

CMPT 880/890

Research integrity and ethics

Outline

- Science as a social enterprise
- Cheaters often prosper
- Issues:
 - Experimental techniques
 - Conflicts of interest
 - Openness
 - Authorship and allocation of credit
 - Errors and negligence
 - Misconduct and fraud

Science as a social enterprise

- “Much science-in-the-making appears as art until it becomes settled science. Latour defines science-in-the-making as the processes by which scientific facts are proposed, argued, and accepted. A new proposition is argued and studied in publications, conferences, letters, email correspondence, discussions, debates, practice, and repeated experiments. It becomes a “fact” only after it wins many allies among scientists and others using it. Latour sees science-in-the-making as a messy, political, human process, fraught with emotion and occasional polemics.”
 - Denning, p.29

Science as a social enterprise

- The initial acceptance of scientific contributions is based on trust
 - papers in conferences and journals
 - lack of replication
 - CS moves quickly
 - people have little time

Science as a social enterprise

- There is enormous pressure to be productive in the early stages of a research career
 - As they say in Toronto: “publish or prairies...”
 - Do you want to be careful and cautious (with few pubs) or a brave discoverer (with many pubs)?
- Much depends on your reputation

Science as a social enterprise

- Over the longer term...
- Acceptance of an idea into the 'body of knowledge' is based on a greater weight of evidence
 - e.g., triangulation of evaluation methods
- Again, much depends on your reputation!

Eventually...

- “We've learned from experience that the truth will come out. Other experimenters will repeat your experiment and find out whether you were wrong or right. Nature's phenomena will agree or they'll disagree with your theory. And, although you may gain some temporary fame and excitement, you will not gain a good reputation as a scientist if you haven't tried to be very careful in this kind of work. And it's this type of integrity, this kind of care not to fool yourself, that is missing to a large extent.”
 - Richard Feynman, *Cargo Cult Science*

Cheaters often prosper

- Dr. Ranjit Chandra, Memorial University
 - Recipient of the Order of Canada
 - Many many publications
 - “The jewel of Memorial”

Cheaters often prosper

- "I would say there was only probably one-quarter of the patients even recruited in this study," Harvey says. "And he had all of the data analyzed and published even before we had even had the data collected!"
 - *The Case of Dr. Chandra*

Cheaters often prosper

- Was he prosecuted?
 - “Despite the committee's conclusion, the university decided not to take any action against Chandra. ...the investigation was dropped because Chandra accused the committee of bias and threatened to sue. "The university was facing a potential lawsuit," Strawbridge says. " There would be loss of reputation, loss of income, et cetera. We, you could be looking at a very, very large lawsuit. And the university would want to be sure it was on firm footing before it took any disciplinary action.”

Cheaters often prosper

- So where is he now?
 - Running a vitamin company in India
 - Wealthy

It's not all black and white

- Cases of obvious misconduct are rare
- Far more cases of bending the rules
 - ...although these are rarely caught
- You will face these grey areas regularly

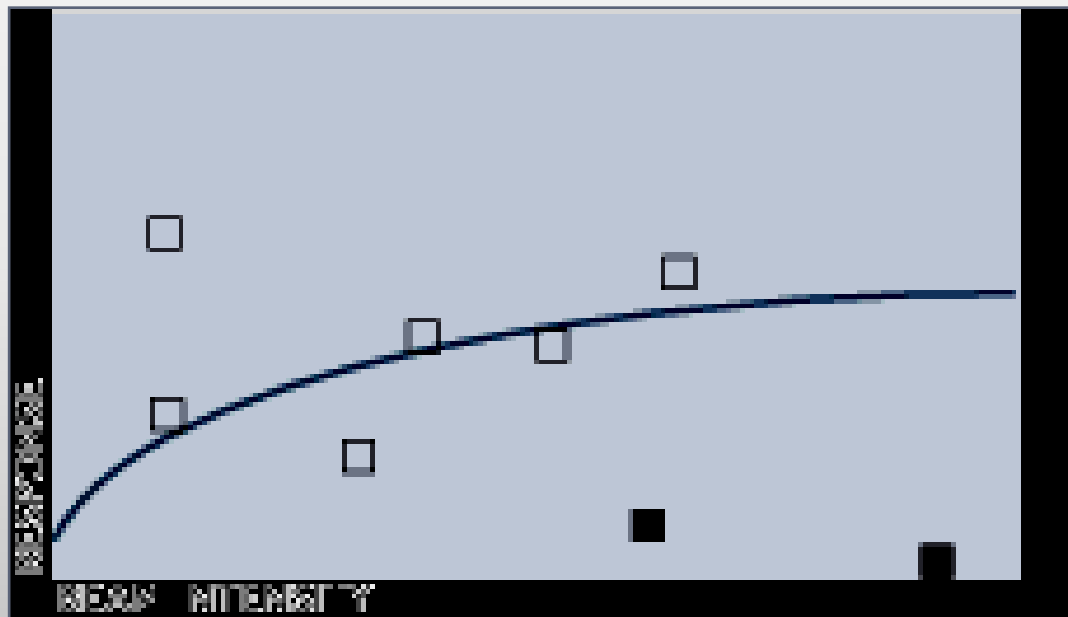
Integrity issues

- Experimental techniques
- Conflicts of interest
- Openness
- Authorship and allocation of credit
- Errors and negligence
- Misconduct and fraud

Experimental techniques

- Careful methodology is vital to reliable conclusions
- Well-established methods are easier to accept
- Care required in all aspects: sampling, statistics, procedure, controls, selection of data
- Case study: selection of data

Selection of data



Conflict of interest

- Reviewing papers or grant proposals
- Industrial sponsorship of research
 - “1994, 63 percent of clinical trials were taking place in academic settings. Ten years later, that figure had shrunk to 26 percent.” (www.slate.com)
 - “a recent survey of academic IRB members found that nearly half had served as consultants to the drug industry.”

Dr. Nancy Oliveri

- Deferiprone is an oral iron chelating agent used in patients with thalassaemia to prevent iron toxicity from repeat blood transfusions. In 1989 Dr. Nancy Olivieri of the Hospital for Sick Children in Toronto started studying the efficacy and safety of deferiprone. The trials were supported initially by the Medical Research Council of Canada, and later by a Canadian pharmaceutical firm Apotex. The trials showed that deferiprone did not adequately control hepatic iron accumulation, and the hepatic iron concentration exceeded the safety threshold for increased risk of cardiac disease and early death. More extended studies suggested that the drug might accelerate the development of hepatic fibrosis.

Dr. Nancy Oliveri

- Dr. Olivieri communicated her findings to the company but the company threatened to take legal action against her if she revealed her findings to her patients and the scientific community citing a non-disclosure agreement under the terms of which she was not allowed to disclose the findings of her research to any third party for 3 years. Within a few years two lawsuits totaling \$20 million were formally lodged against her. Apotex dismissed her from the steering group of the trials, stopped all clinical trials involving Olivieri and tried to stop her from publishing her results. She was dismissed from her position at the hospital, removed as director of the Toronto haemoglobinopathies program, charged with "research misconduct" and referred to the College of Physicians and Surgeons of Ontario, which later exonerated her of all charges. Dr Olivieri did eventually get her findings published in scientific journals despite being under severe pressure from the company.

Dr. Nancy Oliveri

- Professor Joycelyn Downie, the Director of the Health Law Institute at Dalhousie University, has revealed there was more. The independent inquiry she conducted with two other academics was highly critical of Toronto University for not supporting its researcher. It noted the University and the drug company Apotex, were negotiating a donation of \$30-million to build a biomedical research centre. The actual figure at stake was \$96-million when matching government grants were added in. Professor Downie says that overshadowed almost every action and decision taken about Dr. Oliveri.
 - www.abc.net.au/rn/talks/8.30/helthrpt/stories/s971469.htm

Grey areas

- You have received a research grant from SuperMouse corporation to test their new mouse design
- The company plans to fund you for several other research projects in the future
- Early results show that the mouse is ineffective



Openness in reporting and sharing

- “in the latter half of the seventeenth century, many scientists sought to keep their work secret so that others could not claim it as their own.”
 - *On being a scientist*
- Should scientists share ideas?
- Should scientists make data available?
- What venue should a scientist use to publicize results?
- Patent or publish?

Authorship and credit

- In papers, three types of credit:
 - Authorship, Acknowledgments, Citation
- How do you decide who gets authorship?
 - Often better to be generous
- How do you decide what order?
 - Talk about it early!
 - Note that the best spot depends on the venue
 - One approach: a research contribution involves three thirds: the ideas, the research work, and the paper
 - Rank people in order of their contribution to the project

Authorship and credit

- “Credit where credit is due” case study
 - What should Ben have done?
- Pulsars case study

Error and negligence

- What if you make an error?
 - For example, you publish two papers showing that frequency-based caching is best for web servers
 - Now you realize that your analysis was flawed
- What is the line between negligence and error?
 - “By introducing preventable errors into science, sloppy or negligent research can do great damage-even if the error is eventually uncovered and corrected. Though science is built on the idea of peer validation and acceptance, actual replication is selective. It is not practical (or necessary) to reconstruct all the observations and theoretical constructs that go into an investigation. Researchers have to trust that previous investigators performed the work as reported.”
 - *On being a scientist*

Error and negligence

- What if you just stop believing in the idea?
 - Fisheye views
 - Frequency-based read wear
- This is not the same as either error or negligence
 - ...as long as you did the earlier studies with integrity

Misconduct

- Fabrication of results
 - Dr. Chandra
- Altering data
 - “adjusting the facts to fit the theory”
- Plagiarism
 - insufficient citation in a paper
 - outright copying from someone else’s paper
 - self-plagiarism?
 - misrepresentation on the CV
 - “Fabrication in a grant application” case study

Good luck

- “So I have just one wish for you -- the good luck to be somewhere where you are free to maintain the kind of integrity I have described, and where you do not feel forced by a need to maintain your position in the organization, or financial support, or so on, to lose your integrity. May you have that freedom.”
 - Richard Feynman, *Cargo Cult Science*