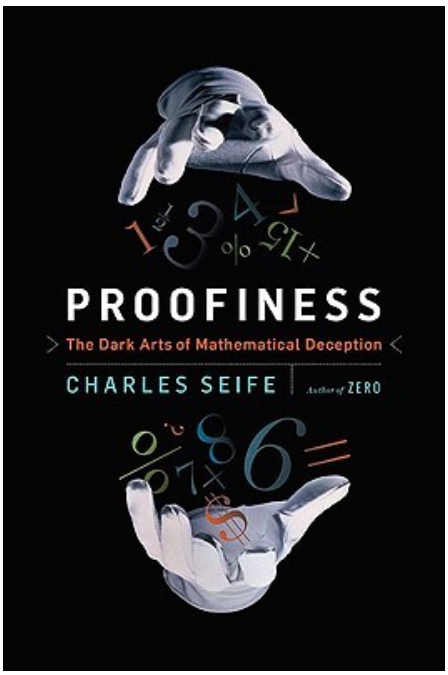

Proofiness: The Dark Arts of Mathematical Deception

Charles Seife

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Proofiness: The Dark Arts of Mathematical Deception Charles Seife
The bestselling author of *Zero* shows how mathematical misinformation pervades-and shapes-our daily lives.

According to MSNBC, having a child makes you stupid. You actually lose IQ points. *Good Morning America* has announced that natural blondes will be extinct within two hundred years. Pundits estimated that there were more than a million demonstrators at a tea party rally in Washington, D.C., even though roughly sixty thousand were there. Numbers have peculiar powers-they can disarm skeptics, befuddle journalists, and hoodwink the public into believing almost anything.

"Proofiness," as Charles Seife explains in this eye-opening book, is the art of using pure mathematics for impure ends, and he reminds readers that bad mathematics has a dark side. It is used to bring down beloved government officials and to appoint undeserving ones (both Democratic and Republican), to convict the innocent and acquit the guilty, to ruin our economy, and to fix the outcomes of future elections. This penetrating look at the intersection of math and society will appeal to readers of *Freakonomics* and the books of Malcolm Gladwell.

Proofiness: The Dark Arts of Mathematical Deception Details

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Author	:	Charles Seife
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From Reader Review Proofiness: The Dark Arts of Mathematical Deception for online ebook

Jenny GB says

Well, now we're all depressed. This book details the ways that governments, businesses, and journalists manipulate numbers to make them do or say what they want. This controls our behavior, disenfranchises people, and creates injustice of many kinds. I already knew most of these ways numbers are manipulated, but it's a valuable book for those that have not heard it before. I think in particular this should be one we have high school students read before we send them out into the world to work or study. My one complaint about this book is that Seife starts inventing his own silly words to refer to different types of lying with numbers. I found it really unnecessary and annoying. However, the rest of the content here is good and important to understand. To the unwary statistics can lie to you all the time.

Andrew Skretvedt says

Fun, entertaining, wince-inducing, and informative.

Pros: Increased awareness of the dominant ways numbers and statistics can be exploited/manipulated/colored to support statements which those same data do not actually support, or represent something as more meaningful than it really is.

Cons: I kept getting visions of Stephen Colbert, because Seife has this thing for coining terms. It got me irritated quickly (please stop trying to be a hipster?!). Surely there are proper terms for these concepts he's enumerating, use them! Coining these made-up goofy words seemed to me almost like he was trying to pass these phenomena as his own novel discoveries. Nope. He's just a journalist (informed by his math education). I suppose doing this can make the point more memorable, especially for laypeople, but it also inhibits communication in that you need to have read his work in order to know his definitions and then relate.

That nit aside, it's well worth the read. Better awareness of probability and statistics helps you to evaluate and understand presented data. Just knowing the common forms of manipulation of this data can go a long way toward insulating you from being told what to think, by someone who claims authority.

The most memorable passages for me dealt with the terrible miscarriages of justice precipitated by "The Prosecutor's Fallacy". Failing to place probabilities in context with rates of incidence can lead thoughtful people straight off a judgmental cliff. It's motivated me to study this more.

Becca says

I'm not really sure for whom Seife wrote this book. The majority of people who like math and/or statistics will already be very aware of most of the statistical concepts that Seife introduces in his book: significant digits, the importance of looking closely at how axes are labelled, appropriate population sampling and correlation vs. causation. And the people who don't like math won't voluntarily read a book on math. So that

leaves...I don't know: people who like math but are bad at it? Middle-schoolers? And unfortunately, this book won't work great for those people either, because rather than using the actual names for the mathematical concepts, like I did, Seife makes up terms so that if this is your first exposure to the concepts, you won't actually be able to communicate about them or google more about them. I think my turning point with Seife was in an appendix about the difference between sensitivity and positive predictive value, where I was originally annoyed that he didn't name-check Bayes and then realized that he also didn't mention *sensitivity* or *positive predictive value* in the entire appendix even once! This appendix was literally about how just knowing the sensitivity of a test without knowing the prevalence of disease results in not being able to predict the positive predictive value and he didn't use the names for a single one of those concepts.

I found the latter half of the book more interesting: Seife largely moves away from mathematical concepts and investigates political hijinks, such as the Franken election, Bush v. Gore and gerrymandering. It doesn't really add to numeracy, nor have that many striking examples of "proofiness," (except that humans can't count numbers to 6 digits worth of significant figures, which hopefully most people intuitively know) but it is interesting.

Overall, it's not a bad book. I might give it to a child who was interested in math, but I don't think most adults will enjoy it very much.

David says

FINAL REVIEW: October 23, 2010

"Proofiness" by Charles Seife is a well-intentioned book that suffers a definite crisis of identity. The jacket blurb and author's introduction promise a guided tour of the seamy underworld of statistical malpractice, that is, an account of the most common ways data are misrepresented or misinterpreted in the media, either through carelessness or because of a deliberate effort to mislead. Seife is not the first author to consider the issue of misleading data analysis; his book carries on a tradition that dates back as far as Darrell Huff's "How to Lie with Statistics", with contributions from Edward Tufte ("The Visual Display of Quantitative Information"), or last year's excellent "The Numbers Game: The Commonsense Guide to Understanding Numbers in the News, in Politics, and in Life" by Michael Blastland and Andrew Dilnot.

There is a major gap between what "Proofiness" promises and what Seife actually delivers. The first hundred pages are roughly what one might expect: graphical deception by use of misleading labels or scales, comparison of apples and oranges (e.g. dollar amounts unadjusted for inflation, absence of an appropriate control group, regression to the mean), cherry-picking of data, the tendency to interpret mere random variation as systematic, nonsensical conclusions obtained by extrapolating beyond the range of observed data, overstatement of the precision of measurements, the way in which humans are hard-wired to misinterpret risk and deal poorly with calculations involving risk. Seife's exposition of these topics is lively and clear (with the major caveat discussed below). About halfway through the chapter on risk, however, he makes a major detour. His discussion of the malfeasance of those involved in the Enron debacle, the Bernie Madoff pyramid scheme, the failures at AIG, Citigroup and other institutions, and the subsequent bailout efforts has almost nothing to do with statistical trickery, focusing instead on the public policy and regulatory issues raised by the financial meltdown.

The next chapter, "Poll Cats" does return to the issues involved in conducting accurate sample surveys and presenting the data appropriately, with a reasonably clear discussion of systematic error versus random error.

However, the following two chapters, "Electile Dysfunction" and "An Unfair Vote", taking up some 80 pages, really have little to do with data-related issues. Instead they provide a review of events surrounding the Florida vote count in the 2000 presidential election, the six-month circus that took place before Al Franken was eventually declared winner in the 2008 Minnesota Senate race, and a review of historical and present-day gerrymandering efforts whenever congressional redistricting comes up for discussion. Not that Seifen's review of the relevant events, and the issues they raise, is not interesting - it just seems to belong in a different book, as does the appendix in which he discusses electronic voting. In making this criticism, I take the view that fraud, malfeasance and corruption stemming from poor public policy, faulty regulatory mechanisms, or inadequate enforcement of existing protections, really are subjects for a different kind of book than that initially described by Seifen. Though the author does return to his initial remit in the final two chapters (discussing abuse of probability and statistical arguments within the judicial system, and for propaganda purposes), overall the book does not make a coherent whole.

The caveat mentioned above, regarding Seife's exposition methods, is a major one, and prevents me from giving this book my endorsement, despite its good intentions. It's evident right there in the book's faux-cute title, "Proofiness". I wish I could say that the author offers a rigorous definition of exactly what he means by this invented term, but he doesn't. It remains unhelpfully vague throughout the book. Sadly, it's not the only example of authorial neologism run amok. "Disestimation", "Potemkin numbers", "randumbness", "regression to the moon", and the horrendous coinage "causuistry"; each of these is a neologism that adds nothing to the discussion. Many of them lack a clear definition, or when a definition is offered, the term just seems to muddy the waters. For instance, Seife uses "disestimation" to mean "overstatement of the precision of a number or measurement", indicating an error related to precision. But the 'dis'-prefix clearly suggests a systematic error, as does the parallelism with "misestimation", which statisticians routinely use to indicate a systematic error. And while one applauds the author's efforts to educate his readership about the error of mistaking correlation for causation, the term "causuistry" is simply an abomination. I'm not sure where this recent trend for authors to invent their own faux-cutesy terminology, where none is needed, originates (possibly Malcolm Gladwell bears some of the responsibility), but I wish it would end.

Though I am sympathetic to the author's stated aims, his execution was such that I cannot endorse this book. A better bet would be "The Numbers Game: The Commonsense Guide to Understanding Numbers in the News, in Politics, and in Life" by Michael Blastland and Andrew Dilnot.

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initial comments below:

One of the benefits of retiring from my career as a statistician is that I no longer feel it's my personal responsibility to alert friends and colleagues to the myriad ways they are being misled or deceived by the kind of abominably poor summarization of data that's pretty much the norm these days. It's just as well - who wants to be *that guy*, the crank at the table who people start to inch away from surreptitiously, avoiding eye contact all the while?

Not that I endorse misleading or deceptive data presentation - far from it. Now more than ever, as we all struggle to make sense of the avalanche of information that constantly assails us, the capacity for critical, intelligent interpretation is vital. So it's important to be able to see through the most prevalent fallacies in data interpretation, not to mention data presentation strategies deliberately intended to mislead.

Sadly, just mentioning the word "statistics" has a demonstrable eye-glazing effect on all but the nerdiest adults. This latest book by Charles Seife has the laudable goal of overcoming the MEGO* reflex and educating the reader about some of the most common types of statistical malpractice out there, continuing a

tradition established by such authors as Darrell Huff ("How to Lie With Statistics"), John Paulos ("Innumeracy") or the authors of last year's highly successful "The Numbers Game" (Michael Blastland and Andrew Dilnot).

I will write a more complete review of this book in due course. For now, I can only remark that, although I was completely predisposed to like it, Charles Seife has already committed crimes against the language that are regrettable, to say the least. The hideous coinage "Proofiness" is an obvious example; the abominable term "disestimation" is another. It remains to be seen whether these lapses are merely aesthetic, or whether Seife is guilty of the greater sin of coining faux-cutesy terms with definitions so fuzzy that they're meaningless. **

* MEGO = "my eyes glaze over"
** a Gladwellian tic that has, unfortunately, been widely copied.

Lars-Helge Netland says

God bok om hvordan statistikk og matematikk misbrukes på det groveste innen en lang rekke felt. Boken bruker mye tid på amerikansk politikk og rettsvesen; og bruker gode eksempler (dog litt utdaterte) for å illustrere den hengemyren vi står fast i. Misvisende data og statistikk har rett og slett blitt et stort demokratisk problem.

Adrian Fridge says

Slightly outdated but still very, very enlightening.

If you want to learn about the ways people twist math and statistics to meet their agendas, then there's a whole lot of good stuff in here. Stuff like the 2000 American presidential election or several of the cases Supreme Justice Scalia (now deceased) was a part of.

I enjoyed the parts about statistical error versus systemic error, as in when the news media say their polls are within a 3% margin of error, they're talking about statistics. This error does not take into account the quality of the question or the pool of respondents, just the mathematical probability of chaos adding noise to the results.

It also goes into causation versus correlation, cherry-picking, and the way sets of data are skewed to look more favorable than they really are.

Simple language, nice charts/graphs for emphasis, and unbiased politics (the American system is corrupt from both sides).

I have a few issues with tone (he takes this one anecdote about fossils a little too seriously to prove a point) and gender bias (the part about abortion, in particular, is a bit victim blamey), but those sections are small in comparison to the whole book.

Overall this is a good read, especially nowadays with the 2016 election coming.

Ben Babcock says

As our society becomes ever-more data-driven, I am increasingly interested in reading books such as *Proofiness: The Dark Arts of Mathematical Deception*. I want to know how numbers, algorithms, data, and mathematics are being used (or abused) to make decisions, mount arguments, and influence the course of civilization. Sound lofty? Good. Charles Seife's incisive and interesting writing brings this topic to life. With clear, topical examples, he shows us how misunderstanding or misplaced faith in numbers and measurements can lead to us making decisions on false pretenses.

Seife begins by examining what we mean when we throw around big numbers, such as "sixty-five million years" as the age of a dinosaur fossil. He defines *disestimation*, a fallacy whereby we assume something is more accurate if it is more precise. Seife wants to establish from the outset that there are limitations to our ability to measure the real world, and that not being aware of these limitations is where a lot of people go wrong, even if they have no intention of misleading or misrepresenting. From there, *Proofiness* veers more into political territory. With occasional glances at advertising copy, Seife smoothly discusses problems with polling, vote-counting, etc., with examples from such high-profile events as the disputed election of Al Franken in Minnesota or *Bush v. Gore* in Florida, 2000.

For a popular math book, there isn't that much actual math in here (which I suspect most readers will consider a good thing). There's some basic statistics and probability, nothing you haven't seen before in high school, and then a little more intense discussion relegated to the appendices. Seife's explanation how an "average" change in something like, say, salaries or taxes, can be very misleading is very appropriate for contemporary readers in an age where American politicians are trying to pass tax reform that only helps the wealthy.

Speaking of relevance, parts of *Proofiness* do feel a little aged seven years on. Seife pulls from such events as the Vietnam War and OJ Simpson's murder trial. This is the double-edged sword of trying to teach these concepts with real-world examples. I'd love to see an update to this book where he talks about the more recent presidential elections, or the Brexit referendum, etc. The subject matter here is still so relevant!

As a mathematician, I can't say I *learned* a lot from this book; it felt very familiar. But most of Seife's explanations are lucid and lovely. I appreciate how he points out that both the left and right are guilty of proofiness—this is not a matter of political ideology but of desire for political power through any means necessary. For a lay reader, this book will probably be a welcome primer that doesn't overstay its welcome but will leave you wanting to learn more.

Sarahj33 says

There's a dangerous truth that every marketer and pundit instinctively knows, but that public often forgets - we will believe anything if there's a number attached to it. In Proofiness, Charles Seife is on a crusade to educate the world and stem the rising tide of mathematical malfeasance. With clarity, wit, and just the right

amount of outrage, Proofiness is a fascinating and appalling look at how numbers are used and abused in our society.

I personally found this book engrossing, and I think if it was required reading for society, it might solve a lot of problems. My one complaint is that Seife had cutesy names for a lot of the tactics he discussed - 'randumbness' was probably the worst. Although I suppose I should have seen that coming in a book called "Proofiness." Sometimes it was hard to tell what he was just making up words for and what were real terms. But other than that the writing was very clear, and helped me understand some concepts that I probably knew at one time but forgot when I went to theatre school. I don't think you have to particularly love reading about math to enjoy this book. As Seife frequently reminds the reader, the numbers in this book represent real things, not mathematical ideals, and it's the real world that suffers the consequences of misused math.

Seife really hits his groove when talking about anything he perceives as unjust. Misrepresenting numbers for advertising purposes is bad enough, but then he devotes chapter-long tirades to various electoral strangenesses like that weird lizard, the gerrymander. Polls are an especially sore spot for him. I can only imagine the fits he's probably having over the republican presidential primary debates and their "numbers." (Disclaimer: Seife makes a valiant attempt to be non-partisan at all times in the book. His position is that every party is first and foremost concerned with their own self-interest.) I looked Seife up on twitter to see what he's been up to lately, and it seems likes he's pretty busy right now because he's suing the FDA for a Freedom of Information Act violation. Which would come as no surprise to anyone who has read this book. It's clear that this book arose out of Seife's deep passion for truth, and that's probably what makes it such good reading.

Bill says

It was a decent treatment of an extremely important subject -- mathematical and statistical literacy -- with some very disheartening case studies. Enjoyable read, except...

I would have given it three stars if not for the author's annoying decision to invent a cutesy vocabulary around the topic. The title was just the tip of that iceberg. Very distracting.

Bob says

Everybody wants to understand the world they live in, and we all rely on facts to help us do this. Unfortunately, what we identify as "facts" are too often not very reliable.

Sometimes data is displayed in a graph with the axes chosen in such a way that the representation is effectively magnified; this was also described in How to Lie with Statistics by Darrell Huff. I've seen this same thing many times in my field of engineering, often from people who were not really aware that they were distorting the story.

Worse, though, are the blatantly corrupt representations with Potemkin numbers: These are total fabrications produced by con artists, and they are intended to fool you into believing a conclusion that is completely unfounded. Senator McCarthy provided the the classic example of this when he claimed he had a list of 205 communists; he actually had not one single name. He was smart enough to make up an odd number, knowing

odds are inherently more believable than evens, and he knew people would tend to accept his claim without demanding proof.

You'd think we would have learned from McCarthy, but not so. As per the Bush-Gore election, which was undecided for weeks due to an extremely close count of the votes in Florida. This book discussed how all elections are prone to some degree of error, despite every intention for keeping the accuracy high. In the Bush-Gore case, the differences in the ballot counts were much smaller than the statistical errors to be expected from the tabulation process. Result? An absurd and expensive cost in dollars and time to resolve the most important election in the world.

Polls are another area which was addressed. These, also, are highly prone to errors, even when done correctly by skilled practitioners. The author showed hoe polls and elections are similar processes in many respects, and they suffer from issues that are also similar.

A quote (pg 11): "Truthful numbers tend to come from good measurements. And a good measurement should be reproducible: repeat the measurement two or ten or five hundred times, you should get pretty much the same answer each time." This is so very true.

Ann says

Did you know that there is a statistical basis for an unequivocal legal decision of how the Gore/Bush presidential election should have been decided? Have you ever heard a drug company or a politician or pundit make a claim involving numbers and had a nagging feeling that something wasn't quite right? Have you ever heard one of those claims and not really questioned it? People who want to make a points or reach a certain outcome use - and abuse - numbers all the time. In this entertaining, accessible, yet highly informative book, Seife keys us into the many ways in which numbers are manipulated and just plain gotten wrong - some of which have far-reaching consequences indeed.

However, it should be noted that Seife sometimes falls victim to the very things of which he warns, drawing unwarranted conclusions and oversimplifying some complicated discussions. I had some outside knowledge about a couple of technical issues; someone unfamiliar with the specific subjects he was discussing could easily accept his argument unquestioningly, which is precisely what he's warning against. This is a small quibble, however, as it happens rarely and doesn't take away from the main points Seife is making, namely that the presentation of numbers can drastically affect what they may seem to mean. And even if you're statistically well-educated, you'll learn something. (I still can't get over the answer to the election issue ...)

Pamela Huxtable says

This was an extraordinary exposé of the deceptive nature of the numbers that inform us. Polls, advertising, the census, the judicial system - no one is exempt from the problems inherent in proofiness.

Seife does an excellent job of keeping his terminology light and humorous. This is a welcome addition to a book that otherwise might be a depressing and overwhelming indictment of our political and juducial systems. The concepts are complicated, the stakes are high, and Seife communicates it all with style. I promise that you will never accept a number at face value again.

B.J. Marshall says

Terrible book. The author is biased and makes nonsensical value judgments about the same misrepresentation of math being worse when applied to one side versus the other. For instance, claims that any proof exonerating an accused person is "sacred." Howls about miscalculation that indicates felony convictions are only wrong 0.027% of the time when his estimate is 5% of the time. As if a 95% success rate isn't pretty good.

Moreover, on the technical side, he seems not to understand the difference between accuracy and precision. If he does, he never broaches it in the book, and mischaracterizes them together. In discussing polling, he talks about reducing the error of margin through large sample sizes, then states there are in fact much larger uncertainties because of systematic biases. This is really an issue of precision and accuracy not being linked in any way. His "mathematical" description of the 95% confidence interval in an appendix fails to be mathematical and barely even mentions confidence or that there are different intervals one could use.

All in all, aside from the hilarious anecdote about the Lizard People ballot in the 2008 Minnesota election, this book is abysmal and unlikely to help anyone understand mathematical and statistical arguments more clearly. DO NOT READ THIS BOOK!

Tonstant Weader says

I would say this is my MUST READ of the year. It's a witty exploration of the many ways numbers mislead us. We are programmed to believe numbers. If someone tells you that x is faster than y, well, that could be debatable. But if they tell you that x is 3 times faster than y, we accept it. We even accept people telling us that this group of people is 2 times happier than that group when happiness is something we don't even know how to measure. A spoonful of sugar may help the medicine go down, but a number will make us swallow anything.

Seife explores the many forms of mathematical fallacies that trap us and gives them clever names such as randumbness and causistry (a mathematical casuistry) and many others. He uses current and historical examples of proofiness and demonstrates again and again and again who the use and abuse of numbers and our credulous acceptance of numerical propaganda is damaging our lives, our health and our democracy.

I loved Seife's early book, Zero, Biography of an Idea. This book brought less joy as some of the examples are infuriating, but he still has a clever and light touch that makes books about math easy and interesting.

I must confess, though, that his information on the derailing of the Nuclear Test Ban Treaty in 1982 left me stunned and seething. To keep the story to its most basic level, fraudulent test results were knowingly cooked up and released by a hawkish neocon in the Reagan White House to a complicit and equally hawkish NYT reporter. The false data was successful in derailing the treaty (which remains stalled to this day) but subsequently it was proved that not only was the data false, but it was deliberately and knowingly falsified for the specific purpose of breaking down the peace talks.

I have to ask if it would have made a difference 20 years later when the case for the Iraq War was being

made if it were widely known that the 1982 leaker was Richard Perle and the conniving and complicit reporter responsible for the false stories that derailed the treaty was Judith Miller. Why were they able to say anything that anyone anywhere would take seriously? Why, when there were questions about the accuracy of the WMD stories did not one say RICHARD PERLE AND JUDITH MILLER LIED IN 1982? Did no one think that was relevant?

Jim says

In which it is noted the statistic that the average male has slept with seven women in his lifetime and and the average women has slept with four men in her lifetime.
