Good and Bad Ways to do Science

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Lecture for the 11th International Conference on Cold Fusion

Marseille, November 2004

Case 1: a mysterious disappearance
(Ed Storms' "Objective Evaluation" review)

"The submission was removed as inappropriate for the cond-mat subject area."

"Unfortunately the policy here is that the material posted on the arXiv at least in principle be publishable in conventional journals. We regret if these resources are too conservative for your needs, but there are other more open internet fora available for such purposes."

Clarification: the archive is essentially a communication mechanism, with no refereeing. The only constraint is supposed to be that "insofar as possible ... submissions [should be] at least of refereeable quality. That means they *satisfy the minimal criterion that they would not be peremptorily rejected by any competent journal editor as nutty, offensive, or otherwise manifestly inappropriate*, and would instead at least in principle be suitable for review (i.e., without the risk of alienating or wasting the time of a referee, that essential unaccounted resource)."

BDJ: “If controversial matters cannot be discussed, this is not good for the progress of science.”

Moderation @ arXiv: “In this case we abide by the determination of the journals that this is no longer a controversial matter.”

Next time I attempted to log on to deposit a paper, I got back this unexpected message:

arXiv Error

The following error has occurred:
User bdj10@cam.ac.uk is not currently permitted to upload

We will learn more about arxiv's regrettable habit of defining individuals as *persona non grata* in due course.

But for now, the little matter of how cold fusion itself got to be a *subject non grata* back in '89...

The trick is mainly psychological:

"*We* see no evidence of any unusual process at all" — Nathan Lewis (American Physical Society spring meeting, Baltimore, Maryland, May 1, 1989).

"My conclusion is that we are suffering from the incompetence and perhaps delusion of Drs. Pons and Fleischmann." — Steven Koonin, same meeting.

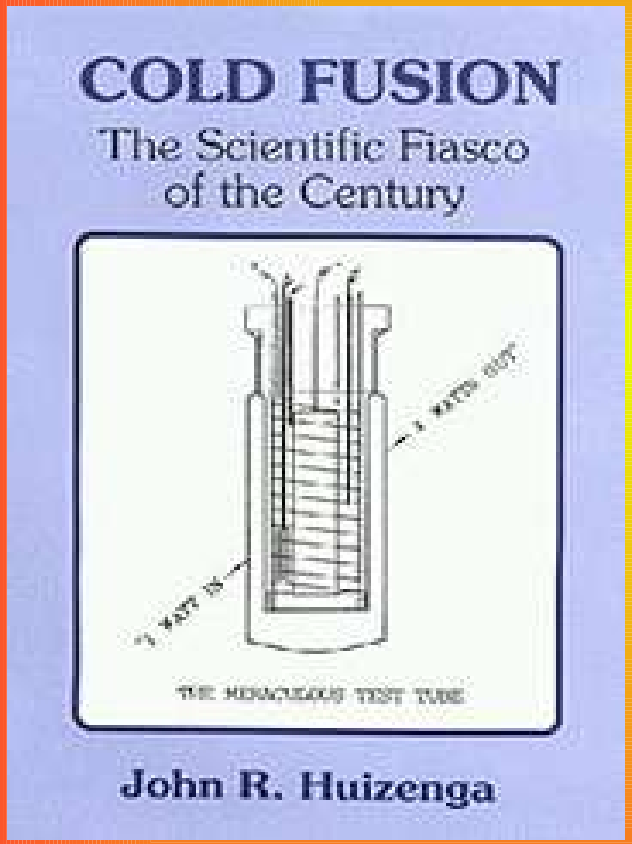
Q: how do you persuade the scientific community to believe that something is the case when there is insufficient evidence to make a proper case?

· state that the claim being made contradicts scientific understanding

· claim the experiments are faulty

· **MAKE YOUR POINTS LOUDLY**, and make them before time has shown them to be incorrect; with any luck, the major journals will then refuse to publish the relevant information when it becomes available.

Write a book with a title such as **'cold fusion: the scientific fiasco of the century'**, and get the right people to give it glowing reviews:



'An authoritative, frank, hard-hitting account of the cold fusion fiasco.'
GLENN T. SEABORG

'As a distinguished nuclear chemist he is uniquely qualified to evaluate the field. Cool, dispassionate scientists and policymakers will receive his book, I trust, with the respect it deserves.' FRANK CLOSE, NATURE

The normal process leading to the acceptance of an idea is roughly this:

- submission of paper refereeing
- publication
- possible dispute
- resolution of dispute

This could be a quite rational process, or it could become a 'battle for hearts and minds'.

Sometimes good science goes by the board, and we see the use of faulty arguments, or science is abandoned altogether and we get the use of ridicule, etc. Look for example at some of the output of Robert Park, "What's New?" columnist on the American Physical Society's web pages:

COLD FUSION: TRUE BELIEVERS SEE DOE REVIEW AS "VINDICATION."

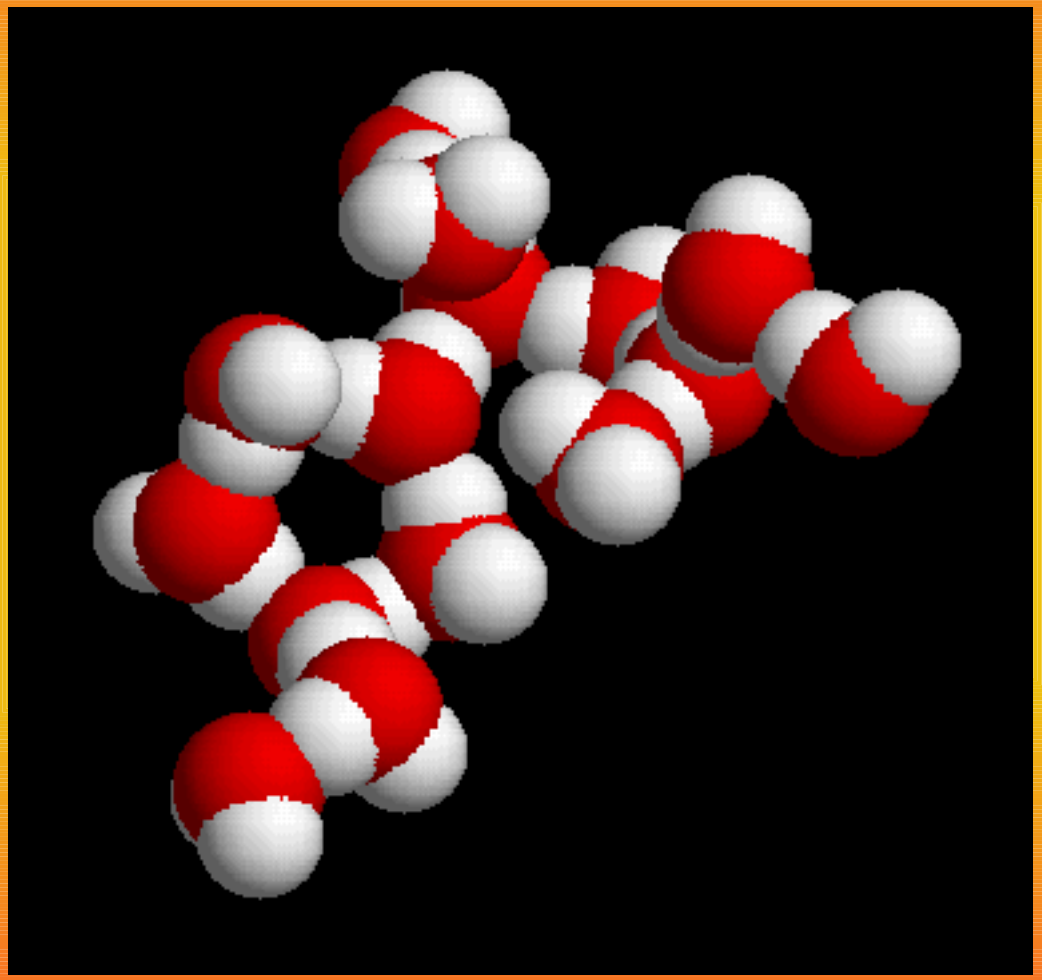
There hasn't been much to celebrate in the 15 years since the University of Utah held a press conference in Salt Lake City to announce the discovery of "cold fusion." Although a brave little band of true believers continued to trumpet cold fusion, the band leader was publishing "Infinite Energy Magazine." That made it pretty hard to take this stuff seriously. Although there was no press release or announcement, DOE has apparently agreed to take a second look. That's not really too surprising; not since the Reagan administration has unbridled technological optimism so dominated Washington decision making: missile defense, hydrogen cars, hafnium bombs, manned missions to Mars.

· For some reason, Park never reports details of *successful* CF experiments!

Some faulty arguments:

1. “no molecules, no effect” (Prof. Edzard Ernst, with reference to homeopathic medicine)

The complexity of water
(simulation by Errington and Debenedetti)



15-molecule cluster

 ICCF11

Dubious argument 2: ‘If telepathy existed, it would confer such a great benefit that we would have all evolved to become extremely good at it.”

Problem: the same arguments would apply to perfect hearing, vision, intelligence, immune system ...

To put it bluntly, this is a bogus argument!

Conclusion: certain people corrupt the scientific process with dubiously ethical activity. Some things that may be appropriate in a conversation are not appropriate in an allegedly scientific context.

Regrettably, we live in a culture that supports and even welcomes such activity. Why is this?

Possibly the ‘Wolpert analysis’:

1. Scientific truth is ‘unique’;
2. Thus the scientist is superior.
3. Unlike most beliefs of others, the scientist’s beliefs are correct (but cf. [name your politician]).
4. The superiority of his own beliefs makes it a legitimate, nay even a moral duty, for a scientist to attack the beliefs of those who hold contradictory, and therefore wrong, opinions.

Back to the archive ...

Previously I suggested the problem with the archive was that, though it is officially open, certain classes of idea are *verboten.*

But also there is the problem of the dispossessed: those who, through the secretive processes of the archive, are barred from depositing preprints there, and even appear to be specifically targeted. Consider again the case of Dr. X, whom I spoke of previously at the Lindau meeting, though a number of others find themselves similarly situated (including one who had the support of Hans Bethe).

Dr. X.:

· has many publications in refereed journals
· has a university affiliation and is supported by his institution (which has however had threats made against it for supporting him)
· yet is barred from submitting to the archive
· even joint publications submitted by coauthors who are allowed to submit by themselves, including a review paper accepted for publication, are deleted from the archive.

The Cornell administrator officially having oversight over the archive fobs off all complaints with replies such as this:

"I am comfortable with our policy that the contents of arXiv conform to Cornell University academic standards."

or this:

"Thank you for your advice and your interest in the archive. We are continuing the transition of the arXiv administration." [a weighted average of a range of generally similar replies]

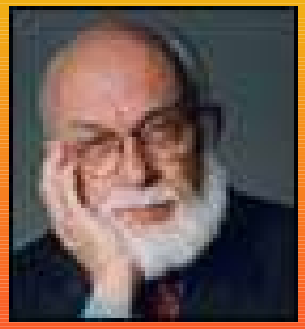
“Information has been received” (as they put it in the press), to the effect that ‘reader complaints’ are the basis upon which individuals are barred from posting to the archive.

A correspondent asks, very reasonably, why such complaints are not passed on to those involved for a response, instead of the archive operators silently pressing the delete button whenever a submission by one of the individuals concerned comes in.

Such an arrangement is clearly open to abuse: a way by which unscrupulous individuals can keep their ways of doing physics free from challenge. This kind of dealing is accepted as unfortunate reality in the world of politics; it should not happen in the world of science.

Now for something completely different: this time an organisation that specialises in propaganda and selective presentation of the facts goes a little too far and is caught out cheating ...

CSICOP (the 'committee for the scientific investigation of claims of the paranormal') offered to 'test' a psychic claiming medical diagnostic skills.



CSICOP member James Randi

They set up the test so that the claimed psychic would be regarded as having performed no better than chance if she got less than 5 out of 7 successes in the experiment (which incidentally was carried out under very unfavourable conditions).

Thus on the programme, she was deemed a failure because she had only 4 successes. However, *the probability of getting 4 or more correct by chance can be calcluated to be* 92/5040, *i.e. less than 1 in 50.* Remarkable!

The language used by the investigators was such as to make it appear that the psychic's claims were false:

"she had the claim, we tested it, she didn't pass the test"

"people believe that she can do it ... how come smart people can get to believe things that aren't so?"

And before the test, a more subtle technique for planting suggestions, similar to those used by politicians:

"Now if the claim is genuine, so if Natasha really can do what she appears to be able to do, then we need to change the whole of our scientific understanding of the world.

If people really have got these sorts of amazing abilities science is badly wrong, so it matters.

If she can't do what she appears to be able to do – well something is going on, she is either kidding herself or she is fooling other people and so there is a fascinating psychology of deception and self deception to be examined."

CONCLUSIONS

· A situation that is bad for science

· "Barbarians are in control (sometimes)"

· Not always deliberate: "people may keep bad company, and get seduced into thinking about issues in an uncritical way, e.g. as in 'no molecules, no effect'.

· People need to be more aware.

