

Ethics and Etiquette in Scientific Research

Rules of Conduct for Persons in Authority.
How to Avoid Improprieties.
How to Tell If You're Being Screwed.

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These notes are available online at
<http://www.cs.cmu.edu/~dst/Ethics/ethics.ps>

How to Avoid Ethical Dilemmas

1. Know the rules. How are researchers supposed to behave?
Who says so?
2. Know your rights as a scientist. Are you being treated fairly?
 - co-authorship, priority, conflicts of interest, etc.
3. Learn to recognize the most common ethical mistakes:
 - misappropriation of text or ideas
 - deceptive reporting of research results
 - breach of confidentiality
4. Take steps now to avoid conflicts in your research group, or resolve them quickly with minimal discomfort.
5. Learn from others' mistakes. (Enjoy horrifying stories of how people ruined their careers by gross ethical violations.)

Ethics Education

- Scientific integrity training now required in the biological sciences, per NIH policy. Source: Susan Henry.
- Ethics training is part of many medical school and business school curricula. But not computer science?
- CMU's Center for the Advancement of Applied Ethics has a collection of educational materials, some of which were used in preparing this lecture. Contacts: Peter Madsen, Preston Covey (Philosophy Dept.)
- National Academy of Sciences booklet:
On Being a Scientist
Research fraud, academic priority, plagiarism.
- AAAS booklet: *Good Science and Responsible Scientists*.
AAAS "Scientific Freedom and Responsibility" Award.
- Sigma Xi: *Honor in Science*, 1986.
- Robin Penslar's *Research Ethics: Cases and Materials*.
Indiana University Press.

Official Policies

- CMU Faculty and Student Handbooks contain policies on:
 - plagiarism
 - conflict of interest
 - use of human subjects in research
 - handling allegations of misconduct in research
 - ownership of intellectual property
 - privacy of computer accounts
 - sexual harassment
- Professional and scientific societies often have codes of ethics.
- ACM Code of Ethics: privacy issues; responsible use of technology; don't mislead the public.
- Many scientific journals impose ethical requirements on authors. Examples include:
 - release of data to other scientists on request
 - compliance with NIH animal care guidelines
 - compliance with human subjects regulations
 - avoiding duplicate publication

First Issue: Allocation of Credit

- Two forms of credit: co-authorship, and acknowledgements.
- Who gets listed as a co-author?
 - Lab director is co-author on all papers?
 - Student “owes” advisor co-authorship on one journal paper?
- How is the ordering of authors determined?
 - First and last are usually the key locations.
- Different disciplines/cultures follow different conventions.
- Rule of thumb: a co-author should have made **direct** and **substantial** contributions. But how direct/substantial?
- *Co-authors share responsibility for the scientific integrity of the paper. Penalties may apply.*
- The David Baltimore case: Nobel laureate was co-author of paper; primary investigator was accused of fraud.

Co-Authorship in Computer Science

- General convention: authors ordered by the amount of their contribution. (But in the Theory community, author list is sometimes alphabetical,)
- Contributions may include: providing key ideas, doing the implementation, running experiments/collecting data, analyzing data, and writing up the results.
- No special honor to being the last author?
- No general consensus that lab directors get to be co-authors, but probably some projects do operate this way.
- Papers typically have 1-4 authors. Rarely see large author lists as in physics.
- Many computer scientists are involved in interdisciplinary work, e.g., HCI, or computational neuroscience.
- It is important to know the conventions in other cultures.

Acknowledgments

People who made contributions that don't merit co-authorship may (sometimes *must*) be acknowledged elsewhere in the paper.

- Contributing a good idea, or coining a useful term.
- Providing pointers to relevant papers for the bibliography section.
- Help with debugging some tricky piece of code.
- Help with typesetting or illustrations.
- Providing resources (e.g., loan of a workstation.)

Also, remember to acknowledge your funding agency!

Questions to Ask Your Advisor

1. What are the authorship conventions in our discipline?
2. What are the authorship conventions in your lab?
3. Are students prohibited from submitting papers (even if sole-authored) without first running them by the advisor?
4. Who owns the code/data/manuscript?

See the CMU policy on intellectual property.

Some CMU-specific cases:

- Godspell
- SCRIBE

Example to Discuss

- **Professor Smith**, an acknowledged expert in his field, is invited to write an article for an upcoming special issue of *Hacker's Monthly*.

Smith asks his grad student **Jones** to help with the article. Some of the most important results in the article are the product of Jones' thesis research.

What do you think of the following outcomes?

1. Smith appears as sole author of the article, since the invitation was issued to him alone. He cites the results as "work done in my lab" but makes no explicit mention of Jones.
2. Smith appears as sole author, but cites Jones' thesis, which is "in preparation."
3. The article is published jointly by Smith and Jones.
4. Jones says he will allow Smith to include his results in the article, but only if the order of authors is Jones & Smith.
5. Jones had been planning to submit his own sole-author paper to *Hacker's Monthly*. He declines Smith's request to collaborate, then sends the editor a title and abstract and promises a full manuscript in time for the special issue.

Issue 2: Misappropriation of Text

Borrowing just a sentence or two without attribution is plagiarism. But easily avoided.

- Smith:

The parrot is a remarkable bird in many respects besides its natural mimicry. In terms of intelligence, humor, and manual dexterity, it is unequalled in the avian kingdom.

- Jones, **wrong way**:

Parrots are excellent mimics. But the parrot is a remarkable bird in many other respects. In terms of intelligence, humor, and dexterity, it is unparalleled in the avian kingdom.

- Jones, **right way**:

Parrots are excellent mimics. But in addition, as Smith (1995) observes, “in terms of intelligence, humor, and manual dexterity, [they are] unequalled in the avian kingdom.”

Citation Etiquette

Cite other people's work freely and often:

- Avoid antagonizing your reviewers by failing to properly acknowledge their contributions to the field.
- Demonstrate your mastery of the literature.
- Make new friends. (Researchers love to be cited.)
- Encourage others to cite your work in return.

Misappropriation of Citations

Citations are good, but stealing citations is not.

Smith:

Rat head direction cells with cosine tuning curves have been found in parietal/retrosplenial cortex (Chen, 1989).

- Jones, **wrong way:**

Some robots use inertial guidance for maintaining heading information in unfamiliar environments. There is evidence for a similar mechanism in the parietal/retrosplenial cortex of rats (Chen, 1989).

- Chen (1989) turns out to be an unpublished PhD thesis that Jones has never seen, and wouldn't comprehend if he had.

- Jones, **right way:**

Some robots use inertial guidance for maintaining heading information in unfamiliar environments. There is evidence for a similar mechanism in rats (Chen, 1989, as cited in Smith, 1995.)

Misappropriation of Ideas

- A researcher must not present someone else's idea as his or her own. *Cite your source!*
- Even if the originator of the idea doesn't care about credit, it is improper to present their idea as one's own.
 - **Right way:** Adding “eye of newt” to the mixture produced a higher reaction rate and, ultimately, a far more potent product.¹

¹We are grateful to Mr. A. E. Newman, a high school student who was visiting our lab for the day, for suggesting this important step.

- A researcher may not use information obtained in confidence as a reviewer (of a paper or grant proposal) to “scoop” the author.

Misappropriation of Entire Documents

How to quickly acquire a huge publication record with virtually no effort or cost:

1. Browse the Web to find papers or tech reports you like.
2. Download the source, or OCR the Postscript.
3. Change the author and title.
4. Change all occurrences of “I/we” or “my/our” accompanying citations of the true author’s work.
5. Resubmit to an obscure conference or journal.
6. Repeat steps 1-5 until fame and fortune are assured.

Technique pioneered by C. V. Papadopoulos, University of Patras, Greece.

See */afs/cs/usr/wing/plagiarism* for details.

New vita category: “papers of mine published in a refereed journal under someone else’s name.”

Issue 3: Responsibilities of a Reviewer

From “Ethical Guidelines to Publication of Chemical Research”, *Accounts of Chemical Research* **18**(12):355-357, Dec. 1985.

1. Do your fair share of reviewing.
2. Promptly return the manuscript if not qualified to review it.
3. Judge quality objectively, with due regard to scientific standards but also with respect for the intellectual independence of the authors.
4. Avoid potential conflicts of interest.

Either decline to review the manuscript, or fully disclose the potential conflict to the editor.

In some cases it may be appropriate to submit a signed review, to prevent any accusations of bias.

Responsibilities of a Reviewer (cont.)

5. Do not review manuscripts where you have a personal or professional connection to the author (e.g., your girlfriend/boyfriend, your colleague down the hall.)
6. Treat manuscripts as confidential.

Don't turn the manuscript you just reviewed into a course handout, even if it is wonderfully relevant to the course.

7. Provide adequate support for your judgments, *including citations*.
 - **Wrong way:** The author's results must be wrong, since they conflict with those of Bovik, who invented the field.
 - **Right way:** The authors should explain the discrepancies between their results and the seminal work of Bovik ("Short Messages Over Long Distances", *Journal of Hyperspace Zephyrgrams*, vol. 1, no. 1, pp. 1-22, January, 1998.)

Responsibilities of a Reviewer (cont.)

8. Know the literature. Point out missing citations.

Call the editor's attention to any substantial similarity between this manuscript and one already published or currently submitted to another journal.

9. Turn in all reviews promptly.

Someone's tenure case may hang on your decision.

10. Do not use the ideas or results in a manuscript except with permission of the author.

If the paper indicates that an approach you were planning to pursue won't work, you can drop that approach.

But if it reveals a new technique that you would like to try out before the paper is published, you must obtain the author's permission.

It's a good idea to let the editor know what you're doing, perhaps before contacting the author.

Contacting an Author

- True story: scientist A submits a paper to a leading journal. Editor B assigns the paper to scientist C to review.
- C thinks the data are interesting, but the computer model is naive and the results unimpressive. Since the model is the focus of the paper, C recommends the paper be rejected, and explains why.
- C is an experienced computer modeler in his own right.
- C believes that an approach he developed two years ago would be much better suited to modeling A's data, if extended in a certain direction.
- C would like access to A's data, but could do the experiment with simulated data (or data from someone else's lab) if necessary.
- C is very concerned about the appearance of impropriety, and wants to act in a responsible and professional manner.
- What should C do?

Reviews That Sting

- At some point in your career, a sharp-tongued reviewer is going to cut you to ribbons.
- At some later point, you will review a paper by some person in desperate need of a clue, and will be presented with the perfect opportunity to cut *them* to ribbons:

The most impressive feature of this paper is the author's obvious ignorance of the basic rudiments of antimatter reactor design. I am genuinely surprised that he managed to perform the ridiculous experiments reported here (if he did in fact perform them) without blowing himself and his entire lab to bits. This paper is not just garbage; it's dangerous garbage.

- ***Resist the urge to trash people.*** Remember how it felt when someone did it to you. Try to set a compassionate example for others to follow.
- Alternative strategy: trash them thoroughly.

Then write a second review with a more professional tone, which you turn in.

Issue 4: Research Fraud

- Painting mice with a magic marker to fake the results of a genetic experiment. (True case.)
- Fabricating some missing data points in order to complete a study in time for a deadline.
- Varieties of data fraud (from *Honor in Science*):
 - **Trimming**: smoothing irregularities to make the data appear extremely accurate and precise.
 - **Cooking**: retaining only those results that fit the theory and discarding others.
 - **Forging**: inventing some or all of the research data that are reported, and even reporting experiments that were never performed.
- Favorite excuses for cooking and trimming:
 - “those outlier points must be measurement error”
 - “they would only confuse the reader”
 - “everybody cleans up their data before publication”

Famous Fabricators

- Mendel: “cleaned up” his genetics data.
- Kepler fabricated data on planetary observations to support his controversial claim that the planets follow elliptical orbits.
- Pasteur: gave a public demonstration of what was supposed to be his new oxygen-attenuation approach to vaccine production.

In reality he was using a chemically treated vaccine, an idea he stole from Henri Toussaint (who suffered a nervous breakdown and died.)

Issue 5: Conflicts of Interest

Professor Smith does NSF-funded research on hyperspace zephyrgrams.

Smith also has a company, HyperZeph, that is developing a commercial product related to hyperspace zephyrgrams.

Smith's graduate student, Jones, is doing his doctoral thesis on hyperspace zephyrgram routing schemes.

1. Smith obtains Jones' permission to incorporate Jones' new algorithm into HyperZeph. *Consent obtained under duress?*
2. Smith asks Jones to delay publication of a journal article, because it will provide valuable data to ZephScape, his company's chief competitor.
3. Jones is also working part time for HyperZeph. Smith pressures him to spend more hours doing HyperZeph development, which takes time away from thesis research.
4. Jones discovers that programmers spending 50% time at HyperZeph are being paid 100% out of the NSF grant.

Failure to Disclose

- Disclosure of potential conflicts of interest is always a good idea. *It's insurance against accusations of misconduct.*
- Failure to disclose may, at the least, lead to an appearance of impropriety.
- At worst: jail time (e.g., for violating disclosure requirements in a stock offering for a startup company.)
- An example of inadequate disclosure: endorsement on the back of a book jacket (MIT Press):

“This wonderfully lucid book describes what history may judge to be the second state in the evolution of <stuff>... It may take generations to unfold the implications of this new species of <artifact> -- but <author> and his colleagues have already made an impressive beginning.”

- What's left out? The endorser is the author's thesis advisor, and hence one of the “colleagues” lauded above.
- The endorser has a financial interest in the company that is commercializing the artifact described in the book.

Talking to the Public

- In general, scientists should not announce discoveries to the public before they have undergone peer review. *That is how Fleischman and Pons got into trouble.*
- Deliberately avoiding peer review for personal gain may constitute professional misconduct.
- Although technical issues sometimes have to be simplified when explaining research to the public, the following guidelines should be followed:
 - Don't oversell your results.
 - Don't permit unsupported claims to go unchallenged. (Reporters may try to “hype” the story, or companies may misrepresent your results.)
 - Make sure that the technical details are available at the time of any public announcement, so that facts can be checked by any scientist who cares to do so.
- Don't refer in print to a shoddy and over-hyped undergrad research project as “The Carnegie Mellon Study” unless the Provost gives permission to attach CMU's name to it.

Issue 6: Computer-Related Ethics Problems

- Privacy of files. The assumption at CMU is that people's computer directories are private; you may not snoop around without permission.

The ***public/*** subdirectory is an exception.

- Forged mail. Forged bboard posts. Forged cancels.
- Is it ethical to operate an anonymous remailer?
- Is it ethical to put sexually explicit materials on the web, where they can be accessed by minors?
- Use of computing resources for personal things: okay as long as the resources consumed are “not significant.”
 - **Okay:** Composing a letter to your parents and printing it on a departmental laser printer.
 - **Not okay:** setting up your own Internet-based mail order business on a university-owned machine.

Copyright and the Web

- Legal issues with copyright assignment forms:
 - Who holds the copyright to your article?
 - What rights must you give to the publisher? What rights can you retain?
 - The right to re-use your material in “other works”.
- Is it okay to put copies of your papers on your web page...
 - Before the journal publishes them?
 - After they’re published?
- Can authors be sued for violating copyright on their own articles?

Etiquette in the Scientific Community

- Pointing out flaws in competing approaches is fine. But be respectful of other researchers working in your area.

(Who do you think is going to be reviewing your papers and grant proposals?)

- Praise good behavior in public, criticize bad behavior (e.g., failure to cite) in private.
- If public criticism is necessary, stick to objective facts. Personal attacks are never appropriate.

Conclusion: Dealing With Problems

- Get your advisor's advice.
- If you have a problem with your advisor, discuss it with him or her before seeking outside opinions.
- If necessary, speak confidentially with some other senior scientist whose opinions you respect.
- Sometimes misunderstandings or unhappy situations can be cleared up through mediation by a third party.
- In the event of serious misconduct, charges may be filed with the Provost's office.
- Handle allegations of misconduct with as much confidentiality as possible. People's careers are at stake. Remember that there are two sides to every story.
- Don't be pushed around. Know the rules, your rights, and your responsibilities.
- Most basic rule of all: don't do anything that would embarrass you if people found out about it.