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# Stuart Firestein, Author of 'Ignorance,' Says Not Knowing Is the Key to Science

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The joy of not knowing, of learning by learning that you were wrong, is one of the chief joys—and one of the great benefits—of science, Stuart Firestein, author of *Ignorance*, explains in an interview with Casey Schwartz.

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In his new book, *Ignorance*, neuroscientist Stuart Firestein goes where most academics dare not venture. Firestein openly confesses that he and the rest of his field don't really know that much, relatively speaking. And what's more, knowing itself, he argues, is highly overrated. Firestein, who is chairman of the biology department at Columbia University, talks to The Daily Beast about the joy of turning our backs on certitude.



The Daily Beast: So, the most obvious question first—ignorance: how did you get into this and decide it was worth writing a whole book about?

Stuart Firestein: I came to the book because I seemed to be being paid for just the opposite: for vomiting out facts all over the place, for just letting out as many facts as possible. Which I guess is what the university's business model has been for the last thousand years or so. Somehow or other, we know the facts and then we dole them out for some cash in return. That's how we make it work.

But it occurs to me that in science, that's not what we *really* care about. I worked in the lab on neuroscience questions, and I taught a course on neuroscience. And both of them were interesting things to do, but working in the lab was a lot more exciting. So I tried to imagine what it was that was exciting in the lab that wasn't exciting in the course.

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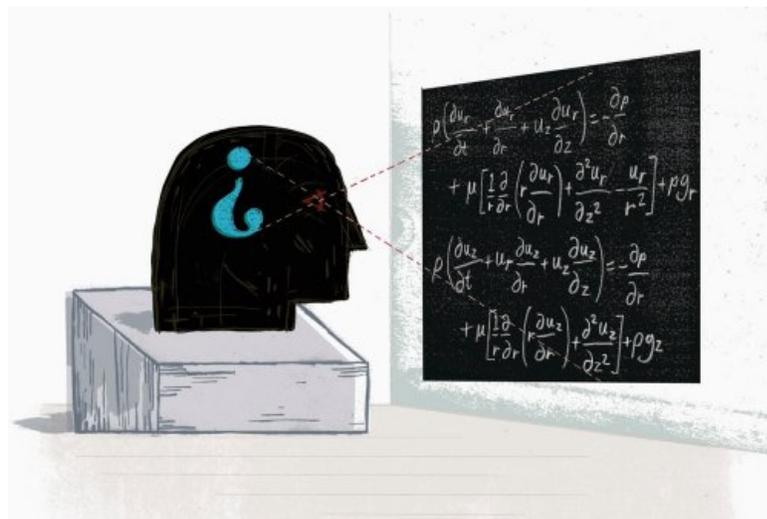
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And in my course, I would use one of these neuroscience textbooks—this one that weighs seven and a half pounds, which is twice the weight of the human brain, by the way—to go along with 25 lectures, also chock full of facts, because that's what I thought I was supposed to do. And I came to the realization at some point several years ago that these kids must actually think we know all there is to know about neuroscience. And *that's* the difference. That's not what we think in the lab. What we think in the lab is, we don't know bupkis. So I thought well, we should be talking about what we don't know, not what we know.

One of my favorite quotes in the book is [Marie Curie](#) writing this letter to her brother, after she'd gotten her second graduate degree mind you, saying, "Well one never really thinks about what one has done, only what is to be done." And I thought, that's what you have to tell students.



Ikon Images / Corbis

**Right. In other words, by delineating what's still unknown.**

As I began to think about it, I realized that, contrary to popular view, scientists don't really care that much about facts. We recognize that facts are the most unreliable part of the whole operation. They don't last, they're always under revision. Whatever fact you seemed to have uncovered is likely to be revised by the next generation. That's the difference between science and many other endeavors. Science revels in revision. For science, revision is a victory. In religion, or astrology, or any other belief system, revision is a kind of defeat. You were supposed to have known the answer to this. But the joy of science is that it's about revision.

**That phrase you just used—"the joy of science"—for the layperson, that may be a contradiction in terms. Do scientists implicitly understand the idea of reveling in revision?**

Oh, yeah. There's no pleasure quite as indulgent for a scientist as being able to write a paper that says, "So and so was wrong." I even get a pleasure out of writing "*Firestein* was wrong when he said this 10 years ago." In science, every answer begets 10 new questions. And that's what keeps it going.

**So what gets lost in translation between the joy of the process in the field and the way that people look at science from the outside?**

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I wish I knew the exact answer to it. But part of it is that people don't like ambiguity. They don't like to hear "We don't know." And scientists pick up on that, and don't like to say "We don't know." So, when the press comes calling, or when it comes to time to write a textbook—I mean, how many textbooks are you going to sell if you write at the end of every paragraph, "but we don't really know too much about this." And how many times are they going to come back and interview you if every time you just say, "Yeah, that's a great question. I wish I knew the answer."

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Newest

**MistaMann**  
Last Month

One of my Astronomy professors from college phrased this in a way I'll never forget:

Think of a drawn circle, in which the area is what you already know, and the circumference represents questions you don't have the answers to.

As the area of the circle grows with knowledge, so too does the circumference of the circle with questions.

 CaptainKazoolikes this.

REPLY

**Carl Hungus**

Last Month

So we have a bet, me and my friends- 10 of Mr. Mao's Reminbe for every 'ignorance- it's just like the democrats/republicans/liberals/cons/whatever'

Shall we get started?

REPLY

**Slapchop**

Last Month

Yeah, just study the know-nothing Liberals on TDB. They don't know the facts and when presented with them, don't believe them!

Liberalism is blissful ignorance!

REPLY

**Carl Hungus**

Last Month

That's 10!

Type your comment here...

**jbird0168**

Last Month

According to my old Science and Technical Values course(ethic), peer review is considered an honor.

REPLY

**Davo**

Last Month

Yep. And it was your "peer review" that condemned Galileo to death for suggesting the "peers" wrong in insisting the Sun revolved around the Earth..

Truth is not (nor has it ever been) a matter of popular vote or mass hysteria. Truth is not a respecter of opinions. It just

stands there rudely ignoring Liberals.

Lunacy, however, requires the support of accomplices just to remain intact.

1 more (expand)

**Carl Hungus**

Last Month

Davo makes it 20.

Type your comment here...

**AKuman69**

Last Month

Key take-away in this article:

"These undergraduates are paying small fortunes to come and be taught by professors who don't put that much time into teaching because in the end they know they're not being evaluated based on their ability to teach—they're going to be evaluated based on their research."

REPLY

**keemia**

Last Month

They should teach some of that "joy of learning you were wrong" to the Tea Partiers.

REPLY

**CaptainKazoo**

Last Month

keemia - Do you have some specifics? Can you identify any political movement that is right about everything? The biggest disasters currently enjoyed by this country were dreamed up by the Neocons that put Bush II into office and used him to attempt to reach their various goals, and by the Democrats that enabled them.

Compared to them the Tea Partiers are relatively rational as a whole. As are the Progressives and the Libertarians. The real problem comes in when the political class uses them for their own agenda, meaning political power and the distribution of money.

 Nexialistlikes this.

1 more (expand)

**Carl Hungus**

Last Month

30!

Type your comment here...

**MikeInIndy**

Last Month

Good article.....I always loved reading Richard Feynman's books. He never took himself too seriously and his humble approach was a much better teaching tool than just throwing facts at people/students. Feynman made me love Physics and I'm not the sharpest knife in the drawer.

Science is the belief in the ignorance of experts. -RF

 thethunderbolt,  Nexialist,  CaptainKazoo and  Indy-Pendantlike this.

REPLY

**I win**

Last Month

Still, knowledge is power. All deductions are based on the known facts first, before being considered for revision. A child, who is not being taught anything during the first formative years, like feral children, will never be able to read or write or socially integrate.

 CaptainKazoolikes this.

REPLY

**Mr. Wonderful**

Last Month

I function as a sort of chemist engineer in a small company working on composite structures. I often tell my boss only half jokingly. There are only a hundred people in this world who really know anything, and the others just copy and plagiarize from them... The few people who had the intellectual curiosity to analyze and consider even the basic facts and formula fed to them in schools and universities.

 Slapchop,  CaptainKazoo and  I winlike this.

REPLY

**I win**

Last Month

Conor, maybe you need to decamp to Planet Comatose.

1 more (expand)

**CaptainKazoo**

Last Month

Mr. Wonderful - All true, but there is something to be said for applied knowledge. The Hubble telescope was assembled by people using knowledge coming research of one sort or another.

**OklahomaJoe**

Last Month

Most of the early history of science is dominated by those answering the "What is that?" questions. As our answers to those questions accumulated, it became harder and harder to find new questions, so we moved on to how? and why?. These are the hard questions because they require reductionist thinking. Once we have some reductionist answers, systems scientists have to put it all back together and see if it all works. Complex systems have multiple variables that all have to be examined in this way -- which is why we still can't solve problems like climate change, aging, the brain, sustainable energy, diseases such as AIDS, etc. Understanding this concept explains why No Child Left Behind is a terrible way to assess education. Growing numbers of academics like Firestein understand this problem and more and more are changing the way we teach and assess learning. But it is difficult and there is a lot about teaching, learning, and assessment that we don't know.

 Golfcoast and  alphawing1 like this.

[REPLY](#)**Dontmakemelaugh**

Last Month

Good grief If I gave you a magic wand 40 years ago you would not be able to imagine and wish into existence all the things that science has discovered since then.

Think about it.

It would be foolish to think the next 40 years won't be just as remarkable, assuming we have the collective will to continue supporting science and technology.

There economic incentives are still there. Half of the GDP growth in this country has come from advances in science and technology.

 I winlikes this.

**Mr. Wonderful**

Last Month

It would be foolish to think the next 40 years won't be just as remarkable, assuming we have the collective will to continue supporting science and technology.

I hope your correct, but I am less optimistic to that....

**Davo**

Last Month

How ironic this article should appear in the Democrat Beast at the same time as the article about global warming. Kinda seems poetic, huh?

REPLY

**Dontmakemelaugh**

Last Month

Poor DavoEwe. Don't flatter yourself. For everyone who debunked conventional wisdom there are perhaps 10 kooks who simply made fools of themselves.

Just because some who rejected conventional wisdom were right does not mean everyone who defies conventional wisdom will be right. Most are not.

**Carl Hungus**

Last Month

Davo's making it 40! Well done!

Type your comment here...

**Genni2002**

Last Month

Always wondered about these universities that churn out little professor clones rewarded for fact regurgitation & mirroring (for example Harvard investment banksters). Very boring and quite deadly for the rest of us.

Hey, if an experiment turned out as expected then really truly haven't accomplished anything unpredictable or new. It is when it turns out differently than expected, now that is exciting. Some of the 'dumbest' people I know are the smartest people because they don't know enough to know that something won't work, so when it does in fact work, they bag millions.

 MikelIndylikes this.

REPLY

**Dontmakemelaugh**

Last Month

Keep wondering. But here is another idea: educate yourself.

 I winlikes this.

1 more (expand)

**MistaMann**

Last Month

Genni, have you ever been in a college classroom? Rote memorization of opinions as fact has nothing to do with the higher learning experience.

I've personally seen students who agree with the professor fail because they couldn't build a solid proof or argument, and I've seen people who got into screaming matches with

professors ace papers because they backed themselves up.

College is about interchange of ideas and concepts, based on factual citation. Rarely do I see people whose concept of college has anything to do with repeating bullet points.

Type your comment here...

**dookyhole**

Last Month

Yes, the key to science is "not knowing", but the key to scientific advancement is NOT "not knowing" what you've already learned.

 Dontmakemelaughlikes this.

[REPLY](#)

**Dontmakemelaugh**

Last Month

Ironically the key to being an ignorant git is also "not knowing".

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