

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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Research Ethics Covers Many Areas

- Use of human subjects in research
 - Informed consent, IRB oversight
- Use of animals in research
 - Appropriate care/use, IACUC oversight
- Moral debates
 - Stem cell research, impact of technology (nuclear weapons, genetic screening), etc.
- Professional issues (today's topic)
 - Authorship, IP rights, confidentiality, etc.

Avoiding Ethical Dilemmas

1. Know the rules.

- How are researchers supposed to behave?
- Who says so?

2. Know your rights & responsibilities.

- Co-authorship
- Ownership of intellectual property
- Conflicts of interest
- Etc.

Avoiding Ethical Dilemmas

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.

Ethics Education

- Scientific integrity training is now required in many areas of the sciences.
- NIH and NSF training grants require it.
- Ethics training is a standard part of medical school and business school curricula.
 - But not computer science?

Resources

- National Academy of Sciences booklet:
On Being a Scientist
- AAAS booklet:
Good Science and Responsible Scientists
- Sigma Xi:
Honor in Science
The Responsible Researcher: Paths and Pitfalls

Resources (cont.)

- CMU's Center for the Advancement of Applied Ethics and Political Philosophy
 - Peter Madsen offers several ethics courses
- Many ethics education programs use case studies to foster discussion.
- Lots of good material on the web, e.g.,
<http://bioethics.od.nih.gov>
<http://onlineethics.org>

Official Policies

- CMU Faculty and Student Handbooks contain policies on:
 - Plagiarism
 - Conflict of interest
 - Use of human subjects in research
 - Handling of allegations of misconduct in research
 - Ownership of intellectual property
 - Privacy of computer accounts
 - Sexual harassment
- <http://www.cmu.edu/policies>

Official Policies

- Professional and scientific societies often have codes of ethics.
 - *ACM: don't mislead the public*
 - *APA: don't sleep with your patients*

But are they enforced?
- Many scientific journals impose ethical requirements on authors:
 - Release of data to other scientists
 - Compliance with NIH animal care guidelines
 - IRB approval for expts. on human subjects
 - Avoiding duplicate publication

Issue #1: Allocation of Credit

- Two forms of credit in a paper:
 - Co-authorship
 - Acknowledgments
- Who gets listed as a co-author?
 - Lab director is co-author on all papers?
 - Student “owes” his advisor co-authorship on at least one journal paper?

Ordering of Authors

- How is the ordering of authors determined in your field?
- First and last usually the key positions.
- Different disciplines/cultures follow different conventions.

Co-Authorship

- Rule of thumb:
 - A co-author should have made direct and substantial contributions to the work (not necessarily to the writing.)
- Co-authors share responsibility for the scientific integrity of the paper.
Penalties may apply!
- David Baltimore case:
 - Nobel laureate was co-author on a paper
 - Primary investigator accused of fraud

Co-Authorship in Computer Science

- Generally: 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 the data
 - Writing up the results

Co-Authorship in CS

- No special honor to be last author?
- No general consensus on lab directors getting co-authorship.
- Papers typically have 1-4 authors.
 - Rarely see large author lists as in physics.
- But many computer scientists do interdisciplinary work: HCI, computational neurosci. Culture clash?

Acknowledgments

- People who made contributions that don't merit co-authorship may (sometimes **must**) be acknowledged elsewhere in the paper.
- Not as good as co-authorship, since it doesn't go on a vita.
- But it's good manners, and costs nothing.

Acknowledge People Who...

- Contribute a good idea or coin a useful term
- Provide pointers to papers for the bibliography
- Help with debugging some tricky code
- Help with typesetting or illustrations
- Provide significant resources, e.g., loan of equipment, tissue samples, etc.

Also acknowledge your funding agency!

Ask Your Advisor:

1. What are the authorship conventions in our field?
2. What are the authorship conventions in your lab?
3. Are students prohibited from submitting papers (even if sole-authored) without your approval?
4. Who owns the code/data/manuscript?
See CMU policy on intellectual property.

Some CMU cases: Godspell, SCRIBE

Example to Discuss

- Professor Smith is invited to write an article for a special issue of The Big Important Journal.
- Smith invites grad student Jones to help with the article.
- Some of the most important results are the product of Jones' thesis research.
- What should the authorship be?

Issue #2: Misappropriating Text

- Borrowing “just a sentence or two” without attribution is plagiarism.
- But plagiarism is easily avoided: give the citation.

Misappropriation Example

Smith:

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

Misappropriation Example

Jones, **wrong way**:

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

Proper Attribution

Jones, **right way**:

Parrots are excellent mimics. But in addition, as Smith (2005) 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 acknowledge their contributions.
 - Demonstrate your mastery of the literature.
 - Make new friends. (Scholars love to be cited.)
 - Encourage others to cite your work in return.

Misappropriation of Citations

- Citations are good, but stealing citations is not good.

Smith:

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

Misappropriation of Citations

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).

What's wrong?

Misappropriation of Citations

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.

Misappropriation of Citations

Jones, **right 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 (Smith, 2005, citing Chen, 1989).

Misappropriation of Ideas

- A researcher must not present someone else's ideas 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.

Citing The Source of an Idea

- Right way:

Adding “eye of newt” to the mixture produced a higher reaction rate and, ultimately, a far more potent product.¹

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

Fast Track to Academic Success

- 1) Browse the web to find papers or tech reports you like.
- 2) Download the source files, or OCR the printed document.
- 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 until fame and fortune achieved.

Fast Track (cont.)

- This technique was pioneered in the 1980s by C. V. Papadopoulos, University of Patras, Greece.
- Professor Jeannette Wing at CMU: new category in her vita:

“Papers of mine published in a refereed journal under someone else's name.”

Issue #3: Responsibilities of a Reviewer

- From “Ethical Guidelines to Publications of Chemical Research”, *Accounts of Chemical Research* **18**(12):355-357, December 1985:
 1. Do your fair share of reviewing.
 2. Promptly return the manuscript if you are not qualified to review it.

Reviewer Responsibilities

3. Judge quality objectively

- With due regard to scientific standards, but
- With respect for the intellectual independence of the authors.

Reviewer Responsibilities

4. Avoid potential conflicts of interest.

- Either decline to review the manuscript, or fully disclose the conflict to the editor.
- In some cases, it may be appropriate to submit a signed review, to prevent any accusation of bias.

Reviewer Responsibilities

5. Do not review manuscripts where you have a personal or professional connection to the author.
 - Your girlfriend / boyfriend / cousin.
 - Your colleague down the hall.

Reviewer Responsibilities

6. Treat manuscripts as confidential.

- Don't turn the manuscript you just reviewed into a course handout, even if it's wonderfully relevant.
- Wait until it's published.

Reviewer Responsibilities

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.

Adequate Support for Judgments

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 Zephygrams*, vol. 1, no. 1, pp. 1-22, January 2007).

Responsibilities of a Reviewer

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.

Responsibilities of a Reviewer

9. Turn in all reviews promptly.

Someone's tenure case may hang on your decision.

Responsibilities of a Reviewer

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

- You can abandon an approach the paper shows will be unsuccessful.
- But you cannot use a new technique disclosed in the paper without first obtaining the author's permission.
- Let the editor know what you are doing!

Contacting An Author

- True story: scientist A submits a paper to a leading journal.
- Editor B assigns it to scientist C to review.
- C thinks the data are interesting, but the computer model is naïve and the results unimpressive. Since the model is the focus of the paper, C recommends the paper be rejected, and explains why.

Contacting An Author

- C is an experienced computer modeler.
- 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.

Contacting An Author

- 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 fool in desperate need of a clue, and will be sorely tempted to cut *them* to ribbons.
- Resist this urge. Remember how it felt when someone did it to you.

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 Sigma Xi's "*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; even reporting experiments that were never performed.

Favorite Excuses for Trimming and Cooking

- “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.

Famous Fabricators

- 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.)

Recent Cases

- Woo Suk Hwang (South Korea):
 - Faked results to support his claim to have cloned human stem cells
 - Coerced egg donations from female subordinates
- Eric Poehlman (U. Vermont):
 - Faked data in 15 NIH grant applications worth \$2.9 million over 10 years
 - **Sentenced to 366 days in federal prison.**

The Hall of Shame

- NIH Office of Research Integrity

<http://ori.dhhs.gov>

- Annual summaries of scientific misconduct cases, and the penalties applied.
- Typically: barred for 3-5 years from applying for federal funds or serving on any review/advisory panels. (So ...)

Issue #5: 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 lead to:
 - An appearance of impropriety
 - Jail time (e.g., for violating disclosure requirements in a stock offering.)

Example of Poor Disclosure

- From the back of an MIT Press book jacket:

“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 Not Disclosed?

- The endorser is the author's thesis advisor, and hence one of the “colleagues” being lauded.
- 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.
 - Fleishman and Pons “cold fusion” case.
- Deliberately avoiding peer review for personal gain may constitute professional misconduct.

Talking to the Public

- Technical issues sometimes have to be simplified when explaining research to the public, but:
 - 1) Don't oversell your results.
 - 2) Don't allow others (e.g., a reporter, or a company you're working with) to hype your results to make the story more exciting.

Talking to the Public

- 3) Make sure the technical details are available at the time of any public announcements, so the facts can be checked by any scientist who cares to do so.
- 4) Don't present a shoddy and over-hyped undergraduate research project as “The Carnegie Mellon Study” unless the Provost gives permission to attach CMU's name to it.

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?

Etiquette

- 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.

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.

Dealing with Problems (cont.)

- Sometimes misunderstandings or unhappy situations can be cleaned up through mediation by a third party.
- In the event of serious misconduct, charges may be filed with the Provost's office.
- The university has a formal policy for handling misconduct allegations.

Handling Misconduct

- 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.

Conclusion

- Ethics education should help you to:
 - Understand the rules of professional behavior, and the reasons for them.
 - Know your rights.
 - Meet your responsibilities.
- Most basic rule of all:
 - Don't do anything that would embarrass you if people found out about it.
(Thanks, mom.)