

Ethics for Astronomers

September 10, 2012

“Professional Codes”

READINGS:

“On Being a Scientist” (National Academies)

“Ethics and Values” from the American Physical Society.



Scientists get death threats over Large Hadron Collider

By Roger Highfield, Science Editor

Last Updated: 12:01am BST 05/09/2008

Homework:
Science ethics in the news?

Scientists working on the world's biggest machine are being besieged by phone calls and emails from people who fear the world will end next Wednesday, when the gigantic atom smasher starts up.

- **Rap about Large Hadron Collider becomes YouTube hit**
- **The Big Bang: atom-smashing could uncover truth**
- **Time travellers from the future 'could be here in weeks'**

The Large Hadron Collider near Geneva, where particles will begin to circulate around its 17 mile circumference tunnel next week, will recreate energies not seen since the universe was very young, when particles smash together at near the speed of light.

Such is the angst that the American Nobel prize winning physicist Frank Wilczek of the Massachusetts Institute of Technology has even had death threats, said Prof Brian Cox of Manchester University, adding: "Anyone who thinks the LHC will destroy the world is a t---."

The head of public relations, James Gillies, says he gets tearful phone calls, pleading for the £4.5 billion machine to stop.

"They phone me and say: "I am seriously worried. Please tell me that my children are safe," said Gillies.

Emails also arrive every day that beg for reassurance that the world will not end, he explained.



Hadron Collider: The final pieces slot into place

advertisement Others are more aggressive. "There are a number who say: "You are evil and dangerous and you are going to destroy the world."

"I find myself getting slightly angry, not because people are getting in touch but the fact they have been driven to do that by what is nonsense. What we are doing is enriching humanity, not putting it at risk."

There have also been legal attempts to halt the start up.

The remarkable outpouring of concern about turning on the experiment, the most ambitious in history, comes as a new report concludes that it poses no threat to mankind.

Since 1994, when the collider was first mooted by the multi-national European nuclear research organisation (CERN), dogged doomsayers have claimed that there would be a small but real risk that an unstoppable cataclysm would take place.

Many of the emails received by Gillies cite a gloomy book - Our Final Century?: Will the Human Race Survive the Twenty-first Century? - written by Lord Rees, astronomer royal and president of the Royal Society.

Paul Kalas (UC Berkeley 2012)

"My book has been misquoted in one or two places," Lord Rees said yesterday. "I would refer you to the



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Ending Honorary Authorship

CREDIT FOR SCIENTIFIC RESEARCH CONTRIBUTIONS MUST BE CLEARLY AND APPROPRIATELY ASSIGNED at the time of publication. This task has become increasingly complicated because of the number of different laboratories and coauthors involved in many studies. The good news is that academic institutions, funders, and publishers are exploring new ways to clarify attribution,* and many publishers now require disclosure of specific contributions for scientific authorship. As part of this effort, it is critical that the problem of honorary authorship be effectively addressed. According to a recent report, honorary authors were attached to 25% of research reports, 15% of review articles, and 11% of editorials published in six major medical journals in 2008.† It is time to end this practice.

A true author is someone who has made substantive intellectual contributions to a study and is responsible for a component of the work. Honorary authorship violates this central principle. Why then is it so frequent? In some cases, honorary authorship amounts to “coercive authorship,” in which a senior person informs a junior colleague that the senior person must be listed as an author, even though she/he did not contribute substantially—or at all—to the work. In other cases, the principal investigator may add the name of a prominent scientist in the field as a guest author in an attempt to boost the paper’s chance of publication. Both types of behavior have fraudulent aspects, distorting the ethical culture that is central to a healthy academic environment.

To discourage honorary authorship and ensure appropriate accountability for published results, many journals have updated their policies on authorship. For some (including *Science*), all authors must formally agree to be listed as authors, specify their contributions to the manuscript, and certify that they approve of its content and submission to the journal. But scientific journals could go even further by adding a statement on authorship forms that reminds authors of their accountability in the event of challenges to the veracity or integrity of the work, such as “By signing this statement, I acknowledge that I take credit for the content of the published work. I also acknowledge that I will take responsibility for the work if questions arise in the future as to its authenticity and credibility.” Such a statement would serve as a firm reminder that being inappropriately listed as an author has negative consequences if the results are challenged or retracted.

Research institutions should develop and promulgate clear statements in their research policies about the importance of upholding ethical standards of authorship. For example, Washington University in St. Louis‡ defines both guest and gift authorship as research misconduct, whereby “guest (honorary, courtesy, or prestige) authorship is defined as granting authorship out of appreciation or respect for an individual, or in the belief that expert standing of the guest will increase the likelihood of publication, credibility, or status of the work” and “gift authorship is credit, offered from a sense of obligation, tribute, or dependence, within the context of an anticipated benefit, to an individual who has not contributed to the work.” Each institution should also specify to whom concerns should be directed, without fear of retribution, when an author feels coerced to include an inappropriate author.

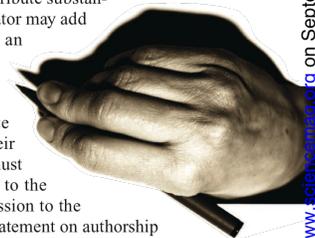
It is incumbent on more-senior coauthors to assist in educating their colleagues about the proper standards for authorship. But all scientists should take a stand against coercive authorship and refuse to comply with such behavior. In this way, senior faculty and mentors will serve as role models of best practices, reinforcing for more-junior investigators the importance of ensuring appropriate authorship. Honorary authorship must no longer be tolerated. Concerted efforts by institutions, authors, and journals are needed to put an end to this fraudulent and unethical practice.

— Philip Greenland and Phil B. Fontanarosa

10.1126/science.1224988

*http://projects.iq.harvard.edu/attribution_workshop. †J. S. Wislar et al., *Br. Med. J.* **343**, d6128 (2011).

‡<http://wustl.edu/policies/authorship.html>.



Ethical guidelines useful for astronomers

National Academies

The Social Foundations of Science
Experimental Techniques & Treatment of Data
Values in Science
Conflicts of Interest
Publication and Openness
The Allocation of Credit
Authorship Practices
Error and Negligence in Science
Misconduct in Science (RM=PF²)
Responding to Violations of Ethical Standards
The Scientist in Society
Bibliography
Appendix: Discussion of Case Studies

American Physical Society

Citizenship in the science community.
Honesty is the cornerstone.
Minimal standards.
Data Management & Sharing.
Fabrication AND Theft are bad.
Offer the opportunity for authorship.
“Significant” contribution = authorship
Plagiarism unacceptable.
Peer review is a duty.
Conflict of interest -> manageable
Honest error is a conflict of interest?
Honest error vs. negligence?

NFL Code of Conduct

- **Prohibited Conduct:** It will be considered conduct detrimental for Covered Persons to engage in (or to aid, abet or conspire to engage in or to incite) violent and/or criminal activity. Examples of such **Prohibited Conduct** include, without limitation: any crime involving the use or threat of physical violence to a person or persons; **theft**, larceny or other property crimes; sex offenses; racketeering; money laundering; obstruction of justice; resisting arrest; **fraud**; and violent or threatening conduct. Additionally, Covered Persons shall not by their words or conduct suggest that criminal activity is acceptable or condoned within the NFL.
- **Persons Charged With Criminal Activity:** Any Covered Person arrested for or charged with conduct prohibited by this policy will be required to undergo an immediate, mandatory clinical evaluation and, if directed, **appropriate counseling**. Such evaluation and counseling must be performed under the direction and supervision of the NFL Vice President of Player and Employee Development. Failure to cooperate with evaluation and counseling (including being arrested for or charged with additional criminal activity during the evaluation and counseling period) shall itself be conduct detrimental to the National Football League and shall be **punishable by fine or suspension** at the discretion of the Commissioner.

NYT

April 10, 2007

N.F.L. Suspends 2 Players for Personal Conduct

By **JUDY BATTISTA**

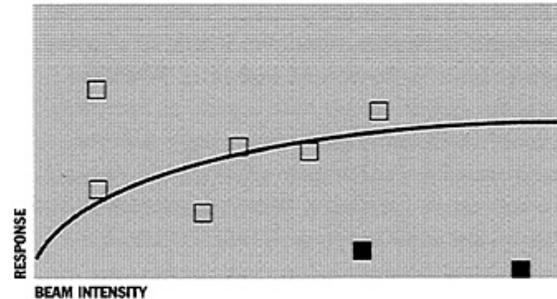
Tennessee Titans cornerback Adam "Pacman" Jones was suspended today for the entire 2007 football season and **Cincinnati Bengals** receiver Chris Henry was suspended for the first eight games as the National Football League began to crack down on players who repeatedly violate its personal conduct policy.

"Your conduct has brought embarrassment and ridicule upon yourself, your club, and the N.F.L., and has damaged the reputation of players throughout the league," Commissioner Roger Goodell wrote in a letter to each of the players. "You have engaged in conduct detrimental to the N.F.L. and failed to live up to the standards expected of N.F.L. players."

Paul Kalas (UC Berkeley 2012)

The selection of data:

Deborah, a third-year graduate student, and Kathleen, a postdoc, have made a series of measurements on a new experimental semiconductor material using an expensive neutron source at a national laboratory. When they get back to their own laboratory and examine the data, they get the following data points. A newly proposed theory predicts results indicated by the curve.



During the measurements at the national laboratory, Deborah and Kathleen observed that there were power fluctuations they could not control or predict. Furthermore, they discussed their work with another group doing similar experiments, and they knew that the other group had gotten results confirming the theoretical prediction and was writing a manuscript describing their results. In writing up their own results for publication, Kathleen suggests dropping the two anomalous data points near the abscissa (the solid squares) from the published graph and from a statistical analysis. She proposes that the existence of the data points be mentioned in the paper as possibly due to power fluctuations and being outside the expected standard deviation calculated from the remaining data points. "These two runs," she argues to Deborah, "were obviously wrong."

- How should the data from the two suspected runs be handled?
- Should the data be included in tests of statistical significance and why?
- What other sources of information, in addition to their faculty advisor, can Deborah and Kathleen use to help decide?

POLYWATER AND THE ROLE OF SKEPTICISM

The case of polywater demonstrates how the desire to believe in a new phenomenon can sometimes overpower the demand for solid, well-controlled evidence. In 1966 the Soviet scientist Boris Valdimirovich Derjaguin lectured in England on a new form of water that he claimed had been discovered by another Soviet scientist, N. N. Fedyaikin. Formed by heating water and letting it condense in quartz capillaries, this "anomalous water," as it was originally called, had a density higher than normal water, a viscosity 15 times that of normal water, a boiling point higher than 100 degrees Centigrade, and a freezing point lower than zero degrees.

Over the next several years, hundreds of papers appeared in the scientific literature describing the properties of what soon came to be known as polywater. Theorists developed models, supported by some experimental measurements, in which strong hydrogen bonds were causing water to polymerize. Some even warned that if polywater escaped from the laboratory, it could autocatalytically polymerize all of the world's water.

Then the case for polywater began to crumble. Because polywater could only be formed in minuscule capillaries, very little was available for analysis. When small samples were analyzed, polywater proved to be contaminated with a variety of other substances, from silicon to phospholipids. Electron microscopy revealed that polywater actually consisted of finely divided particulate matter suspended in ordinary water.

Gradually, the scientists who had described the properties of polywater admitted that it did not exist. They had been misled by poorly controlled experiments and problems with experimental procedures. As the problems were resolved and experiments gained better controls, evidence for the existence of polywater disappeared.

A CONFLICT OF INTEREST

John, a third-year graduate student, is participating in a department-wide seminar where students, postdocs, and faculty members discuss work in progress. An assistant professor prefaces her comments by saying that the work she is about to discuss is sponsored by both a federal grant and a biotechnology firm for which she consults. In the course of the talk John realizes that he has been working on a technique that could make a major contribution to the work being discussed. But his faculty advisor consults for a different, and competing, biotechnology firm.

- How should John participate in this seminar?
- What, if anything, should he say to his advisor-and when?
- What implications does this case raise for the traditional openness and sharing of data, materials, and findings that have characterized modern science?

INDUSTRIAL SPONSORSHIP OF ACADEMIC RESEARCH

Sandra was excited about being accepted as a graduate student in the laboratory of Dr. Frederick, a leading scholar in the field, and she embarked on her assigned research project eagerly. But after a few months she began to have misgivings. Though part of Dr. Frederick's work was supported by federal grants, the project on which she was working was totally supported by a grant from a single company. She had known this before coming to the lab and had not thought it would be a problem. But she had not known that Dr. Frederick also had a major consulting agreement with the company. She also heard from other graduate students that when it came time to publish her work, any paper would be subject to review by the company to determine if any of her work was patentable.

- What are the advantages and disadvantages of Sandra doing research sponsored entirely by a single company?
- How can she address the specific misgivings she has about her research?
- If Sandra wishes to discuss her qualms with someone at her university, to whom should she turn?

CREDIT WHERE CREDIT IS DUE

Ben, a third-year graduate student, had been working on a research project that involved an important new experimental technique. For a national meeting in his discipline, Ben wrote an abstract and gave a brief presentation that mentioned the new technique. After his presentation, he was surprised and pleased when Dr. Freeman, a leading researcher from another university, engaged him in an extended conversation. Dr. Freeman asked Ben extensively about the new technique, and Ben described it fully. Ben's own faculty advisor often encouraged his students not to keep secrets from other researchers, and Ben was flattered that Dr. Freeman would be so interested in his work. Six months later Ben was leafing through a journal when he noticed an article by Dr. Freeman. The article described an experiment that clearly depended on the technique that Ben had developed. He didn't mind; in fact, he was again somewhat flattered that his technique had so strongly influenced Dr. Freeman's work. But when he turned to the citations, expecting to see a reference to his abstract or presentation, his name was nowhere to be found.

- Does Ben have any way of receiving credit for his work?
- Should he contact Dr. Freeman in an effort to have his work recognized?
- Is Ben's faculty advisor mistaken in encouraging his students to be so open about their work?

WHO SHOULD GET CREDIT FOR THE DISCOVERY OF PULSARS?

A much-discussed example of the difficulties associated with allocating credit between junior and senior researchers was the 1967 discovery by Jocelyn Bell, then a 24-year-old graduate student, of pulsars. Over the previous two years, Bell and several other students, under the supervision of Bell's thesis advisor, Anthony Hewish, had built a 4.5-acre radiotelescope to investigate scintillating radio sources in the sky. After the telescope began functioning, Bell was in charge of operating it and analyzing its data under Hewish's direction. One day Bell noticed "a bit of scruff" on the data chart. She remembered seeing the same signal earlier and, by measuring the period of its recurrence, determined that it had to be coming from an extraterrestrial source. Together Bell and Hewish analyzed the signal and found several similar examples elsewhere in the sky. After discarding the idea that the signals were coming from an extraterrestrial intelligence, Hewish, Bell, and three other people involved in the project published a paper announcing the discovery, which was given the name "pulsar" by a British science reporter.

Many argued that Bell should have shared the Nobel Prize awarded to Hewish for the discovery, saying that her recognition of the signal was the crucial act of discovery.

Others, including Bell herself, said that she received adequate recognition in other ways and should not have been so lavishly rewarded for doing what a graduate student is expected to do in a project conceived and set up by others.

PUBLICATION PRACTICES

Paula, a young assistant professor, and two graduate students have been working on a series of related experiments for the past several years. During that time, the experiments have been written up in various posters, abstracts, and meeting presentations. Now it is time to write up the experiments for publication, but the students and Paula must first make an important decision. They could write a single paper with one first author that would describe the experiments in a comprehensive manner, or they could write a series of shorter, less complete papers so that each student could be a first author.

Paula favors the first option, arguing that a single publication in a more visible journal would better suit all of their purposes. Paula's students, on the other hand, strongly suggest that a series of papers be prepared. They argue that one paper encompassing all the results would be too long and complex and might damage their career opportunities because they would not be able to point to a paper on which they were first authors.

- If the experiments are part of a series, are Paula and her students justified in not publishing them together?**
- If they decided to publish a single paper, how should the listing of authors be handled?**
- If a single paper is published, how can they emphasize to the review committees and funding agencies their various roles and the importance of the paper?**

FABRICATION IN A GRANT APPLICATION

Don is a first-year graduate student applying to the National Science Foundation for a predoctoral fellowship. His work in a lab where he did a rotation project was later carried on successfully by others, and it appears that a manuscript will be prepared for publication by the end of the summer. However, the fellowship application deadline is June 1, and Don decides it would be advantageous to list a publication as "submitted." Without consulting the faculty member or other colleagues involved, Don makes up a title and author list for a "submitted" paper and cites it in his application.

After the application has been mailed, a lab member sees it and goes to the faculty member to ask about the "submitted" manuscript. Don admits to fabricating the submission of the paper but explains his actions by saying that he thought the practice was not uncommon in science.

The faculty members in Don's department demand that he withdraw his grant application and dismiss him from the graduate program. After leaving the university, Don applies for a master's degree, since he has fulfilled the course requirements. Although the department votes not to grant him a degree, the university administration does so because it is not stated in the university graduate bulletin that a student in Don's department must be in "good standing" to receive a degree. They fear that Don will bring suit against the university if the degree is denied. Likewise, nothing will appear in Don's university transcript regarding his dismissal.

- Do you agree with Don that scientists often exaggerate the publication status of their work in written materials?
- Do you think the department acted too harshly in dismissing Don from the graduate program?
- Do you believe that being in "good standing" should be a prerequisite for obtaining an advanced degree in science?
- If Don later applied to a graduate program at another institution, does that institution have the right to know what happened?

A CASE OF PLAGIARISM

May is a second-year graduate student preparing the written portion of her qualifying exam. She incorporates whole sentences and paragraphs verbatim from several published papers. She does not use quotation marks, but the sources are suggested by statements like "(see . . . for more details)." The faculty on the qualifying exam committee note inconsistencies in the writing styles of different paragraphs of the text and check the sources, uncovering May's plagiarism.

After discussion with the faculty, May's plagiarism is brought to the attention of the dean of the graduate school, whose responsibility it is to review such incidents. The graduate school regulations state that "plagiarism, that is, the failure in a dissertation, essay, or other written exercise to acknowledge ideas, research or language taken from others" is specifically prohibited. The dean expels May from the program with the stipulation that she can reapply for the next academic year.

- Is plagiarism like this a common practice?**
- Are there circumstances that should have led to May's being forgiven for plagiarizing?**
- Should May be allowed to reapply to the program?**

Paul Kalas (UC Berkeley 2012)

A CAREER IN THE BALANCE

Francine was just months away from finishing her Ph.D. dissertation when she realized that something was seriously amiss with the work of a fellow graduate student, Sylvia. Francine was convinced that Sylvia was not actually making the measurements she claimed to be making. They shared the same lab, but Sylvia rarely seemed to be there. Sometimes Francine saw research materials thrown away unopened. The results Sylvia was turning in to their common thesis advisor seemed too clean to be real.

Francine knew that she would soon need to ask her thesis advisor for a letter of recommendation for faculty and postdoc positions. If she raised the issue with her advisor now, she was sure that it would affect the letter of recommendation. Sylvia was a favorite of her advisor, who had often helped Sylvia before when her project ran into problems. Yet Francine also knew that if she waited to raise the issue the question would inevitably arise as to when she first suspected problems. Both Francine and her thesis advisor were using Sylvia's results in their own research. If Sylvia's results were inaccurate, they both needed to know as soon as possible.

- Should Francine first try to talk with Sylvia, with her thesis advisor, or with someone else entirely?
- Does she know enough to be able to raise concerns?
- Where else can Francine go for information that could help her decide what to do?

Homework for Lecture 3

“Research Misconduct”

- Read the cases presented on the syllabus.

<http://astro.berkeley.edu/~kalas/ethics/pages/lectures.html>

- Study the bubble fusion example.
 - How many violations of APS guidelines can you find?
 - Compare issues and events to the document “US Federal Policies of on Research Misconduct?”
 - Be prepared to discuss your perspective in class.
- Writing Assignment
 - Comment on $RM=PF^2$ (concise 0.5 – 2.0 pgs, “Letter to Editor” style). Should RM specify other undesirable activities? Why or why not? (Hint: Consider Ch. 1 of the Sigma Xi article).
 - Write an astronomy case study (<1 pg) that illustrates your perspective above.
- As always, bring a current science ethics news items if you find one.