

Summer 2012 Book and Media Recommendations

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ABSTRACT: This is a list of recommendations for books and a few Web sites for *Journal* readers to enjoy in the summer, either in preparation for fall teaching, or for sheer pleasure. Four contributors have assembled an eclectic list in this annual collection.



KEYWORDS: General Public, History/Philosophy, Interdisciplinary/Multidisciplinary, Public Understanding/Outreach

■ CHERYL B. FRECH

One of the things I remember fondly about summer is the weekly trips to the library to stock up on books. As a child, I was driven to the library by my mother, and as an adult, I made that trip with my own daughters. Reading is the perfect antidote for a hot summer day: there's nothing better than lounging in your favorite chair with a cool drink and a good book. Four contributors present science titles for your summer consideration.

Four Fish: The Future of the Last Wild Food by Paul Greenberg

The *San Diego Magazine* in my hotel room at the recent ACS meeting had an article about the spiny lobster species available in southern California.¹ In the interest of sustainability, the state has severely restricted the harvest of spiny lobster. The result is that the price is so high that the delicacy is not available on the menu in California because most of the catch is shipped out of the country to be sold at a much higher cost. How is this sustainable? What is going on with seafood?

Paul Greenberg explores these questions in *Four Fish: The Future of the Last Wild Food*² (Figure 1). Greenberg selects salmon, tuna, bass, and cod as four representative fish. In this book you will learn why salmon is somewhat successful as a farmed species, whereas cod has been a dismal failure. We are unable to "domesticate" fish in the same way that other animals have been domesticated as a food source because fish are not endowed with an inborn liking for humans, among other reasons (page 90). The story of fish is complex and fisheries' ecosystems are intricate. Our ability to raise fish for consumption relies heavily on science.

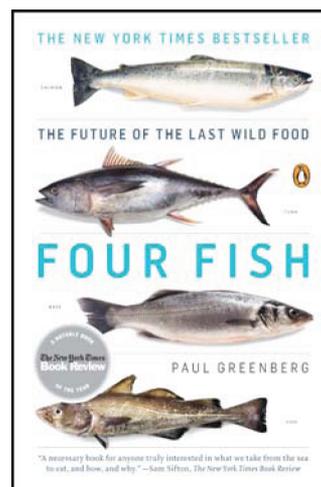


Figure 1. *Four Fish: The Future of the Last Wild Food*² cover image provided by The Penguin Press and reproduced with permission.

I don't often say that a book has changed my life, but this one did. When I returned home from the ACS meeting and went to the seafood counter in my local, landlocked grocery store, I saw a new species of farmed fish that Greenberg had described in the book. Did I really want to purchase a selectively bred freshwater catfish from southeastern Asia that was developed from fish that once lived in outhouses? No, thanks. I bought black lentils and cooked vegetarian instead.

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The Immortal Life of Henrietta Lacks by Rebecca Skloot

Henrietta Lacks was a 31-year-old black woman who became ill with cervical cancer in 1951. Unbeknownst to her, cells were harvested from her aggressive tumor and cultured in the laboratory at Johns Hopkins University. These cells were among the first to survive in laboratory culture. Not only did the cells survive, they thrived. Cell lines from Henrietta Lacks became known as HeLa and are still used in research today. Hence, Rebecca Skloot has titled her debut work, *The Immortal Life of Henrietta Lacks*.³

Relatively few authors are able to write a nonfiction book about a scientific topic that can be read like a novel. Skloot weaves a captivating tale about her personal odyssey to learn about Henrietta Lacks and her descendants and the scientific uses of the HeLa cells. The book raises provocative questions about science and ethics. Doctors, researchers, and companies have profited handsomely from their work with HeLa cells, yet some of the Lacks's descendants struggle in poverty today. I urge you to read this book and share it with your students and colleagues.

Radioactivity: A History of a Mysterious Science by Marjorie C. Malley

*Radioactivity: A History of a Mysterious Science*⁴ may sound like many other books that chronicle the development of the nuclear atom and radioactivity in the 20th century. However, the emphasis in this relatively short volume is on the subtitle—"a history of a mysterious science" (Figure 2).



Figure 2. *Radioactivity: A History of a Mysterious Science*⁴ cover image provided by Oxford University Press and reproduced with permission.

As teachers of chemistry, we may find it easy to teach our students about α , β , and γ radiation. We can grab a Geiger counter for a demonstration or present simple diagrams representing fission. What we may not appreciate is the absolute conundrum in which the scientific community was immersed from 1900–1945 while the enigma of the atom and its transformations was resolved.

By omitting equations, jargon, and scientific details, Marjorie Malley weaves a compelling tale that links the personal lives of the scientists, the tumultuous times, and the pursuit of understanding. She has combed the archives for early photographs and articles that illustrate emerging insight into the atom. Malley effectively communicates the dogged determination and creative thinking deployed by the

researchers when confronted by confounding evidence. I recommend this book for all levels of science teachers for its realistic portrayal of this important chapter of recent scientific history.

Better Living through Science by Mark Frary

When my local Border's bookstore closed last summer, I descended upon their science section and purchased a few bargains. *Better Living through Science*⁵ was among those titles and my husband snapped it up to read before me. He was quickly commenting on all the interesting tips. I will say that "how to get a sofa around a corner", "how to remove red wine stains", and "how to wrap presents" have come in handy, whereas "how to sail a yacht" has not yet been a dilemma at my house in Oklahoma.

Each of the 34 topics is described in three to four pages and includes whimsical drawings as well as relevant equations, tables, and graphs. While the topics all sound useful, some are more esoteric than others. For example, "how to organize" is a noble prospect, but the discussion rapidly devolves into a complex bubble sorting technique.

Middle and high school science teachers will find many topics for lessons or further student research in these pages. The book has a few minor chemistry mistakes that students could be challenged to find. Other readers will benefit from their enhanced household problem solving knowledge at the ball fields, in the kitchen, solving puzzles, and winning at board games.

■ BRIAN P. COPPOLA

Out of Our Minds: Learning To Be Creative by Ken Robinson

Chances are you have seen one of Sir Ken Robinson's TED talks.⁶ He is an international advocate for the power of creativity and innovation in education, business, and society at large. Robinson's thesis is simple: creativity and innovation are inherent human traits, and the drive for conformity, particularly in education, stifles and discourages their development.

This book is a 10th anniversary update to the 2001 edition of *Out of Our Minds*.⁷ Robinson uses a hundred or so case studies, from Gutenberg to Pixar, to illustrate creative thinking and how it might develop. He argues that the needs from industrialization, particularly conformity and standardization, reinforced and enhanced the worst qualities of our education systems.

This is not a how-to book, but rather a lucid, often humorous, and always thought-provoking argument. Robinson believes that an education that encourages flexibility, adaptability, and divergent thinking, the antipodes of conformity and standardization, is fundamentally necessary for us to be successful in an age of rapid change and globalization.

Catching Up or Leading the Way: American Education in the Age of Globalization by Yong Zhao

Yong Zhao, born in China and currently serving as Associate Dean for Global Education, College of Education at the University of Oregon, initially set out to report on some of the age-old problems with the Chinese education system. Instead, in writing *Catching Up or Leading the Way*⁸ (Figure 3), what Zhao found was a system that was trying to move toward Western ideals in an attempt to promote creativity and innovation. More importantly, he saw the current obsession in the U.S. education system with standardization and testing as

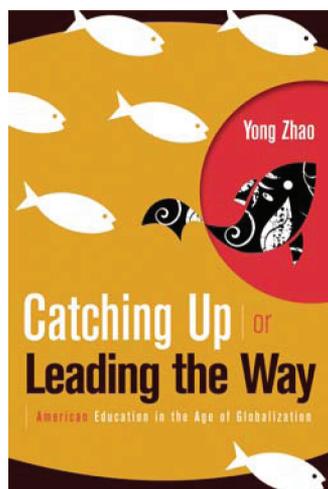


Figure 3. Source: *Catching Up or Leading the Way: American Education in the Age of Globalization*,⁸ by Yong Zhao, Alexandria, VA: ASCD. Copyright 2009 by ASCD. Reprinted with permission. Learn more about ASCD at www.ascd.org.

moving in exactly the direction that China was trying to abandon...and so vice versa!

Zhao's thesis is exactly the same as Robinson's (see above): creativity and innovation are inherent human traits, and the drive for conformity, particularly in education, stifles and discourages their development. Unlike Robinson, however, Zhao would argue that there is plenty of hard evidence, in 2500 years of the Chinese education system, that supports another simple conclusion: schools in the United States have no better or worse idea about how to teach creativity than the schools in China, it's just that the Chinese system has been more effective at killing the inherent creative spirit.

Zhao believes that formal education in the United States has encouraged flexibility and adaptability over the years, and that these are fundamentally necessary in order for us to be successful in our rapidly changing world—and this is the reason that our Chinese colleagues are so interested in understanding how to promote creativity. As he writes in his preface:⁸

China wants what America is eager to throw away—an education that respects individual talents, supports divergent thinking, tolerates deviation, and encourages creativity.

RSA Videos

If you have somehow missed the videos at the Web site of the RSA (Royal Society for the encouragement of Arts, Manufactures, and Commerce),⁹ please do yourself a favor and scoot over and check out (for example) *Changing Education Paradigms*¹⁰ by Sir Ken Robinson.

In early 2010, the RSA recruited Andrew Park to apply his unique concept of illustration to a series of intellectually stimulating speeches. I think there are fundamentally important cognitive reasons why simultaneously processing these visual images along with the audio provides a stellar learning environment.

You can now find other examples outside of the RSA. Bill Gates commissioned Park to illustrate a speech he gave on vaccines,¹¹ and as a genre, others are trying their hands at this emergent combination of art and effective teaching.

Abbey Ryan's Blog and Alla Prima Web Studio

The Internet has benefitted the arts by creating a direct connection between artists and their potential audiences. On any given day, the work of a hundred or so artists can be found at the Daily Paintworks Web site,¹² where over 700 individuals have registered themselves as *alla prima* artists, a genre of oil painting (literally “in one go”), in which a painter uses a wet-on-wet technique to complete a painting in one sitting. For my money, the twenty-something artist Abbey Ryan is the leader of the pack.¹³

I understand the risks in recommending art, but I am willing to urge you to the work of this young artist. Ryan's training is in medical and scientific illustration (ultrarealistic), and her gallery work, in fine-line shaded ink and paper, is quite abstract. As an *alla prima* oil painter, Ryan channels the spirit of the Dutch Masters. Her main subject is food. In fact, one of her signature pieces is a peanut butter and jelly sandwich. Her paintings, which are usually the size of large index cards, generally convey a strong sense of weight and mood, framed in dark browns and other earth tones, and would have been home in 17th-century Amsterdam.

Kickstarter Crowdfunding Web Site

The Internet has benefitted the arts by creating...oh, wait, I said that already.

Kickstarter¹⁴ is an Internet-based crowdfunding scheme for the creative arts. People with ideas for music, theater, art, journalism, sculpture, film, and even a highly regarded iPhone stand can post and promote their project with a short video presentation. There are public art projects, fashion items, video games, photography collections, and cookbooks. A bit like a PBS fundraising drive, individuals specify the total dollar amount they need for their project, different dollar levels for funders to engage, and different premiums or rewards that one can earn at each level.

Contributors only make their commitment to fund a project in the event the project achieves its goal. The fundraising drive is open for a specified period of time, and the financial commitments, mediated by amazon.com, are not triggered unless and until the stated financial goal is met—otherwise, the proposed contribution is not charged.

Kickstarter projects have about a 45% success rate, and are currently limited to activities originating in the United States. Although both Kickstarter and Amazon collect a percentage of the funds from successful projects, the combined rate, about 8%, is significantly lower than a gallery or agent might charge. I like the direct connection between artists and their prospective sponsors, and the ability it gives people to support others in their creative endeavors.

■ HAL HARRIS

The Magic of Reality: How We Know What's Really True by Richard Dawkins

Evolutionary biologist Richard Dawkins attempts in this book, *The Magic of Reality*,¹⁵ to address some of the questions that might arise in the minds of children about topics with which science deals. It was written for kids of unspecified age; I would guess that middle school would be a reasonable estimate. Very often, children's questions are difficult for any parent or teacher who is not deep into science to answer, such as: “Who was the first person?”, “What is the sun made of?”, “What is a rainbow?”, and “Are we alone?” among others. Dawkins addresses 12 such questions, each in a chapter that starts

with one of these questions, which is explored in simple language and with scientific accuracy. While I think that he could have gone a bit further with his discussion of rainbows and I think that he wimped out on quantum mechanics and relativity, this book should be a godsend (irony intended) for homeschooling parents whose science knowledge could use some help. One of the more interesting chapters is the last, “What Is a Miracle?”, in which Dawkins largely relies on the arguments of David Hume, providing a high standard for the acceptance of any proposed miracle.

***A More Perfect Heaven: How Copernicus Revolutionized the Cosmos* by Dava Sobel**

I enjoyed so much Dava Sobel’s previous books, *Longitude*,¹⁶ and *Galileo’s Daughter*,¹⁷ that I was eager to read her latest, *A More Perfect Heaven*,¹⁸ which was judged “best science book” for Fall 2011 by *Publisher’s Weekly*. I have read a lot about Copernicus lately, including both Owen Gingerich’s *The Book Nobody Read*¹⁹ and his article about Kepler and Brahe in the September 2011 *Physics Today*.²⁰ Despite knowing something about Copernicus’s science, the man himself was a cipher to me—one that Sobel has turned into flesh and blood. It is not easy to research the private life of an individual who lived 500 years ago, even if that person became famous. Sobel’s task was facilitated considerably by the fact that Nicolaus Copernicus was not only a scientist, but also a canon in the Catholic Church, and therefore, records related to his ecclesiastical duties supplement a scanty scientific history. Sobel has a theory—that Copernicus postponed publication of *De Revolutionibus Orbium Coelestium*²¹ until near the end of his life because he feared that it would further the cause of the Lutherans. She invents a dialogue between the aging Copernicus and Georg Joachim Rheticus, a young Lutheran mathematician who encouraged and aided the older man in publishing possibly the most important scientific treatise in the history of the world. The invented dialogue is boldly inserted as a two-act play, around which the factual history of Copernicus becomes the bread of this sandwich. The fact–fiction separation is manifestly clear and the intellectual and religious controversies are beautifully elaborated.

***Worm: The First Digital World War* by Mark Bowden**

Mark Bowden, author of *Black Hawk Down*,²² knows how to write a nonfiction thriller. The “Worm” sounds like it ought to be science fiction, but the title refers to the Conficker worm, the most diabolical and potentially damaging computer malware ever devised. Conficker multiplies itself through Internet connections, burrows into the operating system of Windows computers, and waits for instructions from its controller to do...what? It is no exaggeration to claim that the entire worldwide Internet was at risk from Conficker (actually, it still is) and its existing botnet of between 6 and 25 million infected hosts still poses a threat to any site in its crosshairs. *Worm: The First Digital World War*²³ (Figure 4) is the inside story of how a loose confederation of computer security experts barely managed to avert disaster by defending the Net. Chances are that you have never heard of any of the people involved (there are too many to list here), and it is also likely that you were oblivious as the first world digital war raged. It is a story deserving of a wide audience and this skilled storyteller.

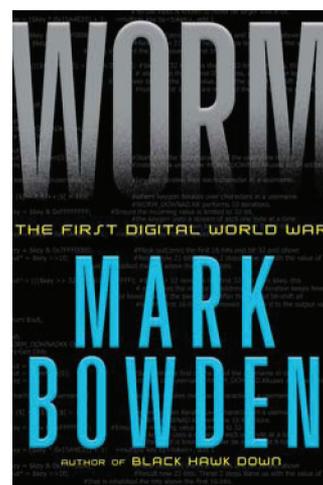


Figure 4. *Worm: The First Digital World War*²³ cover image provided by Grove/Atlantic, Inc. and reproduced with permission.

***The Believing Brain: From Ghosts and Gods to Politics and Conspiracies—How We Construct Beliefs and Reinforce Them as Truths* by Michael Shermer**

None of us is Spock, the superrational Star Trek character, but many of us in the science or science education business imagine ourselves to be less susceptible to unfounded beliefs than the nonscientist community. In *The Believing Brain*²⁴ (Figure 5),

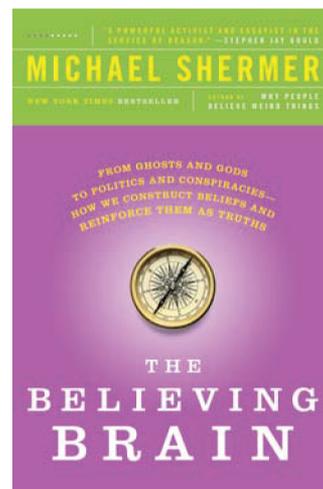


Figure 5. *The Believing Brain: From Ghosts and Gods to Politics and Conspiracies—How We Construct Beliefs and Reinforce Them as Truths*²⁴ cover image provided by St. Martin’s Griffin and reproduced with permission.

Michael Shermer, publisher of *The Skeptic* magazine, shows that beliefs that are not based on data or reason are an inevitable consequence of being human. In fact, the use of imagination when definitive information is unavailable likely was an important trait that evolution favored in our ancestors. His “theory of mind” is based on a separation of mental states into *patternicity*, the tendency to attribute meaning to both meaningful and meaningless noisy data, and *agenticity*, the tendency to infuse patterns with meaning. He argues that both of these characteristics arose in our species as part of natural selection for traits essential for survival in a world of predators. Through numerous examples and lively writing, Shermer builds

a persuasive argument, giving educators another justification for teaching students beginning with what they know—and what they believe.

■ C. M. WOODBRIDGE

Intuition by Allegra Goodman

I first ran across *Intuition*²⁵ (Figure 6) after reading the Ms. Mentor's 2011 Novel Academic Novel list²⁶ and finding it on

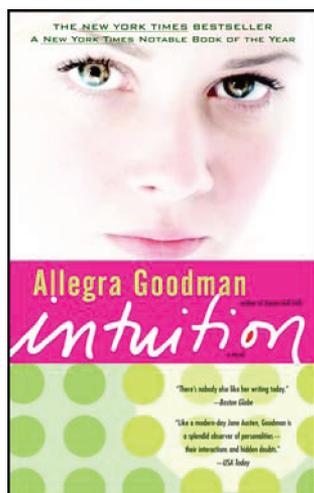


Figure 6. *Intuition*²⁵ cover image provided by Dial Press Trade Paperback (Random House Publishing Group) and reproduced with permission.

the “honorable mention” list.²⁷ At that time, I decided to read as many of the top 100 as I could. After about eight months, I’m down to one more book from the list to read. *Intuition*, however, remains in my personal top 10 list of academic novels, and not just because it is about science.

The story centers on Marion and Sandy, the co-PIs in the Mendelssohn–Glass lab at the fictitious Philpott Institute in Cambridge, Massachusetts, and their postdocs Robin, Cliff, and Feng. The novel opens on a gloomy note: Cliff has just been reprimanded by Marion and Sandy for continuing to carry out experiments he was told to stop because they were not showing results and Marion is worried about securing new funding as the current grant is in its final phase. Despite these stresses, we see that the lab is a tight-knit little family who all support each other both in and out of work.

The action picks up when Cliff’s experiments begin to show remarkable results: the experiment that no one expected to work is not only working but working spectacularly. Papers are published, grant applications are submitted, press releases go out, and *People* magazine comes to the lab to conduct interviews. But then, Cliff is accused of misconduct.

Over the course of the investigation, many questions arise about culpability. The thing I like best about this book is that Goodman does not provide answers to these questions. There are no “heroes” and “villains” here. Instead, she allows the reader to ponder many what-ifs. Not only is this an interesting case study that leads the reader to ponder the responsibilities of PIs and subordinate researchers, but it is also a wonderful glimpse into the world of scientific research and it is written at a level that the general public can appreciate it without losing scientific accuracy. The *People* magazine part might have stretched credibility a bit for me, but it made a good story. This

is a book that I would highly recommend to anyone, faculty or student, doing research.

The Fluorine Murder by Camille Minichino

Camille Minichino is back with the ninth installment²⁸ in her Periodic Table Mystery series. Unsurprisingly, this story centers on fluorine. At the start of the story, our heroine, Dr. Gloria Lamerino, and her husband, Detective Matt Gennaro, are celebrating their third wedding anniversary. They wish to celebrate quietly; however, their friends (who were deprived of a wedding celebration when the couple eloped) are insisting that a party of some sort is required. This is when the fire trucks come rolling down the street.

The town of Revere, Massachusetts has had five fires in the last month and the latest fire (in a nursing home) has claimed the life of a young woman. When fluorine comes up in the course of the investigation, Detective Matt calls on his wife for her help and once again Gloria, Matt, and their friends are off on their latest adventure with fluorine. It turns out that someone is arriving at the fire before the fire department and trying to put the fire out using fluorine-based materials.

This latest installment in the series again combines science (heavily on the chemistry side) and murder in an intriguing story. The disadvantage is that this is only available in e-book format; both Kindle and Nook versions are available from Amazon and Barnes and Noble, respectively. It is also available from the publisher in a wide variety of e-reader formats.²⁸ This particular story was disappointing in that it is only 9000 words and I got through that before we hit cruising altitude. On the other hand, there are over 100 elements to go, so I think I would rather read a series of short stories and get through the whole periodic table. No matter the length, I look forward to future installments in this series.

For the Love of Physics by Walter Lewin

Is your belief in the law of conservation of mechanical energy strong enough to stand in front of a five-pound pendulum set to hit you in the jaw? While I accept the law itself, my faith in setting up a demonstration like this wanes because the demo gremlins have caught me too many times. Not so, for Walter Lewin; this is just one of the topics he describes in *For the Love of Physics*.²⁹ The book details Lewin’s life-long love affair with physics, describing why he loves physics and some of his favorite demonstrations, as well as how he became a physicist and a teacher.

Is this book a memoir of a great career or a physics text? It is a little bit of both. In a discussion of matter (pp 6–9), for example, he discusses matter, radioactive isotopes, his Ph.D. research, nuclear decay, error in measurements, astronomy, and subatomic particles. If this makes the text sound like a stream-of-consciousness, it is, but not in a bad way. He moves seamlessly from one topic to the next while keeping the reader’s interest so that it is similar (I imagine) to sitting in his office and talking with him.

It was also nice to read Lewin’s thoughts on uncertainty in measurement (Chapter 2). He starts by reminding us that physics is an experimental science, so uncertainty in measurements cannot simply be ignored. Not only does he relate uncertainty to practical matters easily accessible to students (clothing sizes, for example), but he also gives more “scientific” examples, such as the 1999 failure of the Mars Climate Orbiter to reach a stable orbit, or why you are shorter standing up than lying down. His discussion of a fundamental topic makes it accessible to students and (hopefully) they will see why their

favorite professors ask them to propagate error and include error estimates in their lab reports.

If you are not interested in reading the book, you might check out some of Lewin's courses on the MIT Open Courseware platform³⁰ or the video "For the Love of Physics",³¹ which is a video of the talk he gave (complete with some of his most famous demonstrations) to celebrate the publication of this book. I have seen this video as well as one or two from his courses; in person, he is just as entertaining as I found the text. Prior to seeing this text on the Barnes and Noble list of forthcoming books last May, I had not heard of Lewin. Now I am sorry that I hadn't heard of him before he retired and I will not likely have an opportunity to head up to MIT and see one of his lectures.

Denying Science by John Grant

John Grant is a prolific author. In addition to writing nonfiction such as *Denying Science*³² (Figure 7), he also writes science

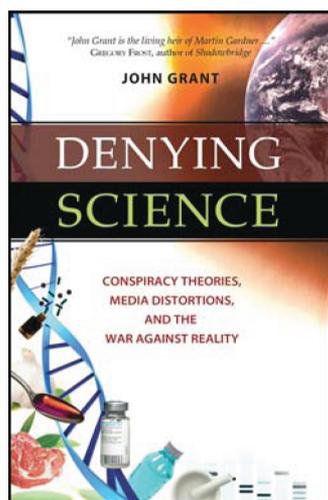


Figure 7. *Denying Science*³² cover image provided by Prometheus Books and reproduced with permission.

fiction and science fantasy. *Denying Science* is a grim portrayal of the demise of the ability to think critically. Whether the topic is creationism or vaccines causing autism or global warming, the average person is more likely to believe the bunk available on the Internet or put forward by the media rather than a subject-matter expert. Consider the following exchange [ref 32, pp 156–157; originally quoted from ref 33]:

OP: “**Fact- If the earth was 10 ft closer to the sun we would all burn up and if it was 10 ft further we would freeze to death ... God is amazing!!”

Commenter: “... to anyone wondering, that’s not true. 1) Earth’s orbit is elliptical and the distance from the sun varies from around 147 million kilometers to 152 million kilometers on any given year. 2) Every star has a habitable zone that is affected by the size of the star and its intensity. The sun’s habitable zone is about 0.95 AU to 1.37 AU ... Earth’s orbit could be decreased by 4,500,000 miles or increase by 34,000,000 miles and still be in the habitable zone. 3) if your claim was true any moderately size earthquake could have taken us out of the habitable zone. sorry. [sic].”

OP: “Okay, that’s cool and all but don’t ever comment on my status telling me that I am wrong everrr again. I didn’t ask you did i? Answer: NO. [sic]”

Willful ignorance, indeed. Grant’s book is not the first about the lack of science literacy in the American public and, judging by the above exchange, it won’t be the last for some time.

So why is the average American so illiterate on the subject of science? Is it poor STEM education or poor education in general? Newspapers continue to publish stories about the lack of science majors,³⁴ and how poorly American students are scoring on science,³⁵ (and other) tests compared to the rest of the world. But these are not new stories and it seems little has changed for the better since these stories were first published. Or could it be the politicians who lack background in science? According to the Office of the Clerk of the U.S. House of Representatives, the 112th Congress has 22 representatives in the medical profession, 16 representatives who hold Ph.D.s, and 168 representatives who are lawyers.³⁶ Unfortunately, the area of specialization was not listed but with a little help from Google, I was able to determine that 4 representatives have Ph.D.s in STEM fields.³⁷ Grant’s book doesn’t answer any of these questions. Instead he gives the reader a chilling summary of the state of the American public’s ignorance about science and scientists. The latter point is summarized more eloquently by Jorge Cham.³⁸

Despite its bleak subject, I enjoyed reading this book and I look forward to sharing this with my students. I must confess, I have chosen to live under a rock: I don’t watch the news or read the newspapers much. Instead, I get my news from scientific blogs and magazines. Grant’s book has persuaded me that I do need to follow these stories and do what I can to encourage my students and members of the community to think critically and not accept assertions that don’t make sense at face value.

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