

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

Source: <http://sci.tech-archive.net/Archive/sci.physics/2008-08/msg01737.html>

- *From:* Jonathan Thiessen <jjthiessen@xxxxxxxxxxxxx>
 - *Date:* Thu, 14 Aug 2008 23:53:16 GMT
-

Timo A. Nieminen wrote:

On Thu, 14 Aug 2008, PD wrote:

On Aug 13, 10:13 pm, "Timo A. Nieminen" <t...@xxxxxxxxxxxxxxxxxxxxx> wrote:

On Wed, 13 Aug 2008, Edward Green wrote:

On Aug 13, 5:02 pm, "Timo A. Nieminen" <t...@xxxxxxxxxxxxxxxxxxxxx> wrote:

On Wed, 13 Aug 2008, PD wrote:

In my
experience,
if you want
to know
what
science is,
you ask a
scientist. It
is unwise
for an
accountant
to tell a
carpenter
that
what the
carpenter
does is not
really
carpentry,
and that
carpentry
should be

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

defined
according to
what the
accountant
believes it
should
be.

Unless you're a fan of
Bacon!

Heh, despite Bacon's
opinion of it, Gilbert's "The
magnet" is still in
print. These days, perhaps
more often read than Bacon.

I've read Bacon. I thought it was the greatest
stuff ever, in
college.

Bacon only has half the story. Yes, he points out the value of
experiment,
over and over. But he appears to have had no idea about what
theory is
for. Experiment (i.e., bees collecting Baconian honey – is
this more than
stamp collecting?) without theory is rather undirected and
unfruitful.

Half of the scientific method is not the scientific method.
Recording
observations of 3x5 index cards isn't complete science any
more than
airy theorising is complete science.

But do tell, what impressed you about Bacon? Maybe I've
read too many
critical secondary sources or suchlike, but I wasn't
impressed. New
Atlantis is somewhat painful, with Salomon's House and all
as his
exposition of the scientific method. (And for the Utopian
genre in

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

general, More did better, along with some wry amusement to be had: people speak of utopian ideals for dealing with, e.g., people with mental or physical disabilities. What did they do with them in Utopia? Gave them pensions and laughed at them in public, as state-paid public fools. Very Utopian!)

That said, writers of 100 years ago were often very fond of Bacon.

PD brings up an essential tension, though: is X what X'ers are doing, or is it something we can define ideally, which the X'ers can either conform to or fall short of. It's like asking whether words mean what's in the dictionary, or the way they are used in current speech. We will always have both poles.

Science isn't what scientists do. Producing scientific results, doing scientific research is what scientists do. Science is more than that (although a large part of it is what scientists have done). As such, science is not the scientific method, but is, in part, one of the outcomes of the scientific method. The scientific method is not the only way to produce science, and science is not exclusively the product of the scientific method.

Given that, how can we usefully define scientific research as different from what is done by scientists (including amateurs)? Now, if we want to talk about an ideal method for doing scientific research – THE Scientific Method, we might say – this isn't necessarily what scientists do. But who is best placed to make statements about what the best methods are? Accountants/lawyers, or researchers? A whole bunch of stuff of what is

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

written and taught about the scientific method is crap. The role of creativity and imagination is often completely ignored, luck is officially non-existent, and the complex feedback between theory and experiment is reduced to the formulaic observation->hypothesis->test->theory. Ah well, the usual oversimplification. Although I did like Dirac on what theory is for - I've used his quote in a couple talks.

Excellent fodder for discussion.

I tend to view science as the activity rather than the product of the activity. (One could also fret over the same distinction with architecture, art, medicine, or plumbing.)

But I entirely agree with you that the common presentations of the scientific method do over-distill a highly complex, variable, and essentially human process. Hunch and pure insight play an essential role, as does a rather poorly grasped esthetic sense that is used to gauge or inspire ideas at the germination point. Also completely under-represented are the various rules, workflows, and metrics by which experimental results are collected and judged -- this is perhaps one of the squishier areas in science. And it is also true that purely humanistic aspects do influence science, even over longer periods of time than the "scientific method" promises a cure -- these include moral imperatives and collegial reputation.

But, and this is a big "but", the distilled "scientific method" as it is taught to high school students everywhere, represents the *essential* components that must be there for it to be recognizable as science.

It depends on which version of the distilled "scientific method". The version, which is a common one, focussing entirely on hypothesis -> experimental test -> accept/reject theory is far too narrow. For starters, this would exclude much observational astronomy, geology, biology from being science. It would certainly rule out almost all mathematics (but then, some people are happy to call mathematics a non-science).

I do not wish to start or continue any sort of inter-discipline wars, however, I feel obliged to share my opinion [feel free to disregard it].

I would argue that mathematics is the foundation of science [or at least scientific formalism]. One must accept a very narrow view of experimental tests in order to exclude any mathematics from science. A scientific experiment is merely conducting a finite number of tests in order to disprove or not disprove the self-consistency of a particular set of statements given an initial set of axioms/postulates/assumptions [based

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

on one's perception of physical reality]. The difference in math [or any sort of thought experiment] is that in addition to being able to disprove or not disprove a general hypothesis, one can possibly prove it, it need not be directly physical, and one may use a non-finite process to do so [eg mathematical induction].

The claim [not specifically claimed here, but I can't remember where it was] that science must be externally verifiable would necessarily exclude everything from science. All fields of science [including mathematics] depend on several base assumptions. The first of these is the assumption that we aren't [or at least one's self isn't] systematically deluded. If we were, it would be impossible to conclude anything. The very fact that we can't actually know if we are systematically deluded or not leaves us to believe everything that we "know", and to know nothing. This is where we make the leap of faith that maintains our sanity. This is not to say that science is baseless, but rather that mathematics [and thus science] is the best we have if we wish to say anything about anything.

The fundamental difference between mathematics and other fields of science [as I see it] is that mathematics assumes very little [thus making it completely general and concrete, but lacking the necessity of direct physical realisations of all things mathematical [all things physical must still be mathematically sound]]. Other fields of science greatly extend the base assumptions of mathematics leading to very specific physical results. It is for this reason that I deem all areas of science as partially overlapping subsets of mathematics.

Thank you for your time.

Have a good one ;)
Jonathan Thiessen

It reminds me of psychology (and disciplines that imitate, sometimes successfully, the research methodology of psychology). The dominant paradigm is statistical hypothesis testing, the core of the above distilled method when faced with noisy data. But, e.g., I'd call Piaget's work science, even if he watched children playing rather than performing experiments.

This is what enables distinguishing science from philosophy, from craftsmanship, from art, from mathematics. If what one does not *somewhere* invoke all the aspects of the scientific method, then another can fairly say that it ain't science, bub.

This is part of the reason why I distinguished science from the production of science.

Cataloging stars and nebulae, describing new species of insects, etc. is science, and can be very important science. (It's even Baconian!) But the usual versions of the scientific method only include such activity as a small part (perhaps the sometimes not-even-mentioned initial observation) of the process. If it's only a small part, is it science?

But the work contributes to science. Is it science? That would depend on how you define science.

But consider the activity of scientists, when working to contribute to science. Much of it is not science, per se (and I'm talking about the work intended to contribute, often quite directly,

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

to science, not administrivia). For example, rejecting/accepting a paper as a reviewer is not science, per se. Requiring that the authors make changes to make the paper more useful to the scientific community isn't science.

It's hard to both precisely and compactly/simplely define something complex (why are papers describing new species so long?). Just recall the tale of Plato's Man (and I'm most pleased to have been able to quote it in a paper): Plato was in full swing, and profoundly defined Man as "a featherless biped". At which point, Diogenes the Cynic got up and went to the marketplace. Returning shortly with a plucked chicken, swinging it around, proclaiming that "Here is Plato's Man!", he forced Plato to amend his definition: "Man is a featherless biped with broad fingernails."

Now, if they'd had chimpanzees for sale at the marketplace ...

I think if the teacher understands what science is about, they can give the compact potted summary of the scientific method, and then discuss it. Why do we call this the scientific method? Is it a good definition? Can we do science in other ways? What other ways? Alas, a teacher who can only read the textbook won't manage this :(

This last point is most irritating to grandstanding cranks, several of whom have posted to this thread, who alternately whine that they have the right to define what science is as much as anyone, or that if that's what science is then they want no part of it and science is doomed, or that scientists have created the scientific method specifically to exclude amateurs who don't know how to use the method.

They allow amateurs to build their own houses. Said houses need to meet building codes, pass inspection etc., just like professionally build houses (I heard a fun story about the trouble a mud-brick house caused). Houses are usually meant to last for 20–100 years (well, around here anyway; in parts of Europe and Asia, and elsewhere, they built to last). Science is meant to last longer than that. Nothing wrong with reasonable standards (and reasonable can mean high standards).

There's a wide-open field in science for amateurs: risky, long-shot research. It will almost certainly fail. It's hard to get grants for it, since grant assessors know it will almost certainly fail [1]. You can't give it to a student as a project (ethically), since it's probably a bunch of crap. You probably won't get any publishable results. So professional scientists won't do it. But amateurs, if keen on the idea, only have their time (and probably some money) to lose. They aren't employed to produce useful science, so it doesn't matter if they don't.

But if they want to contribute to science, they had better produce science. At least some of our long-term cranks on the ng did science. I might not have agreed with it, or the whole point of what they were doing, but at least, sometimes, it was valid science, despite being from cranks. Alas, most cranks around here just display their ignorance of how science is done, basic calculus, or just their emotional response to relativity or QM. Surely, an amateur who does it properly can contribute, and they do. Especially in observational astronomy – looking for new comets etc is unlikely to pay off, so it isn't so attractive to professionals. For the amateur who combines science with the fun of looking at the sky through a telescope, why not?

Re: Why did Richard P. Feynman say, "I love only nature, and I hate mathematicians"?

[1] A case can be made that a small, but not insignificant percentage of government research funding should be made for this kind of thing. Stop frauds from sucking at the govt teat, and go for it!