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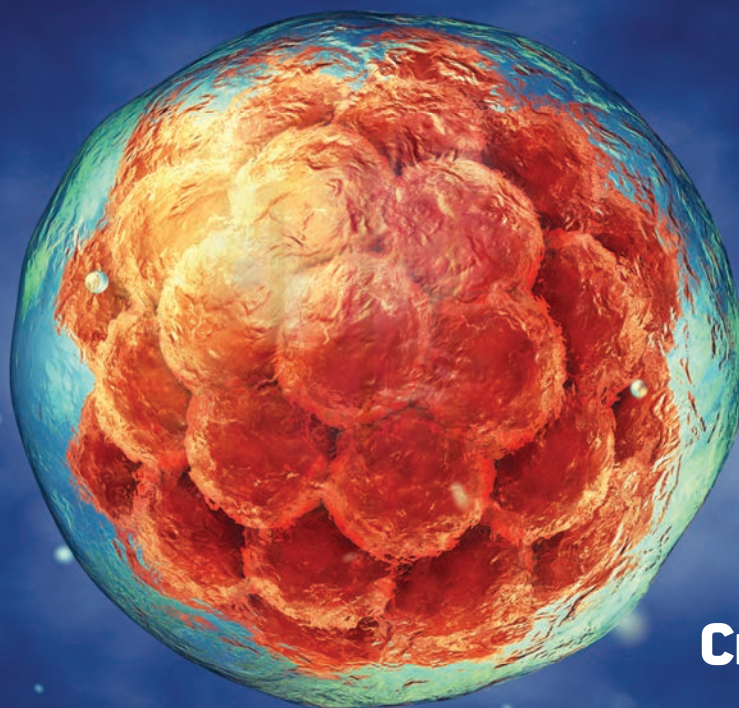
# Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 41 No. 1 | January/February 2017

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EMBATTLED  
AFTER ALL  
THESE YEARS**



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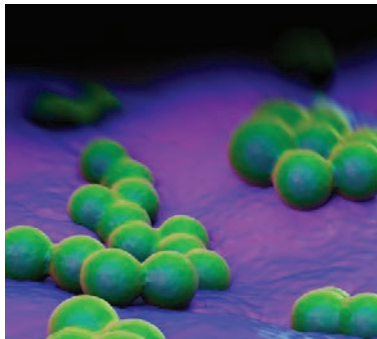
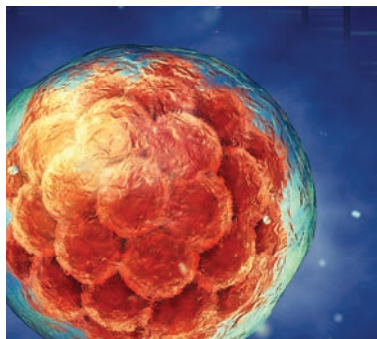
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## Committee for Skeptical Inquiry

“... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims.”

### [ FROM THE EDITOR

## Science, Public Trust, and CSICon 2016

The 2016 presidential election campaign—one of the most bizarre in American history—is finally over. It preoccupied people in this country and worldwide for months. Deep healing and a return to some semblance of civility are essential. Whether or not that can be achieved, there are now other issues demanding our attention. One that deserved discussion in the campaign but got almost none is our political leaders’ attitudes toward science. Science and technology affect at least half of all public issues, but instead of needed dispassionate and thoughtful discussion, the same polarization that vexes our political process has infected people’s attitudes about science.

In this issue, psychologist Stephan Lewandowsky, noted climate scientist Michael E. Mann, and two colleagues consider how scientists can navigate highly polarized public issues and how the public’s legitimate need for involvement can be accommodated without sacrificing scientific integrity. In “Public Debate, Scientific Skepticism, and Science Denial,” they show how we can involve the public in scientific debates and still conduct them according to the rules of science—with evidence-based arguments, peer review, and the discarding of ideas shown to be false. They give some successful examples. Valuable lessons indeed.

We all harbor some myths about child psychology and raising children. In “Science vs. Silliness for Parents: Debunking the Myths of Child Psychology,” psychologists Stephen Hupp, Amanda Stary, and Jeremy Jewell list twenty-six such myths and use them as a starting point for an opinion survey of both students and parents. They asked about both the myths (Attachment Parenting is the most believed myth) and findings that are supported by scientific research. They believe this is the first study to collect data regarding beliefs for the majority of these myths.

\* \* \*

I write shortly after our CSICon 2016 conference in Las Vegas at the end of October. Dedicated to science and skeptical inquiry, it was an exciting conference, filled with great speakers and topical themes, and by any measure—nearly 500 participants, strong audience engagement, expressed satisfaction—highly successful. Fifteen fellows of our Committee for Skeptical Inquiry were on the program, along with as many other speakers with equally strong credentials. Richard Dawkins, in his first U.S. appearance since his stroke earlier in the year, took part fully and was interviewed live on stage, as was James Randi, still going strong (“I’m eighty-eight but I feel only eighty-six,” he quipped). Randi roamed the hallways hobnobbing with attendees and spreading his skepticism and wit. Jill Tarter, Paul Offit, Eugenie Scott, Maria Konnikova, Elizabeth Loftus, David J. Helfand, Carol Tavis, and the aforementioned Michael E. Mann, among others, gave memorable talks. The conference ended with a rousing talk by cosmologist Lawrence Krauss—who flew in from Sweden only a few hours before just to deliver it—on this past year’s epic detection of gravitational waves (“an amazing discovery”) and with a “Sunday Papers” session of competitively selected short topical presentations borrowed from Randi’s now-ended TAM conferences.

We’ll have full coverage in our next issue. Some talks will likely become SI articles. In the meantime, you can get a good sense of it all in Paul Fidalgo’s online “CFI Live at CSICon” write-ups at [www.centerforinquiry.live](http://www.centerforinquiry.live).

—KENDRICK FRAZIER

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Had stem cell research not been obstructed by political and religious opposition, it would probably have arrived by now at effective treatments for a number of severe chronic diseases. See page 34.



## Buzz Aldrin: What That Apollo 11 ‘UFO’ Really Was, and Why He Punched That Moon-Landing Denier

KENDRICK FRAZIER

Buzz Aldrin is an American hero. The Apollo 11 astronaut walked on the moon with Neil Armstrong, the first two humans to do so. Now in his mid eighties and still full of that just-get-it-done spirit, he has become a tireless advocate of space exploration, especially a future manned mission to Mars. (He proudly sports his motto, “Get Your Ass to Mars,” on T-shirts at public gatherings around the world.) He has a PhD from MIT and considers himself a scientist.

His most recent book, *No Dream Is Too High* (National Geographic Books, 2016), is dedicated to “the dreamers, the out-of-the-box thinkers and seat-of-the-pants innovators like me.” It is filled with stories illustrating his lively brand of life’s lessons. Among them:

The sky is not the limit . . . there are footprints on the moon. Keep your mind open to possibilities. Maintain your spirit of adventure. Failure is always an option (“If you are afraid to fail, you probably won’t accomplish much in life”). Do what you believe is right even when others choose otherwise. Keep a young mind-set at every age.

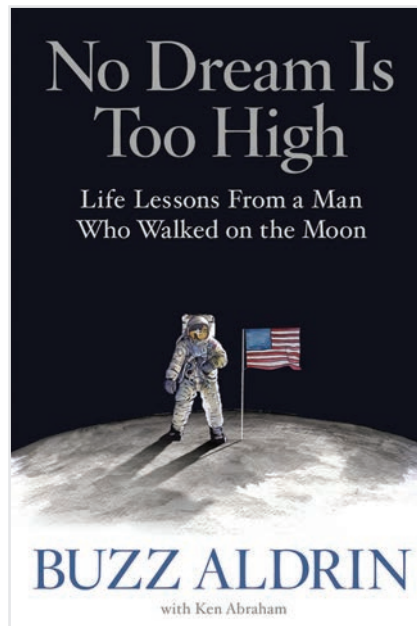
The latter is what has given him so much appeal to younger generations.

The book also includes two small sections of special interest to skeptics. One gives his personal take on the supposed “Apollo 11 UFO” he and his colleagues saw on their way to the moon. The other recounts his much-viewed decking of a moon-landing denier.

He begins the “UFO” section, in a chapter titled “Trust Your Gut . . . and Your Instruments,” with these apt words: “Things aren’t always what they seem.” About three days and 200,000 miles into their journey to the moon, “I noticed something odd outside our windows.” He says it appeared to be a light following along side them. Neil



MARTIAL TREZZINI/EPA/News.com



Armstrong and Mike Collins (the Command Module pilot) saw it as well. They could see all sorts of stars, “but traveling alongside us was this mysterious object. We could see it but we couldn’t identify what it was, so in that sense, I suppose it could technically be described as an ‘unidentified flying object.’”

They never thought it had anything to do with other spacecraft or aliens. On a private channel, Neil asked Hous-

ton if they knew where the S-IV-B, the final stage of the rocket they had jettisoned earlier, was. Houston answered that the S-IV-B was about 6,000 miles away. So what they were seeing couldn’t be the discarded rocket.

They decided to go to sleep and not worry about it. Writes Aldrin: “Of course, people who are convinced that aliens and extraterrestrials exist contend that we were being tracked by a UFO. It certainly *seemed* that way.” He emphasizes “seemed.”

“So,” Aldrin writes, “if three intelligent human beings, all of whom had flown in space previously, agreed that we saw something outside our window, something that appeared to be a UFO, that should be evidence for the existence of UFOs, right?”

“Not necessarily,” he answers. “Remember, things aren’t always what they seem.”

They ruled out the possibility that they were being followed by a spacecraft from another country. (“That was ridiculous. How Russia could launch a rocket to the Moon without our noticing is totally incomprehensible to me.”)

Finally, they decided that what they were seeing was likely one or more

**“I’m glad to say that most people who have seen the video of my punch have sided with me, agreeing that my response was justified. It may not have been one of my most noble moments, but just as one picture is worth a thousand words. . . .”**

of the four panels that peeled away when they extracted the lunar module (LM)—the vehicle that would take Neil and Buzz down to the moon’s surface—from their command and service vehicle.

In moving the LM, the command vehicle in which Mike, Neil, and I were traveling was nose to nose with the LM or a while, and the four panels that had protected the LM fell away in four directions. With the Sun reflecting off one of the panels, still moving along with our spacecraft, it *seemed* as though a brightly lit object was following us.

Which of the four panels? I don’t know, so technically, there was an “unidentified flying object” in our rearview mirror. (p. 153)

When they got back to Earth and were debriefed, they mentioned the odd encounter, but NASA made little of it. A number of years later, Buzz told the story to a foreign television network assuming it was already known. “When word got out that Apollo 11 astronauts had seen a UFO and not informed the world—especially those who adamantly believe in extraterrestrial presences in space—it caused a major uproar.” Lots of believers contended Aldrin saw an alien and NASA wouldn’t let him talk about it. “It *seemed* that way,” writes Aldrin. “But now you know what really happened.”

Aldrin concludes the section this way:

As Carl Sagan is fond of noting about improbable possibilities, “Extraordinary claims require extraordi-

nary evidence.” Personally, I strongly believe other life-forms might exist in various places throughout the universe, but the tremendous distances involved in trying to explore the immensity of the universe make discovery unlikely in the near future.

\* \* \*

A few pages later in the same chapter (pp. 161–163), Aldrin brings up the time he confronted the moon-landing denier. He does so in the context of his advice that when the pressure is on, “you can’t allow your emotions to overwhelm you; the best way to handle the situation is to maintain your composure. Not that I’ve always done so perfectly—not by a long shot.”

“One incident in which my composure was somewhat ruffled hit national news, made the rounds of the talk shows, and has been seen on YouTube more than five million times.”

Writes Aldrin:

For years after I returned to Earth, my fellow astronauts and I were repeatedly accosted by conspiracy theory nuts claiming that the United States never really landed on the Moon, that the whole thing was done in a Hollywood-style studio, and that the landing was a hoax foisted on the public by the government. What lunacy! But there is no accounting for some people’s logic, or lack of it.

Aldrin says he won’t waste time debating the obvious. In the book, he recounts some of the photographic evidence still in place on the moon for

the landing. Their footprints and the experiments they set up are still there. Photos from lunar reconnaissance orbiter satellites show them. “For any intelligent person, such recent photos should forever put an end to the conspiracy kooks claiming that we never landed on the Moon.”

He says most of the conspiracy nuts are harmless—“irritating but benign.” But one was not. Aldrin had agreed to do an interview in a Beverly Hills hotel for what he thought was a children’s television program. “But I quickly figured out the interview was a farce and that I had been tricked into showing up.” He tried to exit, but the man who accosted him repeatedly demanded that Aldrin swear on a Bible, which he thrust into Aldrin’s face, that he had walked on the Moon.

“I was offended for both the Bible and me,” Aldrin says. “I was irritated by his incessant, rude, and irrelevant demands, but when he called me a coward and a liar and a thief . . . well, I could no longer contain my composure. I punched the guy right in the jaw.”

The harasser’s film crew videotaped the whole thing and thought they had an assault case against him. “The video became a blessing in disguise because the police refused to entertain charges, concluding that the accoster had repeatedly provoked me into decking him.”

The video was seen around the world. Talk show hosts had a field day. Many skeptics, though usually preferring intellectual arguments, secretly relished the idea that someone like Aldrin had finally confronted a moon-landing denier in a way the person could understand.

“I’m glad to say that most people who have seen the video of my punch have sided with me, agreeing that my response was justified,” Aldrin concludes. “It may not have been one of my most noble moments, but just as one picture is worth a thousand words. . . .”

Kendrick Frazier is editor of the SKEPTICAL INQUIRER.

## The Legacy of Fake Bomb Detectors in Iraq

BENJAMIN RADFORD

After years of equipping important security checkpoints throughout Iraq with nonfunctioning bomb detectors, the Iraqi government has finally banned their use. According to an ABC News story (<http://tinyurl.com/js5zyyb>):

For nearly a decade, anyone driving through one of Baghdad's many checkpoints was subjected to a search by a soldier pointing a security wand at their vehicle and watching the device intently to see if its antenna moved. If it pointed at the car, it had supposedly detected a possible bomb. The wands were completely bogus. It had been proven years ago, even before 2013 when two British men were convicted in separate trials on fraud charges for selling the detectors.

(See “British Businessman Sentenced in Bogus ‘Bomb Detector’ Scam,” SI July/August 2013.)

The wand devices, marketed under various names, including ADE651 and GT200, were not faulty or defective; they were completely useless. They had no working electronics in them that could detect bombs or anything else. The device has only one moving part, an antenna-like piece of metal that freely swivels, supposedly detecting explosive and other materials. The devices, which have been compared to dowsing rods, were sold for up to \$40,000 each in lucrative government contracts eventually totaling \$60 million.

Despite clear evidence that the bomb detectors were fake—ranging from fraud convictions to warnings by the U.S. military—many remained in use for years, not only in Baghdad but around the country. Corruption and complacency played a role, and it wasn't until July 3, 2016, that the catastrophic toll of these fraudulent devices became too obvious to ignore. That was the day that a massive suicide bombing killed almost 300 people. According to ABC News, “Officials say the explosives-laden minibus used in the July 3



**Despite clear evidence that the bomb detectors were fake, many remained in use for years.**

attack . . . would have encountered at least half a dozen checkpoints, most of which likely used the wand. Investigators say the vehicle carried a 250-kilogram (550-pound) bomb.”

The devices have been used in other countries, including Mexico and Niger; reporters for Reuters discovered them being used recently at checkpoints in volatile regions of Lebanon, Syria, and Egypt. Before Americans get too smug about the silliness of bogus security measures in the Third World, it's important to note that airport security in the United States (as administered by the Transportation Safety Administration or TSA) operates largely on just this sort of self-deception. The TSA's security measures (detecting

weapons and bombs specifically, using proven technology) have failed undercover tests about 95 percent of the time, making them arguably only marginally better than the bogus devices that will “detect” a few potential threats by random chance. It's fair to say that the TSA provides what's called “security theater,” or the illusion of safety, much more than actual safety.

Ironically the devices—though demonstrably worthless—could still conceivably make checkpoints at least slightly more secure. That's because they can serve as a psychological deterrent, just as fake (or nonfunctioning) convenience store video cameras make potential shoplifters and robbers think twice. Bogus and counterfeit products are common, and usually the damage to the consumer is financial—paying top dollar for cheap substitutes sold as high-quality products, for example—but sometimes the fraud can be a matter of life or death. There is no way to know exactly how many innocent lives these bogus bomb detectors cost, but even one life is too many.

Benjamin Radford is the deputy editor of the SKEPTICAL INQUIRER.



# Return of the Phantom Clowns

BENJAMIN RADFORD

In August 2016, creepy clowns were reported in Greenville, South Carolina, allegedly luring children into the woods behind a block of apartments. It's scary and alarming—but whether they're real or rumor is another matter. Most of the handful of reports were from children. No one was actually harmed by the menacing clowns, who children believe live in a house located near a pond at the end of a trail in the woods. Police who investigated this sinister Hansel and Gretel-like tale found no signs of suspicious activity or anyone dressed as a clown.

According to an ABC News story (<http://tinyurl.com/zjrv3gp>):

One resident said she was in front of her apartment one evening when one of her sons “approached her and stated that he [had] seen clowns in the woods whispering and making strange noises.” The resident added that she “went over to the area that her son mentioned and observed several clowns in the woods flashing green laser lights” before seeing them run off.

If this report is to be credited, it suggests that pranksters are afoot—perhaps teenagers with store-bought clown masks and laser pointers having

fun. If so, it would be only the latest in a series of creepy clowns reports; in fact, there were two recent cases in Quebec and Wisconsin. In the former case, a pair of teenagers dressed as clowns were having fun in a park scaring younger kids; in the latter, a nocturnal clown was revealed to be part of a viral marketing campaign for a scary film.

Most evil clowns are fictional, though a few (such as serial killer John Wayne Gacy) are real. But there are other bad clowns reported to roam streets and parks looking for innocent children to abduct—yet they seem to vanish just before police can apprehend them. Some say they are real, while others claim they are figments of imagination. Known as phantom clowns, they were first sighted in 1981 when

**Throughout the phantom clown panic, no hard evidence was ever found.**

several children in Brookline, Massachusetts, reported that clowns had tried to lure them into a van with promises of candy. Police searched the area but found nothing. The following day, Boston parents and police grew worried when children there claimed that adult clowns had been bothering children on their way to school.

Other reports surfaced in other cities and in later years with the same pattern: Parents were fearful, children were warned, and police were vigilant but despite searches and police checkpoints, no evidence was ever found of their existence. Throughout the phantom clown panic, no hard evidence was ever found, and—more importantly—no children were actually abducted. This suggests that some form of social delusion or mass hysteria was at play.

The Greenville sightings seem to be the most recent reappearance of this mythical menace, and in fact there's little evidence the clowns exist at all. An August 21 report from the Greenville County Sheriff's Office offers additional insight, noting that “Several children of the community stated that several clowns have been appearing in the woods behind building ‘D’ and try to persuade them into the woods further by displaying large amounts of money.”

This is a curious (and suspicious) detail. Malicious clowns might be expected to lure children with candy or ice cream—but big stacks of Benjamins? Flashing wads of cash can draw a crowd anywhere, and no clown costume is needed. It seems like an example of urban folklore in the making, perhaps fueled in part by creepy clown sightings in the news and the recent release of publicity photos of the Stephen King killer clown Pennywise from the upcoming film *It*.

The Greenville clown reports are likely pranksters, mistakes (for example assuming that a bang on a door must have been caused by an unseen clown),





legend, or a combination of all three. The chances that one or more people dressed as clowns are actually trying to abduct kids and assault people are remote.

By mid-October, the scary clown panic had spread across the country to dozens of states, fueled by hoaxes, copycats, pranksters, rumors, and social media. The creepy clown panic became so serious that it was addressed in an October 4 White House briefing; Press Secretary Josh Earnest said:

I don't know that the president has been briefed on this particular situation. . . . Obviously, this is a situation that local law enforcement authorities take quite seriously, and they should carefully and thoroughly review perceived threats to the safety of the community, and they should do so prudently.

Many of the reports were later admitted to be hoaxes; for example, a North Carolina man who falsely claimed that a scary clown had knocked on his window at night was arrested for faking the incident, and an Ohio woman claimed that a knife-wielding clown attacked her on her way to work and cut her hand but later admitted she made up the story be-

cause she was running late for her job at McDonald's. In a handful of cases, there were real injuries (fights and so on), but they weren't inflicted by strangers dressed as clowns.

The rumors can, of course, have serious consequences. Schools in Alabama and other states were temporarily placed on security lockdown due to threats allegedly made by clowns on social media (see my September 22 CSI online Special Report "Alabama School Panic: Is 'Clown Lockdown' the New Normal?" at <http://tinyurl.com/jlhfosv>). At any other time reports of threatening clowns would likely have been ignored or dismissed, but these copycat clown incidents come at a time when very real terroristic threats and school shootings are in the news. Parents can take comfort that no clowns are actually trying to abduct or harm kids—not a single credible report has surfaced of any child being hurt or even touched by a threatening clown in recent weeks. Still, teachers and police understandably err on the side of caution, deciding it's better to be safe than sorry.

Amid the rumors and scares, one eleven-year-old girl in Georgia took a

knife to her middle school to fight off clowns, and in several instances, people shot at real or imagined clowns with guns and rifles.

As I describe in my book *Bad Clowns*, this is not the first time that a rash of scary clown reports has surfaced; pranksters used social media to share creepy clown photos in October 2013, and the so-called phantom clowns date back to the early 1980s. Though children have little to fear from stalking clowns, the urban legend may pose a real danger; as the Sheriff's report notes, "While speaking with the residents I was informed male subjects from the complex heard about the recent clown activity and heard noises in the woods behind building 'D'. I was told these men fired weapons in the direction of the wooded area." No one was hurt in the shooting, but as long as people take the rumors seriously, the lives of both face-painted pranksters and innocent bystanders may be at risk—whether the phantom clowns exist or not.

Benjamin Radford is author or coauthor of ten books, most recently *Bad Clowns* from the University of New Mexico Press.

# POINT OF INQUIRY

WITH **JOSH ZEPPE & LINDSAY BEYERSTEIN**

For in-depth interviews with the most fascinating minds in science, religion, and politics, join *Point of Inquiry* cohorts Lindsay Beyerstein and Josh Zepps at [pointofinquiry.org](http://pointofinquiry.org).



**Josh Zepps** (cohost) is a new media pioneer; a journalist serving as a founding host and producer at the online talk network HuffPost Live, following hosting stints with such outlets as Bloomberg TV, the Discovery Channel, and as an anchor for CBS's Peabody Award-winning *Channel One News*.



**Lindsay Beyerstein** (cohost) is an award-winning investigative journalist and staff writer for *In These Times*. Her work has appeared in places such as *The New Republic*, *Reuters*, *Slate*, *Salon*, *Ms. Magazine*, and *The New York Press*. Wait to see what stories she tells with her guests on *Point of Inquiry*.

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## Philosopher and CSI Fellow Robert Carroll, Creator of *Skeptics Dictionary*, Dies at Seventy-One

SUSAN GERBIC

Robert Carroll, philosopher, CSI fellow, and prominent skeptic widely known for his online (and print) *Skeptics Dictionary*, died from pancreatic neuroendocrine cancer August 25, 2016. He was seventy-one. In his last hours, he was surrounded by family and Bob Dylan songs. His legacy lives on through his work, his writings, his inspiration, and in the thousands of students who sat in his classroom where he taught critical thinking skills. Our heart goes out to his family, especially his wife of forty-eight years, Leslie; daughters, Jennifer and Allison; sons-in-law, Rodney and Daniel; and his grandchildren, Olivia and Flynn.

Before there was Wikipedia, there was *The Skeptic's Dictionary*. It was conceived and managed by this one amazing person, Robert Todd Carroll. He started it in 1994 after taking a community education class with his wife, Leslie, learning about the Internet, email, and HTML.

Carroll earned his PhD in philosophy in 1974 from the University of California at San Diego. A professor of philosophy from 1977 to 2007 at Sacramento City College, Carroll initially began the Dictionary with rewritten lectures from his classes. Over time, the website <http://skepdic.com> morphed into the workhorse it is today with more than 85,000 hyperlinks and 5,500 files. It receives more than 400,000 visits a month. In 2003, it was published in book form by John Wiley and Sons.

In 2010, CSI made him a well-deserved fellow. Starting in March 2012, Bob appeared on the *Skepticality* podcast with a regular segment called “Unnatural Virtue.”

When Bob discovered his cancer in 2014, we talked briefly about it, as I had battled the same disease. He didn't feel depressed, just tired. He asked me, “Did you ever get to the point where



**Before there was Wikipedia, there was *The Skeptic's Dictionary*. It was conceived and managed by this one amazing person, Robert Todd Carroll.**

you were tired of being tired?” Yet he continued maintaining the website and writing his popular newsletters. Only in May 2016 did he announce that he was stopping due to health reasons.

Mostafa Mahmoud, an editor for our Guerilla Skepticism on Wikipedia project, published a long overdue rewrite of Carroll's Wikipedia page in May 2016. Readers will enjoy learning about the Bob Carroll few knew. He was raised Catholic and, for a time in college, even entered a seminary. His doctoral thesis was on the religious philosophy of Edward Stillingfleet, which Carroll later published as *The*

*Common-sense Philosophy of Religion of Bishop Edward Stillingfleet 1635–1699*.

I asked Mahmoud why he felt so strongly about wanting to rewrite Bob's Wikipedia page, and I think his response explains completely why Bob Carroll is so important to us:

When I was 15 and grappling with Islam, the internet was my only chance at some rational and impartial reading material in Egypt. That's when I first came across *skepdic.com*. Carroll's article about Satan particularly fascinated me. The article was written in an amusing satirical tone, mocking fears that had been instilled in me since infancy. Yet, it still managed to feel analytical and thought-provoking, it spoke to me deeply at the time. This article was all the more special for me because of how hard it was to find people with a sympathetic point of view before the explosion of social media. Since that day I'm still yet to emerge from the rabbit hole that's *skepdic.com*.

I was fortunate to be able to tell Carroll just how big of an impact he had on my life a few months before his passing. Surely thousands of others have similar stories, thousands who were affected by a stimulating piece of writing from the man's prolific career. His writing brought skepticism to the internet. However, its value doesn't just lie in its entrepreneurial status. More than twenty years after its inception, *skepdic.com* still houses some of the most intriguing and provocative skeptical arguments around. Nowadays, because of the efforts of Carroll and people like him, truth seekers all around the world can traverse any geological or intellectual barriers set by their environments—that's the sort of legacy he leaves behind.

Susan Gerbic is founder of the Guerilla Skepticism on Wikipedia project. She is a CSI Scientific and Technical Consultant.

# Psychic Arrested in Exorcism Scam

BENJAMIN RADFORD

In September 2016, a New York-based psychic was arrested for convincing a client that her failing marriage was caused by an evil spirit that could be driven out only by an expensive exorcism. According to a September 13, 2016, story in *The Gothamist*:

An Upper East Side fortune teller was arrested this weekend after she allegedly terrified and manipulated a distraught woman out of more than \$60K. Among other things, the “psychic” convinced the woman she had a “demon/evil spirit” inside her that was a dead baby the victim’s mother had miscarried before the victim was born—and the only way to get it out was through increasingly expensive “demon removal work.” (<http://tinyurl.com/z6m48d4>)

Many fortune-tellers try to skirt responsibility by advertising their services as “for entertainment only,” though most people who visit psychics really do take the information seriously (as you might expect they would when paying around \$60 per hour for “entertainment”). Those who seriously con-

sult psychics are often troubled people looking for answers and guidance. Thousands of people are scammed by psychics every year, falsely told, for example, that they are cursed and that \$10,000 in “faith money” can help end a bad luck streak.

## Psychic scammers use various psychological principles to ensnare their prey.

The unidentified victim, a thirty-five-year-old woman, first visited “Psychic Lisa” (Victoria Nicholes) in 2013, seeking help in saving her marriage and concerned about her husband’s

suspected infidelity. Nicholes allegedly convinced the victim that her marital troubles were caused by a demon inside her and that if the demon wasn’t exorcized, the woman would never again have a happy, normal romantic relationship. Fortunately for the victim, “Psychic Lisa” knew how to remove the demon and get her life back on track.

As *The Gothamist* explains:

First Nicholes allegedly said she’d need \$33K in cash (\$1K for each year of her age) for special candles and crystals to be used in the cleansing ceremony. Then she allegedly asked for a Rolex Daytona Everose watch with a black dial (valued at \$30K) because (here we go) it would be used as part of a ritual that would “spring back time” to before the victim was born, thereby allowing her to remove the demon.

In the end, according to the complaint, the psychic conned the victim out of nearly \$62,000 over the course of several months. Eventually, the victim grew suspicious and contacted a private investigator, who helped collect evidence that led to the arrest of Nicholes.

Nicholes’s alleged scam—as bizarre as it seems—follows a well-worn (and often successful) formula. Psychic scammers use various psychological principles to ensnare their prey.

One of them is incremental investment, or the escalation of commitment. Once a person has invested a significant amount of time, money, and personal experience in a project, they are more likely to keep going. At some point the behavioral and economic principle of the sunken cost fallacy often comes up: doubts or suspicions that something is not right are rationalized away because the person has already invested time and money—not to mention emotional attachment and likely even friendship—in the project.



Photo: Steven Hirsch



The victim's state of mind is important as well: People who go to psychics are a self-selected group who share certain characteristics that make them especially vulnerable to exploitation. Perhaps most obviously, they are not skeptics but instead people who believe in the existence of psychic abilities. Second, they are unhappy with some aspect of their lives and are seeking answers to important life questions that concern them: health, wealth, love, career, relationships, and so on. Psychic scammers become masters of emotional manipulation and quickly learn what deep psychological issues their client/victim is going through and thus will respond to. Anything is fair game, from fear of infidelity to illness to infertility.

The psychic con artist knows that if the client tells his or her friends and family about what's going on, they may suspect a scam. Thus they often take steps to insulate their client from others, much like cults do. For example, a psychic may say that the whole curse removal process must be kept secret, and if the victim tells anyone the magic

spell will irrevocably fail—or the curse might even get twice as bad. In a particularly insidious theme of victim-blaming, the psychic may even tell the client that the entire success or failure of the curse removal depends on their faith

### Curses are an answer to the age-old question of why bad things happen to good people.

that it will work—that entertaining any doubts will jeopardize the plan.

Why would a person believe a curse has been placed on him or her? Belief in curses has its roots in magical thinking and superstition. If a person experiences bad luck, ill health, an accident, or some unexplained or unexpected tragedy, it's common to look for some external rea-

son why it happened. For many, it's more comforting to think that something bad happened to you because of an enemy's malicious actions than if it's simply bad luck or the result of random chance. If you believe that your poor health or marriage troubles have been intentionally caused through magic by another person, that implies—and psychics are quick to offer—a remedy to remove the spell or curse. Curses are an answer to the age-old question of why bad things happen to good people.

Con games may play out over the course of weeks, months, or even years. Psychic con artists aren't looking to earn a quick \$50 for a half hour palm reading when—with the right victim and the right plan—they could easily take the victim for \$5,000 or \$50,000. Many victims of psychic scams never come forward because they are embarrassed at having been fooled by what in retrospect was an increasingly outlandish series of claims. Nicholes, who has a previous arrest history, including for grand larceny, is scheduled to go on trial later this year.

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# Skepticism, at Heart, Is Not Partisan

CRAIG A. FOSTER

The United States has just completed the most contentious presidential election in recent memory. The concept of President Trump is obviously distressing to many members of the skeptical community. It might be particularly tempting at times like this to associate skepticism formally or informally with being a political movement. I think it is important for skepticism to avoid making this mistake.

Skepticism, as it is used in the skeptical movement today, is not necessarily easy to define. Suffice it to say that modern-day skeptics promote the logical and reasonable interpretation of existing evidence. They question claims that lack legitimate supporting evidence and embrace claims that are supported by such evidence. In so doing, skeptics promote good science, criticize bad science, and question no science. Skepticism is needed because people frequently fail to interpret evidence in a sensible manner due to humans' limited cognitive capacity, memory distortions, and a variety of well-known cognitive errors and biases.

Skepticism can be conceptualized as a nerdy superhero. Until nobody believes the scientifically unreasonable, skepticism is there! Skeptics' powers are an odd sort. They constitute little in the way of physical force. Skeptics do not overpower villains with superhuman strength or with Amazonian combat skills. Rather, skeptics possess a heightened ability to detect flim-flam, a willingness to educate about corresponding issues, and a propensity to ask a series of annoying questions possibly ending with a lecture about non-falsifiable claims. Skeptics use these tools to promote a particular kind of truth—a truth based on science and reason.

Skepticism has one other inconspicuous but incredibly important superpower. Skeptics should be particularly adept at changing their beliefs to keep them consistent with the existing evidence. Consequently, skeptics, by definition, typically have the evidence on their side. If, for instance, somebody provides reliable evidence for Bigfoot, good skeptics will eventually adapt to the new evidence and move on. Thus, skepticism is an approach to the world, not an obstinate set of beliefs.

Skepticism is enhanced by the number of people who embrace it. There are well-known skeptics who famously and fabulously promote science and reason, but skepticism is also

promoted importantly by every member of the skeptical movement. This occurs when members support each other. This occurs when members support groups such as the Committee for Skeptical Inquiry. This occurs, perhaps most importantly of all, when skeptics have those innumerable unplanned conversations with others about vaccinations, ancient aliens, creationism, faith healing, psychics, and so forth. In sum, the skeptical movement needs members. The more people embracing science and reason, the better.

Politics is potential kryptonite for the skeptical movement. Skepticism, in its focus on the evidence, does not seem to require a particular political affiliation. In the United States, a true skeptic could be conservative or liberal. Many debates between liberals and conservatives carry a considerable degree of conjecture and invoke different ethical perspectives and corresponding solutions. In this respect, aspects of broad political debate are often outside the scope of modern-day skepticism. Science and reason do not clearly debunk many political claims, and they do not debunk the entirety of a political candidate or party, with perhaps some isolated exceptions. Skepticism is applied most sensibly to political claims that are inconsistent with existing science or are illogical in some other way. These political claims could come from any political party or broad political view.

If the skeptical movement allows its focus on science and reason to become transmuted into broad political affiliation, I think the consequences for skepticism would be dire. First, this would undermine the identity of the skeptical movement. Skepticism would be in danger of searching for evidence to support political causes rather than searching for evidence to support truth. Second, an inappropriately partisan skeptical movement would alienate potential members. People who are ready to embrace skepticism more formally might not do so due to political disagreements rather than concerns with skepticism per se.

To illustrate, I return to the 2016 presidential election. It is clearly appropriate for the skeptical community to criticize sternly some of President-elect Trump's apparent platforms. Mr. Trump appears to be dangerously disdainful of the evidence supporting anthropogenic climate change. He has encouraged unsubstantiated stereotypes by characterizing Mus-



lim and Mexican immigrants in negative ways. One could argue that he has promoted beliefs about gun control that are inconsistent with the existing evidence. These issues, among others, make it alluring for the skeptical movement to fashion itself as Anti-Trump or even Anti-Republican.

It is nonetheless important for all of us who love skepticism to separate the broad political considerations from skepticism. Skeptics cannot support political claims that are simply at odds with reasonable interpretations of the existing evidence. However, they should, when speaking as skeptics, stop short of denigrating an entire political viewpoint. It is understandably enticing for many skeptics to do so by embracing skepticism today as a battle between science-denying Republicans and logical pro-science Democrats, but this would be harmful to skepticism more broadly. It would embrace stereotyping at the political party level; obviously some Republicans are for science and reason and some Democrats are not. Ironically, this broad level of generalization would contradict the thoughtful approach that skeptics generally try to embrace. To this point, it is important to remember that liberally minded people are also capable of generating woo. Proponents of the anti-vaccination movement are more likely to come from the political left than the political right.

More importantly, I think it is imperative to consider the nature of an ideal skeptical movement. Skepticism will be most effective, and possibly most enjoyable, when its members come from all parts of the political spectrum. This might feel counterintuitive at present. However, if skepticism stays true to its principles, a conservative presence would not represent failure. It would represent success. Scientific skepticism will always promote science and reason. A conservative or Republican presence in this movement would not signify a diminishing of those goals. Rather, it would demonstrate that the promotion of science and reason is taking place across the political spectrum. It would indicate that the ensuing political debates are more likely to be grounded in scientific reality. If we could create that world, I would be a happy, happy skeptic. I suspect that most skeptics feel the same way.

So, even at a time like this, we should proceed carefully and openly. Based on my experiences in the skeptical community, I believe that most of its U.S. members are left of center politically. This is understandable. The skeptical community does not need to match the U.S. liberal-conservative political spectrum, and it seems intuitive that contemporary politics makes it easier to be a liberal skeptic than a conservative one. Nevertheless, I believe that the skeptical community should keep open chairs at the dinner table for conservatives who also embrace science and reason. To illustrate, perhaps the most pressing skepticism issue of our time is climate change. On this issue, the skeptical movement does not need more liberals. It needs more conservatives. Liberals are already far more likely to support initiatives aimed at mitigating anthropogenic climate change. Helping conservatives understand the skeptical perspective is more likely to create sensible evidence-based solutions.

How do we do this successfully? To begin, skepticism must stay true to its principles. Skeptics must continue to voice their disapproval for claims that appear to be implausible or impossible based on a logical interpretation of the evidence. Skepticism should continue to engage in this manner regardless of whether claims are associated with liberal or conservative viewpoints. However, skeptics should also take care to criticize the claim not the player. Skeptics, when communicating as skeptics, should be careful to constrain their concerns to inconsistencies between claims and evidence and avoid generalizing skepticism to concerns with broader political affiliations. Skeptics should also take care to constrain the disdain. It is easy to understand why skeptics become so frustrated, but suggestions that opponents are stupid or ignorant will not win them to our side. The goals of the skeptical movement are most likely to be achieved when skeptics communicate in a respectful, transparent, and constructive manner.

**Skepticism will be most effective, and possibly most enjoyable, when its members come from all parts of the political spectrum.**

Mahatma Gandhi used the Sanskrit word *Satyagraha* to describe the soul of his political opposition. The word is difficult to translate, but in being so, it might describe Gandhi's morally enlightening perspective better than any English term. *Satyagraha* means something like politely and insistently holding on to the truth. *Satyagraha* is the best course of action for the skeptical community. The skeptical community is founded on the pursuit of truth, a truth that changes as the evidence dictates. In this emotionally charged political zeitgeist, the skeptical community needs to remember its goal of promoting science and reason across all parts of the political spectrum. The skeptical community will achieve that goal most effectively not with brazen, negative characterizations of those who disagree but rather with polite insistence. ■

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(The views expressed in this commentary are those of the author and do not necessarily reflect the official policy or position of the Air Force Academy, the Air Force, the Department of Defense, or the U.S. government.)

# Survey Shows Americans Fear Ghosts, the Government, and Each Other

CARRIE POPPY

Every year, Chapman University tells us what we fear the most. While “What’s your biggest fear?” might seem a psychological riddle, these researchers have got it down to a science, using rigorous polling methods to ask Americans about the most common fears and suspicions that plague them. The project, which is in its third year, offers telling insights about fear of government control and terrorism. For readers of *SKEPTICAL INQUIRER*, the survey covers something else equally compelling: Americans’ seemingly unshakable beliefs in the paranormal and in conspiracy theories. And things are looking ... well ... pretty bonkers.

According to the new research in the 2016 survey, issued in October, 46.6 percent of Americans believe places can be haunted by spirits; 27 percent believe that extraterrestrials have visited Earth in “our ancient past” (we no doubt can thank the History Channel, in part, for this result); 24.7 percent say aliens have come to Earth “in modern times”; 13.5 percent are eating tacos, answering email, and all the while believing that Bigfoot is real; and a whopping 39.6 percent believe that Atlantis, or something like it, once existed.

Conspiracies were a new addition this year, but paranormal beliefs are categorically distinct from conspiracy theories. For one, conspiracies do happen,

whereas ghosts (as far as we can tell) do not. It’s simply when we speak of a massive, and massively unlikely, conspiracy requiring many players pulling off incredibly difficult cover-ups that these theories become less likely than the original story they’re meant to blow wide open. Still, an alarming number of Americans believe in outlandish conspiracy theories. Some are more rational than others, and the survey is designed to fairly assess the nuances, from believing that the government might not be disclosing all the details about the 9/11 attacks (which might not be totally outlandish, and which is vague enough that any unreleased detail about 9/11 might be considered “covered up”)



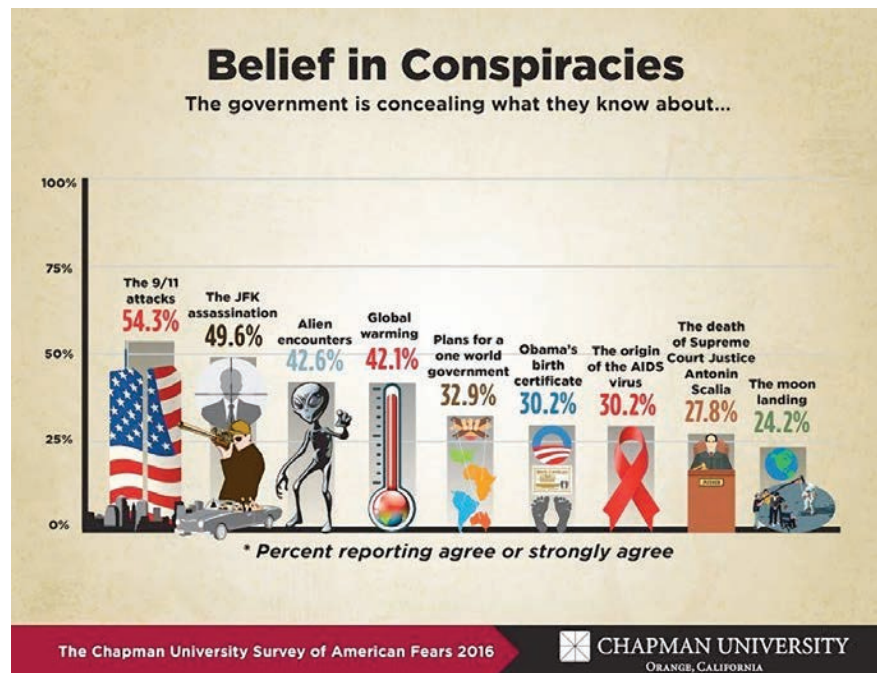
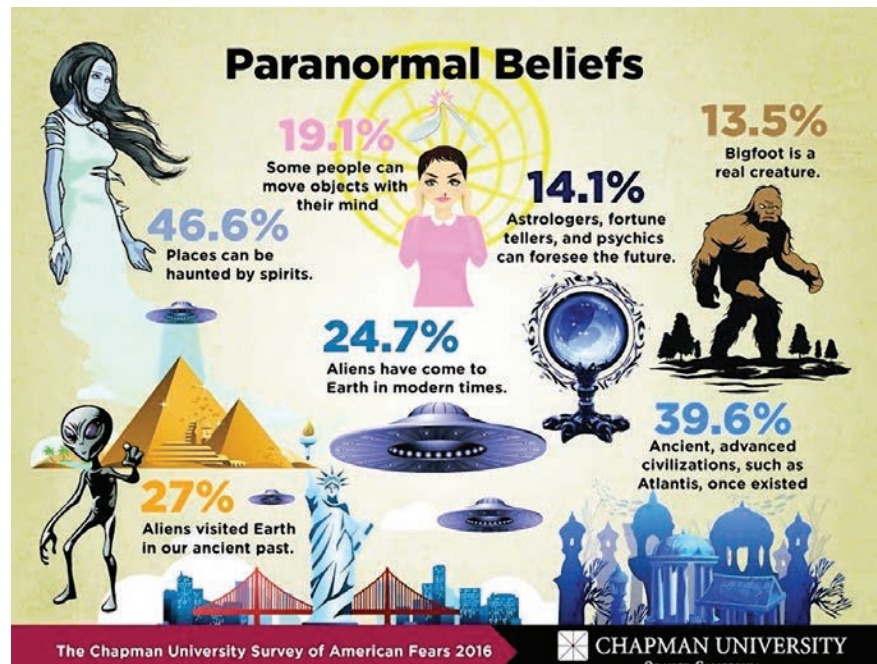


to the idea that the moon landing never happened (which has been completely discredited).

In this study, conspiracy theories were examined particularly as they relate to distrust of the government. For each theory, respondents were asked whether they believe the government is “concealing what they know about” the incident or alleged incident.

**While “What’s your biggest fear?” might seem a psychological riddle, researchers have got it down to a science, using rigorous polling methods to ask Americans about the most common fears and suspicions that plague them.**

Respondents were most likely to think that we aren’t getting the whole story about the 9/11 attacks (54.3 percent said the government is hiding something there); the JFK assassination came in at second place (49.6 percent); alien encounters are third (42.6 percent think the government is pulling the extraterrestrial wool over our eyes); 30.2 percent still think there’s something up with Obama’s birth certificate even though that issue has been put to rest so hard you’d think we’d euthanized it; and 30.2 percent think something fishy caused HIV (some believe the CIA created the virus that causes AIDS). Finally, 24.2 percent are still hanging on for dear life to the oft-derided view that the moon landing isn’t real.



However, the most exciting part of the study, by far, is about the North Dakota Crash. As each respondent was asked whether they think the government was covering up information about the famous, mysterious aerial wreck, they were given this question: “To what degree do you agree with the following statement? The government

is concealing what they know about the North Dakota Crash.” A sizable 32.5 percent of respondents either agreed or strongly agreed. As readers of SKEPTICAL INQUIRER will know, the craft in the North Dakota Crash was quickly discovered to be an experimental passenger plane. Its odd circular design was no match for aerodynamics, and

unsurprisingly it fell to Earth within a few minutes of its first test flight. Yet 32.5 percent of respondents still believe that the government wants to cover up something about this highly banal tale of ragtag plane hobbyists.

Okay, I lied. That's not what the North Dakota Crash was. I made it up. And so did the people who designed the study. The North Dakota Crash never existed; the study's designers merely cre-

## The issues of paranormal and conspiracy claims, which have long been the focus of our work at SKEPTICAL INQUIRER, are finding new, interesting connections with these broader issues of how fear—especially irrational fear—works.

ated a name for an incident that sounded like something mysterious (the description of the event is all mine). Yet even that name—North Dakota Crash—was enough to make over 30 percent of respondents agree that something is up and the government isn't telling us what it is. But my little trick is a reminder to us, too. If you, having never read even the name "North Dakota Crash," presumed there was nothing shady going on with it either, you've faced your own presuppositions. And if you read my fictionalized account of the crash and took it on face value without looking it up yourself, it's a good reminder to al-

ways corroborate your sources, because even SKEPTICAL INQUIRER gets things wrong sometimes. (One reviewer didn't like Ben Stein's *Expelled*, which, while truly one of the worst movies of all time, is also, for all the same reasons, one of the best movies of all time.)

I asked Christopher Bader, the survey's lead researcher on conspiracy theories and the paranormal, what he made of all these new North Dakota Crash believers.

"I was absolutely shocked by the high levels of belief in the North Dakota Crash," he wrote via email, "and by the fact that most Americans believe in at least one of the conspiracies we presented. I see this item as the best indicator (better than asking about any particular conspiracy that 'exists' in the public consciousness such as JFK or 9/11) of a conspiratorial mindset."

So why does someone who has never even heard of the supposed crash say he or she is suspicious of it? Said Bader:

I read it as a respondent thinking "Well I don't know what the North Dakota Crash is—but whatever it is, the government knows more than it is telling us." Of course, when you try a [misleading] question like this other factors come into play. Some respondents might lie in their response or may actually think they know what the North Dakota Crash is (have it confused with something else). But the amount of belief we found was shocking, even considering the random error such a technique will introduce. It is a worrying sign of the extremely high levels of distrust in the government when people simply assume the government is nefarious.

And these conspiratorial beliefs can have troubling associations in the believer's personal life. A person who believes in numerous conspiracy theories is more likely to fear their partner cheating on them and also is more likely to buy a gun out of fear—a potentially deadly combination.

But what of those ghost beliefs? Do they betray other fears and insecurities?

Yes, says Bader, who ran an analysis of the data especially for our audience. "There is a significant, positive correlation between fear of ghosts and fear of dying. The more one tends to fear ghosts, the more one tends to fear dying. This is a correlation so I couldn't claim which comes first—just an association."

There were other connections, too. I asked Bader if those who believe ET has come to visit also fear undocumented immigrants (a separate portion of the study dealt with American fears of immigrants and xenophobia).

"People who believe aliens have visited the Earth in modern times are more likely to believe that immigrants are more likely to commit crimes than U.S. citizens and that immigrants bring diseases into the United States," said Bader.

In many ways, the larger report is a warning against painting people with a broad brush: it serves to fight xenophobia and unwarranted fear of Muslim Americans (tragically, 75 percent of respondents said they would or might call the police to report "a large group of people who appear to be of Middle Eastern descent congregating near a fountain"). The issues of paranormal and conspiracy claims, which have long been the focus of our work at SKEPTICAL INQUIRER, are finding new, interesting connections with these broader issues of how fear—especially irrational fear—works.

You can read the entire Chapman University Survey of American Fears 2016 on their website at <https://blogs.chapman.edu/wilkinson/2016/10/11/americas-top-fears-2016/>. ■



Carrie Poppy is a journalist and podcaster in Los Angeles. She thinks there's definitely something up with the North Dakota Crash.



# Notable Articles about the Creation of CSICOP and SKEPTICAL INQUIRER

TIMOTHY BINGA

Susan Gerbic, founder of the Guerilla Skeptics on Wikipedia Project, contacted CSI to provide pictures and other information for an update to the Wikipedia article about SKEPTICAL INQUIRER. Several of us were involved in making content available for this endeavor, and Kendrick Frazier, the magazine's editor, created a bibliography of important articles concerning the origin of CSICOP and SKEPTICAL INQUIRER.

The biggest concern we had was the fact that very little of the material was easily available, if it was available at all. As part of my role as librarian and archivist for the Center for Inquiry, we decided I should try to find these items and get them together in one place, either in links or by creating electronic copies for preservation purposes.

Below is Ken's bibliography as written. Links to the text of the original articles and PDFs of the original articles can be found at [http://www.csicop.org/specialarticles/show/notable\\_articles\\_about\\_the\\_creation\\_of\\_csicop\\_and\\_skeptical\\_inquirer](http://www.csicop.org/specialarticles/show/notable_articles_about_the_creation_of_csicop_and_skeptical_inquirer). These items now reside on our server in an effort to preserve the early history of CSICOP. The items were scanned from the originals, and text was created from the scans using Optical Character Recognition (OCR) software and then manually corrected as needed. I hope we can continue to preserve the history of our organization in this manner and provide our members with more and more of this type of information in the future.

## Notable Articles about CSICOP and SKEPTICAL INQUIRER

(Chronological order. First two decades.)

1. Boyce Rensberger, "Paranormal Phenomena Facing Scientific Study." *New York Times*, May 1, 1976, p. 26.
2. Kendrick Frazier, "Science and the Parascience Cults." *Science News* (cover article), May 29, 1976, pp. 346–350.
3. "Attacking the New Nonsense." *Time*, December 12, 1977.
4. Kendrick Frazier, "UFOs, Horoscopes, Bigfoot, Psychics, and Other Nonsense." *Smithsonian*, March 1978.
5. Kendrick Frazier, "UFOs! Horoscopes! (And Other Nonsense)." *Reader's Digest*, July 1978. (Condensed from *Smithsonian*. Also published in dozens of languages in *Reader's Digest's* international editions.)
6. Douglas R. Hofstadter, "About Two Kinds of Inquiry: 'National Enquirer' and 'The Skeptical Inquirer.'" *Scientific American* ("Metamagical Themas" column), February 1982. Republished as Chapter 5, "World Views in Collision: *The Skeptical Inquirer* versus the *National Enquirer*," with an eight-page "Post Scriptum" of further meditations on the topic, including a long exchange with M. Truzzi, in Hofstadter's 1985 book *Metamagical Themas* (New York: Basic Books), pp. 91–114.
7. James Cornell, "Science vs. the Paranormal: Skeptics Fight an Uphill Battle in their Efforts to Overthrow the Forces of Pseudoscience." *Psychology Today*, March 1984.
8. Alan L. Otten, "People Will Believe Anything, Which Is Why Csicops Exist: These Defenders of Science Debunk 'False' Notions; How to Regard Astrology." *Wall Street Journal*, July 19, 1985, pp. 1, 15.
9. David F. Marks, "Investigating the Paranormal," *Nature* (cover article), 120: 119–123, March 13–19, 1986.
10. Carl Sagan, "The Fine Art of Baloney Detection: How Not to Be Fooled," *Parade Magazine*, February 1, 1987, with a box titled "The Skeptical Inquirer."

Timothy Binga is Director of Libraries for the Center for Inquiry.



Joe Nickell, PhD, is now well into his fifth decade as an investigative writer. Among his many books is *Secrets of the Sideshows* (2005).

## Claims of Chi: Besting a Tai Chi Master

In nearly half a century of investigating strange mysteries, I have frequently encountered claims of the mysterious force or power known as *qi* or *ch'i* or simply *chi* (pronounced “chee”). The term translates as “air” or “breath” and, by extension, “life force” or “energy flow.”

In traditional Asian cultures, especially Chinese, chi is the essential principle in such practices as *feng shui* (pronounced “fung shway”), the art of creating harmonious environments; acupuncture, a form of traditional Chinese medicine in which needles are inserted at specified points to stimulate the flow of chi (Nickell 2012); and certain martial arts, including *tai chi*. I will expand on the latter here, exposing tricks used by masters and their followers.

I am quick to say I did not have much special knowledge for this particular investigation other than my background as a magician and wonderworker (Nickell 2005, 219–220, 231–232, 274), but I did have a college course in sport judo and was once trained—by karate black belt and physics teacher Matt Lowry—to break boards by striking them with my hand (Nickell 2011; 2012a).

### Tai Chi, et al.

Tai chi is a shortened form of *taiji quan*, “Supreme ultimate boxing.” Conceived centuries ago as a martial art, it is now also practiced—as “Taoist tai chi”—as an exercise technique. In China in 2010 as a visiting scholar in an exchange program (see Nickell 2012), I watched people doing morning tai chi exercises. The

graceful, flowing movements reminded me of Chinese brush calligraphy, and I found plausible the claims that the practice could help reduce stress and tone muscles.

In addition to tai chi, all martial arts typically involve the concept of chi—including *kung fu*, a Chinese form of fighting without weapons, and *taekwondo*, a type of Korean karate that uses such aggressive moves as jabs, chops, and dramatic leaping kicks. All rely on chi, the supposed internal life energy, as discussed in the *Qi Encyclopedia* (Lam 2016). Many unsupported claims are made for the magical, invisible chi—whose existence itself is unsupported by science.

Consider the myriad therapeutic claims made to promote tai chi. Martial arts authority Bruce Tegner (1973, 140) calls them “misleading.” As he explains:

Tai chi promoters claim that tai chi exercise will cure as many diseases and restore as many non-functioning organs as the old snake-oil remedies. While it is true that practice of the routine will promote general health and you will feel better if you do tai chi, there is absolutely no acceptable evidence that tai chi is a substitute for medical care. A tai chi teacher is without any preparation for diagnosing disease, or for prescribing for cure or care. If you are ill, see a doctor. If your ailment could be “cured” by doing tai chi, it could be “cured” by any routine of exercise. It is a cruel deception to make promises of “cure”; rather than enhancing the reputation of tai chi, it lowers it to



Figure 1. Author at the grave of Dixie Annie (Jarrett) Haygood, a.k.a Annie Abbott, “The Little Georgia Magnet,” whom strong men could not move. (Author’s photo, taken before a headstone was installed.)



the rank of a quack or crank activity. Tai chi is a good exercise and it deserves to be rescued from the bad reputation of cure-all quackery.

### Chi Chicanery

Still other claims made for chi—involving tai chi and related martial arts—are actually due to skill and application of simple physical principles. Here are a few examples.

*Candle Feat.* In 1984, one of my university students, who had witnessed a sensational karate demonstration, told me how the practitioner supposedly flung off some of his “energy” (chi) to extinguish a candle. He supposedly accomplished this by simply pointing at the flame in a dramatic fashion.

I went to see the demonstration at a Lexington, Kentucky, high school. The martial artist had his mouth taped to prove he was not blowing out the flame. He moved his open hand in a rather short, quick blow toward the flame. It only flickered the first time, but on the fourth try was extinguished. I was later able—with some practice—to duplicate the feat. I also found that the secret to such a stunt had been published months earlier in a kung-fu magazine. The secret lies in “displacing the air. . . . The speed of your technique is what causes the flame to go out” (Blauer 1983, 86).

*Cutting Apple on Throat.* The same evening I watched the candle stunt, I also witnessed a seemingly risky feat in which a martial artist placed an apple on the throat of a reclining man and cut it in two with a sword. The blade went quickly down but stopped abruptly—rather in the manner of someone “pulling a punch” in stunt fighting. This might be practiced successfully.

The blade does not need to go all the way through the apple to cut it in two. Indeed, I have heard of a trick method in which a short length of rigid wire is inserted in the apple near the bottom to help stop the blade. Nevertheless, sometimes the stunt can go awry as shown in a YouTube video of an assistant having his throat cut—fortunately not fatally (“Karate Master” 2009).


*Psychokinetic Effects.* A young martial arts instructor and ex-con named James Hydrick fooled countless people in the

1980s by causing a balanced pencil to move by only pointing at it, turning pages of a phone book from several feet away by simply staring, and performing other feats. Touted by an Associated Press story and the TV program *That’s Incredible*, Hydrick seemed to gain scientific support for his powers when he passed tests given by an assistant professor of electrical engineering. Hydrick wore a karate *gi* and claimed Eastern philosophy helped him develop his mind power.

However, Hydrick was undone when magician and psychical investigator James Randi challenged Hydrick on *What’s My Line?*—offering him \$10,000 if he could demonstrate genuine paranormal powers as claimed. Randi thought Hydrick was merely blowing to spin the pencil and flip the book pages, so he scattered feather-

target. My Italian friends Massimo Polidoro and Luigi Garlaschelli investigated the claim for an episode of National Geographic TV’s *Is It Real?* They began by watching a video of Dillman waving his hands before a volunteer who started to oscillate and then collapse on the floor, “exactly as Obi Wan Kenobi would do on an Imperial guard in the *Star Wars* films” (Polidoro 2008, 20).

The skeptics suspected the feat depended on the power of suggestion. “It looked like the old hypnotic stunts where the hypnotist stands in front of someone, points a finger to his face telling him that he is going to fall backward and, after a while, the person falls as expected” (Polidoro 2008, 20). When they conducted an experiment with Dillman, and Garlaschelli stood with closed eyes as suggested,



**Grand Master  
Don Ahn**

Master Ahn learned Yang Style T'ai Chi Ch'uan from the late Professor Cheng, Man Ching from 1964-1970; T'ai Chi, Push Hands, Sword, etc. Master Ahn also studied briefly with the Master Yang, Sui Chong, eldest son of Yang, Ch'eng Fu (Prof. Cheng's Teacher) in Hong Kong, 1970.

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Portrait of Don Ahn graces his business card (author’s collection).

light Styrofoam pieces on the table around the book and challenged him to repeat the feat. If he were blowing, the Styrofoam pieces would be disturbed and thus reveal the trick. Hydrick spent an hour and half pretending to use his powers before giving up (Baker and Nickell 1992, 80). He later confessed, boasting that he had “tricked the whole world” (Korem 1988, 149).

*No-Touch Knockouts.* Again, karate master George Dillman allegedly discovered a technique allowing him to direct chi so as to knock down a human

he learned that another factor was at play: It is easier to lose one’s balance with closed eyes. So he opened his and became immune to the punches of chi directed at him.

The investigators followed up with another test in which one of Dillman’s students stood behind a curtain that blocked his view while the karate master sent his supposed chi punches at intervals directed by the skeptics. This ruled out suggestion, and the student simply stood looking puzzled, awaiting the chi force that never came.

## Rooting

Another questionable claim—one a television producer asked me to look into in 2009—involves what is known in the martial arts as *rooting*. This is the purported special ability—aided by drawing chi up from the earth while imagining roots branching down from the feet—to keep oneself planted firmly despite an incoming force (“Rooting” 2016). I watched a hastily shot video of tai chi Grand Master Don Ahn. What I saw reminded me of the stunts of certain “human magnets”—such as teenage Lulu Hurst of Georgia in the 1880s.

## I was the only one to displace Master Ahn. I did so by subverting his method: I quickly crouched low, grabbed him bodily, and moved him—sputtering and protesting—straight back.

Billed as the “Georgia Magnet,” the fifteen-year-old Hurst would stand before the audience holding a stick parallel to the floor of the stage, while two strong men gripping it would attempt to move her. Instead, she merely pressed against the stick and not only prevented the action but pushed them across the stage to the spectators’ delight. Hurst called her power a “Great Unknown.” However, in time came criticism: the *New York Times* (July 13, 1884) called her performances “a phenomenon of stupidity” showing “how willingly people will be fooled. . . .”

Miss Hurst also became concerned with how spiritualists were embracing her as a powerful medium. After two years of performing, she married the young man who managed her show and returned to obscurity. She later confessed that the secret behind her power was simply “deflected force,” namely,

“unrecognized mechanical principles involving leverage and balance.” She simply caused force applied against her to deflect, or glance off, and so become a useless effort (Nickell 1991, 34–40).

Among several imitators of Hurst, “One of the cleverest of these,” wrote magician Harry Houdini (1920, 228), used the stage name Annie Abbott. Her posters even billed her as “The Little Georgia Magnet.” She was a brief sensation in London, where she took her act in 1891, but—exposed by what Houdini (1920, 229) called “a keen-witted reporter”—she also soon faded from view. Her real name was Dixie Annie (Jarrett) Haygood, and she is buried in the Memory Hill Cemetery in Milledgeville, Georgia, where I visited many years ago (see Figure 1).

### Overpowering a Master

Master Ahn seemed to use principles similar to those of Hurst and Abbott. I flew to New York on June 26, 2009, to shoot a demo for a possible TV series,<sup>1</sup> and I observed him closely. He remained firmly in place while others—singly or together—attempted to push him backward. Having others play by his rules ensured his success as he applied the principles of low center of gravity (his small stature and effective stance) and force deflection.<sup>2</sup> He employed his forearm much as Lulu Hurst used a stick, having opponents place their hands there so he could use it as a lever, pivoting from the elbow.

I was the only one to displace him. I did so by subverting his method: I quickly crouched low, grabbed him bodily, and moved him—sputtering and protesting—straight back. He strongly objected, saying I was manipulating him. And so I was, refusing to play his game, which had nothing at all to do with chi and everything to do with physical principles.

Of course it was rude to have behaved so, but it was not the same as grabbing something from a magician’s hands. The latter is an honest deceiver, whereas—intentionally or otherwise—the martial artist who attributes such feats to anything other than physical principles is misleading the public.

To smooth things over, I pretended to have misunderstood what was expected and invited him to try again, allowing him to succeed. He not only resisted my push but actually repelled me, as I compliantly played by his rules and let him easily deflect my applied force. ■

## Notes

1. I never learned what happened to our videotape of this event, since I was drawn away to another film project. A producer did say he was very happy with my efforts (Gaines 2009).

2. Dongkuk “Don” Ahn (1937–2013) was also a prominent artist residing in New York City. Born in Seoul, South Korea, he painted in acrylic on canvas using fluid brushstrokes reminiscent of Eastern calligraphy (“Don Ahn” 2014).

## References

- Baker, Robert A., and Joe Nickell. 1992. *Missing Pieces: How to Investigate Ghosts, UFOs, Psychics, & Other Mysteries*. Buffalo, NY: Prometheus Books.
- Blauer, Tony. 1983. Effective self-defense. *Inside Kung-Fu* August: 85–87.
- Don Ahn (Dongkuk)—Spirit. 2014. Available online at [www.ahlfoundation.org/spirit/](http://www.ahlfoundation.org/spirit/); accessed August 23, 2016.
- Gaines, Cory. 2009. Personal communication (from Leftfield Pictures) to Joe Nickell, June 27.
- Houdini, Harry. 1920. *Miracle Mongers and Their Methods*. Reprinted Toronto: Coles, 1980.
- Karate master cuts his assistant’s throat. 2009. Available online at <https://www.youtube.com/watch?v=OYJvgrEsAk>; accessed August 23, 2016.
- Korem, Dan. 1988. *Powers: Testing the Psychic & Supernatural*. Downers Grove, IL: InterVarsity Press, 85–156.
- Lam, Paul. 2016. Qi in Martial Arts. Available online at [qi-encyclopedia.com/?article=Qi%20in%20Martial%20Arts](http://qi-encyclopedia.com/?article=Qi%20in%20Martial%20Arts); accessed August 23, 2016.
- Nickell, Joe. 1991. *Wonderworkers! How They Perform the Impossible*. Buffalo, NY: Prometheus Books.
- . 2005. *Secrets of the Sideshows*. Lexington, KY: University Press of Kentucky.
- . 2011. Karate Student. Available online at [www.joenickell.com/KarateStudent/KarateStudent1.html](http://www.joenickell.com/KarateStudent/KarateStudent1.html); accessed August 25, 2016.
- . 2012. Traditional Chinese Medicine: Views East and West. *SKEPTICAL INQUIRER* 36(2) (March/April): 18–20.
- . 2012a. Jujitsu White Belt. Available online at [www.joenickell.com/JujitsuWhiteBelt/JujitsuWhiteBelt1.html](http://www.joenickell.com/JujitsuWhiteBelt/JujitsuWhiteBelt1.html); accessed August 25, 2016.
- Polidoro, Massimo. 2008. Just like Jedi knights (if only). *SKEPTICAL INQUIRER* 32(3) (May/June): 20–21.
- Rooting, stabilizing . . . in Qigong . . . 2016. Available online at [www.egreenway.com/qigong/rooting.htm](http://www.egreenway.com/qigong/rooting.htm); accessed August 23, 2016.
- Tegner, Bruce. 1973. *Kung Fu & Tai Chi: Chinese Karate and Classical Exercises*. New York: Bantam Books.

## 'Mirage Men'—Disinformation Agents or Just a Mirage?

In UFOlogy today, the term *Mirage Men* is understood to signify supposed shadowy government agents who, for inscrutable reasons, are allegedly tricking the public—not by “debunking” UFOs but *creating* belief in UFOs and the like. The title comes from a 2010 book by the British author Mark Pilkington, *Mirage Men: An Adventure into Paranoia, Espionage, Psychological Warfare, and UFOs*. In 2013, the book was made into a movie of the same title written by Pilkington and directed by John Lundberg, Roland Denning, and Kypros Kyprianou. The movie purports to demonstrate “How the US government created a myth that took over the world” (www.mirage-men.com). Interestingly, Lundberg is a leading “crop circle maker” in the United Kingdom (www.circlemakers.org).

One investigator who has been widely promoting the idea of *Mirage Men* is James Carrion, who served as the International Director of MUFON from 2006 to 2009. Carrion was very different from the typical MUFON leader. Not even willing to defend Holy Roswell as an E.T. event, he was far too independent a thinker to fit in well at MUFON. It was no surprise when Carrion and MUFON went their separate ways, with him proclaiming that the UFO phenomenon “is based in deception—of the human kind.” He cited several very interesting examples of such deception, although



none of them involved official agencies (see my book *Bad UFOs*, p. 4).

After promoting the *Mirage Men* hypothesis on his blog for several years, on August 20, 2016, Carrion claimed to have found a “smoking gun” that demonstrates “Human Deception at Play during the UFO Wave of 1947” (<http://goo.gl/cq87Ej>). He cited an FBI memo of July 21, 1947, stating that Colonel Carl Goldbranson “desired the Bureau conduct some investigation of Shaver to determine whether or not he has any information pertaining to the origin of the flying saucers.” This, says Carrion, “unequivocally documents the connection between U.S.

strategic deception planners and early UFO events by relating how Colonel Carl Goldbranson petitioned FBI assistance in investigating UFO events. Goldbranson was a WW2 member of Joint Security Control and one of its principal deception planners.”

On August 23, I posted the following comment on Carrion’s blog: “Goldbranson ‘desired the Bureau conduct some investigation of Shaver to determine whether or not he has any information pertaining to the origin of the flying saucers.’ So, am I correct in understanding that Col. Goldbranson was asking the FBI investigate Richard Shaver to see what he knows about the origin of the flying saucers? Shaver, the guy who claimed that underground robots are fighting in caves?”

Carrion seems not to have noticed that Goldbranson was in essence asking the FBI to investigate the “Shaver Mystery,” a well-known series of crackpot stories about all kinds of impossible things that were supposedly true. In chapter 5 of his classic 1952 book *Fads & Fallacies in the Name of Science*, Martin Gardner explains: “Drawing on his ‘racial memories,’ Shaver described in great detail the activities of a midget race of degenerates called ‘deros’ who live in huge caverns beneath the surface of the earth. By means of telepathy and secret rays, the deros are responsible for most of the earth’s catastrophes—wars, fires, airplane crashes, shipwrecks, and nervous breakdowns.”



On August 25, longtime UFO researcher Brad Sparks wrote:

[Carrion's] "proof" is what is now his central figure in the entire plot, a "Col." Carl Goldbranson, and an FBI memo of July 21, 1947, released decades ago. But Carrion has so far failed to prove that Goldbranson did anything more than ask the FBI to investigate a notorious character who supposedly knew the origin of flying saucers and whose location and timing supposedly coincided with certain incidents in early July 1947.... Carrion apparently missed the fact that it was the infamous Richard Shaver whose name got through the document censors in one place of the FBI memo. Yes, the Richard Shaver of the lunatic Shaver Mysteries, full of "deros" or "deranged robots"—the so-called robots who were not actually even robots (how deranged is that!?)—and Lemuria tales. . . .

But Goldbranson did not even ask the FBI to perpetrate any deception! How is asking the FBI to investigate someone amount to carrying out a deception? Does any of this deceive the Soviet intelligence agencies? And into believing what? That a marginal character such as Richard Shaver of the Shaver Mystery stories and the "truth" about underground worlds and Lemuria was a credible bearer of intelligence about flying saucers being U.S. secret weapons? (see <http://goo.gl/308r0g>).

The British researcher Christopher D. Allen noted:

The FBI did, from time to time, interview a few oddities we would call "cranks." Adamski was one, Ray Palmer was another, Shaver was obviously another. I dare say anyone who, in the opinion of the FBI, published something cranky that might have some effect on the security of the US was a suspect, and therefore a risk. Hence these occasional interviews of eccentrics. (<http://goo.gl/5S0tib>)

So while we don't know if the FBI actually did interview Shaver, even if they did it doesn't prove anything. What this does suggest, however, is the startling fact that the experienced military intelligence officer Goldbranson actually thought that the "true fantasy" writer Richard Shaver might have some useful information about flying saucers!

\* \* \*

Believers in government UFO conspiracies are always on the lookout for "evidence" to support that belief, and now they think they may have found some. Alejandro Rojas of Open Minds, a group that promotes UFO claims, wrote on July 6, 2016, about the supposed discovery of "the US military's high-priority UFO reporting system" (<http://goo.gl/Fp0ICA>):

AFI 10-206 now references what is called Operational Reporting (OPREP). In the past, UFO researchers have noted the term OPREP-3 on UFO documents. Australian UFO researcher Paul Dean has been taking a closer look, and it appears this may be the way important UFO sightings are being reported by the military today. . . . Dean first noticed that OPREP-3 was being used to report UFOs when he was looking into UFO cases in the 70s, in particular a case from the Pinecastle Electronic Warfare Range in Florida on May 14, 1978. . . . It is no wonder that these cases are deserving of a vital reporting system such as OPREP-3. It is also no wonder that despite telling the public they are not interested in UFOs, that they are in fact investigating these shocking cases of unidentified aircraft violating our most secure airspace.

Skeptics with a military background were quick to point out that the various OPREPs have long been used to report practically any kind of unexpected event up the chain of command, for example, a vehicle accident. So if some military personnel saw a light in the sky that they could not identify, the officer in charge would write an OPREP and send it upstairs. But some UFO conspiracy theorists seem to think that the reporting of lights in the sky on an OPREP is proof of the long-rumored Secret Government UFO Investigation Group.

\* \* \*

And here comes a new piece of craziness: trending on Facebook in mid-September was the "black moon," which is one of the silliest things I have seen in a very long time. The *Express* in London proclaims, "Warning of rare

BLACK MOON: Astrological event to herald 'End of Days' and second coming." This supposedly rare event was supposed to occur on September 30, 2016, at 8:11 PM Eastern time, which is in fact the exact time of the new moon.

"On Friday September 30, a rare Black Moon will occur, which many are linking to the apocalypse. The spectacular Black Moon occurs when the illuminated side of the moon is caught in the shadow of the Earth, making it virtually impossible to see" (<http://goo.gl/ELbwhc>). This makes no sense at all. The moon can only move into the Earth's shadow at the time of full moon, not new moon. And the new moon is *always* "virtually impossible to see," unless it impinges on the solar disk during an eclipse.

Somewhat more comprehensible are other discussions of the "Black Moon" of September 30. An article by science writer Joe Rao explains, "Friday's sky (Sept. 30) is host to a somewhat unusual lunar event in the Western Hemisphere: a second new moon in a single month, which some people call a 'Black Moon'. . . . A second full moon in a single calendar month is sometimes called a 'Blue Moon.' A Black Moon is supposedly the flip side of a Blue Moon: the second new moon in a single calendar month" (see <http://goo.gl/0rru35>).

Of course, astronomers did not invent these terms and never used them—at least not until they became fixed in the public's mind. Decades ago, some creative writer reassigned the old term "blue moon," which used to signify a rare event, to mean two full moons in a single month (which is not so rare), and the usage stuck. Now it appears that the same has been done in the case of two new moons, and with all this hoopla the designation is likely to stick. Then there is the supposedly dreadful "Blood Moon," to which many attribute religious significance. It is nothing more than the full moon passing into total eclipse, illuminated only by reddish light passing through Earth's atmosphere. ■



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## Ten Practical Tactics to Unravel the Uncanny

*“Science, my boy, is made up of mistakes, but they are mistakes which it is useful to make, because they lead little by little to the truth.”*

—Jules Verne

Investigating mysteries can be both fun and instructive. Sure, it’s an activity that requires a lot of patience, the desire and the time to study and remain up to date, the willingness to not stop at the surface but always get to the bottom of things, the humbleness to seek advice, and a lot of other big and small strategies in order to reach the end of the path that will lead to a final explanation—or at least to an educated guess when it’s impossible to perform definitive testing.

Here I present a few tools that will help you get started, after which you can go deeper as you see fit. In Italy, for example, the skeptics group CICAP organizes an annual course on how to investigate mysteries, which includes several seminars, experts from which to learn, books and documents to study, and practical experiences to perform (such as walking on hot coals, testing a self-proclaimed psychic, or creating a crop circle in the night). Similar courses are organized by skeptical organizations in other parts of the world as well, and there are also very good books on the subject.

Let’s start with these ten practical suggestions that you must keep in mind each time you find yourself watching a TV show or news report or reading an article dealing with an apparently inex-

plicable mystery. Just add a little curiosity about the subject and the desire to apply yourself and you are ready to go!

### **1) Make sure that the mystery actually exists.**

It’s the first rule. More often than you would expect, news devoid of any foundation is published in newspapers or broadcast on television. These are usually curious episodes found on the Internet that never happened in reality, fantasies of people seeking publicity, poor translations of news outlets in a foreign language, stories misunderstood by the reporter, or perhaps urban legends that for the umpteenth time are passed off as authentic facts. In all these cases, those who have the patience to ask fundamental questions will invariably find the explanation to the mystery simply because there is no mystery to explain.

However, when you raise doubts and explain the facts to the newspaper, the website, or the program that broke the news, the reaction is rarely one of gratitude. In the best cases, a retraction is published, though usually in small print; at worst, the correction is ignored or the news is simply taken down from the website without further explanations. Therefore, when contacting the news outlet it is best to avoid sarcastic

comments or reproaches. Mistakes can happen to anyone, and it is better to offer your findings as helpful contributions to the subject at hand in the hopes that in the future news will be checked for facts before being announced.

### **2) Check the credibility of the source.**

If the director of NASA were to say that little green men have landed on Earth, the credibility of the news would be much higher than if similar statements were made by a former actress or a writer of science-fiction novels. This does not mean that the authority of a source is enough to make the statement true—the list of blunders made by Nobel laureates and heads of state is unfortunately very long—but, at least, it may represent an initial credibility filter.

### **3) Conduct extensive research and go back to the original sources.**

Never trust the accuracy of what is reported by secondary sources. Even unintentionally, news may be distorted because it is poorly understood by the reporter, because a witness has not been able to explain him- or herself, because his or her statements were changed in order to make them more palatable to the audience, or for many other reasons. It is important to, on the one hand, compare multiple versions of the same episode, and, on the other hand, to determine who first made the

claim in question whenever possible. Only then can you hope to reduce the “noise” added to a story by those who came afterward.

## **This is perhaps the most important rule of all: always try to find the simplest explanation available.**

### **4) Do not make assumptions before you have all the facts.**

This is the fundamental rule laid out by Sherlock Holmes: “It is a capital mistake to theorize before one has data. Insensibly, one begins to twist facts to suit theories, instead of theories to suit facts.”

Trying to guess possible explanations for a mystery with few facts and basing your guesses merely on news reports or hearsay is a sure way to avoid solving the problem. You should instead approach the mystery with an open mind and note as much detail and information as possible. You cannot rely on news reports for a very simple reason: even if a reporter is capable and attentive, the limited space available will lead him or her to leave out details that might at first sight seem insignificant but that, if known and seen in perspective, could lead to the solution of the mystery.

### **5) Reproduce the original conditions.**

Try to recreate the conditions under

which a specific phenomenon took place. Sometimes this can be enough to solve a mystery. Once, for example, I had a chance to examine some video clips with James Randi where you could see a Russian psychic move objects without touching them. The only explanation possible, aside from the unlikely explanation that she used psychokinetic powers, seemed to be the use of invisible threads or magnets. However, when we had the opportunity to recreate the same conditions using a Plexiglass plate identical to the one used by the psychic, we found with great surprise that any object of a certain weight and a certain shape was going to move around “by itself” when put on top of the plate due to a reaction of static electricity produced by the Plexiglass after it was rubbed. By reproducing the original conditions under which the psychic operated, we found a solution for the mystery without testing the psychic herself.

### **6) Whenever you can, check the facts for yourself.**

Never trust reports given by others, even though they may be from people who are usually reliable. For example, whenever you have the opportunity, personally go to the location where a mystery took place; it’s the best way to really evaluate the situation. You can easily start to see possible alternative explanations and maybe understand what really happened. Watching television or reading web pages about the mystery at hand are not even remotely comparable to going out in the field to conduct an investigation.

### **7) Ask experts for advice.**

Do not pretend you know everything—especially in a hyper-informed age such as ours. Getting in touch with the appropriate experts is the only useful way to solve a technical or practical doubt. CICAP’s consultants, for example, come from many different disciplines: physicists, chemists, biologists, psychologists, neurologists, climatologists, geologists, and so on. There is always some new mystery that

requires a specialist opinion outside our covered fields. Searching an appropriate expert for the information you need can be a fun activity in itself and could result in collaborations that lead to new investigations and discoveries.

### **8) Learn to distinguish between facts and fantasies.**

The plural of anecdote is not evidence. It does not matter how many stories you collect on a particular mystery, they will never have the probative value of a single documented fact. You may even have 1,000 witnesses who claim they have seen a psychic levitate in mid-air, but you can never declare a genuine levitation unless the medium performs the feat, even once, under conditions that prevent any tricks or deceptions.

### **9) Take witnesses with a grain of salt and be polite.**

Listen with respect and patience to those who had unusual experiences or who believe they possess evidence of a paranormal phenomenon. Granted, they may be wrong, but the number of factors that influence eyewitness reports are so many (and beyond personal control) that a person may believe in good faith in what he or she says. Please, always bear in mind that the task of an investigator of mysteries is to reconstruct the facts and to find the truth, not to attack or ridicule people’s beliefs or motivations.

### **10) Apply Occam’s Razor.**

This is perhaps the most important rule of all: always try to find the simplest explanation available. Occam’s Razor is a problem-solving principle devised in the fourteenth century by an English Franciscan friar and philosopher, William of Ockham. It states that when there are competing hypotheses that predict equally well, the one with the fewest assumptions is most likely the correct one. In other words, before formulating revolutionary theories, it is necessary to determine whether or not a certain phenomenon can be interpreted with existing theories. ■





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## The Superbug Crisis False Beliefs about Antibiotics Are a Global Threat

As millions of Americans visit their health care providers this winter complaining of a cold, surveys suggest that one in four will be expecting their provider to prescribe them an antibiotic, falsely believing that the antibiotic will help them recover more quickly from the virus (Watkins et al. 2015). The demand for antibiotics by patients is not surprising, considering other survey findings. Only about half of Americans know correctly that antibiotics kill bacteria but not viruses, a proportion that has remained relatively stable for more than a decade (Hwang et al. 2015).

In recent decades, similarly false beliefs across countries have contributed to a dangerous rise in antibiotic use. Between 2000 and 2010, worldwide sales of antibiotics by pharmacies and hospitals increased 36 percent. Overall, India, China, and the United States use the most antibiotics, though Americans are by far the highest per capita consumers (Van Boeckel et al. 2014). In fact, the Centers for Disease Control (CDC) (2013) estimates that 50 percent of all antibiotics prescribed in the United States are not warranted.

The overuse of antibiotics in the United States and other countries combined with the rapid growth in the use of antibiotics to grow livestock has led to the evolution of lethal “superbugs,” bacteria that are resistant to most antibiotics. When people overuse antibiotics, they are more likely

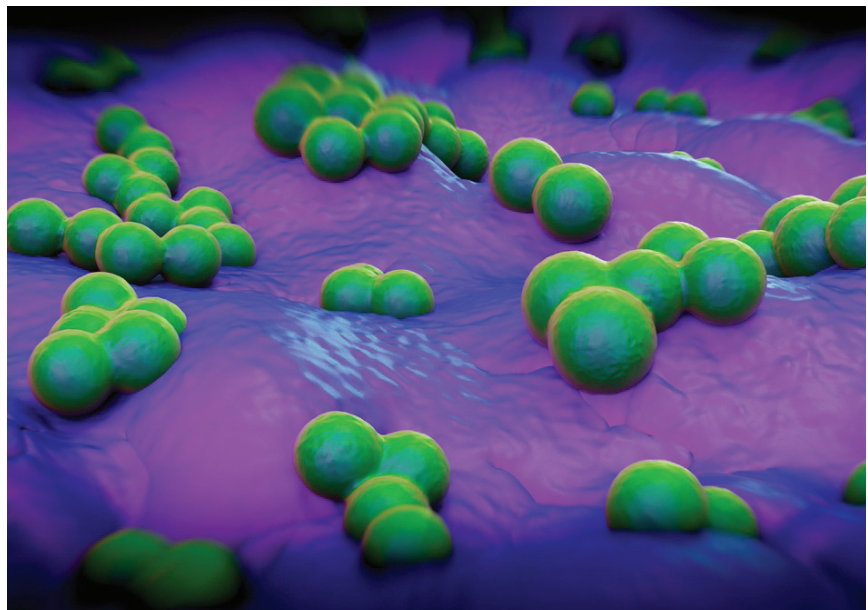
to kill off “good” bacteria in their bodies that protect them from infection. Drug-resistant bacteria are then more likely to take over, festering in places such as the gut. These superbugs can spread to other people at home and at work or in a hospital.

The rise of superbugs and the loss of antibiotic effectiveness not only makes it more difficult to combat common threats, such as urinary tract infections or pneumonia, but those patients undergoing joint replacements, dental surgery, cancer therapy, and other procedures—who often depend on antibiotics to recover—are also put at high risk.

Each year at least 2 million Americans battle serious bacterial infections

that are resistant to one or more antibiotics, and at least 23,000 die annually as a direct result of those infections (Centers for Disease Control 2013). In a recent report, the World Bank (2016) warned that by 2050 the growth in drug-resistant infections, if not contained, would cause a level of global economic damage equivalent to, if not worse than, the 2008 financial crisis.

Responding to the threat, in 2015 the Obama administration set a goal of by 2020 cutting inappropriate use of antibiotics in hospitals by 20 percent and in other health care settings by 50 percent. Recognizing that antibiotic resistance is an international problem that cannot be solved by the actions



of a single country, a United Kingdom report last year called for a “massive global public awareness campaign” so that patients no longer demand—and health care providers do not prescribe—unnecessary antibiotics (Review on Antimicrobial Resistance 2016).

### Communicating in the Dark

To be sure, more than just public education is needed. The widespread and unnecessary use of antibiotics in agriculture must be ended; sanitation and clean water systems must be built in poorer countries; drug companies must step up to develop new antibiotics; and health agencies need funding for the early detection of emerging superbugs, concludes the recent U.K. report.

## Research shows that a health care provider's perceptions of patient expectations are important, since they tend to be a reliable predictor of over-prescribing.

But changing the beliefs of the public is also essential. Health care providers are under immense pressure from patients to provide antibiotics for treatment of colds and other viral illnesses. A 2012 survey found that half of U.S. health care providers say that their patients expect an antibiotic when visiting for a viral infection. Research shows that a health care provider's perceptions of patient expectations are important, since they tend to be a reliable predictor of over-prescribing. Patients also report other means by which they obtain antibiotics, using prescriptions left over from past visits or using those obtained by a family member or friend (Watkins et al. 2015).

The problem in mounting a public education campaign is that only a handful of quality studies and surveys

exist that evaluate public attitudes and beliefs, providing little basis by which to design and target messages or to plan other persuasion strategies. Those few studies available reveal a variety of substantial communication challenges and barriers.

In the United States and Europe, members of the public still do not see antibiotic resistance as a personally relevant problem that poses risks to their health or that is a function of their own choices as a health consumer. Instead, they tend to blame doctors, hospitals, and the government. They also believe that science is likely to find a solution in the form of new antibiotics and, as of yet, do not see the need for major changes in individual behavior, health

care practice, or policy (McCullough et al. 2016; Wiklund et al. 2015).

The 2016 U.K. report estimates the budget for a global public education campaign at \$100 million, an absurdly low figure. The research costs of adequately mapping and evaluating the views of different segments of the public across countries, identifying the types of messages that are likely to be persuasive, the sources that they trust for information, and the local channels by which to reach people would alone easily exceed that figure. The budget for the actual advertising and campaign efforts would be much greater.

In September 2016, all 193 member countries of the United Nations signed a declaration committing to a process that sets goals and timelines for reducing the use of antibiotics in medicine

and agriculture. The model for the process reflects past UN efforts on climate change.

However, for decades on the topic of climate change, world governments and scientific bodies were slow to recognize the need to invest in social science-based research to inform public communication efforts, and they continue to underfund initiatives aimed at engaging the public on actions to reduce greenhouse gas emissions. Hopefully we have learned a lesson. In combating the superbug threat, we cannot afford to delay investing in the communication research and activities needed to decrease the overuse of antibiotics. ■

### References

- Centers for Disease Control. 2013. Antibiotic Resistance Threats in the United States, 2013. Atlanta, GA: US Department of Health and Human Services. Available online at <http://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>.
- Hwang, T.J., K.A. Gibbs, S.H. Podolsky, et al. 2015. Antimicrobial stewardship and public knowledge of antibiotics. *The Lancet Infectious Diseases* 15(9): 1000–1001.
- McCullough, A.R., S. Parekh, J. Rathbone, et al. 2016. A systematic review of the public's knowledge and beliefs about antibiotic resistance. *Journal of Antimicrobial Chemotherapy* 71(1): 27–33.
- Review on Antimicrobial Resistance. 2016. Tackling Drug-Resistant Infections Globally: Final Report and Recommendations. Available online at [https://amr-review.org/sites/default/files/160525\\_Final%20paper\\_with%20cover.pdf](https://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf).
- Van Boeckel, T.P., S. Gandra, A. Ashok, et al. 2014. Global antibiotic consumption 2000 to 2010: An analysis of national pharmaceutical sales data. *The Lancet Infectious Diseases* 14(8): 742–750.
- Watkins, L.K.F., G.V. Sanchez, A.P. Albert, et al. 2015. Knowledge and attitudes regarding antibiotic use among adult consumers, adult Hispanic consumers, and health care providers—United States, 2012–2013. *MMWR—Morbidity and Mortality Weekly Report* 64(28): 767–770.
- Wiklund, S., I. Fagerberg, Å Örtqvist, et al. 2015. Knowledge and understanding of antibiotic resistance and the risk of becoming a carrier when travelling abroad: A qualitative study of Swedish travellers. *Scandinavian Journal of Public Health* 43(3): 302–308.
- World Bank. 2016. Drug-Resistant Infections: A Threat to Our Economic Future (Discussion Draft). Washington, DC: World Bank. Available online at <http://pubdocs.worldbank.org/en/527731474225046104/AMR-Discussion-Draft-Sept18updated.pdf>.



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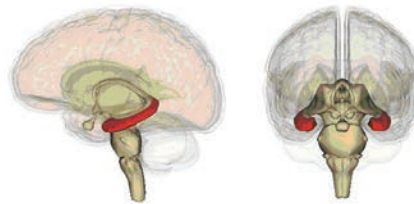
## Consensus: Could Two Hundred Scientists Be Wrong?

In August of 2016, publication of a book about neuroscience’s most famous amnesia patient—known for decades only as H.M.—stirred up a controversy in the world of science. On August 3, the *New York Times Magazine* released an article adapted from Luke Dittrich’s book, *Patient H.M.: A Story of Memory, Madness, and Family Secrets* (Dittrich 2016a; 2016b). Two days later, on August 5, more than two hundred neuroscientists from around the world had signed a letter to the *Times* in support of Professor Suzanne Corkin, the Massachusetts Institute of Technology scientist who did most of the research with H.M. (DiCarlo et al. 2016).

Henry Molaison (H.M.) suffered profound memory loss as a result of an experimental brain operation conducted in 1953 in an effort to control his epilepsy. The surgery removed most of Molaison’s hippocampus and some nearby structures on both sides of his brain, leaving him incapable of creating new episodic memories. Henry, who was the inspiration for the popular film *Memento*, could recall many things that happened to him prior to 1953, but after the surgery he couldn’t tell you what he had done five minutes before the present moment. As Dittrich put it in the *New York Times Magazine* article, “Each of the hundreds of times [he and Professor Corkin] met, it was, for Henry, a first meeting. . . .”

### The Questions Raised

Sadly, Suzanne Corkin died in May of 2016, months before Dittrich’s book and the *Times* article appeared, and so it was left to her colleagues to defend her against what they believed was Dittrich’s



An illustration of the human brain showing the hippocampus (red area), one of the structures removed from Henry Molaison’s brain. [source: Wikimedia]

“biased and misleading” description of Corkin’s work with H.M. On August 9, six days after the *Times* article was released and four days after the letter signed by the scientists appeared, Professor Corkin’s colleagues in the Department of Brain and Cognitive Sciences got specific about their concerns, posting a letter on the MIT website outlining what Department Head James J. DiCarlo characterized as the “allegations” in Dittrich’s article (DiCarlo 2016a):

1. Allegation that (H.M.’s) research records were or would be destroyed or shredded. Given the importance of H.M. to the history of neuroscience, any destruction of primary data would be considered an enormous loss and possibly a violation of research ethics.

2. Allegation that the finding of an additional lesion in (H.M.’s) left orbitofrontal cortex was suppressed. When Molaison died, his brain was donated to science, and postmortem analysis revealed a previously unknown lesion in his left frontal lobe. The discovery of this injury could affect the interpretation of earlier

studies of H.M.’s memory loss. DiCarlo objected to the suggestion that Corkin had ever tried to block the publication of an article revealing this brain injury. The article did eventually appear with Corkin as a coauthor.

3. Allegation that there was something inappropriate in the selection of Tom Mooney as Henry’s guardian. Perhaps the most troubling questions raised by Dittrich were about the way Corkin obtained Henry’s consent to be studied. Given Molaison’s disability, it was doubtful that he was capable of understanding and evaluating Corkin’s requests to participate in research, and yet informed consent is a basic hallmark of research ethics. According to Dittrich, from 1981 to 1992, Henry was the only person signing the informed consent forms for Corkin’s research studies. Eventually, although three of Henry’s first cousins were alive at the time, Corkin arranged for Thomas F. Mooney, a second cousin, to become his conservator. Mooney went on to sign research consent forms and—importantly—an agreement to donate Henry’s brain to MIT upon his death.

The August 5 letter to the *New York Times Magazine* signed by two hundred scientists in defense of Professor Corkin appeared on the MIT website with the heading “by International Community of Scientists”—a clear attempt to suggest a consensus opinion in support of Professor Corkin. Without question, Suzanne Corkin was much admired, and her death must have been a great loss to her colleagues. On a human level, the urge to defend her honor is completely





Leonard Shelby, the central character of the popular movie *Memento*, was based on patient H.M., although the script incorrectly described his problem as a lack of short-term memory. In fact, both Leonard Shelby and H.M. suffered from an inability to form new long-term episodic memories.

understandable, but was it a good idea? Should these scientists have put their names and institutional affiliations on this letter?

#### When Scientists Appeal to Consensus

Two other recent cases of scientists making appeals to consensus come to mind. In my July 2015 online “Behavior & Belief” column, I argued that Lumosity and similar brain training programs were scams (Vyse 2015). I based my assessment, in part, on a 2014 consensus statement signed by seventy neuroscientists and memory researchers that found the claims of the brain training industry to be unjustified (“A Consensus on the Brain Training Industry from the Scientific Community” 2014).

Similarly, in arguments about climate change, scientists frequently cite the overwhelming consensus among climate change scientists that global warming is real and caused by human activity. For example, in an August 10, 2016, televised climate change debate, physicist Brian Cox made an appeal to scientific consensus, and the Australian climate change denier Malcolm Roberts, a member of the far-right One Nation Party, attacked Cox for citing consensus rather than data (“Professor Brian Cox Clashes with Australian Climate Sceptic” 2016). Fortunately, Cox brought

temperature trend data—spawning a popular “I brought the graph” Internet video meme—and other evidence in further support of his viewpoint, whereas Roberts could only defend his position with vague conspiracy theories about NASA and other scientific groups “manipulating” the data.

As Malcolm Roberts was trying to suggest, consensus alone is not evidence. There was a time when, according to the prevailing scientific consensus, the Earth—not the Sun—was at the center of our planetary system, and it took a long time for geocentricism to be tossed aside. Appeals to consensus and authority should always be suspect. At the same time, we cannot all be experts. In the contemporary world, citizens confront many important issues without having the necessary skills to judge the evidence. As a result, we are often forced to rely on authorities. Furthermore, if the experts have reached a level of agreement, knowing that they agree can sometimes be a useful bit of information.

Consensus is not a given. Often well-intentioned investigators working with shared sets of data fail to agree. Problems remain unsolved, and scientists retreat to their corners in support of conflicting pet theories. This is common and to be expected. Eventually, future advances in technology or theory may make additional progress possible, but until then disagreements and incomplete answers are the normal state of affairs. So, when scientists are able to converge on a shared understanding, consensus can add a little weight to that view.

But how should regular folks know when to accept a consensus viewpoint? To help decide, it is useful to ask, “What is the basis of the claim?” In the strongest cases, we have the word of scientists who have worked directly with the relevant evidence. For example, the consensus in climate change comes from researchers who work directly with climate data. Similarly, the brain training consensus statement was written by seventy scientists who routinely conduct and evaluate research on memory and learning. So, in these cases, the presence of a consensus seems noteworthy. It is not a guarantee that the dominant paradigm is correct, but it adds weight to the claim.

Unfortunately, the apparent consensus produced by the two hundred signatures on the MIT website in support of Professor Corkin is something else entirely. It is unlikely the vast majority of the signers had direct experience with the relevant evidence.

#### The Questions Raised

In the August 9 letter, Professor DiCarlo highlighted and responded to the three “allegations” above. According to DiCarlo, two of Professor Corkin’s department colleagues at MIT had investigated the matter, and their report “rebutted each claim” made by Dittrich in the *New York Times Magazine* article. Unfortunately, that appears to be far from clear.

In response to the August 9 letter, Dittrich published a piece addressing each of the objections raised by the MIT evaluation on Medium.com (Dittrich 2016c). In defense of his claim that Corkin destroyed some of H.M.’s data, Dittrich posted an audio file of his interview with Corkin in which she can be heard saying that she had already shredded data and planned to shred more. This means that either Corkin did what she said and destroyed data, or she lied (or perhaps misspoke) to Dittrich.

In a subsequent piece posted on the MIT website (that’s number three, if you are counting) on August 20, Professor DiCarlo further defended Corkin, arguing: (1) that an internal investigation had discovered that no files were destroyed, (2) that there was nothing wrong with the assignment of Thomas Mooney as Henry’s conservator, and (3) that any dispute over publication and the newly discovered lesion was overblown (DiCarlo 2016b).

#### Weighing the Evidence

This is a spat that will not be resolved. Professor Corkin is no longer with us, and she alone could answer some of these questions. In her defense, it should be acknowledged that the ethical standards for research with human participants has been evolving somewhat gradually since World War II, and Corkin began working with H.M. more than four decades ago. Today’s standards for obtaining informed consent and for the preservation of research data are much more rigorous than they were when she first met Henry. In addition, squabbles

among authors of scientific publications happen from time to time. As a result, it is unclear—to me, at least—whether she violated professional research standards.

Having said that, the questions raised by Dittrich are ones that, as a journalist, he has a right—perhaps even a duty—to raise. Our ethical standards will not continue to evolve unless we soberly consider the various research dilemmas of the past, present, and future. Perhaps there were good reasons for assigning Thomas Mooney conservator for H.M.—despite his not being Henry’s closest relative—but what principles should guide cases like this in the future? Like Dittrich, I would prefer that every bit of Henry’s data be preserved, and yet in Dittrich’s audio recording, Corkin can be heard defending the shredding of data. It is clear to me that Dittrich considers Henry Molaison’s legacy to be a public good, something that should be preserved for future generations, and I tend to agree.

But now back to the question of scientific consensus.

#### **When Should a Scientist Sign a Statement, Petition, or Letter of Support?**

It is understandable that MIT’s Department of Brain and Cognitive Sciences should want to defend its status in the scientific community and come to the defense of a beloved colleague. But what of the two hundred signers of the letter, the “International Community of Scientists”? Each of these individuals lent their professional identities to a claim of journalistic bias when few—if any—of them could have known the facts. In an interview for this article, Luke Dittrich reported that only one of the signers had an advanced copy of his book. In preparation for the book, Dittrich interviewed four people who later signed the statement. He recalled discussing the general question of informed consent with all four, but “I don’t think I delved into the three specific ‘allegations’ that MIT made.”

So here is what we know:

- All of the signers responded very quickly—in all but one case based on the *New York Times Magazine* article alone.
- The signatures were obtained before the specific claims of bias were made public by MIT.

- Once MIT identified the “allegations” it became clear that few if any of the signers could have had relevant knowledge of the facts. For example, it took an additional week and a half for MIT to investigate the H.M. files and come to the conclusion that they had been “maintained and not destroyed”—a claim that would be difficult to validate (DiCarlo 2016b).

Scientists have a unique and important role in the public dialogue. They are trusted—or should be—to have special skills of analysis achieved after long study and practice. There are many important social issues to which scientists can and should contribute. Unfortunately, when it comes to evolution, climate change, and the benefits of vaccination, scientists are too often ignored.

But if scientists are going to maintain their credibility, they should not squander their authority by weighing in on subjects outside their circle of knowledge. Many of us—including me—have at times made public statements that go beyond the data, but if we want to maintain the influence of science in society, we need to make every effort to stick to the subjects we know best.

I cannot help but wonder what might have happened if MIT had just let the issue slide. Dittrich’s book is interesting and provocative, but the “allegations” that MIT saw in the *New York Times Magazine* article are undoubtedly a much bigger deal inside the field of neuroscience than outside. Had Professor Corkin’s supporters kept their powder dry, they might have done a better job of protecting her honor. The Dittrich article and book would have caused whispers within the scientific community, but by returning fire MIT ensured that the case would be picked up by the press and that more copies of Dittrich’s book would be sold. MIT may ultimately have come to understand this point. Neither Dr. DiCarlo, the head of the Department of Brain and Cognitive Sciences, nor the department media office replied to emails requesting comment for this article.

Not responding to the *New York Times Magazine* article would also have saved the two hundred scientists from having to endorse a dubious statement.

Finally, I strongly recommend Dittrich’s book, *Patient H.M.: A Story of Memory, Madness, and Family Secrets* (Dittrich 2016b). It paints a vivid picture of the history of psychosurgery and the treatment of the mentally ill from the mid-nineteenth to the late twentieth centuries, and it provides an evocative and detailed account of the world’s most famous human research participant. In addition, Dittrich has a number of personal connections to the story. For example, it was Dittrich’s grandfather, William Beecher Scoville, who performed the tragic operation in 1953 that turned Henry Molaison into Patient H.M. ■

#### **References**

- “A Consensus on the Brain Training Industry from the Scientific Community.” 2014. Max Planck Institute for Human Development and Stanford Center on Longevity. Available online at <http://longevity3.stanford.edu/blog/2014/10/15/the-consensus-on-the-brain-training-industry-from-the-scientific-community/>; accessed October 12, 2016.
- DiCarlo, James J. 2016a. “Letter/Statement Submitted to the *New York Times* on August 9, 2016 from Prof. James J. DiCarlo, Head, Department of Brain & Cognitive Sciences at MIT,” Bsc.mit.edu. Available online at <http://bcs.mit.edu/news-events/news/letter-statement-submitted-new-york-times-august-9-2016-prof-james-j-dicarlo-head>; accessed October 12, 2016.
- . 2016b. “Additional information as of August 20, 2016, further rebutting Luke Dittrich’s allegations against Professor Corkin.” Bsc.mit.edu. Available online at <http://bcs.mit.edu/news-events/news/additional-information-august-20-2016-further-rebutting-luke-dittrich%E2%80%99s-allegations>; accessed October 12, 2016.
- DiCarlo, James J., Nancy Kanwisher, and John D.E. Gabrieli. 2016. “Letter to the Editor of the *New York Times Magazine*,” Brain & Cognitive Sciences. Available online at <http://bcs.mit.edu/news-events/news/letter-editor-new-york-times-magazine>; accessed October 12, 2016.
- Dittrich, Luke. 2016a. The brain that couldn’t remember. *The New York Times Magazine* (August 3).
- . 2016b. *Patient H.M.: A Story of Memory, Madness, and Family Secrets*. New York: Random House.
- . 2016c. “Questions & Answers about ‘Patient H.M.’” Medium.com. Last modified on August 10, 2016. Available online at <https://medium.com/@lukedittrich/questions-answers-about-patient-h-m-ae4ddd33ed9c#m07ogcven>.
- “Professor Brian Cox clashes with Australian climate sceptic.” 2016. BBC.com. Last modified August 16, 2016. Available online at <http://www.bbc.com/news/world-australia-37091391>.
- Vyse, Stuart. 2015. Neuro-Pseudoscience. CSICOP.org. Available online at <http://www.csicop.org/specialarticles/show/neuro-pseudoscience>; accessed October 12, 2016.



# Ghost Hunters in the Dark

Q:

Why do ghost hunters look for ghosts at night with the lights off? Obviously it's more dramatic, but is there some specific reason or investigative rationale behind it?

—S. Pedroncelli

A:

Nearly every ghost-themed “reality” TV show and film has one or more scenes in which the investigators walk around a darkened place, usually at night, looking for ghosts. Much of the reason that modern ghost hunters look for their quarry in the dark has nothing to do with science or investigation but instead early Spiritualist fraud and fakery—specifically the conditions under which ghostly hoaxing by psychic mediums would least likely be detected and visitors would be most open to misperception and psychological suggestion.

In her book on the Spiritualist town of Lily Dale—the site of various CSI investigations over the years (see, for example, Radford 2002)—Christine Wicker notes that “mediums so disliked light that they nailed planks over the windows of their séance rooms. . . . The mediums further improved their chances by constructing so-called spirit cabinets—curtained-off portions of the room from which the spirits emerged once all the lights were extinguished. Spirits demanded such conditions, the mediums said” (Wicker 2003, 65).

Whether ghosts indeed had a clause in their contracts to appear only out of the spotlight is unknown, but the darkness certainly helped mediums hide hoaxing and trickery. It's the same reason that magicians carefully control where their audience sits; they are keenly aware of the angles from

which they can be observed and use that to their advantage in hiding their illusions. While it's an unspoken rule that an inquisitive audience member is not allowed backstage—or onstage behind the magician while he or she performs—mediums offering a ghostly experience would give clear instructions about where their audiences could sit, what they could do, and so on.

When mediums and ghost conjurers were caught faking, it was often because the investigators did not follow the rules carefully set for them but instead took steps to get a clearer view of what was going on, for example by bringing out hidden flashlights or whisking a dark cloth they'd been told not to touch off a prop concealing trickery. Keep in mind of course that bringing literal and metaphorical light to supposed ghost activity would only reveal fakery and presumably not deter real paranormal entities. If automatic writings really did magically appear on mediums' slates by ghostly hands—or the spirit trumpets really did float in the air from otherworldly forces—there's no reason it couldn't be done in a brightly lit room. The same holds true today; that ghosts are more apt to appear when close scrutiny and open investigation are thwarted is not a coincidence.

Some ghost hunters believe that darkness helps to draw out ghostly entities. Yet even a casual review of ghost reports reveals that this is not true: *most sightings do not occur in darkness*.

People have reported seeing ghosts in broad daylight, in the morning, and at all times of the day. Well over a century ago, it was recognized that ghosts were not necessarily associated with the dark—popular perception notwithstanding. Educator and researcher Eleanor Sidgwick of the Society for Psychological Research concluded around 1885 when analyzing hundreds of eyewitness ghost reports that “ghosts may be seen in daylight or in artificial light, at dawn or at dusk, and in various parts of a house or outside in the yard,” according to Michaeleen Maher (2015, 328).

It is true that people are statistically more likely to report seeing a ghost in the evening, but it does not logically follow that ghosts must be more active after sunset. There are several non-supernatural reasons why ghost reports would occur more often at night, especially in homes. For one thing, there's a sampling bias: most people are not at home during the daytime, and most of their waking hours while at home occur in the evening. Obviously, people are more likely to report potential ghostly activity at night in their homes instead of during the day at an office job, post office, or assembly plant. Furthermore, people are more likely to be in psychological states that can induce misperceptions (and even mild hallucinations) in the evening. The evening hours—which of course largely overlap with the darkness hours—are when people typically get off work to relax; sometimes they drink alcohol or use



recreational drugs. Others succumb to another common mental state that has been clinically proven to greatly increase misperceptions and hallucinations: ordinary fatigue.

This of course does not mean that everyone who is tired after a long day will necessarily see or hear things that aren't there, but fatigue is a real and significant factor that cannot be dismissed. Ironically, ghosts are almost never reported under the conditions that most ghost hunters search for them: in near darkness with flashlights and EMF detectors.

Conducting an investigation in the dark is the equivalent of tying an anvil to a marathon runner's foot. It intentionally hobbles the investigation and is completely counterproductive. It also violates common sense and logic; if you are trying to identify an unknown object, is it better to look for it under bright lights or in a darkened room? There are virtually no other objects or entities on Earth that anyone would think are better observed in darkness instead of light; why would ghosts be any different? Humans are visual creatures, and our eyes need light to see—the more light the better. Darkness, by definition, severely limits the amount of information available. Searching at night in the dark puts investigators at an immediate and obvious disadvantage in trying to identify and understand what's going on around them. If limiting the investigator's ability to detect things around them helps find ghosts, why not take it a step further and use blindfolds and earplugs?

Furthermore, this strategy fails on its own terms. While some report seeing ghosts as glowing figures, many people report them as shadows or dark entities. Searching a dark room for a shadowy figure is an exercise in futility. If it were an established fact that ghosts emit light, there would be some logic to looking for them in a dark room. Unless a ghost or entity has been specifically and repeatedly reported or photographed emitting light, there's no valid, logical reason that ghost investigators would work figuratively (and literally) in the dark.

There is no logical or scientific reason that ghosts would not (or could

not) manifest themselves in bright light and under well-observed conditions. In fact, while many ghostly experiences are said to be liminal, others have been claimed to be very clear and obvious, such as in poltergeist cases in which dishes, telephones, and other large items are claimed to suddenly fly off tables and shelves. Some ghosts have even been claimed to move and rearrange furniture, including chairs and tables. These are not faint, brief sounds or light arguably best perceived in the dark but instead large and loud obvious ghostly displays that presumably should and could occur in bright daylight and while cameras are recording—yet do not.

This quest for minimal light creates an amusing paradox in which

**That's right: after choosing to remove a bright, fixed light from the investigation area (by looking after dark, turning lights off, etc.) the ghost hunters then re-introduce small amounts of light into the area, thus clearly illuminating only what is directly in front of the flashlight.**

ghost hunters' desire for ghost-friendly (not to mention error- and suggestion-prone) darkness must be weighed against the fact that ghost hunters must be able to see *something* in order to sustain the pretense of investigation. So a compromise is often reached in which ghost hunters use flashlights. That's right: after choosing to remove a bright, fixed light from the investigation area (by looking after dark, turning lights off, etc.) the ghost hunters then re-introduce small amounts of light into the area, thus clearly illuminating only what is directly in front of the flashlight, whose light constantly moves along with the ghost hunters and thus introduces moving shadows into an area in which moving shadows are easily mistaken for ghosts. If a ghost hunter has reason to believe—based, for example, on multiple eyewitness reports or videos—that ghosts emit light, then the investigation to find those entities should be done in complete darkness; if not, then it should be done in bright light. But to turn lights off

in an investigation area and then turn smaller lights back on is illogical and a very poor investigative strategy virtually guaranteed to fail.

It's like trying to record auditory evidence for ghosts by turning off stereos and devices generating ambient noise—but then putting on headphones to listen to music while investigating. It's as if the ghost hunters are unwittingly doing everything they can to introduce false-positive evidence of ghosts and make it as difficult as possible to determine whether something paranormal is truly occurring or not.

As Thomas Paine wrote, "It is error only, and not truth, that shrinks from inquiry"; thus ghost hunters should

not be content to sabotage their own research by turning the lights off or otherwise impeding their ability to investigate and identify the source of any anomalies, whether natural or supernatural. The reason it's often done for television shows is obvious: it makes for dramatic footage. It's spookier and more visually interesting to film the ghost investigators with infrared cameras. If the purpose of the investigation is to get spooky footage, turn the lights off. If the purpose is to scientifically search for evidence of ghosts, leave the lights on. ■

#### References

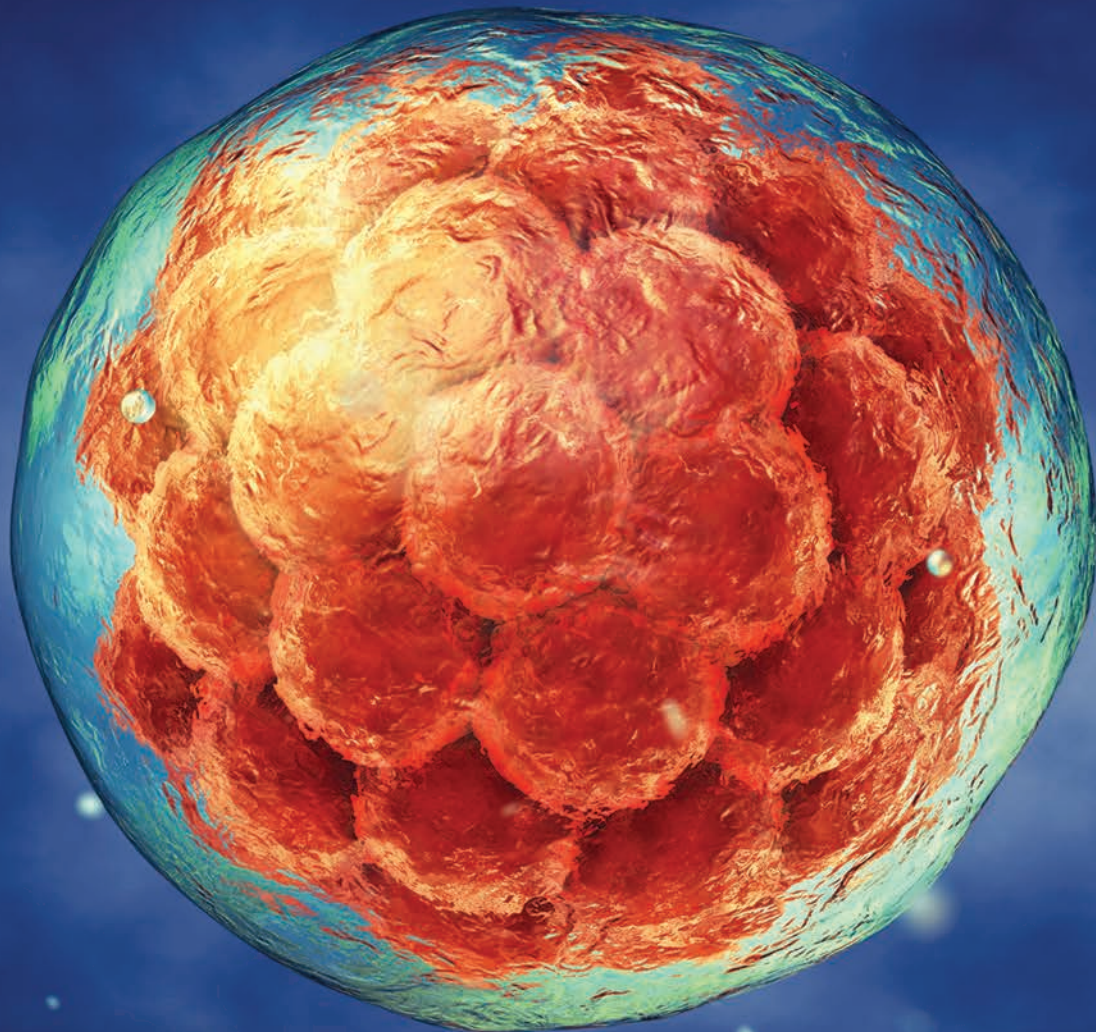
- Maher, Michaelleen. 2015. Ghosts and poltergeists. Chapter 25 in *Parapsychology: A Handbook for the 21<sup>st</sup> Century*. Ed. by Etzel Cardena, John Palmer, and David Marcussen-Clavertz. New York: McFarland.
- Radford, Benjamin. 2002. Messages from beyond at a Spiritualist meeting. *Skeptical Briefs*, June.
- Wicker, Christine. 2003. *Lily Dale: The True Story of the Town that Talks to the Dead*. New York: HarperCollins.

# STEM CELL RESEARCH

## Still Embattled after All These Years

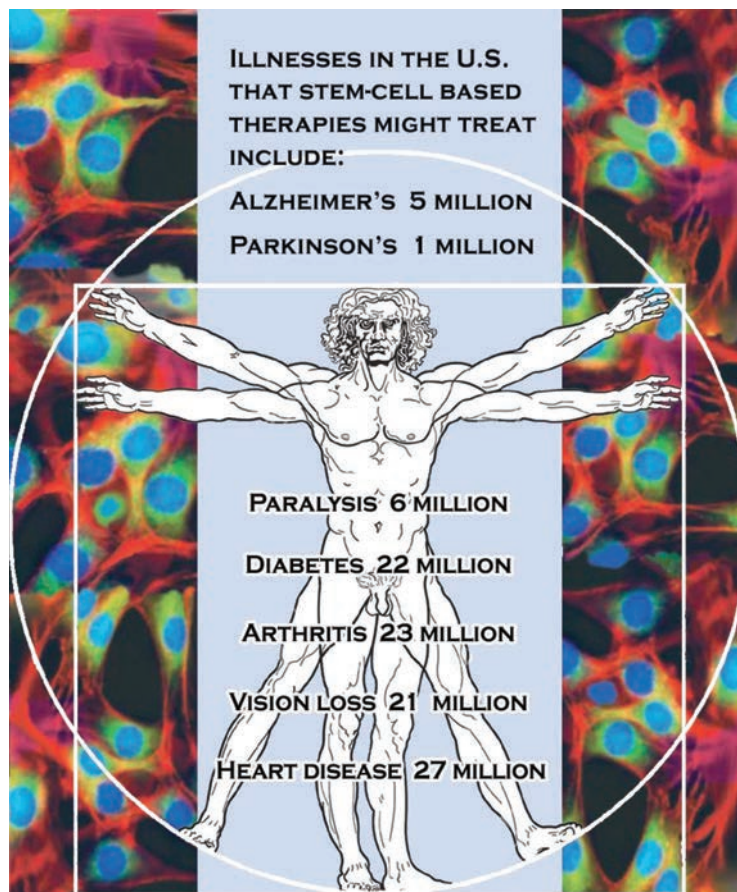
Had stem cell research not been obstructed by political and religious opposition, it would probably have arrived by now at effective treatments for a number of severe chronic diseases.

RAYMOND BARGLOW AND MARGRET SCHAEFER





**S**tem cell research seized headlines at the beginning of this century, promising to revolutionize medicine by healing illnesses such as Alzheimer's, Parkinson's, diabetes, spinal cord injury, and heart disease. These are all illnesses of severe cell deterioration or injury—illnesses that are in principle curable by embryonic stem cells, which have the ability to build every single tissue in the human body. Hence, when these cells were first isolated and replicated in 1998, it struck scientists at the time that the door now lay wide open to the advance of regenerative medicine.

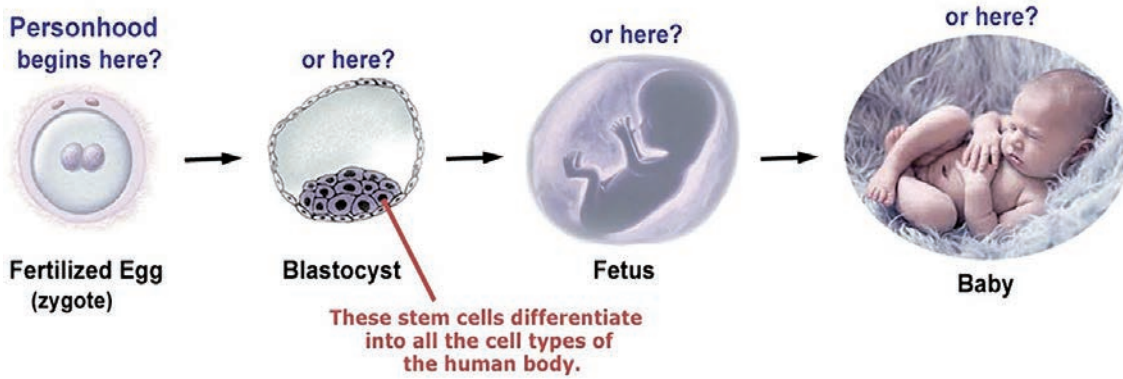


Yet stem cell research has to date not lived up to its immense potential. Two narratives are commonly told about this history, and they are at loggerheads with one another. The first is that the research has in fact steadily advanced and that clinical trials will soon yield effective stem cell-based therapies. This narrative acknowledges that stem cell research has run into obstacles, but it holds that such challenges are only to be expected, given the newness of the science.

Pitted against this sunny evaluation is an incriminating one: stem cell research, combining scientific hubris with hype, has been an overreaching, grandiose enterprise that has under-delivered on its therapeutic promises and proven ethically abhorrent as well scientifically barren.

Whether the story is told in a way that makes the glass look half-full or empty, both the positive





view and the negative view misread the actual history, failing to recognize that it has been and remains *political* opposition that has been primarily responsible for slowing down stem cell research in the United States and worldwide. Had the research received the support that it merits, it would probably have arrived by now at effective treatments for a number of severe chronic diseases.

### Stem Cell Research and Abortion Politics

It is of course appropriate that the goals and to some extent even the methods of science be approved not only in the laboratory but also in the legislative chamber. Indeed, scientific inquiry sometimes raises ethical issues that call for careful deliberation. In the case of stem cell research specifically, such issues have been especially difficult to resolve because this scientific project has been impacted by clashing demands. On the one hand, human beings are vulnerable to severe illnesses that stem cell research may help to remedy or cure, making the moral case for doing this research unusually compelling; public polls show strong support for research that uses embryo-derived and other kinds of stem cells to find effective therapies. On the other hand, there has arisen in the United States over the past several decades an influential religion-based political movement that strongly opposes embryonic stem cell research on the grounds that it is akin to abortion.

Beginning in the late 1970s, the legalization of abortion in the United States was contested by the religious right and the Catholic Church, and it is still contested today. Many states have passed laws based on the belief that a pre-born human is a full-fledged person and therefore possesses all the rights of personhood. Consequently, women are required to run a veritable gauntlet in order to terminate a pregnancy. This “pro-life” belief is also hostile to stem cell research, since the conviction that a fertilized egg is a person with full human rights makes a five-day-old blastocyst (which is a source of embryonic stem cells for scientific experimentation) as sacred as a months-old fetus or a newborn child. And while it is true that research that uses embryonic cells is only one form of

stem cell science, that research has played an important part in advancing the entire field—a point that we’ll return to later on in this article.

Because the slope of the trajectory from a fertilized egg to a born child is a gradual one with no discernible sudden leap into personhood, a consistent “sanctity of life” view is logically compelled to push the time of incipient personhood all the way back to fertilization. Hence this view sweeps embryonic stem cell research, along with abortion at every stage of pregnancy, into the domain of practices that are unethical and should be outlawed.

Were personhood to begin at conception, as the religious right maintains, that indeed would make the extraction of stem cells that destroys a blastocyst an act of murder. What is amiss with this reasoning? To be sure, a fertilized egg does count biologically as “human life.” But so does every individual cell in a human body. A single hair cell, for example, is also “human life,” since it is both human (i.e., it belongs to a member of the human species) and alive. But a hair cell is not a “person,” and a haircut is not homicide. Hence not every instance of “human life” has the status of a “person” with an inviolable right to life.

Yet this “right to life” view is fervently held by evangelical Protestant groups and the Catholic Church, and it has been politically influential in the United States for more than two decades. In 1995, the U.S. Congress passed legislation that prohibits federal funding for any research that creates or destroys a human embryo at any stage of development. That legislation bars federally funded stem cell scientists from using any of the hundreds of thousands of surplus embryos stored in IVF (in-vitro fertilization) clinic freezers across the nation—embryos that are routinely discarded as waste. Lost on the lawmakers is the manifest irrationality of such legislation, which permits the destruction of excess embryos in IVF clinics but prohibits the scientific use of those same embryos.

In 2001, President Bush issued an executive order that limited federal funding for embryonic stem cell research still further, on the grounds that “human life is a sacred gift from our creator.” In 2006 and again in 2007, he vetoed congressional legislation that

would have enabled the research. Although President Obama, shortly after assuming office in 2009, issued more permissive guidelines, stem cell research remained vulnerable to federal opposition. Legislation bestowing the full legal rights of personhood upon fertilized eggs was introduced in both houses of Congress in 2011 and 2013. A similar bill, H.R. 2761, the so-called “Sanctity of Life Act,” was introduced in 2015 and is backed by the current Speaker of the House, Paul Ryan. This bill declares that personhood “is deemed to exist from fertilization” and would prohibit not only abortion but embryonic stem cell research as well. In 2017, newly emboldened conservatives in federal government are likely to renew their attack on science and science funding, including funding for stem cell research.

### Research Funding

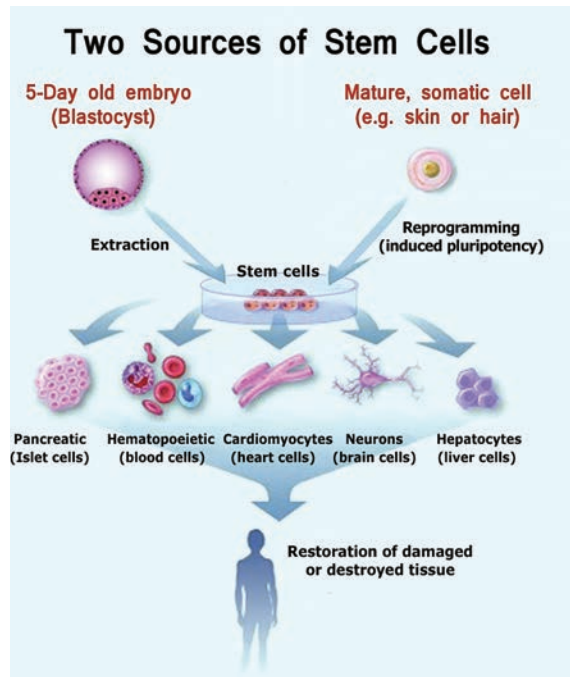
Stem cell research has never received substantial federal investment in the United States. Hence scientists have had to rely largely on private funding, which has proven inadequate for several reasons. First, biotech companies are reluctant to invest in stem cell research since this science is still in its infancy and unlikely in the short term to yield profitable clinical applications. Second, privately funded research typically relies on current or past government-sponsored research. Scientists employed by biotech companies learn from the work that their colleagues in the public sector are doing, and when that work is underfunded, the entire field is held back. Third, when the research is funded privately, its innovative methods, materials, and results become patented and proprietary in a way that interferes with the sharing and cooperation among researchers and laboratories that is needed to move scientific exploration forward most effectively.

These three problems with private financing have played a significant role in slowing the progress of stem cell research. Let’s review the history. The scientific breakthrough that, according to most accounts, founded the field of stem cell research was the isolation and extraction of embryonic stem cells by James Thomson of the University of Wisconsin in 1998. If the self-propagating stem cell lines produced in his laboratory had been made readily available to everyone conducting stem cell research, they would have supported the advance of the entire field. But although Thomson’s work was done at a public institution, the University of Wisconsin, it was privately funded by a single corporation, Geron. Access to these embryonic stem cell lines by other researchers was controlled by broad patents granting exclusive ownership to the Wisconsin Alumni Research Foundation (WARF), an entity set up by the University of Wisconsin but answering to Geron instead of to the wider public interest in advancing the science.

Four leaders in the field of stem cell research—Jeanne Loring from the Burnham Institute for Medical Research, Douglas Melton and Chad Cowan from Harvard, and the Australian researcher Alan Trounson who became the president of the California Institute for Regenerative Medicine—declared their opposition to the Geron patents. Stem cell research, they pointed out, is very much a collaborative enterprise, involving multiple disciplines and relying upon the unencumbered sharing of information and methods between scientists and sometimes between multiple laboratories. Patents such as those granted to Geron have not successfully incentivized innovation but have instead driven up stem cell research and development costs and interfered with the sharing of information that is so important to scientific advance.

### The California Institute for Regenerative Medicine

Because of the lack of federal support for stem cell research, a few individual states have sought to fund the research on their own. In California in 2004, a group of patient advocates and scientists wrote a state initiative to provide \$3 billion funding for stem cell research. Their grassroots campaign gathered enough signatures to place the measure on the ballot, and they achieved a landslide victory in November 2004. Proposition 71 established the California Institute for Regenerative Medicine (CIRM), which has, over the years, deployed its resources judiciously, becoming the hub of a global network of collaborating scientists, educators, and research institutions. However, although CIRM-funded research has substantially advanced scientific knowledge in many areas and has received approval for many clinical trials, it has not yet yielded a single FDA-approved





Joan Samuelson, an attorney diagnosed with Parkinson's disease in 1987, served for a decade as one of ten patient advocates on the governing board of the California Institute for Regenerative Medicine and helped to shape a wide range of institute policies.

Credit: C-Span

therapy. The major reason Proposition 71 has, to date, not lived up to early expectations is that CIRM has had to cope with political and legal objections to its scientific work.

First, immediately following passage of Proposition 71, the constitutionality of the ballot measure was challenged in court at the behest of the Life Legal Defense Foundation, a "pro-life" law firm representing religious organizations. Although this legal effort was ultimately defeated, it succeeded in delaying financing for nearly three years. Only in October of 2007 were the state funds released that enabled the research to go forward.

Second, political controversy has made it impossible for federal and state regulatory agencies to arrive at a consensus on the permitted paths that stem cell research may follow. Thoughtful and consistent reg-

compensation, this policy stops proposed studies from going forward. Scientists who applied to CIRM for embryo research funding were turned down because they could not guarantee the availability of eggs to conduct their proposed projects. Alta Charo, professor of law and bioethics at the University of Wisconsin, argues that making economic compensation for egg donation illegal throttles scientific advance and can "harm the millions of women worldwide who act as the primary caregivers for husbands, parents and children sickened by the very illnesses this research might someday cure."

CIRM's mission has also been thwarted by insufficient funding. Although California's \$3 billion investment in stem cell research is substantial, it has not been enough to subsidize both scientific discovery and the development of new treatments. In today's research and development environment, it takes an average of twelve years and, on a conservative estimate, costs a billion dollars to produce a single new drug, beginning with basic scientific exploration and discovery and followed by animal studies, preclinical and clinical trials, FDA approval, and finally manufacture. Advocates for the California stem cell program anticipated from the beginning that clinical applications would be too expensive for the Institute alone to fund, and they assumed that therapy development (so-called "translation") based on CIRM-sponsored scientific findings would instead be financed largely by biotech and pharmaceutical firms possessing resources sufficient to carry the research "from the laboratory to the bedside." Unfortunately, this strategy has so far not worked well, since the commercial prospects of discoveries made in the basic science have not been promising enough to assure interested companies that a major investment on their part will eventually be profitable.

Failure to publicly fund stem cell research adequately is unjustifiable, given the alleviation of suffering and the savings that will accrue if the research results in treatments for debilitating diseases. Care in the United States for patients with just one of these diseases, Alzheimer's, cost \$236 billion in 2016, according to the Alzheimer's Association. It's noteworthy as well that total federal investment on biomedical

## Failure to publicly fund stem cell research adequately is unjustifiable.

ulation is essential, and the public good will not be served if, under a Trump administration, politicians succeed in weakening FDA authority over biomedical research and development. On the other hand, when the California Institute conducted a survey of its major stakeholders in 2015, every group—the academic scientists, the clinical researchers, the industry investors, the patient advocates, and the general population—listed regulation as the biggest obstacle in developing stem cell medicine. For example, in California economic compensation for donating eggs to be used in embryonic stem cell research is prohibited by law (although it is legal throughout the United States to pay women when they donate eggs for *non-scientific* purposes, in fertilization clinics, for example). Since very few women are willing to undergo an egg donation procedure without any monetary



research—the 2016 NIH budget is \$31.3 billion—is much less than investment in other domains, such as military preparedness for example. The Pentagon has estimated that the expenditure in 2016 on the F-35 fighter plane alone, the most expensive aircraft ever developed, will be \$379 billion. The total cost of designing and building the plane may reach \$1.5 trillion.

### Pluripotent Stem Cells

“Induced pluripotent stem cells” are adult cells that have been genetically reprogrammed to closely resemble embryonic stem cells, and for some research purposes they can be substituted for embryonic cells as a “raw material.” The discovery of induced pluripotency in 2006 was acclaimed by stem cell research advocates and critics alike because it permitted the research to sidestep religious objections to working with embryos. But leading research scientists such as Thomson, Yamanaka, and Weissman have cautioned that the discovery of induced pluripotency does not render embryo research scientifically superfluous. The reprogramming of cells to a state of pluripotency has in the past run into a number of problems, including low replication rates and early senescence of the induced cells. It currently remains unclear whether induced pluripotent stem cells can be made equivalent to embryonic cells for all clinical as well as scientific applications. And even if it turns out that induced pluripotent stem cells can provide an adequate cell source for almost all of the needs of regenerative medicine, valuable time has been lost. It has taken a decade (2006–2016) to validate this substitute for embryonic cells—a decade during which embryonic cell research might have advanced much further had it not been largely abandoned.

### The Advocacy Community

The advance of stem cell science requires adequate economic support and wise government oversight, which to date have not been in place. A technocratic strategy for dealing with this predicament is to wrest science policy formation out of the hands of the lay public altogether, on the grounds that scientific matters are too complex for “ordinary people” to ever grasp. Yet the history of the California Institute for Regenerative Medicine, beginning with the campaign to gather signatures and build public support, and continuing with patient advocate participation in administering the institute following the electoral victory in 2004, illustrates that lay citizens, not themselves versed in biology or medicine but deliberating in the company of scientists, are capable of providing effective guidance.

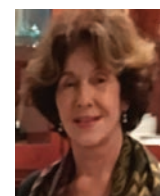
Patient advocates are capable also of communicating the value of stem cell research to the public. To

win hearts and minds on this issue, to persuade even some of those who are opposed on religious grounds, the case has to be made by those who are burdened by severe illnesses that the research has the potential to alleviate or cure. When patients, together with their caregivers and advocates, take their cases to the public, when they visit the offices of their political representatives and talk about the medical promise and ethics of the research, when patient activists such as Michael J. Fox, Joan Samuelson, and Mohammed Ali and his wife Lonnie Ali travel to Washington, D.C., and testify at a congressional hearing, opinions change. Conservative Senator Strom Thurmond’s encounter with the diabetes of his daughter and Nancy Reagan’s with the Alzheimer’s of her husband disarmed their religious qualms, and they both became proponents for the research. In California, the overwhelmingly affirmative vote for stem cell research in 2004 was achieved by a campaign that recounted the challenges faced by patients and their care providers in newspapers and social media, on TV, and at fundraising house parties.

In the 1980s and ’90s, HIV/AIDS activism enabled the successful scientific search for effective therapies. Today’s stem cell research movement travels a path that is no less promising—and no less challenging. Many patient activists, although they realize that their own personal illness may be too far advanced to be helped by a stem cell therapy that will be developed during their lifetime, hold out hope that others will be spared the travail of that illness. “While we prolong the stem cell debate,” said Christopher Reeve, the movie celebrity who was paralyzed by a horse-riding accident and became an advocate for the research, “millions continue to suffer.” By conveying to the public the urgency of acting on this humanitarian cause, patient advocacy can play a decisive role. ■



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Margret Schaefer received a PhD in English at UC Berkeley and has taught at UC Berkeley, San Francisco State, and the University of Illinois at Chicago. She is a cultural and literary critic, journalist, and translator and has written on issues in psychology and medical history as well as on Oscar Wilde, Kleist, Kafka, and Arthur Schnitzler.

# Public Debate, Scientific Skepticism, and Science Denial

How can scientists navigate highly polarized public controversies, and how can the public's legitimate demand for involvement be accommodated without compromising the integrity of science?

STEPHAN LEWANDOWSKY, MICHAEL E. MANN,  
NICHOLAS J.L. BROWN, AND HARRIS L. FRIEDMAN

**W**hen scientists discover a distant planet that is made of diamonds (Bailes et al. 2011), public admiration is virtually assured. When the same scientific method yields findings that impinge on corporate interests or people's lifestyles, the public response can be anything but favorable. The controversy surrounding climate change is one example of a polarized public debate that is completely detached from the uncontested scientific fact that Earth is warming from greenhouse gas emissions (e.g., Cook et al. 2013). How can scientists navigate those contested waters, and how can the public's legitimate demand for involvement be accommodated without compromising the integrity of science?

## Denial of Science

Public debate and skepticism are essential to a functioning democracy. There is evidence that skeptics can differentiate more accurately between true and false assertions (Lewandowsky et al. 2009). However, when tobacco researchers are accused of being a "cartel" that "manufactures alleged evidence" (Abt 1983, 127), or when a U.S. senator

labels climate change a "hoax" that is ostensibly perpetrated by corrupt scientists (Inhofe 2012), such assertions are more indicative of the denial of inconvenient scientific facts than expressions of skepticism (Diethelm and McKee 2009). The dividing line between denial and skepticism may not always be apparent to the public, but existing research permits its identi-

fication because denial expresses itself in similar ways regardless of which scientific fact is being targeted (Diethelm and McKee 2009). For example, denial commonly invokes notions of conspiracies (Lewandowsky et al. 2015; 2013; Mann 2012). Conspiratorial content is widespread in anti-vaccination material on the Internet (Briones et al. 2012) as well as on blogs that deny the reality of climate change (Lewandowsky et al. 2015).

A second common feature of denial, which differentiates it further from legitimate debate, involves personal and professional attacks on scientists both in public and behind the scenes. To illustrate, the first two authors (Lewandowsky and Mann) have been variously accused of "mass murder and treason" or have received email from people who wanted to see them "six feet under." Such correspondence is not entirely random: Abusive mail tends to peak after the posting of scientists' email addresses on websites run by political operatives.

Those public attacks are paralleled by prolific complaints to scientists' host institutions with allegations of research misconduct. The format of such

complaints ranges from brief enraged emails to the submission of detailed multipage dossiers, typically suffused with web links and richly adorned with formatting. In the tobacco arena, there is evidence that such complaints are highly organized (Landman and Glantz 2009). The triage between vexatious complaints and legitimate grievances causes considerable expenditure of public funds when university staff are tied up in phone calls, email exchanges, and responding to persistent approaches while also trying to examine the merit of complaints.

A further target for contrarian activity involves preliminary results or unpublished data. This modus operandi was also pioneered by the tobacco industry, which campaigned hard to gain unhindered access to epidemiological data (Baba et al. 2005). At first glance, it might appear paradoxical that an industry would sponsor laws ostensibly designed to ensure transparency of research. However, access to raw data is necessary for the re-“analyses” of data by entities sympathetic to corporate interests. In the case of tobacco, those analyses have repeatedly downplayed the link between smoking and lung cancer (see Proctor 2011).

A curious feature of all these lines of attack is that they tend to be accompanied by calls for “debate.” Often the same individuals who launch complaints with institutions to silence a scientist also proclaim that they want to enter into a “debate” about the science that they so strenuously oppose.

### **Public Skepticism and the Scientific Process**

Given that scientific issues can have far-reaching political, technological, or environmental consequences, greater involvement of the public in policy decisions can only be welcome and may lead to better outcomes. To illustrate, the town of Pickering in Yorkshire, England, recently revised its flood management plan as a result of a year-long collaboration between the local public and scientists (Whatmore and Landström 2011). The plan that was ultimately accepted differed con-

siderably from the initial draft produced by scientists without local public input. Notably, Pickering escaped the flooding that gripped other parts of Yorkshire during the winter of 2015–2016 (Lean 2016).

Notwithstanding the public’s entitlement to be involved, scientific debates must still be conducted according

satisfactory and fulfilling life. At the time when the project that led to our article began, Brown (the first author of that paper) was essentially a stranger to academia, having only attended three weeks of a weekend master’s program in psychology at the age of fifty-one while working full time as a civil servant.

When he doubted the validity of

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to the rules of science. Arguments must be evidence-based, and they are subject to peer review before they become provisionally accepted. Arguments or ideas that turn out to be false are eventually discarded—a process that sometimes seems to take too long but that arguably has served science and society well (Alberts et al. 2015).

Although these strictures are rigorous and may appear daunting to the layperson, they do not exclude the public from scientific debate. It is important to show that the public can participate in scientific debate, because otherwise denialist activities might acquire a sheen of legitimacy as the only avenues open to the public to question scientific findings.

Recently, two of us (Friedman and Brown) were coauthors of an article (Brown et al. 2013) that received much coverage for its criticism of a long-standing, much-cited finding in the field of positive psychology. Positive psychology studies the strengths that enable individuals to thrive and aims to aid in the achievement of a

some of positive psychology’s findings that were presented as fact in his classroom, he pursued the issue by contacting a researcher (Friedman) by email based only on the hope that Friedman might be sympathetic to his puzzlement. Once a dialog with the expert had been established—and once Brown had convinced his interlocutor of his sincerity—a fruitful scientific collaboration ensued that has thus far led to the publication of six articles. Notably, this collaboration differs from conventional student–professor interactions in that the parties initially were not known to each other and had no professional relationship prior to an unsolicited approach by email.

To be sure, the process of getting the first rebuttal article published was not easy, given the stature (e.g., more than 350 citations) of the article reporting the original, erroneous finding (Fredrickson and Losada 2005). Brown and Friedman encountered a certain amount of resistance—which would mostly qualify as bureaucratic rather than sinister, despite some apparent



conflicts of interest—to the acceptance of both their initial rebuttal article (on the basis of some rather bureaucratic interpretations of customary publishing practices), and to their attempts to write a subsequent comment on the original author’s reply (on the basis that the standard sequence of replies to a target article was now finished).

Ultimately, the system worked as it should: everyone remained calm and polite, and the various publishing and appeals processes were tested and observed to work. In the end, all articles appeared in print in the same journal, the scientific record was corrected, the

(GMOs) as a way to alleviate global food shortages, whereas two of us (Mann and Lewandowsky), while provisionally accepting the safety of GMOs, are concerned about their indirect consequences, such as the emergence of herbicide-resistant weeds that has been associated with GMO-related overuse of herbicides (Gilbert 2013). One of us (Friedman) is concerned about both their indirect consequences and their potential safety to individuals.

Two of us (Friedman and Brown) are not convinced beyond doubt that highly complex climate models are as yet sufficiently validated to be used as

not preclude, political debate about the safety of nuclear power. Whatever the science may say about the safety of nuclear power—for example, that it causes 100 times fewer fatalities than renewable biomass (Markandya and Wilkinson 2007)—those data might be legitimately overridden by the “dread” that nuclear power evokes in people. However, even dread does not justify harassment or threats of violence against scientists who measure nuclear fallout (Hume 2015).

### **Enhancing the Resilience of the Scientific Enterprise**

Opinion surveys regularly and consistently show that public trust in scientists is very high (Pew Research Center 2015). However, the position of the scientist as a neutral, disinterested proponent of “the truth” should not be taken for granted. For example, when Brown and Friedman’s first article on positive psychology (Brown et al. 2013) was published, it was cited on several forums and blogs dedicated to creationist ideas or to climate change denial. The argument typically ran thus: If psychologists can be as badly wrong as Brown et al. showed, and if psychologists are scientists, then how much confidence can we have in the pronouncements of other scientists? While such flawed logic is easily refuted in reasoned debate, it might be preferable if scientists refrained from giving provocateurs the opportunity to raise this kind of question in the first place. We suggest that the scientific community should respond to both legitimate skepticism and politically motivated denial with a three-pronged approach.

First, legitimate public concern about a lack of transparency and questionable research practices must be met by ensuring that research lives up to rigorous standards. We endorse most current efforts in this regard, and one of us (Lewandowsky) is a member of a relevant initiative involving the use of peer review to facilitate openness (<https://opennessinitiative.org/>).

Second, we believe that daylight is the best protection against politically motivated maneuverings to undermine

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field of positive psychology took stock, and nobody felt the need to publish home addresses or other personal details on the Internet (a harassing process known as “doxxing” that is popular not only with political operatives who oppose climate science but also with anti-vaccination activists and others). The contrast between the approach followed by Brown and the refusal to engage in the scientific process that is characteristic of denial as we described earlier in this article is striking.

### **The Need for Vigorous Debate**

We underscore that there is plenty of room for honest and vigorous debate in science, even among collaborators: One of us (Brown) is an enthusiastic proponent of the widespread adoption of genetically modified organisms

the basis of major public policy decisions that might have effects for many decades; the other two authors (Lewandowsky and Mann) acknowledge the uncertainty inherent in climate projections but note that, contrary to popular intuition, any uncertainty provides even greater impetus for climate mitigation (Lewandowsky et al. 2014). Notwithstanding those disagreements, the present authors found common ground for this article.

Although we believe that scientific evidence should inform political debate, we acknowledge that it is no substitute for it. To illustrate, the scientific evidence shows that the fallout from the Fukushima nuclear accident poses no discernible risk to people in North America (e.g., Fisher et al. 2013), but that finding should only guide, and

science. The first part of this article is one effort toward such transparency.

Finally, skeptical members of the public must be given the opportunity to engage in scientific debate. We have shown how two of the present authors—an academic and a member of the public who had been to three evening classes before his skepticism was aroused—teamed up to critique a widely cited finding and showed it to be unsupported. None of their activities fell within the strategies and techniques of denial that we reviewed at the outset, clarifying that denial is not an “avenue of last resort” for members of the public who are desperate to contribute to science or even correct it but rather a politically motivated effort to undermine science. ■

#### Note

An extended version of this article, which contains recommendations for the way in which scientists and members of the public might engage with each other on contested issues, can be found at Lewandowsky, S., M.E. Mann, N.J.L. Brown, et al. 2016. Science and the public: Debate, denial, and skepticism. *Journal of Social and Political Psychology* 4: 537–553. DOI:10.5964/jssp.v4i2.604.

#### References

Abt, C.C. 1983. The Anti-Smoking Industry (Philip Morris internal report). September. Available online at <http://legacy.library.ucsf.edu/tid/vob81f00>. Accessed May 6, 2012.

Alberets, B., R.J. Cicerone, S.E. Fienberg, et al. 2015. Self-correction in science at work. *Science* 348: 1420–1422. doi: 10.1126/science.aab3847.

Baba, A., D.M. Cook, T.O. McGarity, et al. 2005. Legislating “sound science”: The role of the tobacco industry. *American Journal of Public Health* 95: S20–S27. doi: 10.2105/AJPH.2004.050963.

Bailes, M., S. Bates, V. Bhalerao, et al. 2011. Transformation of a star into a planet in a millisecond pulsar binary. *Science* 333: 1717–1720.

Briones, R., X. Nan, K. Madden, et al. 2012. When vaccines go viral: An analysis of HPV vaccine coverage on YouTube. *Health Communication* 27: 478–485. doi: 10.1080/10410236.2011.610258.

Brown, N.J.L., A.D. Sokal, and H.L. Friedman. 2013. The complex dynamics of wishful thinking: The critical positivity ratio. *American Psychologist* 68: 801–813. doi: 10.1037/a0032850.

Cook, J., D. Nuccitelli, S.A. Green, et al. 2013. Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters* 8: 024024. doi: 10.1088/1748-9326/8/2/024024.

Diethelm, P., and M. McKee. 2009. Denialism: What is it and how should scientists respond? *European Journal of Public Health* : 2–4. doi:

10.1093/eurpub/ckn139.

Fisher, N.S., K. Beaugelin-Seiller, T.G. Hinton, et al. 2013. Evaluation of radiation doses and associated risk from the Fukushima nuclear accident to marine biota and human consumers of seafood. *Proceedings of the National Academy of Sciences* 110: 10670–10675. doi: 10.1073/pnas.1221834110.

Fredrickson, B.L., and M.F. Losada. 2005. Positive affect and the complex dynamics of human flourishing. *American Psychologist* 60: 678–686. doi: 10.1037/0003-066X.60.7.678.

Gilbert, N. 2013. Case studies: A hard look at GM crops. *Nature* 497: 24–26. doi: 10.1038/497024a.

Hume, M. 2015. Canadian researcher targeted by hate campaign over Fukushima findings. *The Globe and Mail*. Available online at <http://www.theglobeandmail.com/news/british-columbia/canadian-researcher-targeted-by-hate-campaign-over-fukushima-findings/article27060613/>.

Inhofe, J. 2012. *The Greatest Hoax: How the Global Warming Conspiracy Threatens Your Future*. Washington, DC: WND Books.

Landman, A., and S.A. Glantz. 2009. Tobacco industry efforts to undermine policy-relevant research. *American Journal of Public Health* 99: 45–58. doi: 10.2105/AJPH.2004.050963.

Lean, G. 2016. UK flooding: How a Yorkshire town worked with nature to stay dry. *The Independent*. Available online at <http://www.independent.co.uk/news/uk/home-news/uk-flooding-how-a-yorkshire-flood-blackspot-worked-with-nature-to-stay-dry-a6794286.html>.

Lewandowsky, S., J. Cook, K. Oberauer, et al. 2015. Recurrent fury: Conspiratorial discourse in the blogosphere triggered by research on the role of conspiracist ideation in climate denial. *Journal of Social and Political Psychology* 3: 142–178. doi: 10.5964/jssp.v3i1.443.

Lewandowsky, S., G.E. Gignac, and K. Oberauer. 2013. The role of conspiracist ideation and worldviews in predicting rejection of science. *PLoS ONE* 8: e75637. doi: 10.1371/journal.pone.0075637.

Lewandowsky, S., J.S. Risbey, M. Smithson, et al. 2014. Scientific uncertainty and climate change: Part I. Uncertainty and unabated emissions. *Climatic Change* 124: 21–37. doi: 10.1007/s10584-014-1082-7.

Lewandowsky, S., W.G.K. Stritzke, K. Oberauer, et al. 2009. Misinformation and the war on terror: When memory turns fiction into fact. In W.G.K. Stritzke, S. Lewandowsky, D. Denemark, et al. (Eds.), *Terrorism and Torture: An Interdisciplinary Perspective* (pp. 179–203). Cambridge, UK: Cambridge University Press.

Mann, M.E. 2012. *The Hockey Stick and the Climate Wars: Dispatches from the Front Lines*. New York: Columbia University Press.

Markandya, A., and P. Wilkinson. 2007. Energy and health 2: Electricity generation and health. *The Lancet* 370: 979–990. doi: 10.1016/S0140-6736(07)61253-7.

Pew Research Center. 2015. Public Esteem for U.S. Military Highest, Scientific Achievements Second in Global Comparison. Available online at <http://www.pewinternet.org/2015/01/29/public-and-scientists-views-on-science-and-society/>.

Proctor, R.N. 2011. *Golden Holocaust: Origins of the Cigarette Catastrophe and the Case for Abolition*. Berkeley, CA: University of

California Press.

Whatmore, S.J., and C. Landström. 2011. Flood apprentices: An exercise in making things public. *Economy and Society* 40: 582–610. doi: 10.1080/03085147.2011.602540.



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# Science vs. Silliness for Parents: Debunking the Myths of Child Psychology

Parents and students struggle to distinguish between pseudoscience and evidence-based ideas in child psychology. This study sampled the beliefs of 163 students and 205 parents on topics related to parenting and development.

STEPHEN HUPP, AMANDA STARY, AND JEREMY JEWELL

**M**any ideas in child psychology have been largely discredited (Koocher et al. 2014). Unfortunately, parents and college students often have a hard time distinguishing between research-supported ideas and discredited myths. For example, in recent research, college students believed that Facilitated Communication (a pseudoscientific intervention) was more effective than Applied Behavior Analysis (a well-established intervention) as a treatment for autism (Hupp et al. 2012; Hupp et al. 2013).

While there is emerging literature on beliefs about child-focused myths, the existing research base continues to have limitations. First, many popular myths of childhood have never been examined with opinion surveys. Second, published opinion surveys are largely limited to focusing on ineffective *interventions* even though there are many other myths in child psychology such as those related to etiology (cause), typical development, assessment, and basic parenting approaches. Finally, previous opinion surveys primarily included college students. Although it is valuable to know the beliefs of students, it may be even more informative to gather information regarding parents' beliefs. The purpose of this study was to assess the beliefs of both students and parents on a wide range of myths related to child

psychology, and this is the first study to collect data regarding beliefs for the majority of these myths.

## Method

This study includes two different samples of participants. First, 163 consenting undergraduate students were given a paper survey at the beginning of a child psychology course at a mid-sized midwestern university. All students in the course received a small amount of credit for this activity regardless of whether or not they consented to being in the study. The mean age of the students was 19.9 years old ( $SD = 2.0$ ). Students were mostly female (83.4 percent), with 13.5 percent indicating they were male, and 3.1 percent leaving this item blank. The sample was primar-

ily Caucasian (66.9 percent), followed by African American (17.8 percent), Hispanic/Latino (3.1 percent), and Asian (1.2 percent); 6.7 percent of participants were biracial, and 4.3 percent did not classify themselves. The sample included freshmen (32.5 percent), sophomores (25.2 percent), juniors (28.2 percent), and seniors (11.0 percent), with 3.1 percent of participants leaving this item blank.

The second group of participants consisted of parents. Specifically, 205 parents took part in an online study using Amazon's Mechanical Turk. Although Mechanical Turk is a relatively new tool for data collection, research shows that high-quality data from a diverse population can be collected in this manner, and it helps compensate for limitations inherent in studying college students alone (Buhrmester et al. 2011). Only parents living in America could take the survey, and they completed the survey anonymously. Participants received 25 cents worth of credit to be used at Amazon.com. The mean age of the parents was 33.2 years old ( $SD = 8.4$ ), and the mean age of their oldest child was 8.6 years old ( $SD = 6.8$ ). Regarding gender, 52.7 percent of parents were female, 45.9 percent were male, and 1.5 percent left the item blank. The sample was primar-



ily Caucasian (69.8 percent) followed by African American (10.2 percent), Asian (9.8 percent), Hispanic/Latino (4.9 percent), and American Indian or Alaska Native (0.5 percent); 2.9 percent of participants were biracial, and 2.0 percent did not classify themselves into any category.

Both students and parents completed a survey that was designed for this study. The Opinions About Kids Scale (OAKS) includes twenty-six statements that are myths related to child psychology, development, and parenting. Research debunking each of these myths is thoroughly described in the book *Great Myths of Child Development* (Hupp and Jewell 2015). The myth statements are interspersed with another twenty-six statements that are supported by research.

Participants responded on a four-point Likert scale for each statement (3 = “agree,” 2 = “somewhat agree,” 1 = “somewhat disagree,” 0 = “disagree.”). For the purposes of this study, responses of “agree” and “somewhat agree” were combined to indicate that the participant believed the statement. Results are reported in terms of the percentage of college students and the percentage of parents that believed each statement.

### Results and Discussion

Results for the myths are presented in Table 1, and results of research-supported statements are in Table 2. Overall, college students (with a paper survey) and parents (with an online survey) responded similarly across most items. That is, college students and parents differed by less than 10 percentage points for a large majority of the items (i.e., forty-one of fifty-two statements), and they differed by less than 5 percentage points for half of the items (i.e., twenty-six of fifty-two statements). Thus, this data indicates that college students and parents hold similar beliefs as measured by these different data collection methods.

The highest-ranked myth overall involved Attachment Parenting: 88.4 percent of students and 83.0 percent of parents believed that “The Attachment Parenting approach strengthens

**Table 1. Percent of College Students and Parents that Believe Child-Focused Myths**

Myths of Child Psychology	Rank	College	Parents
The Attachment Parenting approach strengthens the mother-infant bond.....	1	88.4	83.0
Most toddlers go through a “terrible two’s” stage.....	2	84.7	83.4
A child’s drawings provide insight into the subconscious cause of their problems.....	3	87.0	79.1
Within about one hour after birth, babies need to bond with their mothers so that attachment is stronger over time.....	4	82.7	82.0
The sex chromosomes of all girls are XX and all boys are XY.....	5	82.4	79.1
Baby walkers help young children learn to walk.....	6*	77.8	75.6
Showing cognitively stimulating videos to infants boosts their intelligence.....	7*	84.7	68.7
Too much sugar causes most children to be hyperactive.....	8	81.6	70.3
Most antidepressants used for kids are approved by the Food & Drug Administration.....	9	68.1	67.8
Most “only children” (without siblings) are more likely to be selfish & spoiled..	10	79.0	54.2
Some identical twins can feel each other’s physical pain.....	11	56.4	76.1
Programs like Scared Straight help prevent youth from breaking the law.....	12	64.2	62.4
Having a baby sleep in the mother’s bed promotes the baby’s secure attachment.....	13	63.2	62.4
When Mozart’s music is played to infants the music boosts their intelligence...	14	59.9	58.0
Using “baby talk” with an infant delays their ability to speak normally.....	15	50.0	51.7
Breastfeeding a baby for more than two years helps strengthen the attachment between the mother and child.....	16	38.7	52.2
Divorce tends to ruin the lives of most children that have to go through it.....	17*	39.5	46.8
Children who frequently wet the bed usually have underlying emotional issues.....	18*	42.9	43.4
When kids are never spanked for their misbehavior they are likely to be spoiled.....	19	45.0	38.5
Being in daycare interferes with the attachment between children and their parents.....	20	35.1	39.1
If a child has an imaginary friend, the child is usually less sociable with real kids.....	21	41.7	32.2
Brief “time-outs” are too weak to help decrease real behavior problems in toddlers.....	22	41.1	32.2
Letting one-year-olds “cry it out” at bedtime hurts their emotional development.....	23	25.5	42.5
Couples that are struggling with fertility have an increased chance of getting pregnant after they adopt a child.....	24	29.6	35.6
The shape of the mother’s belly is one factor that can help doctors predict the sex of a fetus.....	25	31.3	20.4
Vaccines have been a common cause of autism.....	26	22.8	24.4

Note. Participants are reported to believe the statement if they marked “agree” or “somewhat agree.” Rank was determined by calculating the overall average between the college students and parents for each statement; in two cases there was a tie in rank (marked by asterisks), and greater weight was given to the parent rating because there were more parent participants.

the mother-infant bond.” This commonly held belief could be concerning to psychologists using evidence-based approaches, as a large part of Attachment Parenting is to warn parents of the cry-it-out method used for sleep problems with children even though the cry-it-out approach is supported by research when used as part of a larger sleep hygiene intervention (Kuhn and Elliott 2003). Fortunately, fewer of the participants (i.e., 25.5 percent of students and 42.5 percent of parents) reported believing the myth that

“Letting one-year-olds ‘cry it out’ at bedtime hurts their emotional development.” Other items from the survey queried about other components of Attachment Parenting. For example, 82.7 percent of students and 82.0 percent of parents believed that “Within about one hour after birth, babies need to bond with their mothers so that attachment is stronger over time,” and 63.2 percent of students and 62.4 percent of parents believed that “Having a baby sleep in the mother’s bed promotes the baby’s secure attachment.”

**Table 2. Percent of College Students and Parents that Believe Research-Supported Statements**

Research-Supported Statements	Rank	College	Parents
Daily physical activity is important for children's health.....	1	100	97.6
It is common for siblings to have disagreements with each other.....	2	99.4	96.1
Breastfeeding is a healthy way for babies to get nutrition.....	3	97.5	97.6
Physical abuse can be harmful to children's emotional development.....	4	98.8	95.6
It is important for mothers to eat a balanced diet while pregnant.....	5	99.4	94.6
Teachers should report a parent if they see the parent abuse a child.....	6	98.7	95.1
It is common for children to make grammatical mistakes when learning to talk.....	7	98.7	94.6
It is a good idea for parents to read every day with toddlers.....	8	98.1	94.6
Drug use during pregnancy can be harmful to the developing fetus.....	9	98.8	92.7
Most children need more sleep than adults.....	10	96.4	94.2
Fathers often have a big influence on their children's emotional developments.....	11	92.6	96.1
Most young babies can perceive different speech sounds.....	12*	92.6	94.7
Verbal teasing can be more harmful than physical bullying.....	13*	95.1	92.2
Cognitive-behavioral therapy can be helpful for children with clinical depression.....	14	92.0	92.2
It can be helpful for children who experience a lot of anger to see a therapist.....	15	93.8	88.3
Children sometimes need to learn how to "face their fears".....	16	93.9	87.3
Often a physical trait is influenced by more than one gene.....	17	91.4	89.7
Applied Behavior Analysis can be helpful for children with autism.....	18	87.7	88.8
Kids usually develop friendships with others that are similar to them in some way.....	19	91.9	84.4
Most people don't remember much before the age of about three years-old....	20	91.4	83.9
It is common for children who have been adopted to live happy and successful lives.....	21	82.2	91.2
When babies are born they already have many reflexes.....	22	81.5	86.8
Children can be diagnosed with clinical depression.....	23	77.3	88.3
The average boy tends to be more aggressive than the average girl.....	24	87.0	75.2
Intelligence is influenced by genes.....	25	57.1	79.1
The vision of most babies is worse than the vision of most adults.....	26	51.6	66.3

Note. Participants are reported to believe the statement if they marked "agree" or "somewhat agree." Rank was determined by calculating the overall average between the college students and parents for each statements; in one case there was a tie in rank (marked by asterisks), and greater weight was given to the parent rating because there were more parent participants.

Overall, these Attachment Parenting beliefs may cause parents to avoid research-supported treatments, engage in bedtime behaviors discouraged by the American Academy of Pediatrics (i.e., bed-sharing), and feel guilty if they did not have the opportunity to bond with their newborn immediately after birth.

The second-highest-ranked myth involved disruptive child behaviors. Specifically, 84.7 percent of students and 83.4 percent of parents believed that "Most toddlers go through a 'terrible two's' stage." Although it's common for all two-year-olds to engage in some disruptive behaviors, it's also common to find some disruptive behaviors in

just about every age group, and research shows that two-year-olds are not more terrible than children of other ages (Janson and Mathiesen 2008). While it is true that some new disruptive behavior might crop up at two-years-old, the same can also be said for other ages, and many new prosocial behaviors emerge at age two as well. The "terrible two's" myth has the potential to normalize clinical behavior problems and prevent parents from seeking evidence-based interventions such as behavioral parent training (Eyberg et al. 2008). Similarly, time-outs are a common component to behavioral parent training, and 41.1 percent of students and 32.2 percent

of parents believed that time-outs are too weak to be effective even though research shows that they can often be helpful when used along with other strategies.

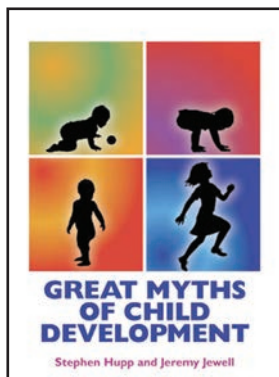
The third-highest-ranked myth involved projective drawings that are rooted in psychoanalysis. Eighty-seven percent of students and 79.1 percent of parents believed that "A child's drawings provide insight into the subconscious cause of their problems." In other research, over half of the professionals doing child custody evaluations (Ackerman and Pritzl 2011) and nearly half of school psychologists (Hojnoski et al. 2006) were using projective drawing methods, such as the House-Tree-Person. With high use among professionals, it's not surprising that students and parents believe this myth even though projective drawings have been debunked in terms of their ability to provide useful clinical information during an assessment (Lilienfeld et al. 2000). Although *non-projective* drawings may be one useful tool for therapists to build rapport with children, *projective* drawings are problematic when used in place of useful assessment techniques such as functional behavior assessment.

Other commonly believed myths may also interfere with evidence-based approaches. For example, 81.6 percent of students and 70.3 percent of parents believed that sugar causes children to be hyperactive. This belief may lead to ineffective treatments such as sugar-elimination diets instead of well-established treatments such as behavioral classroom management (Evans et al. 2013). In another example, 64.2 percent of students and 62.4 percent of parents believed that the Scared Straight program is an effective intervention for delinquency, which could lead to parents seeking this ineffective treatment in place of an evidence-based treatment such as Multi-systemic Therapy (Eyberg et al. 2008). In addition, 42.9 percent of students and 43.4 percent of parents believe that emotional issues are at the root of bed-wetting, which could lead to therapy based in treating an unidentified subconscious problem, when a urine alarm

is actually a quite effective treatment instead (Gimpel et al. 1998).

The lowest-ranked myth involved autism and vaccines. Specifically, 22.8 percent of students and 24.4 percent of parents believed that “Vaccines have been a common cause of autism,” even though research consistently fails

Overall, students and parents tended to believe in the effectiveness of evidence-based approaches; however, they also tended to believe several myths that could interfere with effective treatments and may otherwise put children’s safety at risk. This study provides data regarding the prevalence of beliefs



## Overall, students and parents tended to believe in the effectiveness of evidence-based approaches.

to find this connection (Hobson et al. 2012). Although this is the lowest ranked myth, it is potentially one of the most dangerous, as this belief causes some parents to avoid important vaccinations for measles, mumps, rubella, and other diseases. In addition, belief in this myth causes parents to choose ineffective autism treatments, such as chelation (i.e., to remove mercury from the body) instead of well-established treatments such as Applied Behavior Analysis (Rogers and Vismara 2008).

Regarding the research-supported statements on the OAKS, college students and parents tended to report high levels of belief. For example, about 92 percent of participants believed that Cognitive-Behavioral Therapy was effective for childhood depression, and about 88 percent of participants believed that Applied Behavior Analysis was an effective treatment for autism. Regarding childhood anger, 93.8 percent of college students and 88.3 percent of parents believed that “It can be helpful for children who experience a lot of anger to see a therapist.” Regarding anxiety, 93.9 percent of students and 87.3 percent of parents believed that “Children sometimes need to learn how to ‘face their fears.’”

about several myths and can help instructors prioritize which myths need to be addressed in the classroom. For these myths, this study serves as a marker in time for future studies to evaluate how beliefs change over time. ■

### References

Ackerman, M.J., and T.B. Pritzl. 2011. Child custody evaluation practices: A 20-year follow-up. *Family Court Review* 49: 618–628.

Buhrmester, M., T. Kwang., and S.D. Gosling. 2011. Amazon’s Mechanical Turk a new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science* 6(1): 3–5.

Evans, S.W., J.S. Owens, and N. Bunford. 2013. Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder. *Journal of Clinical Child & Adolescent Psychology*: 1–25.

Eyberg, S.M., M.M. Nelson, and S.R. Boggs. 2008. Evidence-based psychosocial treatments for children and adolescents with disruptive behavior. *Journal of Clinical Child & Adolescent Psychology* 37: 215–237.

Gimpel, G.A., W.J. Warzak, B.R. Kuhn, et al. 1998. Clinical perspectives in primary nocturnal enuresis. *Clinical Pediatrics* 37: 23–29.

Hobson, K.A., P.F. Mateu, C.L. Coryn, et al. 2012. Measles, mumps, and rubella vaccines and diagnoses of autism spectrum disorders among children: A meta analysis. *World Medical & Health Policy* 4(2): 1–14.

Hojnoski, R.L., R. Morrison, M. Brown, et al. 2006. Projective test use among school psychologists: A survey and critique. *Journal of Psychoeducational Assessment* 24: 145–159.

Hupp, S., and J. Jewell. 2015. *Great Myths of Child Development*. Malden, MA: Wiley-Blackwell.

Hupp, S.D.A., E. McKenney, M. Schmittel, et

al. 2013. Disseminate, debunk, differentiate: Teaching about evidence-based treatments in a child psychology course. *The Behavior Therapist* 36: 14–16.

Hupp, S.D.A., A.K. Stary, K.N. Bradshaw, et al. 2012. Debunk, debunk, debunk: Some evidence for why dissemination is only half the battle. *The Behavior Therapist* 35: 76–78.

Janson, H., and K.S. Mathiesen. 2008. Temperament profiles from infancy to middle childhood: Development and associations with behavior problems. *Developmental Psychology* 44: 1314–1328.

Koocher, G.P., M.R. McMann, A.O. Stout, et al. 2014. Discredited assessment and treatment methods used with children and adolescents: A Delphi poll. *Journal of Clinical Child & Adolescent Psychology*: 1–8.

Kuhn, B.R., and A.J. Elliott. 2003. Treatment efficacy in behavioral pediatric sleep medicine. *Journal of Psychosomatic Research* 54: 587–597.

Lilienfeld, S.O., J.M. Wood, and H.N. Garb. 2000. The scientific status of projective techniques. *Psychological Science in the Public Interest* 1(2): 27–66.

Rogers, S.J., and L.A. Vismara. 2008. Evidence-based comprehensive treatments for early autism. *Journal of Clinical Child & Adolescent Psychology* 37: 8–38.



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# Creationism in Europe

Creationism is not an exclusively North American phenomenon. In Europe, creationism is also finding a foothold, drawing the attention of European scholars.

STEFAN BLANCKE

**M**any people regard creationism as a North American phenomenon. Indeed, polls over the past three decades have invariably shown that creationism is immensely popular in the United States. Between 40 and 50 percent of the American population endorses the belief that God created the Earth (and life on it) more or less as it is today. The rest accept the fact of evolution, but the large majority believes that God has guided the process. Only 10 to 15 percent accept the scientific, naturalistic account of evolution. If we compare these numbers with the few figures that we have on Europe, it becomes immediately clear how exceptional the American situation really is.

In some Northern and Western European countries, such as Iceland, Denmark, and France, the acceptance rate of human evolution is higher than 70, sometimes even 80, percent. In Eastern European countries the acceptance rate is much lower, but it is still at least ten percentage points higher than in the United States (Miller et al. 2006). The only exception is Turkey, where no more than 30 percent of the public accepts evolution. Furthermore, American creationists actively battle the (exclusive) teaching of evolution in public schools—politically, in the courtroom, and on school boards, which has made them highly visible in the media. So it seems only reasonable to associate creationism with the United States.

Nonetheless, recent research in the historical and sociological sciences indicates that creationism is spreading

across the globe. Historian Ronald Numbers has documented creationist activities from Australia to Canada, from Brazil to Korea (Numbers 2006; 2009). Incidents in various European countries have suggested that creationism is gaining a following on that continent as well. As a result, an increasing number of European scholars developed an interest in the phenomenon, and some published on creationist activities in the countries where they resided. However, most of this research was scattered across various magazines and scientific journals. Two Danish researchers—Hans Henrik Hjermslev and Peter C. Kjærgaard—and I thought it would be a good idea to bundle everything we know about the recent history of creationism in Europe to get a good understanding of what exactly is going on in Europe. We joined forces with Ronald Numbers and invited ex-

perts from various countries to contribute. These efforts resulted in a recently published edited volume with the Johns Hopkins University Press: *Creationism in Europe* (Blancke et al. 2014). The book contains ten chapters discussing the situation in different countries or regions, plus four topical chapters; this article offers a sampling.

## What Is This Thing Called 'Creationism'?

What do we mean by creationism? People tend to associate it exclusively with young-Earth creationism: the belief that God created the Earth six to ten thousand years ago as told in the Book of Genesis. However, this is only one type of creationism, and it has become the dominant view among American creationists only since the 1960s. There is also old-Earth creationism, which reconciles the fact that the Earth is millions of years old with the biblical account of creationism. The most recent creationist variety is intelligent design (ID), a movement that purports *not* to be connected to a particular interpretation of the biblical creation story. It merely claims that the world clearly bears the marks of an intelligent designer, without explicating the exact identity of that designer. This strategy is designed to circumvent the First Amendment to the U.S. Constitution, which states, "Congress shall make no law respecting an establishment of religion." By avoiding signs of explicitly religious commitments, ID proponents aim to introduce their beliefs in biology classes as a viable

alternative to evolutionary theory. At the same time, ID is also intended to function as “a big tent” where creationists can put their theological disputes about the age of the Earth aside because they all believe that an intelligent being created life on Earth.

Phillip Johnson, professor emeritus of law at the University of California and godfather to the ID movement, wants to expand the tent even further. He defines a creationist as someone who believes that God creates. As if by magic, he makes every religious person a creationist, and atheism becomes the only alternative. Many people would resist such a depiction of their religious beliefs. Moreover, to understand the phenomenon of creationism, Johnson’s definition is far too broad. It would be quite a stretch to put a deist, who believes that God created the universe but has not actively intervened since, or a theistic evolutionist, who accepts the scientific account of evolution, on the same footing as a fundamentalist who endorses a literal interpretation of the Bible.

Because it comes in various shapes and sizes, creationism is not easy to define. Pragmatically, however, each variety of creationism shares two features. First, a creationist believes that God (or an ambiguously defined “intelligent designer”) actively and directly intervenes in the world and that we can find traces of these divine activities in nature. Biological adaptations such as the human eye are typical examples. For creationists, these instances of functional complexity constitute irrefutable evidence of the existence of a divine intelligence. In other words, this is the old design argument. Second, creationism is characterized by antievolutionism. Creationists oppose evolution because they believe it has terrible consequences for mankind and society, and they want to defend their traditional norms and values, which they believe are divinely ordained. Practically, this entails that women should stay at home and take care of the family, that there should be no LGBT rights, no abortion or euthanasia, and so forth. Creationism is much more than a religion. It is a

socio-political movement that strives for the return to a utopia before the Enlightenment humanism in which God took central stage at all levels of society. Indeed, the creationist movement emerged from American Protestant fundamentalism that gained ground in the 1920s as a response to World War I, which was regarded as an example of the devastating consequences of humanism.

These two features together—the design argument and antievolutionism—form a working definition that is precise enough to allow us to discriminate between conservative and liberal religious people. It is also broad enough that we do not have to associ-

ate creationism with a particular interpretation of the Bible, nor even with a particular religion. Hence we can speak not only of Christian but also of Muslim, Orthodox, and even Vedic creationism; this definition is very useful if one wants to study and understand creationism in Europe.

### Creationism in Europe

In the course of the first decade of the twenty-first century, it became undeniably clear that creationism in Europe was becoming an issue. Particularly telling and alarming were incidents involving ministers of education. In 2004, the Italian minister tried to delete any reference to evolutionary



**Phillip Johnson defines a creationist as someone who believes that God creates. As if by magic, he makes every religious person a creationist, and atheism becomes the only alternative.**

theory from textbooks for primary and secondary education. One year later in 2005, the Serbian minister of education had to resign after she decided that teachers were no longer allowed to teach evolution without also discussing creationism. In the same year, the Romanian Ministry of Education allowed teachers in Christian and public schools to use a creationist handbook in biology classes. In 2006, the minister of education of the German state of Hessen sided with evangelical schools that taught creationism. The same year, the ultra-Catholic Polish deputy minister of education openly questioned evolutionary theory, which he considered to be “a lie” and “the feeble idea of an aged non-believer”

(Kjærgaard 2008). In both Ukraine and Russia, the Ministry of Education has supported creationist conferences. And in the Netherlands, the minister of education declared that ID could perhaps be used in the classroom to bridge science and religion. Because of the political and media upheaval her statement caused, she had to put those plans to rest (Blancke 2010; Blancke et al. 2013).

Support also comes from official religious institutions. In 2007, a fifteen-year-old girl from St. Petersburg, Russia, and her parents filed a complaint to the court because they felt that the teaching of evolution had violated the

which explains why the theory hardly receives any attention in Greek education.

However, the involvement of religion in matters of state is nowhere as prominent as in Turkey where creationism is simply in the textbooks. This situation is partly the result of active missionary work by American young-Earth creationists during the 1960s and 1970s, when they were looking for the remains of Noah's Ark on Mount Ararat. It is therefore unsurprising that Turkey is home to the group of one of the most active and influential creationists in Europe, Harun Yahya, which is the *nom de plume* for architect Adnan Oktar. In 2007, the organiza-

and thus made Europeans aware of the existence of Islamic creationism. However, Harun Yahya not only spreads his message via books but also—probably more importantly—via the Internet. Through his websites, he reaches the Muslim youngsters who live in European cities and are looking for an Islamic identity within a secular society, where they do not always feel at home. They make an appreciative audience for Harun Yahya's antievolutionary rhetoric. As a result, biology teachers are frequently confronted with students who protest, make a fuss, or simply leave the classroom when evolutionary theory is taught.



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girl's religious rights. Both the Russian Ministry of Education and the Russian Orthodox Church supported her case because they welcomed the teaching of alternative ideas. After the fall of the Soviet Union, a large and influential conservative faction within the Russian Orthodox Church has sought to extend its impact on Russian society. Opposing evolutionary theory, which is often associated with atheist communism, is an important part of their strategy. In the Greek Orthodox Church, a conservative faction has strived for the deletion of evolutionary theory from textbooks,

tion sent numerous unsolicited copies of the *Atlas of Creation* to schools, universities, clergymen, and journalists in countries such as Denmark, France, Switzerland, Spain, and Belgium. This lavishly published and monstrous book contains only one argument. By putting pictures of extant species next to similar looking fossils, it intends to show that evolution has never taken place. (See Stefano Bigliardi, "Harun Yahya's Islamic Creationism: What It Is and Isn't," *SKEPTICAL INQUIRER*, January/February 2014.) Naturally, this event drew massive attention of the media,

The activities of Harun Yahya were one of the incentives for the Council of Europe (not to be confused with the European Council, which is one of the main political bodies in the European Union) to issue a resolution in 2007 that warned against the dangers of creationism for education and society at large. The report that was drafted in preparation of the resolution also tallies several other creationist incidents that had occurred in various European countries in years before. Some of them I've already mentioned, but the report also refers, for instance, to a



creationist museum in Sweden and an incident in the United Kingdom where a school had rented out classrooms to the organizers of a creationist conference with American speakers. Later, a newspaper revealed that the students at this partly state-funded school were taught creationism. The school denied the accusations, but it quickly became clear that the director and the head of science were both young-Earth creationists who were in favor of “equal time” (teaching as much creationism as evolutionary theory). After the report, creationists have not stood still. Also in the United Kingdom, an organization called “Truth in Science” dispatched unsolicited DVDs to secondary schools to promote ID. Later, a study showed that after watching this material, teachers were more inclined to doubt evolutionary theory. ID has also put its foot firmly on Scottish soil with the founding of the Centre for Intelligent Design in 2010.

In the Netherlands in 2009, a group of Dutch creationists distributed a leaflet with the title *Evolution or Creation? What Do You Believe?* through the mail to every Dutch household. The action was intended as a counter voice to the many celebrities in the public sphere on the occasion of the Darwin year, the bicentenary of the scientist’s birth and the 150th anniversary of the publication of *On the Origin of Species*. One of the organizers, entrepreneur Johan Huibers, has built an ark as a traveling museum to spread the word of God. On a debate show on Dutch national television in 2008, he was asked whether there were dinosaurs on the ark, to which he replied: “Only the little ones.” One year later, some of these creationists established a “scientific” creationist magazine, *Weet Magazine*, which looks just like a popular science magazine such as *Scientific American*. They also published Dutch translations of German creationist books, including the sixth edition of *Evolution, Ein kritisches Lehrbuch (Evolution: A Critical Textbook)*. The authors of this book are Reinhard Junker, a theologian and former biology teacher, and Siegfried Scherer, a microbiologist at the Technical University of Munich. The book has been

translated into several European languages, including Serbian, Portuguese, Italian, and Russian. Both authors are members of the Studiengemeinschaft Wort und Wissen (Study Community Word and Knowledge), a small but very active German creationist organization with ties to the American ID movement. In 1999, Joseph Cardinal Ratzinger (later Pope Benedict XVI) referred to the works by Scherer and Junker to substantiate his doubts about macroevolution. Hence, it seems that they have managed to turn a typical brand of American creationism into a European version that is digestible and usable for religious conservatives who do not want to be associated with American creationism.

Clearly, creationism in Europe is a complex phenomenon. Not only does the popularity of creationist beliefs differ from one European country to the next, but there are also many different types of creationism. Sometimes Europeans (especially evangelicals) simply adopt American-style creationism. Creationism, however, also easily adapts itself to new environments by mixing with local varieties. There are Islamic, Protestant, Catholic, Orthodox, and in some places even Jewish and Vedic creationists. In Russia and other former Eastern Bloc countries, evolutionary theory is associated with communism, whereas for Muslim creationists the theory is a symbol of Western decadence. Dutch creationists regard evolution as the cause of the undesirable modernizing developments since the 1960s. Hence, local factors determine the form and the success of creationism, which makes it impossible to speak of one European creationism or creationist subculture.

### The Future of European Creationism

Because of this complexity, it is difficult—if not impossible—to predict the overall fate of creationism in Europe. The situation is completely different from the United States where creationism is part and parcel of a substantial and politically influential subculture. In Western and Northern Europe, creationism does not seem to stand

much chance, except perhaps in small Protestant communities and among Muslim populations in the cities. In Eastern Europe, however, decades of communist regime have resulted in a religious wasteland, where the traditional religious beliefs of conservatives and fundamentalists find a welcoming soil. Creationists seem to have the best chance of exerting societal influence when they can align themselves with right-wing parties who share the same moral agenda, as in Poland, or when they are the dominant faction within the official church, as in Russia. This means that we cannot drop our guard. When creationism spreads, it poses a threat not only to science education but also to the many achievements of modern society. ■

### References

- Blancke, Stefaan. 2010. Creationism in the Netherlands. *Zygon. Journal of Religion and Science* 45(4): 791–816. doi: 10.1111/j.1467-9744.2010.01134.x.
- Blancke, Stefaan, Hans Henrik Hjermitsev, Johan Braeckman, et al. 2013. Creationism in Europe: Facts, gaps, and prospects. *Journal of the American Academy of Religion* 81(4): 996–1028. doi: 10.1093/jaarel/lft034.
- Blancke, Stefaan, Hans Henrik Hjermitsev, and Peter C. Kjærsgaard, eds. 2014. *Creationism in Europe*. Baltimore: Johns Hopkins University Press.
- Kjærsgaard, Peter C. 2008. Western front. *New Humanist* 123(3): 39–41.
- Miller, J.D., E.C. Scott, and S. Okamoto. 2006. Public acceptance of evolution. *Science* 313(5788): 765–766. doi: 10.1126/science.1126746.
- Numbers, Ronald L. 2006. *The Creationists. From Scientific Creationism to Intelligent Design*. Expanded ed. Cambridge: Harvard University Press.
- . 2009. Myth 24. That creationism is a uniquely American phenomenon. In *Galilei Goes to Jail and Other Myths about Science and Religion*, edited by Ronald L. Numbers, 215–223. Cambridge MA: Harvard University Press.



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# Project Greenglow: How *Horizon* Lost the Message in the Medium

When news media tailor their science reporting to their expected audiences, the message of science can get lost in the requirements of the medium. An episode of the BBC flagship science series *Horizon* offers an unfortunate example.

JOHN EADES

Several years ago, I acquired a recording of Sibelius's fifth symphony. This is one of his best-known works, but the version I received was the original 1915 one rather than the revised 1919 version, which until fairly recently was the only recording ever heard. What I expected were minor changes in orchestration, with perhaps a few passages removed or extended here and there. What I got was the kind of shock you might feel if you met someone in the street you had known all your life and found that he was twenty centimeters taller than he was three weeks last Tuesday and that his hair had turned blue. When I cast a skeptical eye over newspaper, magazine, and television coverage of scientific topics, I often get much the same feeling.<sup>1</sup>

*The medium is the message*, a phrase coined in the 1960s by the Canadian philosopher Marshall McLuhan, became what was perhaps the most successful, and least understood, meme of the age. Arguments still rage about what McLuhan really meant, but it seems to me that he may at least have gotten it right about science reporting: the media decide what the message of science is, not the scientists. The requirement that TV science presentations keep the viewer entertained and tuned in means that they can easily wind up as a PR pitch for some supposed future technological miracle, while reality and the true nature of the science involved are largely ignored or obscured.



### Making Apples Fall Up

The March 23, 2016, episode in the BBC's science series *Horizon*, titled "Project Greenglow," was billed as "the story of an extraordinary scientific adventure—the attempt to control gravity" (*Horizon* 2016). The episode provides us with a textbook case of real science disappearing in medium-promoted PR.<sup>2</sup>

In the real world gravity controls us, not the other way around, and scientists talk about measuring or understanding natural forces, not about controlling them. It quickly became clear that "controlling gravity" meant getting it to push things (such as Newtonian apples!) up instead of pulling them down. *Extraordinary?* What was extraordinary to me was that almost the entire program was devoted to things being pushed upward by forces other than gravity, such as electromagnetism, or to gravitational contraptions that were supposed to push up but didn't. And the *green glow* was more like a red light warning the viewer to treat most of what followed with extreme skepticism.

"Project Greenglow" was, it seems, a 1990s scheme by U.K. defense contractor BAE Systems, which apparently "set about turning science fiction into reality." The episode's main protagonist was a BAE aerospace engineer named Ron Evans, but neither he nor BAE were alone in this effort. Across the pond, NASA had its own idea about things that glow green, but they called it the Breakthrough Propulsion Physics Project. It involved such things as space applications of "new physics," "faster-than-light travel," and "warp drives." "What new physics?" I wondered, and why hadn't I heard of it? Has it, as *Horizon* claimed, "helped change our understanding of the Universe?" And did all this really make "the dream of flying cars and journeys to the stars no longer seem quite so distant?"

### Gyroscopes and Gravity

*Horizon* traced its theme back to a 1990s demonstration at the Royal Society, London, in which gyroscopes appeared to be producing a repulsive gravitational field. The late Professor

Eric Laithwaite, who originally promoted this as a real effect, to his credit subsequently admitted that this phenomenon was illusory.

CERN theorist Professor John Ellis explained why: The forces of nature are well understood in terms of quantum field theory, which, in the electromagnetic case, permits two kinds of elec-

anybody who said they could fly was looked upon as a lunatic." And Evans's admission that the green rays he added under a drawing of a VTOL aircraft were only put in to make the idea of a working nuts and bolts antigravity machine look plausible did nothing to encourage the critically minded viewer to take what was to follow seriously.

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tric charge, positive and negative. Just as like electrical charges repel, unlike ones attract. For gravity, the property analogous to electric charge is mass. This is always positive, but in gravitational fields the "likes repel" rule does not hold, and every mass attracts every other. The gravitational pull of all the atoms in the Earth therefore add up to produce what we call weight or the force of gravity.<sup>3</sup>

### Killjoy Academics

Logic would dictate that the entire program end at this point. This would have ruined a good story, so it continued for another forty-five minutes with a number of nonarguments and descriptions of nonworking gadgetry suggesting that some really serious science was forthcoming. Saying things such as: "Academics jump on any antigravity device as being—impossible! Well it's not impossible it's just that we don't how to do it," is not, however, a scientific argument. Neither is the statement: "It's like flight in the nineteenth century—in those days

### Levitation Experiment Falls Flat

In the late 1990s, Russian chemist Yevgeny Podkletnov claimed to have observed gravitational levitation of a small test object placed over a spinning superconducting disk (his first inkling of this came—and I am not making this up—when he saw the disc levitating tobacco smoke from a colleague's pipe!). Even if it had been genuine, the claimed effect was tiny, but Podkletnov nevertheless insisted that his device could *destroy missiles—remove them from their trajectory*. After both BAE and NASA had tried unsuccessfully to replicate his results, they gave up. Podkletnov, by then fearful of prying military eyes and ears, arranged a secret meeting with Dr. Evans in a London hotel, in which he described an improved version of his device. This, he claimed, delivered a gravitational push that was detectable a kilometer away. Evans admitted that he could draw no conclusion from the meeting but nevertheless solemnly remarked, "We don't know with gravity. Gravity is a subject we don't know about! That's why we are exploring it." Experiments



at the Technical University of Dresden with a replica of the new device nevertheless failed to show any evidence that gravitational pulses were being propagated, even over short distances within the laboratory.

### Nongravitational Apple-Pushers

Much of the program described various devices that did indeed push objects upward, or purported to, but not by gravity. This incongruence apparently troubled neither the producer nor many of the participants. Thus an electromagnetically levitated magnetic disc was shown with the comment, “Wouldn’t it be great if we could get gravity to work in reverse and be able to levitate things with gravity?”, while Roger Shawyer’s EMDrive (Shawyer 2006), which claims to generate a propulsive thrust without an equal and

by the Dresden team that investigated Podkletnov’s device (Tajmar and Fiedler 2015; Koepsell 2015; Tramiel 2015), also found that any thrust produced by the EMDrive was within the experimental margin of error.

Shawyer has now produced a new, improved, bigger EMDrive that, he says, does work. Of course he has never claimed to make apples or anything else fall upward under gravity, only to violate Newton’s third law!

### Cosmic Repulsion?

In response to the fact that Podkletnov’s kitchen sink-sized gadget should have generated a gravitational push and didn’t, *Horizon* simply changed course and talked up the idea that levitation of earthly objects might be achievable by tapping into cosmic energies.

There is in fact a tenuous connec-

to the pull of gravity. Quite how this idea, even if it were correct, might manifest itself in an earthly setting, where no negative mass object has ever been seen, was a can of worms that *Horizon* chose not to open. Moreover, as University of Southern California physicist Professor Clifford Johnson explained, such notions have huge problems with runaway instabilities, which should be easily detectable but have never been observed anywhere in the universe.

Einstein initially included in the theory of general relativity a form of dark energy—the cosmological constant—to hold back gravity and keep the universe static. When Hubble later found that the universe was not static but rather expanding, he removed it. Putting it back in is now generally accepted as the best explanation for dark energy rather than introducing highly problematic negative masses.

### Hands-On Dark Energy

Loath to abandon the imagined promise of dark energy, *Horizon* moved on to dream about stockpiling it. One participant suggested that “dark energy has some form of antigravity—we still don’t know whether we can ever harness it” while the background commentary suggested that “the idea that the universe has some inherent form of antigravity is tantalizing—if only we could get our hands on it.”

Well let’s suppose that we could: The density of dark energy has been estimated to be about 0.63 joules per cubic kilometer. A simple calculation shows that the amount contained in a volume the size of the Earth ( $10^{12}$  cubic kilometers) would raise a 2,000-ton vessel, the approximate lift-off weight of a space shuttle, about 330 km into the air—not exactly encouraging news for any idea NASA might have for dark-energy-powered star probes. “Just hilarious” was Prof. Johnson’s understandable reaction to these ideas.

### Upward Falling Antimatter and Wobbling Atomic Clouds

In its continued quest to ransack the universe from top to bottom for evidence of repulsive gravitational forces,



opposite reaction, was discussed at great length. NASA, which would like to send space probes to the stars without the inconvenience of carrying trillions of tons of propellant, displayed a close interest in this microwave oven-like device, but in the face of unconvincing results soon defunded research on all novel propulsion systems. “Who cares?” said Evans. “If it works it’s up to the theorists to find out why.” Unfortunately, it doesn’t. Further work

tion here with the observed acceleration of the expansion of the universe, which is suspected to be caused by a so-called dark energy that fills space and pushes the universe outward. True to form, *Horizon* highlighted only the most speculative and questionable explanations of this phenomenon. One of these is the concept of negative mass, which at first sight would fit Green-glow’s bill nicely since negative masses would move in the opposite direction

*Horizon* then lurched from the cosmic to the atomic scale, misrepresenting certain ongoing experiments on hydrogen and antihydrogen atoms at CERN. These aim to test for any small difference in the free-fall of these matter–antimatter pairs under gravity. This would violate the Equivalence Principle, the modern synthesis of Galileo’s findings at the tower of Pisa. There being good grounds to expect that the principle applies on the atomic as well as the bulk matter scale, the experimenters do not expect to find that antihydrogen falls upward. Even if they did, it would take many thousands of times the age of the universe to collect the 2,000 tons or so of antihydrogen atoms necessary to push a space shuttle–sized payload skyward.

## The message delivered by the medium of television in this episode of *Horizon* was not a scientific one. Rather it was that one of the world’s most respected media organizations gussied up a collection of smoke-and-mirror arguments as real science under the rubric of what it claims to be its gold-standard science series.

And of course, apart from the problem of confining such a gigantic number in a small space, they would annihilate the very payload they were supposed to push.

The final topic concerned a quantum gravity gradiometer, a device that detects small changes in the local gravitational field by their effect on a cloud of ultra-cold atoms. A slight wobble of the cloud as an experimenter moved around was interpreted to mean that the gradiometer was sensitive to the gravitational field of a human being–sized object.<sup>4</sup> No justification was presented for this (nor the further claim that the laws of nature as we know them were somehow being broken). Ever the optimist, Dr. Evans saw the wobble as a start on the road to controlling gravity

in the future and summed up the entire *Horizon* episode with the words: “Gravity control is just something we haven’t learned to do—yet. . . . I’m sure we will one day; it’s just a matter of time.”

### A Flagship Science Series?

The message delivered by the medium of television in this episode of *Horizon* was not a scientific one. Rather it was that one of the world’s most respected media organizations gussied up a collection of smoke-and-mirror arguments as real science under the rubric of what it claims to be its gold-standard science series. The lone voices of mainstream science, Professors Ellis and Johnson, were heard for a total of about three to four minutes during

the sixty-minute episode. Given the speculative and handwaving arguments of the accompanying commentary, I was not really surprised to find that it was narrated by an actor from the BBC science-fiction series *Doctor Who*. Nor was I sure that all the participants realized the extent to which their remarks would be decontextualized and trivialized in the actual broadcast.

This is not the first time that *Horizon* has failed to live up to its advertised role as a serious and reliable vehicle for presenting scientific topics to nonscientists (Close 2007). Richard P. Feynman once remarked that for a successful technology, reality must take precedence over public relations, for you cannot fool nature. These wise

words seem to have vanished over this particular *Horizon*. ■

### Notes

1. A similarly titled article with the same theme but a quite different body of material appeared in *The Pantaneto Forum* (April 2006), available online at [www.pantaneto.co.uk/issue22/front22.htm](http://www.pantaneto.co.uk/issue22/front22.htm).

2. On account of the gadfly nature of this *Horizon* episode, with contextless soundbites being freely inserted at will and incomplete or nonexistent connecting material between the various topics covered, this article could not always stick to the program’s chronological sequence.

3. The latest success of field theory in its application to gravitation was spectacularly achieved just weeks before the *Horizon* broadcast, when the gravitational waves the theory predicts were detected after decades of searching. This great achievement in real science did not even get a mention in the “Project Greenglow” episode.

4. Gravity gradiometers are quite common devices, with uses in geophysics and geology. The claim about the wobble may be true, but in the absence of any supporting information there was no way of checking it.

### References

- Close, F. 2007. Fears over factoids. *Physics World* 20(8): 16–17.
- Horizon*. 2016. Project Greenglow. BBC2 (March 23). Producer’s article available online at <http://www.bbc.co.uk/programmes/b0752f85>.
- Koepsell, D. 2015. From N-rays to EMDrives: When does science become pseudoscience? *SKEPTICAL INQUIRER* 39(6): 14–15.
- Shawyer, R. 2006. *SPR Ltd*. Internal document. Available online at <http://www.emdrive.com/theorypaper9-4.pdf>.
- Tajmar, M., and D. Fiedler. 2015. Direct thrust measurements of an EMDrive and evaluation of possible side-effects. Available online at <http://arc.aiaa.org/doi/abs/10.2514/6.2015-4083>.
- Tramiel, L. 2015. Is the EMDrive pseudoscience? *SKEPTICAL INQUIRER* 39(6): 16–17.



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# No Time for Certainty

Uncertainty and imprecision are basic attributes of interpreting the world and should not be viewed with scorn or disdain but understood, measured (when possible), and mixed into the framework of well-planned and well-reasoned public policies.

ALAN J. SCOTT

It has been said that a person with one wristwatch always knows what time it is. A person with two is never quite certain. The person with two watches is tormented if each displays a different time. A passerby asking for the time of day will induce a semi-painful mental dissonance.

Most science and public policy issues resemble the two-watch scenario. More generally, we inhabit a world with uncertainty, inaccuracy, and imprecision. This inexactness stretches into all realms of our existence—science, politics, public policy, religion, social interactions, news media, environment, economy, and so on. Yet many are beckoned and drawn toward the over-simplicity and overconfidence found in consciously choosing to wear

one watch. Bertrand Russell hits the bull's-eye saying, “The whole problem with the world is that fools and fanatics are always so certain of themselves and wiser people so full of doubts” (Russell n.d.).

In this world, it is possible for both watches, when wearing two, to be inaccurate—and in some cases purposely distorted. Consider the scandal engulfing Volkswagen. The company introduced software into eleven million

vehicles that was designed to cheat emissions tests (Davenport 2016), and a team of engineers and researchers from West Virginia University discovered the deception (Ross 2016).

This team refused to wear just one watch. They could have simply accepted the measurements made by the U.S. Environmental Protection Agency on tailpipe emissions, but they instead decided to perform independent measurements both in the lab and on the road. Reproducibility is a hallmark of science, which means other watches should show roughly the same time but didn't in this case.

It was reported (Open Science Collaboration 2015) in August of 2015 that a group of 270 researchers, known as the “Open Science Collaboration,” tried to replicate 100 social and cognitive studies published in top, peer-reviewed psychology journals. Only about one-third to one-half of the original findings was observed in the replicated studies. Metaphorically, more than half of the watches—in this large collection—have never really functioned properly.

In 2013, a scientific study (Hart et al. 2013) was conducted that provided “. . . the first clear and simply measurable evidence for the influence of geomagnetic field variations on mammal behavior.” They found that dogs preferentially align with the Earth's magnetic field when defecating.

It can be argued that such conclusions are synonymous with wearing only one watch. There could be a host of confounding variables along with





inaccurate measurements leading to an incorrect interpretation of the statistics or significance (SkeptVet 2014). Nevertheless, it is enchanting to know that some creatures can sense and utilize Earth's magnetic field.

Even scientists are tempted to wear just one watch—sometimes for nefarious reasons. The journal *Nature* reported (Callaway 2015) in August of 2015 that a leading scientific publisher suddenly retracted sixty-four articles in ten journals because of author improprieties in gaming the peer-review system. About 365 scientific papers get retracted every year, and about two percent of scientists admit to monkeying with their data in improper ways (Marcus and Oransky 2015). Nonetheless, this finding should be kept in perspective, since millions of articles are published every year.

In the world of politics, leaders aren't wearing enough watches. They are selling simple solutions to complex problems with a lot of uncertainties and, all too often, making factually incorrect statements. A visit to Politifact.com and FactCheck.org will sour most pride and optimism toward our leaders.

Scientists may be at fault, at least partially, for a large portion of the U.S. population having distrust of government and casually dismissing scientific claims and concerns—particularly involving climate change. It is possible that this stems from the perception that science and technology are, in some way, contributing to their economic anxieties.

This population often views scientific voices urging action on environmental concerns as costing jobs. And some have argued that mechanization has placed a net downward pressure on average wages (Brynjolfsson and McAfee 2011). Technology, combined with reduced labor costs for equally skilled workers, are also driving jobs out of the country.

To elaborate upon the economic connection, consider the work done by economic researchers Josh Bivens and Lawrence Mishel from the Economic Policy Institute (Bivens and Mishel 2015). They examined economic productivity with worker compensation from 1948 to the present.

Productivity, driven in large part by scientific and technological advances, steadily rose about 3.6 percent per year. From 1948 to 1973, average worker salaries also rose by about the same percent (adjusted for inflation). Around 1973, average worker salaries decoupled from the rising productivity. They remained stagnant or flat. All the gains in productivity went to an explosion in CEO salaries and corporate stock profits, which amplifies inequality.

Physicist Michael Lubell makes the argument that scientists bear some responsibility for today's political discontent. He states "The danger for the science community is that disillusioned voters could begin to direct their ire at the progenitors of the technologi-

tion-based afterthought reinforced and echoed by social media self-organization and preferred news outlets. In this sense, misdirected teleological intuitions about the source of our emotions could be fueling voter behavior.

Pharmaceutical corporations often wear one watch that is purposely distorted to misinform consumers and optimize profits. Just in the past seven years, over \$13 billion in fines have been levied by the U.S. Department of Justice against eleven of the biggest pharmaceutical companies (Groeger 2014). These companies have knowingly engaged in deception and fraud.

Philosophically speaking, we should embrace the idea of wearing more than one watch. Skepticism and doubt can

**Philosophically speaking, we should embrace the idea of wearing more than one watch. Skepticism and doubt can serve us well in trying to make sense of the world. Some organizations have codified wearing two watches by forming red teams, people tasked with playing devil's advocate.**

cal changes they see as harming them" (Lubell 2015).

*New York Times* columnist David Brooks reinforces these *anxieties of impotence* by saying, "The fact is, for all the problems we may have with Wall Street or Washington, our biggest problems are systemic—the disruptions caused by technological progress and globalization, mass migration. . . . There's no all-controlling Wizard of Oz to slay" (Brooks 2016). This may explain much of the disfigurement of political discourse and polarization.

Yet one should be guarded against oversimplifications in this one-watch worldview of a rational voter. Neuroscience and psychology (Cooper 2015; Laber-Warren 2012) point to emotions as the source of many voting decisions, with logic and reason being twisted into a dissonance-reducing, predilec-

tion-based afterthought reinforced and echoed by social media self-organization and preferred news outlets. In this sense, misdirected teleological intuitions about the source of our emotions could be fueling voter behavior.

serve us well in trying to make sense of the world. Some organizations have codified wearing two watches by forming what are called red teams. These are teams of people tasked with playing devil's advocate. The U.S. Army uses red teams to penetrate defenses and find weaknesses in ground combat and cybersecurity (Satyanarayana 2015). Google and Microsoft utilize such teams to find and fix vulnerabilities (Claburn 2012; Field 2014).

When it comes to religion, it would also behoove people to initiate red teams to play devil's advocate in rooting out superstition and dogma. Thomas Jefferson urged his nephew Peter Carr in 1787 to "Question with boldness even the existence of a god; because, if there be one, he must more approve the homage of reason, than that of blind-folded fear" (Jefferson 1787).

Improprieties—wearing purposely distorted watches—lurk everywhere. Intelligence information on U.S. progress in its fight against ISIL, or Daesh, were likely cooked (Apuzzo et al. 2015) harking back to Westmoreland’s Vietnam assessments. In 2016, Goldman Sachs agreed to a \$5 billion settlement for deceptions associated with securities. A host of different banking and investment entities have been fined \$40 billion by federal prosecutors and regulators for deceptions in recent years (Goldstein 2016). Wearing purposely

tal organization) Engineers Against Poverty, states that between 10 and 30 percent of worldwide construction project costs get funneled off into corruption such as bribery. About \$17.5 trillion is expected to be lost to corruption by the year 2030 (Matthews 2016).

One report (Kottasova 2014) indicates that the most corrupt industries, from most to lesser, are: (1) extraction of natural resources (such as oil and mining), (2) construction, and (3) transportation. Transparency in checking and recalibrating the timepieces of

demanded by an enlightened citizenry. Science teaches us to detest the unpromising, self-aggrandizing simpleton orthodoxy of always knowing the exact time by wantonly wearing only one watch. ■

## References

- Apuzzo, M., M. Mazzetti, and M.S. Schmidt. 2015. Pentagon expands inquiry into intelligence on ISIS surge. *New York Times* (November 21).
- Bivens, J., and L. Mishel. 2015. Understanding the Historic Divergence Between Productivity and a Typical Worker’s Pay, September 2: Economic Policy Institute. Available online at <http://www.epi.org/publication/understanding-the-historic-divergence-between-productivity-and-a-typical-workers-pay-why-it-matters-and-why-its-real/>.
- Brooks, D. 2016. The anxieties of impotence. *New York Times* (January 22).
- Brynjolfsson, E., and A. McAfee. 2011. Why workers are losing the war against machines. *The Atlantic* (October 26). Available online at <http://www.theatlantic.com/business/archive/2011/10/why-workers-are-losing-the-war-against-machines/247278/>.
- Callaway, E. 2015. Faked peer reviews prompt 64 retractions. *Nature.com*. Available online at <http://www.nature.com/news/faked-peer-reviews-prompt-64-retractions-1.18202>.
- Childress, S. 2015. Report: After *Citizens United*, Outside Spending Doubles. PBS, Frontline. Available online at <http://www.pbs.org/wgbh/frontline/article/report-after-citizens-united-outside-spending-doubles/>.
- Claburn, T. 2012. Google ‘red team’ to test product privacy. *InformationWeek* (August 23). Available online at <http://www.darkreading.com/risk-management/google-red-team-to-test-product-privacy/d/d-id/1105950>.
- Cooper, K. 2015. The psychology of voting: An emotional matter? *BBC News* (May 6). Available online at <http://www.bbc.com/news/election-2015-32537661>.
- Cox, S. 2016. Tennis match fixing: Evidence of suspected match-fixing revealed. *BBC News, Sport Tennis*. Available online at <http://www.bbc.com/sport/tennis/35319202>.
- Davenport, C. 2016. U.S. sues Volkswagen in diesel emissions scandal. *New York Times* (September 22).
- Department of Justice. 2015. Department of Justice Report Regarding the Criminal Investigation Into the Shooting Death of Michael Brown by Ferguson, Missouri Police Officer Darren Wilson.
- Federal Trade Commission. 2016. Lumosity to Pay \$2 Million to Settle FTC Deceptive Advertising Charges for Its “Brain Training” Program (January 5).
- Field, S. 2014. Red teaming: Using cutting-edge threat simulation to harden the Microsoft Enterprise Cloud. *Microsoft Azure Blog* (November 11). Available online at <https://azure.microsoft.com/en-us/blog/red-teaming-using-cutting-edge-threat-simulation-to-harden-the-microsoft-enterprise-cloud/>.
- Futterman, M., S. Germano, and P. Sonne. 2015. Anti-Doping Commission finds Russia engaged in state-sponsored doping. *Wall Street Journal* (November 9).
- Goldstein, M. 2016. Goldman to pay up to \$5

## This push to wear more than one watch is not about time but instead about the propensity for self-delusion.

distorted watches is an industry.

The book *Merchants of Doubt* (Oreskes and Conway 2011; Scott 2015) summarizes such exploits where corporations use shady experts-for-hire to foment and interject scientific doubt where there is no doubt—or very little. Improprieties and flimflam dot the cultural landscape. We’ve got corruption in soccer organizations (Reuters 2016), state-sponsored doping of Olympic athletes in Russia (Futterman et al. 2015), and professional tennis matches being fixed (Cox 2016).

Socially, a “hands-up, don’t shoot” mantra blossomed—spurred by a narrative of police abuse in the case regarding Michael Brown in Ferguson, Missouri—that was contrary to the physical evidence, though this is not to argue police abuse isn’t a problem (Department of Justice 2015). There is dark money flooding into politics since the *Citizens United* Supreme Court decision (Childress 2015). The U.S. government has regulations to register cars and drones but not guns. And so it goes.

Globally, corruption is a serious problem. Petter Matthews, executive director of the NGO (non-governmenten-

others is all about integrity, justice, fairness, and democracy.

In the past three years, the Federal Trade Commission (FTC) filed 220 actions against consumer fraud, resulting in \$1.7 billion in penalties and consumer redress (Rich 2015). One can say the FTC helps keep corporate wristwatches properly calibrated when companies push them out of calibration. Recently, the FTC forced Lumosity—a “brain-training” software company—into a \$2 million settlement (Federal Trade Commission 2016) for unfounded and unwarranted advertising claims that its product reduces cognitive impairment associated with various health conditions, including Alzheimer’s and dementia. The company falsely claimed that scientific studies proved the benefits.

This push to wear more than one watch is not about time but instead about the propensity for self-delusion. It is about the need for continuous reflection done with intellectual honesty and humility that seeks multiple, reproducible, and calibrated measurements. Only then will information graduate into facts onto which public policies can be built with informed reasoning as

- billion to settle claims of faulty mortgages. *New York Times* (January 14).
- Groeger, L. 2014. Big Pharma's big fines. *ProPublica* (February 24). Available online at <http://projects.propublica.org/graphics/bigpharma>.
- Hart, V., et. al. 2013. Dogs are sensitive to small variations of the Earth's magnetic field. *Frontiers of Zoology* 10: 80.
- Jefferson, Thomas. 1787. Letter to his nephew Peter Carr, from Paris. In *Thomas Jefferson: Writings*, Merrill D Peterson, ed., by M.D. Peterson, 900–906. New York: Library of America.
- Kottasova, I. 2014. World's most corrupt industries. CNN Money. Available online at <http://money.cnn.com/2014/12/02/news/bribery-foreign-corruption/>.
- Laber-Warren, E. 2012. Unconscious reactions separate liberals and conservatives. *Scientific American Mind* (September 1).
- Lubell, M.S. 2015. Does science bear any responsibility for today's political discontent? *APS News* (November). Available online at <http://www.aps.org/publications/apsnews/201511/beltway.cfm>.
- Marcus, A., and L. Oransky. 2015. What's behind big science fraud? *New York Times* (May 22). Available online at <http://www.nytimes.com/2015/05/23/opinion/whats-behind-big-science-frauds.html?smprod=nyt-core-ipad&smid=nytcore-ipad-share>.
- Matthews, P. 2016. This is why construction is so corrupt. *World Economic Forum* (February 4). Available online at <http://www.weforum.org/agenda/2016/02/why-is-the-construction-industry-so-corrupt-and-what-can-we-do-about-it>.
- Open Science Collaboration. 2015. Estimating the reproducibility of psychological science. *Science* 349(6251) (August 28).
- Oreskes, N., and E. Conway. 2011. *Merchants of Doubt*. New York: Bloomsbury Press.
- Reuters. 2016. Support for FIFA hopeful. *New York Times* (January 23).
- Rich, J. 2015. Our Consumer Protection Agenda: Meeting the Challenges of a Changing Marketplace. National Consumers League speech: Federal Trade Commission. Available online at [https://www.ftc.gov/system/files/documents/public\\_statements/734351/150728changingmarketplace.pdf](https://www.ftc.gov/system/files/documents/public_statements/734351/150728changingmarketplace.pdf).
- Ross, P.E. 2016. How engineers at West Virginia University caught VW cheating. *New York Times* (January 4).
- Russell, Bertrand. n.d. Wikiquote. Accessed February 19, 2016. Available online at [https://en.wikiquote.org/wiki/Talk:Bertrand\\_Russell](https://en.wikiquote.org/wiki/Talk:Bertrand_Russell).
- Satyanarayana, M. 2015. Military academy members hone hacking skills at Pittsburgh competition. *TribLive News* (January 30). Available online at <http://triblive.com/news/editor-spicks/7669450-74/computer-military-security#axzz3xihyaOsW>.
- Scott, A.O. 2015. Review: 'Merchants of Doubt', separating science from spin. *New York Times* (March 5).
- SkeptVet. 2014. Do dogs line themselves up with the Earth's magnetic field to poop? *The SkeptVet Blog*. Available online at <http://skeptvet.com/Blog/2014/01/do-dogs-line-themselves-up-with-the-earths-magnetic-field-to-poop/>.



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## REVIEWS

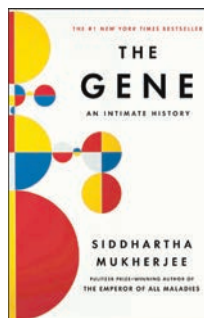
# The Story of the Gene

HARRIET HALL

Nearly six years ago, I reviewed Siddhartha Mukherjee's book *The Emperor of All Maladies: A Biography of Cancer* (SI, May/June 2011). It was hands-down one of the best books I have ever read on a medical topic. Now he's done it again. His new book is titled *The Gene: An Intimate History*.

Mukherjee is a superb writer. Much of what I said about his first book applies equally to his second, so I will quote myself:

It is a unique combination of insightful history, cutting edge science reporting, and vivid stories about the individuals involved: the scientists, the activists, the doctors, and the patients. It is also the story of science itself: how the scientific method works. Beautifully written and informative. . . . Reads like a detective story with an exciting plot.



*The Gene: An Intimate History*. By Siddhartha Mukherjee. Scribner, New York, 2016. ISBN 978-1476733500. 592 pp. Hardcover, \$32.00.

He links this second book to his first by pointing out that cancer is an ultimate perversion of genetics and that studying cancer means also studying its obverse: normalcy. He gives the topic a human face by interspersing anecdotes from his own family's struggles with mental illness

and its connection to inherited genes. He sets out to tell the story of the birth, growth, and future of one of the most powerful and dangerous ideas in the history of science: the gene. He says it is one of three destabilizing ideas that have transformed science: the concept that ir-



## [NEW AND NOTABLE

*Listing does not preclude future review.*

**CHEATS AND DECEITS: How Animals and Plants Exploit and Mislead.** Martin Stevens. In this book, Martin Stevens, associate professor of sensory and evolutionary ecology at the University of Exeter, examines how trickery and deception are widespread in nature. Animals and plants mimic other objects or species in the environment for protection, to trick other species into rearing their young, to lure prey to their death, and to deceive potential mates for reproduction. Harmless butterflies, for example, mimic the wing patterning of a poisonous butterfly to avoid being eaten. *Cheats and Deceits* describes the remarkable range of such adaptations in nature and considers how they have evolved as part of an arms race between predator and prey or host and parasite. Skeptics are inherently interested in deception—not only how people mislead each other but also how people fool themselves. Stevens's book reminds us that trickery, in all its many forms, is common in the world around us and is indeed part of evolution and life itself. Oxford University Press, 2016, 296 pp., \$34.95.

**THE EDGE OF REASON: A Rational Skeptic in an Irrational World.** Julian Baggini. Not just science is under siege; reason itself is more and more dismissed and has ceased to be a universally admired faculty. British philosopher, writer, and cofounder of *The Philosopher's Magazine* Julian Baggini says we have lost our reason, and it's not an accident. It is too often misperceived as a cold tool and "an enemy of mystery and ambiguity." Baggini, who considers himself a generalist whose perspective enables him to appreciate virtues of reason less evident from purely academic viewpoints, sets out here to rehabilitate reason and rationality (he uses both terms interchangeably). It is important because "it is only through the proper use of reason that we can find our way out of the quagmires in which many big issues of our times have become stuck." He has a moderate, commonsense view of reason, drawing on Hume's "mitigated skepticism," and he sets out to debunk myths about reason that have led to its widespread diminishment (the first is "that reason is purely objective and requires no subjective judgment"). He ends with a short section on the uses of skepticism and a fifty-two-point "User's Guide to Reason." It is a timely and important book. Yale University Press, 2016, 272 pp., \$26.

**FELT TIME: The Psychology of How We Perceive Time.** Marc Wittmann, translated by Erik Butler. We have varying and subjective perceptions of time; children have trouble waiting for anything, while as we grow older, time seems to speed up. Marc Wittmann, a research fellow at the Institute for Frontier Areas of Psychology and Mental Health in Friburg, Germany, explores the riddle of subjective time. Drawing on the latest insights from psychology

reducible units underlie matter (the atom), digitized information (the byte or bit), and biological information (the gene). He explains how the consequences of these ideas have transformed our thinking, our language, and our culture, politics, and society.

### History

Mukherjee delves into the fascinating history of our early groping toward understanding inheritance. Pythagoras believed that information was carried only in the sperm, and the uterus only provided nourishment. The preformation theory held that sperm contained a miniature human. Lamarck believed that acquired characteristics could be inherited. Mendel was the first to discover dominant and recessive inheritance of traits, which meant that there must be inheritable units. His published research was ignored for decades, and only much later did those units come to be called genes.

The history of genetics was stained by the eugenic movement, which had dire consequences. In America, there were involuntary sterilizations of people who were thought to be defective but often weren't. One such person who was sterilized against her will was Carrie Buck, the plaintiff in the Supreme Court Case on the topic, *Buck v. Bell*. In Nazi Germany, eugenic arguments were used to justify the murder of children, gypsies, Jews, and other politically undesirable groups.

The research of Mendel and others convinced scientists that there must be such a thing as a gene. Around 1900, they figured out that genes must be carried in the cell's nucleus and narrowed it down to the chromosomes. Studies of fruit fly mutants and variants found that some traits were linked, so their genetic information must be located close to each other on the chromosome. But how was the information carried?

When DNA was first proposed, it was dismissed as a "stupid molecule" that couldn't carry clever messages. It took a long series of ingenious experiments to reveal that DNA was the carrier of genetic information, and it was decades before the amino acid triplet code was discovered and the structure of the DNA molecule was revealed by Watson and Crick. Mukherjee tells the story step by step, experiment by experiment, with all the suspense and excitement of a detective story where the gradual accumulation of clues finally reveals the culprit. His use of language is delicious, noting for example that "Bread molds are scrappy, fierce creatures."

As he relates discovery after discovery, the story gradually educates the reader about all the important concepts in genetics: introns, "junk" DNA, the function of RNA, how genes direct the embryo to form a human, recombinant DNA, gene sequencing, how proteins are manufactured, genotype vs. phenotype, transcription and reverse transcription, alleles, and epigenetics. He explains the "central dogma" that information moves from genes in DNA to messenger RNA to proteins, and then he explains why that overly simplistic theory has required several modifications.

He tells the complicated story of political restrictions on genetic experimentation and of the conflicts that troubled the Human Genome Project. He explains how genes carry a molecular clock that tells our evolutionary history and how gene analysis can reconstruct the movements of early human populations. He explains why the Mitochondrial Eve is the mother of us all. He tries to explain why biological males have a Y chromosome. He throws a monkey wrench into racial discrimination by showing that there is more diversity *within* races than *between* races. He talks about genetic factors in homosexuality

and transgender identity. He explains why epigenetics is on the verge of transforming into a dangerous idea that is being used to justify junk science and a new Lamarckism. He even speculates about how life itself began.

We have mapped the human genome and understand a lot about the genetic code, but we know virtually nothing about the genomic code, which governs how multiple genes at various sites on the human genome coordinate gene expression in space and time to build, maintain, and repair a human organism. We don't understand the functions of noncoding tracts of DNA between the genes.

### Tinkering with Genes

Understanding the genome was the first goal that inevitably led to a second goal: altering the genome. The hope was that we could outwit nature and take control of our own destiny, changing the course of human evolution. If we could identify genes that caused diseases, we ought to be able to fix the genes and eliminate diseases. We had eliminated smallpox from the world; now genetics offered the hope of eliminating everything from nearsightedness to cancer. We are still far from that goal, and it is looking more and more unrealistic, but some progress has been made.

Genetic analysis can identify couples who might want to avoid pregnancy because of a high likelihood of transmitting a serious genetic condition such as Huntington disease. Prenatal diagnosis can be used to guide selective abortion of fetuses with genetic diseases (and sometimes fetuses of the “wrong” sex!). Gene therapy is already possible, although some of the early experiments have gone awry due to incompetence, blunders, neglect, and gaps in knowledge. It is now possible to biopsy a human embryo and extract cells for pre-implantation genetic diagnosis without affecting the viability of the embryo. In 2014, a landmark study was published in *The New England Journal of Medicine* reporting the successful use of gene therapy to treat hemophilia. Thanks to CRISPR (see SI Special Report “CRISPR-Cas9: Not Just Another Scientific Revolution,” May/June 2016), we have the ability to cut out a defective gene and replace it with a normal one.

The new technologies offer exciting promises but give rise to ethical dilemmas. Should society allow the creation of “designer babies”? Who is to determine what is normal and what is not? What if a defective gene causes mental illness but also causes genius and creativity? Genes affect the expression of other genes; modifying genes could have unforeseen consequences.

The book is a cornucopia of delights that offers something for everyone. You can read it for its detective story and literary value. You can read it to get a basic education in genetics. You can read it to finally understand what epigenetics is really all about. You can read it for its explanation of cutting-edge science, for its tantalizing clues about where science is headed, and for a challenging view of the ethical dilemmas we will have to face as a society.

Mukherjee is a rare combination of scientist, storyteller, and educator. He is a truly gifted writer. I highly recommend both of his books, and I look forward to reading whatever he may write about in the future. ■

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and neuroscience, Wittmann offers new answers to the question of how we experience time. Wittmann explains, among other things, how we choose between savoring the moment and deferring gratification; why impulsive people are bored easily; and why the feeling of duration can serve as an “error signal,” letting us know when it is taking too long for dinner to be ready or for the bus to come. The book is of particular significance to skeptics investigating or seeking to understand psychological factors underlying eyewitness testimony and perceived elapsed time. It suggests, for example, that the duration of sudden or surprising events (such as UFO, ghost, or Bigfoot sightings) may be significantly overestimated by the eyewitnesses. The MIT Press, 2016, 184 pp, \$24.95.

**PSYCHOLOGY LED ASTRAY: Cargo Cult in Science and Therapy.** Tomasz Witkowski with a foreword by James E. Alcock. Psychologist Witkowski follows up his 2015 book *Psychology Gone Wrong* (with M. Zatonski) with this second part of what he says will be a trilogy devoted to the dark side of psychology. It examines the many problems that plague modern psychological research and psychotherapeutic practice. He critiques problems in statistical significance, over-generalization of findings from neuroscience, and uncontrolled experiments on humans, and he picks apart a number of questionable practices in the treatment of children, including the pseudoscience of educational kinesiology, attachment therapy, trauma debriefing, Facilitated Communication, Dolphin Therapy, and so on. In his Foreword Alcock calls this “a very important and valuable book” and praises the author for not just his critical examinations of shortcomings in psychology but for his support of the value of evidence-based psychology. BrownWalker Press, 2016, 276 pp., \$29.95.

**THE WAR ON SCIENCE: Who's Waging It, Why It Matters, and What We Can Do About It.** Shawn Otto. Foreword by Lawrence M. Krauss. “A vast war on science is underway,” writes Otto, “and the winners will chart the future of power, democracy, and freedom itself.” He sees the war as having three well-funded fronts: the identity politics war on science, the ideological war on science, and the industrial war on science. Politically, he says, the war on science is coming from both the left (arguing that truth is relative and there are hidden environmental and health threats afoot) and the right, but he argues that the anti-science of those on the right has the more dangerous public policy implications because it is about forestalling policies based on evidence (in order to protect business models). This ambitious book is an account of that war and what concerned citizens of all political persuasions in all countries can do about it. Otto, a novelist and award-winning screenwriter, and in Krauss's word, “the epitome of a responsible citizen scientist,” is head of the effort to persuade presidential candidates to engage in science debates. Milkweed Editions, 2016, 598 pp. \$18.

—Benjamin Radford and Kendrick Frazier



### Spread the Word

Bill Nye’s “Promote Reason, Prevent Climate Catastrophes: Let’s Get ‘Er Done” (September/October 2016) was a great article on critical thinking, but it misses the mark on two points.

First, you are, as they say, “preaching to the choir” (sorry about the theistic reference). Send this to *The Wall Street Journal*, *Washington Post*, *New York Times*, Fox News. Now you are talking to an audience that matters.

Second, his reference to his parents, World War II, and the Greatest Generation was faulty. They were responding to a catastrophe that had already happened. It affected us all in a direct and personal way. I worked in government and we, too, had a saying: “Nothing happens until you turn on the faucet and nothing comes out.” As a people we don’t respond to a problem until it affects us directly and personally, whether it be a dry faucet or climate change. Sad but true.

David H. Brands  
Tehachapi, California

### Special Anniversary Edition

Your special anniversary edition (September/October 2016) is great reference material touching outstanding issues. Neil deGrasse Tyson and Edzard Ernst nailed the coffin of blind belief and unscientific attitudes.

In India, we experienced a hostile atmosphere and physical attacks when homeopathy was

exposed by scientist Dr. Pushpa M. Bhargav and me. Governments are supporting and justifying pseudo-medical practices in the name of religion. It is deplorable that institutions such as the National Institutes of Health support alternative medicines, wasting taxpayers’ money. Children should be taught the scientific method. Educated people have succumbed to beliefs due to lack of systematic exposure of science.

Innaiah Nariseti  
Brookeville, Maryland

### Greenpeace’s Anti-GMO Stance

Your report on 110 Nobel laureate scientists urging Greenpeace to drop its anti-GMO stance (News & Comment, September/October 2016) was very interesting. Another organization in need of correction on this issue is the Consumers Union. Recently it has been emailing its *Consumer Reports* subscribers urging them to contact their state representatives in support of legislation requiring GMO labeling. This organization, which has generally provided consumers with sound scientific and technical advice, has unfortunately followed the lead of popular opinion on this issue.

David W. Briggs  
Marion, Massachusetts

Regarding “110 Nobel Laureate Scientists Urge Greenpeace to Drop Its Anti-GMO Stance,” perhaps the anti-GMO attitude is encouraged by a pro-GMO “Trust us; we’re scientists” stance. Laboratory GMOs *could* produce harmful foods if they tried—just as natural selection produces organisms that produce toxins to protect themselves. The pro-GMO position needs to present information (understandable to reasonably educated laymen) on how we know GMO foods are safe. Replace “trust us” with “here’s why.”

Also avoid saying “all GMOs are safe.” If there’s no distinction in the how and why of GM, one problem with one GMO will

bring down all GMOs, in the public eye, like a house of cards.

Separate the reasons for GM and address them. Golden rice is a great example of GM food that should be allowed; it’s simply inhumane not to. GM for pesticide resistance is more problematic—not because of the GMO itself but because it can encourage misuse of pesticides.

GMOs for increasing food supply may be a red herring. For one, we’re told that famine may be as much due to failed distribution (including politics and crime) as to lack of food. Second, “you can’t beat the exponential”; if world population keeps growing it will eventually outstrip any means of increasing food supply.

Dick Dunn  
Longmont, Colorado

I would not give a blanket statement that all GM organisms are safe.

I oppose those foods that have been genetically modified to be more resistant to herbicides because that allows farmers to spray even more carcinogenic herbicide on it, poisoning our rivers and streams. We now also have “Roundup ready” weeds. I also oppose having food plants genetically modified to have an insect poison throughout their tissues so that any insect that eats or uses its pollen or nectar is poisoned.

Because we are related to *all* living things, our DNA speaks the same language as all other DNA. What poisons an insect can’t be good for us either.

There is also a huge problem with genetically modified fish. They have been modified so that they grow faster and bigger than wild fish. This means that when, not if, they escape into the wild, they will breed with our remaining wild salmon for example, causing them to need more food than normal to grow. This could result in skinny, sickly fish that will fail in the wild, resulting in even fewer wild salmon returning to our polluted dying rivers and causing the extinction of our remaining wild salmon. Because

of farmed salmon, the Atlantic salmon is heading to extinction; the Pacific salmon species can be next. Farmed fish are also overcrowded, fed with antibiotics, and have high parasite loads. Wild fish are caught to feed those farmed fish depleting the food that other fish and our seals, birds, and whales need to eat.

I have no problem with GMOs that improve flavor, improve quality, or increase productivity, but that is *not* what most GMOs are being developed for; they are being developed to maximize profit!

Sheila Chambers  
Brookings, Oregon

*In response to Sheila Chambers, it may be worth simply repeating two key sentences from the 110 Nobel laureates’ statement:*

*Scientific and regulatory agencies around the world have repeatedly and consistently found crops and foods improved through biotechnology to be as safe as, if not safer than, those derived from any other method of production. . . . Their environmental impacts have been shown repeatedly to be less damaging to the environment, and a boon to global biodiversity.*

—The Editors

### Fate

Perhaps Stuart Vyse’s bafflement concerning the source of people’s persistent near-universal tendency to see purpose, destiny, or fate in especially unusual natural or coincidental events (“Fate: Inventing Reasons for the Things that Happen,” September/October 2016) is unnecessary. As may be his caution in attributing this tendency toward a particular cognitive error to “nature vs. nurture.”

Of course almost all traits and behaviors in any one individual are the result of a complex interaction between these two sets of factors. But this need not prevent



us from confidently leaning one way or the other in our general attributions. And the findings and features pushing toward an explanation of this tendency in our “nature,” in our “hard-wiring,” or in our genes have grown exponentially in recent years.

Some of these findings were described in my article “Why Do People Believe in Gods?” (SI, January/February 2015), in which Kelemen’s program of research was cited to suggest that “promiscuous teleological intuition” is a powerful innate universal tendency because people born without it (as seems to occur in autism) do not recognize, engage with, and manipulate their critical early environment, i.e., their parents. Before our modern, affluent, safe, and doting world developed, such individuals would invariably fail to engage their carers, wander away to be eaten, or eat poison themselves. So this cognitive error confers an enormous survival and evolutionary advantage.

The surprise—given such a powerful and necessary, if deluded, tendency to attribute agency to all events in the world—is that some of us are able to see past the excruciating desire for a purpose and a creator behind those events and, as we cognitively mature, correct our cognitive error tendencies by deliberately adopting scientific methods of enquiry and objective explanation. This is very hard to do, but it confers its own survival advantages beyond the childhood years.

Gary Bakker  
Legana, Tasmania, Australia

In “Fate: Inventing Reasons for the Things That Happen,” Stuart Vyse covers some interesting ground. I felt uncomfortable, however, with an aspect of the article. The word *fate* is presented as having an exclusively supernatural or religious context, and this seemed to me unreasonably restrictive. I am sure that determinists are capable of using words such as *fate* to signify merely that something happened, was always

going to happen, and could not have been avoided. Such beliefs do not require belief in a god, merely that stable(-ish) mechanisms exist.

To add to the scope of the discussion, perhaps there is someone out there who could write a similar article but with a “no-free-will” orientation.

Peter J. Seymour  
Redhill, U.K

*Stuart Vyse replies:*

*Citing research by Deborah Kelemen, Gary Bakker subscribes to the view that “promiscuous teleological intuition’ is a powerful innate universal tendency,” giving people a natural propensity to see fate and purpose in objects and events. In his 2015 SKEPTICAL INQUIRER article “Why Do People Believe in God?” Bakker goes on to propose that this innate tendency provides a reasonable explanatory hypothesis for widespread popularity of religious belief. Both of these ideas are popular among developmental psychologists, but the latter, in particular, is far from settled. For example, in a 2013 article titled “Would Tarzan Believe in God? Conditions for the Emergence of Religious Belief,” Konika Banerjee and Paul Bloom argue that without cultural influence, children would not naturally acquire religious belief. Tarzan would not believe in God (Trends in Cognitive Sciences 17(1): 7–8).*

*Researchers are in greater agreement that children’s tendency to see fate and purpose is innate, and Kelemen and others have conducted studies that support this view. However, I am reluctant to make this attribution because the studies that would provide the strongest evidence of innateness are not ethical to conduct. The best test would be a deprivation study in which a group of healthy newborns were assigned to be Tarzans, raised without language or human culture. If these feral children went on to show teleological intuition, then the point would be made. Absent this kind of data, it is difficult to assess the relative contributions of nature vs. nurture in our tendency to see fate. As I mentioned in*

*the article, I am further chastened by the recent revelation that a classic study suggesting that imitation is innate has been thrown into question.*

*Peter J. Seymour is correct. The word fate is sometimes used simply to indicate a nonsupernatural deterministic outcome of events, but the first definition of fate in the Oxford dictionary is “The development of events outside a person’s control, regarded as predetermined by a supernatural power.” The most common usage seems to imply something more than mere physical determinism, and that is the meaning most researchers in this field have employed. Finally, I like Mr. Seymour’s suggestion of an article on free-will and determinism and may take up that topic in a future column.*

## NECSS 2016 Conference

Russ Dobler’s account of the NECSS 2016 conference (News & Comment, September/October 2016) was good as far as it went, but it didn’t go far enough. He inexplicably left out one-third of the whole. The conference had three cosponsors, not two. He mentioned the New York City Skeptics and the New England Skeptical Society, but he neglected to mention the Society for Science-Based Medicine (SfSBM), which cosponsored this year’s and last year’s NECSS.

The SfSBM put on a third of the entire NECSS program, with a full day devoted to science-based medicine on Friday, the first day of the conference. I spoke on functional medicine; dentist Grant Ritchey spoke on science-based dentistry; pharmacist Scott Gavura and lawyer Jann Bellamy spoke on different aspects of the “natural disaster” of dietary supplements; three pediatricians spoke: John Snyder on pediatric CAM, Saul Hynes on the bogus diagnosis of Chronic Lyme, and Clay Jones on the inadvisability of chiropractic for children; Steven Novella spoke on Bayesian statistics; and there was a panel debate on whether pediatricians

should “fire” anti-vaccination parents. Finally, there was an “ask us anything” Q&A panel session.

Harriet Hall, MD  
Puyallup, Washington

*Russ Dobler replies:*

*The space limitation was the main determining factor. Also, having put a strong focus on the day of Science-Based Medicine in the online version published on csicop.org, I wanted to highlight some things that didn’t make the previous cut, such as the day of workshops on Thursday and Richard Wiseman’s keynote. My apologies to Dr. Hall; no slight was intended.*

## Dog Behavior

I am not pleased with the article on animal behavior (Science Watch column, “Dog Behavior: Beneath the Veneer of Man’s Best Friend,” September/October 2016).

It is claimed that cougars cannot consume an animal that’s already dead, but offering meat is a standard means of trapping pumas. Predators are not stupid enough to pass up a free meal, and it’s a simple coded behavior. Even finicky cheetahs occasionally coordinate to drive a lone hyena off its kill.

The hypothesis that the classic canid “play bow” is merely an aborted stalking action is nowhere close to being convincing. The dropping of the shoulders while extending both forelimbs forward is not at all a sneaky stalking pose in which the entire body is dropped to nearly the ground to minimize visibility while the legs work alternately so the hunter can creep toward its target. Nor is such an awkward, head-low/butt-high pose going to intimidate potential prey into fleeing. Keeping the rump high is instead an obvious, prominent signal that hunting is not intended. And why do dogs frequently adopt the bow with humans and other dogs in play-friendly locations, such as dog runs, and then enthusiastically

engage in playful behavior in which doing harm to the playmate is strictly avoided? To look at it another way, dogs do play, and they have to have a stereotypical posture signal to initiate nonviolent play, and since they do the play bow thing before playing, it's pretty darn obvious that's what the play bow is for.

The hypothesis that many animal activities, such as pack hunting, are guided by simple genetically programmed rules rather than sophisticated intelligence is viable. But although we're currently lacking the ability to fully assess what is going on in the brains of nonhumans, it is reasonable for a skeptic to provisionally conclude that sometimes dogs have fun because they consciously enjoy having fun.

Gregory Paul  
Baltimore, Maryland

I found it interesting to learn that my Golden Retriever's "CONSUME" rule for food in her bowl and "NOT-CONSUME" rule for food in the cat's bowl is due to the cat being lucky. It is impressive that the amazing dog that guides the disabled, fights in our wars, protects us from seizures, provides emotional therapy, rescues us from the rubble

of our buildings, finds lost children, is a trusted companion, and so much more does all that with a few simple motor-pattern combinations.

There is nothing in nature like the thousands-of-years-old bond between humans and dogs. This relationship has benefited both. Dogs have a much longer life and far better reproduction success than their wolf ancestors. The relationship has expanded the range of dogs to every corner of the Earth. When humans begin to travel to the stars, dogs will be with us providing their superior olfactory ability, hearing, and companionship. It will be important to fully understand our friend when that day comes. Today it appears dogs understand our behavior and language more completely than we do theirs.

Matthew Carter  
Portland, Oregon

### Science and Religion

I see no irreconcilability between science and religion ("Why Science and Religion Are Irreconcilable," review of Jerry Coyne's *Faith vs. Fact*, September/October 2016).

Sure, antagonism can arise when a religion denies scientific truths, or science challenges its

long-held beliefs.

However, the scientific method can be used to dissect the foundations of all religions, while they have no tool but assertion to explain their worlds. In my view, science always trumps religion.

Herman M. Heyn  
Baltimore, Maryland

### Ghost Hunting with Music

Thank you for a very enlightening and comprehensive answer to the important question of whether hunting ghosts with music is effective (Ben Radford's Skeptical Inquiree column, "Ghost Hunting and 'Singapore Theory,'" September/October 2016).

In a far future, they might call me back from the great unknown by playing Duke Ellington's "Mood Indigo," but for the moment I just listen to him on the rack.

But—unwittingly—you revealed an important aspect of musical ghost hunting: Playing the music backward (as in Notgnille Ogindi Doom). At least, that is what the illustration on page 31 demonstrates: Normally phonographs play the records clockwise. Here you see it the other way around. Apart from the needle plowing the record to chips, the music will come out

very, very eerie. . . .

Beware, ghosts—Benjamin Radford is on your trail. . . !

Frits Schjøtt  
Svendborg, Denmark

### Keep to the Ley Lines

Just a minor quibble with Joe Nickell's article on ley lines (September/October 2016).

In the article, Dr. Nickell describes paranormalist and believer in ley lines John Michell as a "lifelong marijuana smoker." I have to wonder why that was relevant. The fact this fellow may have smoked pot doesn't come up anywhere else in the article. It seems like a soft *ad hominem* or a bit of poisoning the well, which is completely unnecessary. Let the man's ideas float or sink on their own merits. What he smokes on his own time doesn't seem, in Nickell's article, to have any bearing on his beliefs.

Jim Fitzsimons  
St. Paul, Minnesota

*Joe Nickell replies:*

*While interjecting some negative irrelevancy would be an ad hominem, surely given Michell's many fanciful ideas, his chronic use of a drug—that is known to promote a fantasy state—is potentially explanatory.*

There's much more available on our website!

# Skeptical Inquirer

Here's just a sample of what you'll find:

### Self-Hatred: The Cause of Autoimmune Disease?

CSI Fellow Harriet "SkepDoc" Hall examines the idea that self-loathing can cause autoimmune disorders. When we get sick we naturally want to understand what is happening to us, and we want to understand what caused the illness. When science has no explanation, people are tempted to make one up. When scientifically ignorant people speculate about the causes of disease, it can lead to bizarre false conclusions and to blaming the victim.

### In Memoriam Segment from CSIcon 2016

CFI Director of Libraries Tim Binga, along with veteran skeptics Tim Farley and Jim Lippard, highlight at the recent CSIcon conference those who died in the skeptical world in 2016. Both notable skeptics and what were termed "cultural competitors" (those who were opponents of skepticism or noteworthy) were remembered for their deeds in a short presentation.



## [FEEDBACK]

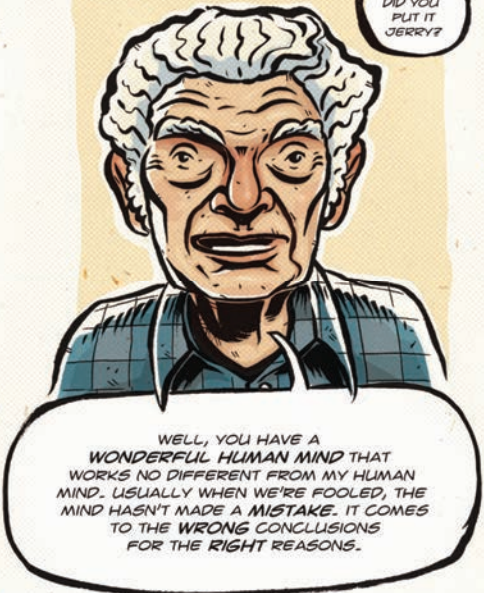
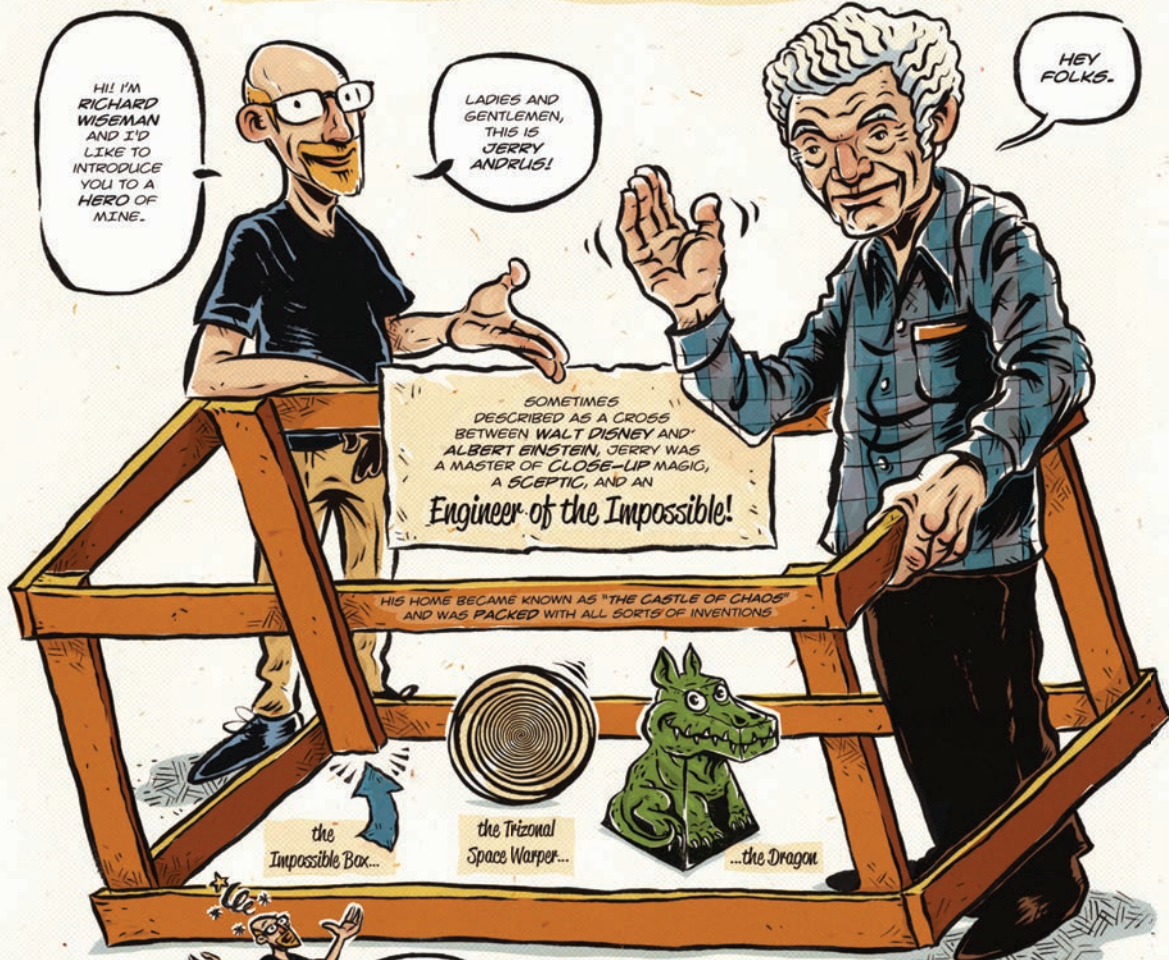
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# an introduction to JERRY ANDRUS

by Richard Worth & Jordan Colver  
with Richard Wiseman

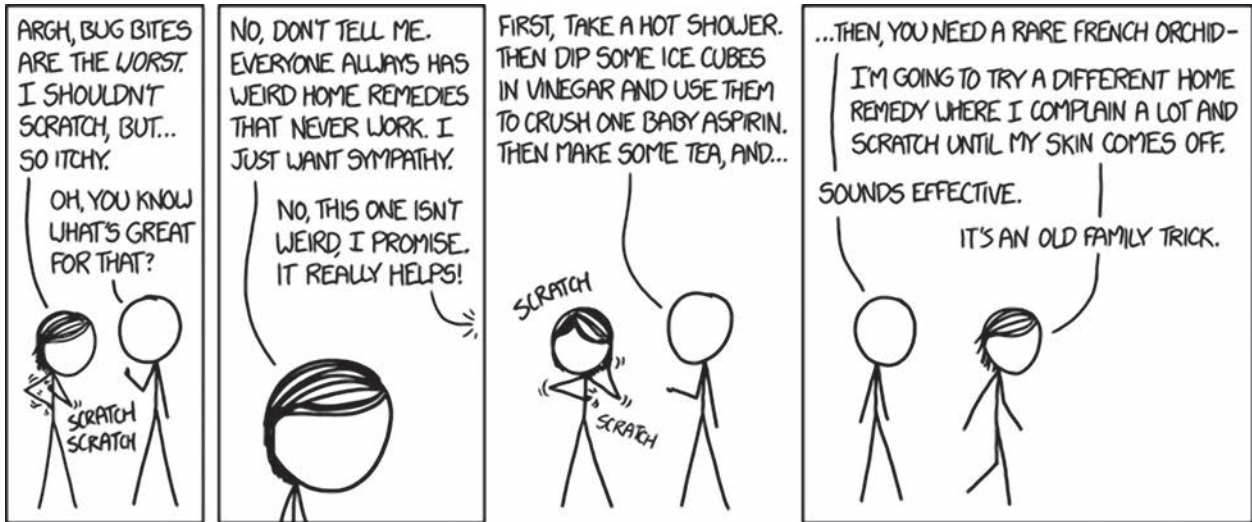


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# Home Itch Remedies



xkcd.com

W triple-u    NM enm    R peeq    2 arb    J jay-two

ALPHABET REJECTS

Hankin

TIME AND TIDE WAIT FOR NO MAN. NO MAN IS AN ISLAND. THEREFORE, TIME AND TIDE WAIT FOR AN ISLAND.



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Hankin

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**San Diego Association for Rational Inquiry (SDARI)** President: Tom Pickett. Email: pickett.thomas@gmail.com. Program/general information 619-421-5844. www.sdari.org. Postal address: PO Box 623, La Jolla, CA 92038-0623

**CONNECTICUT**  
**New England Skeptical Society (NESS)** New England. Steven Novella M.D., President. Tel.: 203-281-6277; Email: board@thenss.com. 64 Cobblestone Dr., Hamden, CT 06518 www.thenss.com

**D.C./MARYLAND**  
**National Capital Area Skeptics** NCAS, Maryland, D.C., Virginia. D.W. "Chip" Denman. Tel.: (240) 670-6227. Email: ncas@ncas.org. PO Box 8461, Silver Spring, MD 20907-8428 http://www.ncas.org

**FLORIDA**  
**Tampa Bay Skeptics** (TBS) Tampa Bay, Florida. Rick O'Keefe, contact person. Tel.: 813-505-7013; Email: tbs@centerforinquiry.net. c/o O'Keefe, 4011 S. Manhattan Ave. #139, Tampa, FL 33611-1277. www.tampabay skeptics.org

**ILLINOIS**  
**Rational Examination Association of Lincoln Land (REALL)** Illinois. Bob Ladendorf, Chairman. Tel.: 217-546-3475; Email: chairman@reall.org. PO Box 20302, Springfield, IL 62708 www.reall.org

**Chicago Skeptics** Jennifer Newport, contact person. Email: chicagoskeptics@gmail.com. www.chicagoskeptics.com

**LOUISIANA**  
**Baton Rouge Proponents of Rational Inquiry and Scientific Methods** (BR-PRISM) Louisiana. Marge Schroth. Tel.: 225-766-4747. 425 Carriage Way, Baton Rouge, LA 70808

**MICHIGAN**  
**Great Lakes Skeptics** (GLS) SE Michigan. Lorna J. Simmons, Contact person. Tel.: 734-525-5731; Email: Skeptic31@aol.com. 31710 Cowan Road, Apt. 103, Westland, MI 48185-2366

**Tri-Cities Skeptics**, Michigan. Dr. Gary Peterson. Tel.: 989-964-4491; e-mail: peterson@svsu.edu. www.tcskeptics.blogspot.com

**MINNESOTA**  
**St. Kloud Extraordinary Claim Psychic Teaching Investigating Community** (SKEPTIC) St. Cloud, Minnesota. Jerry Mertens. Tel.: 320-255-2138; Email: gmertens@stcloudstate.edu. Jerry Mertens, Psychology Department, 720 4th Ave. S. St. Cloud State Univ., St. Cloud, MN 56301

**MISSOURI**  
**Skeptical Society of St. Louis** (SSSL) St. Louis, Missouri. Michael Blanford, President. Email: info@skepticalstl.org. 2729 Ann Ave., St. Louis, MO 63104 www.skepticalstl.org

**St. Joseph Skeptics** P.O. Box 8908  
St. Joseph MO, 64508-8908

**NEVADA**  
**Reno Skeptical Society, Inc.**, Brad Lutts, President. Tel.: (775) 335-5505; Email: info@renoSkeptics.org. 18124 Wedge Parkway #1052 Reno, Nevada 89511. www.RenoSkeptics.org

**NEW MEXICO**  
**New Mexicans for Science and Reason** (NMSR) New Mexico. David E. Thomas, President. Tel.: 505-869-9250; Email: nmsrdave@swcp.com. 801 Fitch Ave., Socorro, NM 87801. www.nmsr.org

**NEW YORK**  
**New York City Skeptics** Michael Feldman, president. PO Box 5122 New York, NY 10185. www.nycskeptics.org

**Central New York Skeptics** (CNY Skeptics) Syracuse. Lisa Goodlin, President. Tel: (315) 636-6533; Email: info@cnySkeptics.org. cnySkeptics.org PO Box 417, Fayetteville, NY 13066

**OHIO**  
**Central Ohioans for Rational Inquiry** (CORI) Central Ohio. Charlie Hazlett, President. Tel.: 614-878-2742; Email: charlie@hazlett.net. PO Box 282069, Columbus, OH 43228

**Cleveland Skeptics** Joshua Hunt, Co-Organizer, www.clevelandSkeptics.org

**South Shore Skeptics** (SSS) Cleveland and counties. Jim Kutz. Tel.: 440 942-5543; Email: jimkutz@earthlink.net. PO Box 5083, Cleveland, OH 44101 www.southshoreskeptics.org

**Association for Rational Thought** (ART) Cincinnati. Roy Auerbach, president. Tel.: (513)-731-2774. Email: raa@cinci.rr.com. PO Box 12896, Cincinnati, OH 45212. www.cincinnatiSkeptics.org

**OREGON**  
**Oregonians for Science and Reason** (O4SR) Oregon. Jeanine DeNoma, president. Tel.: (541) 745-5026; Email: wilkinsa@peak.org; 39105 Military Rd., Monmouth, OR 97361. www.O4SR.org

**PENNSYLVANIA**  
**Philadelphia Association for Critical Thinking** (PhACT), Bob Glickman President. 653 Garden Road Glenside PA 19038. 215-885-2089 E-mail: President@phact.org. Website: www.phact.org

**TENNESSEE**  
**Rationalists of East Tennessee**, East Tennessee. Carl Ledebeker. Tel.: (865)-982-8687; Email: Aletall@aol.com. 2123 Stonybrook Rd., Louisville, TN 37777

**TEXAS**  
**North Texas Skeptics NTS Dallas/Ft Worth area**, John Blanton, Secretary. Tel.: (972)-306-3187; Email: skeptict@ntskeptics.org. PO Box 111794, Carrollton, TX 75011-1794. www.ntskeptics.org

**VIRGINIA**  
**The James Randi Educational Foundation**, James Randi, Director. 2941 Fairview Park Drive, Suite 105 Falls Church, VA 22042  
Email: jref@randi.org  
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**Science & Reason**, Hampton Rds., Virginia. Lawrence Weinstein, Old Dominion Univ.-Physics Dept., Norfolk, VA 23519

**WASHINGTON**  
**Seattle Skeptics**  
www.seattleskeptics.com

The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703. International affiliated organizations listed at www.csicop.org.

