaceutical now has to be measured against the effect of a placebo treatment.

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Because placebos are still largely viewed as a nuisance—a bizarre psychological reaction that affects weak and gullible people and keeps the real patients from getting the drugs that they need. But today that view is radically changing. The only way we have to separate an effective

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Placebos and expectation are part of all medicine. They kick in the moment we swallow that pill and the moment we step into the doctor's office and see that white coat. None of us is immune to it, and those who fall under its spell aren't weak or gullible. This is who we are.

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But every time I saw the green screen, I swear I felt less pain. A lot less. I'm not an idiot—I can tell the difference between a pinprick and squeezing fire.

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In real life, placebo responses can be triggered by many things—the desire to please a doctor, for instance, or just to get better.

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What he saw was backward, with the pain signals starting in the prefrontal cortex—the most advanced logic center of the brain—and working back to the more primitive regions. This seemed to suggest a sort of collision of information: half originating in the body as pain, and half originating in the advanced part of the brain as expectation. And whatever comes out of that collision is what you feel.

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Enter one of my favorite placebo treatments, acupuncture. As with so many forms of folk medicine, acupuncture doesn't reliably outperform a placebo. When it does, it's for especially placebo-prone conditions like pain or nausea. But although acupuncture doesn't often outperform placebos, it still performs really well, and many respected scientists are not yet ready to label it strictly brain chemistry. Ted Kaptchuk even found that the brain's response to acupuncture is markedly different than it is to other placebos. It performs so well, it seems to be in its own class of placebo.

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What if acupuncture is an active placebo? What if that tingling sensation in my nerves and pain in my muscles is a message to my brain that this exercise with needles is doing something? That would explain why it performs so well in trials, yet not well enough to reliably beat placebos.

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Parkinson's disease is a somewhat mysterious and incurable condition whereby neurons deep in the brain responsible for generating dopamine die. Why they

die isn't clear, but since dopamine is so important for movement, patients are increasingly unable to walk, stand, or hold a pen without shaking.

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People, it seems, are programmed with a preexisting need to go with the herd. In an instant, people tapped into a more powerful placebo response than if they had spent hours conditioning themselves. Let that sink in for a second. Someone else's opinion is not only powerful, it can be more powerful than your own. It can be more powerful than your experience and even more powerful than repeated conditioning. We are hardwired to follow other people's opinions.

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Thus began a bizarre dual health care system that continues in China to this day. On one side is Western medicine with its MRIs, morphine, surgeries, and so on. On the other is TCM, which treats patients with acupuncture, herbs, animal parts, and massage. Just like conventional medicine, TCM has its own hospitals and drugstores; its students go through extensive schooling (though it's usually not as long as that of their Western-medicine counterparts).

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Every remedy that has ever been used in TCM—from ginseng to rhinoceros horn to mercury—is theoretically just as valid today as it ever was. In other words, evidence is not the primary driver.

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"In Chinese medicine we don't have 'bacteria.' We don't have this word. We don't have 'virus.' We consider maybe this is the chi or the blood movement," she says. "For Chinese medicine, what we adjust is chi, blood, the yin and the yang."

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Modern science cannot measure yin or yang, the Chinese complementary feminine and masculine principles, and no serious scientists—East or West—have been able to demonstrate the existence of chi.

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A person's chi, their vital energy, can change with the seasons, the time of day, and a hundred other things. When I ask her how she can prove this, she points to tradition. Over thousands of years TCM has been honed by millions of physicians, evolving naturally over time to where it is today. As with homeopathy, TCM has a coherent story to tell that works perfectly within

its own logic but contradicts biology and physics. And as with homeopathic remedies, TCM treatments are often as much about the description of the pain as the physiology.

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For Zhang, the point of the story is that the chemicals in, say, ginseng or deer antler are not as important as the intangible, ineffable quality of the healer. There are many roads, she says, but the destination is the same.

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Sitting there drinking my third pot of tea, all this starts to sound very familiar. I am reminded for a moment of my parents and their community of faith healers in California. “What you are describing is religion,”

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Zhang says that Western medicine is a straight line—always refining itself, always moving forward—while Chinese medicine is a circle around a fixed dot. The fundamentals never change, just your interpretations of them.

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According to the theory of Chinese medicine, you can tell a lot about your health by looking at your foot. Each muscle is tied to an organ in the body through meridians, or energy highways. Because the feet and toes are farthest from the heart, they are seen as good diagnostic tools—the 10 little piggies in the coal mine, if you will.

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There is no physiological mechanism by which the foot could tell you something about the urinary tract. But that doesn’t bother Wang. He’s happy in his practice and knows he’s helping people (though my arm pain is no better after seeing him). When I ask him how he can be so sure that his work is effective, he has a simple, familiar response: “For so many thousands of years the Chinese people have been the most populous on the Earth, and they have all gone to Chinese medicine to cure their illnesses. How can we doubt it?”

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Outsiders often wonder how people can stay connected to a faith like this—thinking, “Eventually, won’t they naturally drift toward solutions that are reinforced by success?” But Christian Science, like TCM, is being reinforced. Humans aren’t stupid. Like everyone, Christian Scientists are trying to put their faith in treatments that work. The results can be stunning. I’ve seen

Christian Science heal people of lifelong pain. I watched my grandmother collapse and then recover after my father held her and whispered song lyrics to her. I've also seen it fail. One member of our community had cataracts for many years, which easily could have been treated by an eye surgeon.

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Gene therapy—the notion that you can tinker directly with the genes of ailing human cells—has held tremendous promise for many years. But like stem cell therapy, cold fusion, and reboots of *The Muppet Show*, it's beginning to look like a breakthrough that's never going to happen.

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This may seem cruel to you and me, but Parkinson's is a devious disease. One of the reasons it has been so hard to cure is that it seems to respond more to placebo treatments than other degenerative brain ailments do.

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After the call, she got the details of the study, and what she saw stopped her cold. Pauletich had been in the placebo group.

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The problem of placebo responders is the central challenge to modern medicine. The placebo response not only has the power to kill a proposed drug that doesn't work; it also has the power to block one that does.

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The development of Prozac was bedeviled by high placebo rates that made it hard to tell if it worked. It obviously made it to your pharmacist's shelf, but nowadays many scientists say it is not effective enough to outperform placebos. (It's still on the market because once a drug clears the FDA, it cannot be recalled just because the placebo effect gets stronger.)

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One unpleasant 1961 paper written in Louisiana declared that African Americans were particularly vulnerable to placebos, according to one unaffiliated scientist, because of a "prevalent attitude amongst the negroes to please their doctor."

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In the past couple of decades, scientists have shifted to a theory called dispositional optimism, or the measure of how glass-half-full you are as a possible

measure of how placebo prone you are.

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When she says she once dabbled in a Reiki-like form of aura cleansing and even cured herself of carpal tunnel syndrome through acupuncture, I categorize her as a well-meaning hippie on a quest to undermine the big bad pharmaceutical industry.

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Met/mets—those people who were born with lazy enzymes and a little too much dopamine in their systems—were more prone to placebo responses.

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The concept makes great evolutionary sense as well. Just as it's good to have some members of a population who are stronger, faster, or smarter than others, it's probably good to have varying levels of suggestibility. Some people need to be clear-eyed and unmoved, like the val/vals. But nature thrives on variety and has given us an equal number of suggestible people who have an extraordinary genetic tool that allows them to heal themselves.

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It's a crack in the wall that suggests a reason why some people seem to respond to one placebo and not another, why the placebo response can seem so clear in one person and not in another, and why it seems vaguely related to personality and at the same time totally divorced from it. Homeopathy patients, Christian Scientists, TCM—suddenly all these phenomena make more sense. What if the reason some people experience such relief from prayer healing and unproven therapies while others don't is that they simply have different genetic maps for self-medication?

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Winkler says each person enrolled in an experiment ends up costing the company a shocking \$30,000, including time and resources. Considering that even a minimal “proof of concept” study—to prove that a drug is even worth the effort of testing—requires hundreds of subjects, costs can accumulate quickly.

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when this company went back through its data and screened out met/mets, it found, lo and behold, the COMT gene would have predicted who was going to eventually respond to the placebos in the trial. All because of a single rung on a single strand of DNA.

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After thousands of years, the placebo response isn't going anywhere. It's hard-wired into who we are on a neurochemical level. And after decades of searching for the perfect placebo responder, scientists have finally admitted that they may never be able to separate him or her from the rest of humanity.

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All things considered, they are actually the most fortunate members of the population. They can take the drug and they will respond at a higher level than the recalcitrant val/vals. Or, if they decide that conventional medicine isn't their thing, they can try acupuncture, homeopathy, or faith healing and perhaps do just as well—whereas on a val/val, those treatments are more likely to fall flat.

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“It's not ‘telling yourself.’ You can't fool yourself. You have to believe that you have control over it. That the disease is not going to take control of you, that you are going to take control of it,” he says. “It's a difference between belief and hope. At some point there's a switch between ‘I hope I'm going to get better’ and ‘I know I can defeat this.’”

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For instance, cancer historically has not responded well to placebo treatments, yet plenty of dubious treatments have claimed to cure the disease. Are they all hokum, or is there perhaps some yet-to-be-discovered mechanism by which the mind can affect a cancerous tumor?

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Recall that placebo is Latin for “I shall please”; nocebo means “I shall harm.”

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(Generally a shot of salt water is considered inert—the injected version of a sugar pill. However, some scientists have argued that saline shots can cure back pain, and many doctors even use them as therapy. If this is true, it would basically invalidate every study that has used saline as a placebo.)

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For instance, some studies suggest that the nocebo response is less an active process than simply the experience of pain without the buffer of a placebo response.

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Consider the so-called second-year syndrome, whereby medical students become convinced they have all the diseases they are studying. Have you ever heard of it working the other way: students being convinced they're being cured by the various treatments they are studying?

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Mackey says the cutting edge of pain research is trying to understand what makes one person vulnerable and another person resilient to these deep, powerful danger signals. Of course, we can't spot those vulnerable to chronic pain any more than we can spot those prone to having placebo responses.

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At first, it was distractingly painful. As I lay there, he told me to think of this horrible burning thing on my arm as nothing more than sunlight warmly caressing my skin. Sure enough, I watched as a part of my brain involved in pain (in that case, the anterior cingulate cortex, a couple of inches behind the left side of my forehead) slowly ramped down.

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Does this mean that chronic pain, fibromyalgia, and neuralgia are nothing but elaborate nocebos?

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Colloca feels that a doctor should never say "Don't worry" to a patient. Of course the patient is worried! Telling her what not to do just makes it worse. Instead, the doctor should address those fears and come up with novel ways to frame the dangers. The doctor who approaches a patient with straightforward, positive language ("Here is what is happening to you, and here is what we are going to do about it") stands a better chance of fighting off potential nocebo effects

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Most men speak at around 120 hertz (which measures the frequency, or pitch, of a sound), and women at around 210 hertz. The lowest Barry White sings is about 90 hertz. Most humans can't hear anything below 20 hertz.*

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Some researchers have observed that we can subconsciously detect sounds below this level, translating them into a vague sense of anxiety or awe, but it's not clear whether this is true.

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What are the limits of negative expectation? According to Cannon, there are none. He hypothesized that it was possible for someone to become so agitated, so frightened, that she could literally die from it. He was convinced that if that happened, it would appear in communities that believe in the power of black magic.

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People who consider themselves at risk for heart disease die four times more often than similarly healthy people who don't think they're at risk.

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And certainly people with cancer who have a dim outlook on their future don't live as long as optimistic patients. But killing an otherwise healthy young person with just suggestion?

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"Mental malpractice," as it was called, was the act of wishing someone ill and thus causing him to get ill, or worse. In other words, a Christian Science version of a curse.

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This means blocking all aggressive thoughts, either free-floating or targeted by someone who wished me ill. I didn't fully understand it at the time, but it made a pretty powerful impression on a little kid. Whenever I got sick, I spent a fair amount of time imagining British Queen's Guards standing inside my ears, just in case.

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Almost every culture on earth has its own language of curses. Hexes, bad juju, demons, djinn, black magic—when you get sick, it has never been hard to find someone to blame. To be clear, a curse is not a placebo. But if you believe you've been cursed, the placebo effect certainly plays a role in any resulting changes to your health.

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The first is that bokors use puffer fish venom to simulate death. Then the lack of oxygen from the time spent buried in a wooden box causes brain damage and that telltale shuffle. The second explanation is much more fascinating. Some have suggested that the tremendous cultural pressure to become a zombie after being knocked out and buried might have actually forced the poor wretch to

turn himself into a shuffling creature of scorn. In other words, zombies could be self-made, molded from the collective will of a community—a massive, societal negative expectation fulfilled.

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They rely on the fact that—as should be evident by this point—we are not always rational creatures. If we were all equipped with perfectly logical minds, we would see that the number of bad things happening to people who’ve been cursed is the same as the number of bad things happening to everyone else.

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Valadez says that the ingredients of his treatments are important but not the most crucial part of his work. “Nothing in this works if you don’t have faith. Faith is like the engine,” he tells me.

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No, the real power of a curse is to give cause to a bad event—to give me someone to blame. In this case, myself. That’s how quickly a man of science can turn to superstition. Whether it’s a curse or a blessing, the power of belief comes from two little words: What if? What if that blessing could have helped me get the job I wanted? What if that ex-girlfriend I cheated on five years ago decided to curse me?

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On that Sunday in June—my first Father’s Day—I feel anything but cursed.

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But one type of story is even more powerful at harnessing our expectation than either placebos or nocebos. So powerful that with just a few spoken words, it can erase pain, memories, and even disfiguring skin diseases. So powerful, in fact, it’s hard to argue that it’s not magic.

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Hypnosis has inspired scientists and snake oil salesmen alike for centuries, and it holds fascinating clues into the world of suggestion and expectation in the brain. It’s a powerful, tangible phenomenon that has cured addiction, erased pain, and brought comfort to millions.

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Experts who study what happens during hypnosis fall into two loose camps. One group asserts that hypnosis is a form of intense focus, like daydreaming

or getting lost in a good book or jigsaw puzzle. For many people, that's all hypnosis is: a nice relaxing meditation, a little like the end of a yoga session, when everybody gets to lie down and focus on breathing. For them, hypnosis is like lying in the grass on a sunny spring day, staring into a cloud so intently that you momentarily lose yourself in it. It's not a state unfamiliar to real life. For others, hypnosis can be much, much more. The second group of scientists considers it an "altered state," having no counterpart in daily life. Some people under hypnosis commune with the dead, revisit their past, and perform superhuman feats. Warts disappear from their skin, and they feel no pain when surgeons slice into them.

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The novelist and poet Sir Walter Scott referenced it in 1805, noting that Gypsies among certain rural Scottish communities had "the power of throwing upon bystanders a spell to fascinate their eyes and cause them to see the thing that is not."

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Eddy wasn't alone. Most orthodox Christians and Muslims eventually rejected and continue to reject hypnosis as a tool of Satan or supernatural creatures called djinn.

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Interestingly, in Bram Stoker's 1897 novel *Dracula*, it was the hero who used hypnosis to find the vampire. But by the time the various movie versions came along, it was always the bloodsucker himself who hypnotized his victims.

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Mason noted that this poor kid, who was once "lonely, solitary, with a hopeless attitude towards future friendship and employment," suddenly became a "happy, normal boy" who went on to become an electrician's assistant and then a bike mechanic with no sign of relapse. Had it been a priest performing the hypnosis and not a doctor, it would be enough to make a person believe in God (or devise some wild explanation involving magnets). But amazing as this account is, it hasn't inspired the kind of research it deserves. Over the next half century, medical science came only marginally closer to understanding the potential power of hypnosis to heal.

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Contrary to Hollywood portrayals, the most spectacular forms of hypnosis work only on the most hypnotizable 10 percent or so of the population. Another 10 percent don't respond to hypnosis at all, and the rest fall somewhere in between.

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Another controversial theory from the 1970s ties hypnotizability to how much white is visible around your iris when you roll your eyes up.

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Different performers have different tricks, but the key is to get the audience to act as one: Get them to stand up and then sit down on your command. Get them to laugh together.

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We can't help it; we want to be a part of the crowd. By signaling to the audience that he is their leader, Newton primes them to obey his suggestions. When it's really working, he says, the hypnotist is even more amazed than the audience.

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Newton tends to see hypnotists everywhere around him—for instance, in military parades where soldiers march in lockstep and onlookers cheer on cue. He says one of the best hypnotists he's ever seen is Tony Robbins, perhaps the world's most famous motivational speaker, celebrated for his boundless energy and rock star-like persona. Robbins has a dedicated, almost cultlike following. Participants of his seminars often report feeling energized and ready to change their life afterward. Newton says it's not hard to spot his secret.

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Many religions, from Christianity to Sufism to Buddhism, employ some form of group trance (which is ironic, since many religions lump hypnosis in with satanic or occult practices). Singing, dancing, and chanting in unison, be they for healing or simply for getting in touch with a higher power, rely on the element of trance. And although it's true they can be used to manipulate people, trances (whether in a group or all alone) can also open a portal through which we can tinker with our expectations. In addition to being a fun stage trick, hypnosis can be a powerful tool for healing.

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Amazingly, even with all these barriers, when scientists listen to multiple places in the brain, a neurological picture of hypnosis begins to emerge. For instance, although to people experiencing them meditation and hypnosis can feel very similar, they create very different scenarios. The "stadium chant" that many parts of your brain participate in during meditation is measurably slower than in daily life. And with hypnosis, it becomes even slower. About the only way to get brain rhythms slower than those during hypnosis would be to fall into a coma.

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If Jensen is right, his research will back up much of what scientists have suspected for many years: Hypnosis is not a placebo or a trick of the mind that releases the brain's inner medicine cabinet. And it's not akin to distraction, which uses the brain's need to focus as a way to cloak the pain. By this line of reasoning, hypnosis may be an exotic brain state that directly accesses expectation and perception—a little like turning off all the software in your computer and accessing its basic coding.

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His logic seems not to go anywhere yet continues forward, spinning around itself, repeating ideas while moving in no particular direction. I have trouble tracking it, which is the point, since I soon start to relax.

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For centuries, people assumed that those who easily fall into trances are somehow gullible. But Jensen flips that observation on its end. He thinks highly hypnotizable people are not only skilled but also “talented.”

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“What are you telling yourself about yourself? If you have more hypnotic talent, our hypothesis is that the things you tell yourself are more strongly impactful.”

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Try it: Close your eyes, lift your hand off the table or your leg, and then slowly—ever, ever so slowly—lower it back down. Chances are that you will think your arm should have touched down long before it actually does. This, it turns out, is a big part of hypnosis: using tricks to create the sense that you are hypnotized, so that soon enough, you are.

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For now, the track record for digital hypnosis still lags behind that administered by a real person. But without a doubt, digital hypnosis is coming.

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IN MARCH 1988, RESIDENTS OF THE SMALL TOWN of Stuart, Florida, were gripped by what can only be described as mass hysteria. Law enforcement officers had discovered a secret satanic cult being run out of the local Montessori preschool.

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There were tales of dark hooded figures, bizarre blood ceremonies, and the ritualistic rape of children.

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[W]e've learned, you can't make people do something against their will under hypnosis, but a subject can become highly suggestible.

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Then, while living in San Francisco in her 20s, she decided to experiment with a sensory-deprivation tank—a chamber half filled with tepid water and impervious to sound or light. Crawl into one and you feel as if you are floating silently in the blackest space. For decades, people have used this extreme sort of quiet blackness as a sort of forced meditation.

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scientists understand that what caused a nationwide panic and the imprisonment of dozens of people wasn't a conspiracy of pedophiles but an interesting glitch in the human mind: specifically, how we create memories.

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Broadly speaking, your memories are created in three stages: encoding, consolidation, and retrieval.

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Encoding happens just as an event is occurring—that moment when you find yourself paying attention to something.

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At the end of the day, your mind sifts through all the memories it's made that day (where my keys were before I left the house; whether that was a chickadee or a nuthatch), and moves only the important ones (my moronic roommate accidentally lit the kitchen on fire) into long-term memory.

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The last step in creating memories is retrieval—that moment when you actually remember something. But wait, you might say, retrieving a memory is completely different from creating one.

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Memory isn't static like photos. It's more like reassembling a picture from jigsaw pieces or making a photocopy of a picture and then looking at it.

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[W]hen you try to go back in time, your mind simply fills in the blanks with something that seems right, given the story it's trying to construct. We all have memories like this—things we're sure about and that we can see with our eyes closed—that just aren't true.

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Although repressed memories certainly could exist in theory (and indeed “dissociative amnesia,” its technical name, is still listed in the latest version of the Diagnostic and Statistical Manual of Mental Disorders), they are difficult to study in the laboratory, and some experts assert that they don't exist at all.

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It's not clear how many innocent people are currently in prison because of false-memory testimony, but every year counties and states occasionally quietly release supposed child molesters who have spent decades in prison based on the testimony of hypnotized children.

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Scientists have been able to paint a rich picture of how false memories might function in the brain. They can form at any stage of memory making: during the initial encoding; during the consolidation into long-term memory; and during retrieval of the memory days, months, or years later. We know that in some people false memories can be just as powerful and even longer lasting than real memories.

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(Most lie detectors rely on subtle physiological changes—eye movement, pulse, skin conductance—triggered by the knowledge that a person is lying. These triggers disappear when the subject doesn't know he's lying.)

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In 2015, a Spanish team, in a conclusion that will surprise no one, found that cannabis use encourages false memories. But what was surprising was that even after people stopped smoking weed, they remained prone to creating false memories, suggesting some kind of long-term changes to the brain's medial temporal

lobe as a result of regular marijuana use. A similar effect, though perhaps in a different brain region, probably exists as a result of sleep deprivation.

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And we know that no matter how immune we may think we are, anyone can have one. In one study, even people with the disorder hyperthymesia, which causes them to remember every event in their lives in painstaking detail, were susceptible to false memories at roughly the same rate as the rest of us.

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How can you understand false memories if there is a chance that some of the memories you are studying are true? So he turned to the next logical place to conduct memory research—little green men from outer space.

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the nearest planet we have found to date that could sustain life, called Wolf 1061c, is 13.8 light-years away. For a creature living there to visit us, it would have to break almost every law of physics and still endure an extremely long trip. It's a fair bet that after such a grueling journey, the last thing a space creature would want to do is quietly pick someone out of their bed and extract semen or eggs.

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He also noticed that the people who “remembered” satanic cults never overlapped with those who said they'd experienced alien abduction, and vice versa. If you were setting out to find alien abductees through hypnosis, wouldn't it make sense that you'd find at least a few satanic-ritual survivors?

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In the end, we can't always trust what our memories are telling us. But that knowledge in itself can be powerful. Once you understand that people's memories are less videotape and more extended personal narrative, the world begins to make a little more sense. Autobiographies cease to be absolute truth and turn more to “some stuff that happened mixed with some stuff that probably didn't.”

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Children and the mentally handicapped are victims of an unusually high number of assaults, partly because they make such terrible witnesses. What if sexual predators could target people prone to false memories? And several studies have suggested that women are more prone to memory errors than men are,

providing an opportunity to discredit half the population. Is society ready for that kind of information?

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What if that foundational memory isn't real? What does that make me? As with all forms of suggestion, false memories remind us that our perception of reality is fallible. Just as most of us are susceptible to placebos and some level of hypnosis, so too do we have to realize that not everything we think happened actually did. We are all vulnerable to suggestive storytelling that fits our own expectations. And if we are unable to see these memories as fallible, the consequences can be disastrous.

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And although it's true that being kidnapped by aliens or fed blood by satanists may seem like bizarre narratives, all one has to do is turn on the television to see that, in the modern world, we're frequently exposed to such stories. Strange as it may seem, for some of us, the notion that a creature traveled 13 light-years to collect our semen is easier to accept than the idea that our memories cannot be trusted.

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Among the first to lay out this proposition was a British team of researchers who wrote in 2003 that "thinking of the future is closely related to retrospective memory." They found that imagining the future and remembering the past use similar networks—kind of like how two roommates will frequent the same restaurants.

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Neuroscientists admit that if a bottle of wine is clearly bad—Welch's grape juice or nearly vinegar—people won't be duped into thinking it's a fine vintage. Expectation is an extraordinary force, but it can go only so far.

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Most companies achieve this in one of two ways: Either they spend a fortune creating, cultivating, and enhancing a particular brand, or they just use a good old-fashioned price tag. For example, if a company tells you it has a new line of brain-enhancing drinks—which, I shouldn't even have to tell you, is just flavored water—and you take a series of cognitive tests after imbibing, you'll find that your cognitive performance actually improves.

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studies suggest that athletes perform better when they drink flavored water out of a Gatorade bottle. And amazingly, students' test scores rise when they use a pen labeled "MIT."

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Interestingly, those who thought of intelligence as more or less fixed—and thus perhaps intent on proving themselves—were more suggestible to brands than those who saw intelligence as more fluid. In other words, if you're the type of person who considers intelligence to be a malleable idea—that everyone has the capacity to be brilliant in their own way—then you may be less malleable to the power of marketing suggestions.

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Which brings me to another part of our daily lives that scientists now say is all about suggestion. Namely, our ever expanding waistlines. In the same way that our instinctual fears, which protected our ancestors for millions of years, can get out of control and create nocebos that affect our bodies, so, too, can our ancient need for sweet and fattening food get us in trouble in the modern world. A 2015 Finnish study showed that obesity is tied to the number of opioid receptors in the brain (drug addicts, as we will see, often have a similar problem, except with dopamine receptors).[†] In other words, with fewer opportunities for pleasure-related endorphins, some people seek out more pleasurable experiences like eating. It's not that addiction and overeating are the same thing; it's just that they manifest in very similar ways.

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Scientists have discovered a fascinating web of interconnected chemicals that link your brain and your belly, many of which may harness placebo-like effects when you start that new fad diet or that all-fruit purge.

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Free radicals—extra ions floating in your bloodstream—are in some ways as natural as pomegranate juice and are an important part of your body's functioning. It's true that if they get too plentiful, they can lead to cancer, but the same would be true if they got too scarce. And it's certainly not clear that drinking smoothies can somehow eradicate free radicals and protect you from cancer.

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Any diet or form of exercise that claims to make you healthy by purging toxins is just playing with your suggestibility. Evil free radicals and toxins are just stories. We buy them or we don't.

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Ghrelin is a fascinating little hormone that our stomach secretes to tell us we are hungry. It also seems to play a role in monitoring how energy is absorbed in the body. But notice that all these things start in the body, not the mind. The stomach tells the brain when it's hungry, not the other way around. Ghrelin tapers off after we eat and we are no longer hungry because the stomach is full. But Crum found that sometimes the process can work in reverse. When she told subjects she was giving them a fattening shake, their ghrelin levels were far lower than those of the people who thought they were getting a diet shake. Remember, everyone got the same shake—the only difference was expectation.

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Or maybe you don't even need a diet. Maybe a little perspective is enough to give you a healthier lifestyle. "It's not just what you're doing; it's how you're thinking about what you're doing," Crum says. "And what sort of mindsets or expectations you have that encapsulate those things."

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Next, she took half the maids and gave them a short tutorial that explained the value of their work as exercise, citing that they actually got well more daily activity than the surgeon general recommends. A month later, she revisited both groups; those who had received the tutorial experienced a significant weight loss and drop in blood pressure when compared with their co-workers. They also had more energy after work and a new outlook on the work they did.

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The easier experience confirmed the participants' expectation about the pills and nearly doubled the amount of actual weight they could lift. Similar studies have played with fake steroids, supplements, oxygenated water, amino acids, and even sodium bicarbonate, which goes by the street name "baking soda."

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So how are these people increasing their performance? Although these are not professional athletes, they are serious about their sports, and even a 12 percent enhancement is tough to explain, let alone 50 percent. It could be that there is a not-yet-understood mechanism at work that is actually building strength-boosting red blood cells.

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Addiction was once viewed as a moral failing or a lack of willpower, but to-day we understand it as mostly physiological, specifically around our old friend

dopamine (which isn't surprising, since the neurotransmitter deals with anticipation and enjoyment of rewards). That can mean sugar, sex, money, a high score on Grand Theft Auto—or using drugs.

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Multiple studies have shown that people who think they're drinking booze but are actually drinking a nonalcoholic brew feel just as drunk as those

page 193

Multiple studies have shown that people who think they're drinking booze but are actually drinking a nonalcoholic brew feel just as drunk as those drinking the real stuff—at least for a couple drinks.

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Those who drank beer actually absorbed more alcohol into their blood than those who thought they were drinking soda but were in fact consuming just as much alcohol—almost as if the beer drinkers' bodies were absorbing booze partly because they expected to.

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First she trains the patient to expect pain relief when taking a pill. Then she takes the pill away and lets the patient's own expectation cover the pain relief, just as she did with me in that electrocution chair. Rather than becoming dependent on the drug, which would lessen the effect of the internal pharmacy, the patient uses her expectation to switch from an external drug to an internal one.

page 195

Depression isn't a sadder version of you; it's a whole different you. The best way to describe it is like being chemically sedated into someone you don't recognize. Because, in a way, you are. I've never been clinically depressed, but I know enough about brain chemistry to say that, given the choice, I might prefer excruciating chronic pain.

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Some 7 percent of Americans will experience clinical depression this year, costing the United States more than \$200 billion.

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In fact, placebos and expectation are so effective against depression that it is difficult to find a drug that's more powerful. From 1987 to 1999 the phar-

maceutical industry exploded with depression meds like Prozac, Paxil, Zoloft, Luvox, and Celexa—each of which has become a blockbuster drug and presumably helped millions of suffering people. But if you look at drug studies during this time, about 75 to 80 percent of their efficacy can be attributed to placebo effects. And if you look carefully, there was no real difference between high doses and low doses, which is odd and suggests the meds weren't as effective as we thought. (Usually, for a truly effective drug, you would expect a difference. Imagine a high dose of morphine versus a small one.) What's more, these effects seem to be long-lived—for weeks and months even. It didn't do any good to exclude placebo responders in the first few weeks; others just filled their place. This high placebo response has been one of the main reasons why depression has been so difficult and expensive to treat.

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Some experts even say that if Prozac had to compete against the placebo effect today, it would not have been cleared by the FDA.

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Scientists have studied how dopamine can crash in lovers who stay together long periods of time without maintaining their relationship.

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Thus was born sildenafil citrate, more commonly known as Viagra. It hit the market in 1997, and almost overnight erectile dysfunction was cured in all but the most serious cases. Never before had an entire class of ancient herbal and alternative treatments become so obsolete so quickly.

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The placebo group had about a 20 percent success rate as soon as they popped the pill and about 50 percent if they persisted. Even men with erectile dysfunction resulting from spinal injury have been able to have sex after taking a placebo.

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Conversely, one study revealed that if you tell someone that the drug he's taking will cause erectile dysfunction, loss of libido, or ejaculation problems, he's three times as likely to experience one of those problems as a man taking the same drug who was not given one of those assessments.

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Perhaps some historical fertility cures—rosemary, parsley, and hazelnut—do indeed have some as-yet-undiscovered mechanism, some pharmacological value.

Perhaps it's just a numbers game. The more time that goes by while a couple tries various remedies, the more likely that they will get pregnant. Or perhaps there is something more.

page 201

Having seen and heard about many healings as a boy, I noticed that the stories became more dramatic as time went on. Recoveries became instant recoveries. A doctor with a frank diagnosis became a doctor who had given up all hope. A particularly low point in the disease became a deathbed. Healing became a miracle.

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But that didn't stop health gurus from picking it up. The most notable was Dr. Oz, who called it a "miracle pill." It's not the first time he's held up snake oil as medicine (a Canadian study showed that fewer than half his recommendations are backed up, and 14 percent are actually contradicted, by science), but it did force him to admit to Congress that on his show, he's an entertainer, not a doctor.

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Generally, "maintaining" means lots of affectionate and sexual touching. Without that, the dopamine spike tends to drop over time as part of something called the Coolidge effect. The best way to bring it up to its original level is to bring in a new mate (the effect exists in both sexes but is stronger in men). The effect is named for President Calvin Coolidge, whose wife supposedly once noted to him how much sex roosters have. He responded that a rooster has more than one hen to choose from.

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Three thousand years ago, people gathered in sacred spaces to chant themselves into a hypnotic state. They rubbed dung on open wounds and mixed potent herbs with inert ones, hoping that one of them would cure their diseases. They told stories that became ever more improbable.

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Perhaps we should stop acting as if there is some kind of line between the mind and the body. In the same way that placebos can be as powerful as drugs or a few hypnotic words can erase real pain, any disease that cripples a person, whether it begins in the body or the mind, is absolutely real.

page 206

The first thing University of Washington researcher David Patterson did when he tried to hypnotize me was get to know my personal history.

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It wasn't that he thought my dad's arm pain was connected to mine; he just needed a story that resonated with me and thus tapped into my belief and expectation.

page 207

A few years ago, some supplement makers got into hot water because tests revealed that their garlic pills turned out to contain not garlic but rice powder. The pills were having the same placebo effect as before, but somehow consumers felt cheated. I can't resolve this paradox any more than I can explain it. Con men have been with us since the time of Hippocrates, and a part of us has hated them for their ability to trick us—even if it's for our own good.

page 208

Rule #1: Don't endanger yourself. Some alternative health remedies are physically dangerous. Mercury is a poison, chiropractic treatment can seriously damage your spine, and a careless hypnotist can implant terrifying memories that may not be yours.

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In early 2015, the New York State attorney general investigated a few of the plant supplements for sale at GNC, Target, Walgreens, and Walmart. Forty-five percent of the pills contained no plant matter at all; 33 percent contained something different from what was on the label; and just 22 percent actually tested positive for the plant that was supposed to be in the bottle.

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if you think you might be suggestible, try combining mainstream medicine with alternative therapies to treat the pain, nausea, or depression that might accompany either a disease or its treatment. But as soon as your shaman, homeopath, or acupuncturist suggests you stop using scientifically proven techniques, they are putting you in serious danger.

page 209

Rule #2: Don't go broke. It's true that more expensive placebos work better than cheaper ones, but there is a limit. Ranjana Srivastava, an author and oncologist in Melbourne, Australia, has written about the challenges of treating

cancer and the relationship between doctor and patient. Her patients have spent thousands on vitamin infusions, smoke therapies, and lavender extracts. She says patients regularly come to her broke and near death after chasing placebos that haven't worked out.

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Rule #3: Don't send any creature to extinction.

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Rule #4: Know thyself. As we have seen, for many people the suspicion that a treatment might be a placebo does not change its ability to heal. There's nothing wrong with wondering in the back of your mind whether the herbal immune-boosting shake in front of you is nothing more than a placebo wrapped in wheatgrass puree.

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First of all, know what kind of person you are. Are you someone who might be suggestible to the power of a certain placebo? If so, what kind?

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Second, get to know your condition (or symptoms, if you prefer). Is this a problem that taps into dopamine and expectation?

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While you are getting to know yourself, try to determine how suggestible you are. If you are looking to cure a physical problem, quit smoking, or beat depression, give hypnosis a try to see if you are hypnotically susceptible. If you are, hold on to that information, like your blood type or your vaccination records. It's a tool that you can use to find relief and improve your life.

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But the minute someone, whether a licensed therapist or your next-door neighbor who dabbles in hypnosis, suggests they can help you retrieve lost memories or improve a memory you do have, walk away. Be careful with techniques like past-life regression or regression to the womb—anything where you'd be retrieving memories you did not have before.

page 213

Over the course of writing this book, a part of me genuinely hoped I would find something so odd, so impressive as to be truly unexplainable. An honest-to-God miracle cure. I never found it. Most recoveries I came across were, in the

end, either completely explainable through science or impossible to verify. Are you disappointed? Don't be. After all, what is a miracle but an event that's completely unexplainable?

page 214

[Y]et the most successful healings I investigated took the view that the healing had already happened. Mike Pauletich said this when he thought back on his recovery from Parkinson's, and so do many Christian healing ministries and even Christian Science. It's one thing to expect that healing will happen, but it seems far more effective to expect that it already has. Placebos might be a promise for the future, but they work only once you've ingested them, convinced that they have done their job.

page 216

"Hey, aren't you one of those kids who doesn't go to doctors? What happens if you break your arm?" (Even the most devout Christian Scientist would go to a doctor in a case like that. There are exceptions, it turns out, to every rule.)

page 216

Christian Science doesn't work if it's mixed with other treatments. It requires 100 percent faith and 100 percent dedication. So I ask her the question I have asked traditional Chinese doctors and witch doctors and New Age healers across the world: Since suggestibility and placebos are part of every treatment, what percentage of Christian Science healing is simply the body's response to expectation?

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"You say that the test of science is that you have a hypothesis you put to the test, and then you draw conclusions for whether or not your hypothesis is correct. My sense is that God's law isn't a hypothesis; it's a rule. I am not applying this science to test whether it's true. I am applying this science to prove that it is true."

page 218

"I want to love God with all my heart—and part of that is not to have any other gods. And I think medicine is a god. I think matter is a god. And I realize that's radical and that you might really be offended by that." She says this so warmly and gently that I don't even realize she's just called everything I believe in a false idol.

page 219

Already, studies are starting to suggest that many common forms of arthroscopic joint surgery may be no more successful than a sham surgery. Though if that knee operation made it possible to ski again, who are you to question it?