BN4101 Research Methodology and Ethics

Ethical Conduct in Research

Ethics in research

WHAT ARE THE ETHICAL ISSUES?

HOW DO YOU DEFINE ETHICS IN GENERAL?

Misconduct (scientific, scholarly, student)

- Fraud (faking and inventing data)
- Plagiarism (copying and taking something without revealing source)
- Stealing credit

What do you think are possible reasons for this?

Reason for scientific misconduct

- Lack of knowledge how to conduct research
- Lack of respect (also towards oneself)
- Medical condition
- Pressure to produce data (funding, supervisor)
- Desire to please the supervisor (afraid to say no)
- Panic, worries
- Career considerations (ambition, jealousy, competition)
- Recognition or lack there of
- Cultural background that prefers politeness to honesty
- Face saving strategies (intralab, interlab)
- **IMPATIENCE**

NUS Code & Procedures on Research Integrity

(a) emphasizing quality of research;

(b) carrying out open publication and discussion, where applicable;

(c) supervising research appropriately;

(d) maintaining accurate and detailed research records of procedures and results, sufficient to allow others to repeat the work.

(e) assigning appropriate credit and responsibility for research and publications;

(f) complying with all applicable laws, rules and codes of conduct

NUS Code & Procedures on Research Integrity

Dishonesty in reporting results: includes fabrication of data, improper adjustment of results, gross negligence in collecting or analysing data, and selective reporting or omission of conflicting data for deceptive purposes, or otherwise tampering with the research record. Failure to disclose conflicts of interest is also a breach of this Code. The "research record" is the record of data or results and includes, but is not limited to, research proposals, laboratory records (both physical and electronic), progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

NUS Code & Procedures on Research Integrity

Deliberately misrepresenting research : includes misrepresenting the progress of research, falsely claiming priority by willfully ignoring prior relevant reports in the research literature, knowingly publishing material that will mislead readers, e.g. misrepresenting data, adding names of other authors without permission, excluding a major collaborator as co-author without his/her agreement, or including authors who did not contribute significantly to the research.

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Plagiarism : includes taking credit for someone else's work and ideas, using others' results or methods without attribution, deliberately omitting acknowledgement of significant assistance received from others, copying the writing of others without proper acknowledgement, and otherwise falsely taking credit for the work or ideas of others, or appropriating their intellectual property.

Plagiarism on thesis level

• cut and paste: “forget to cite origin”

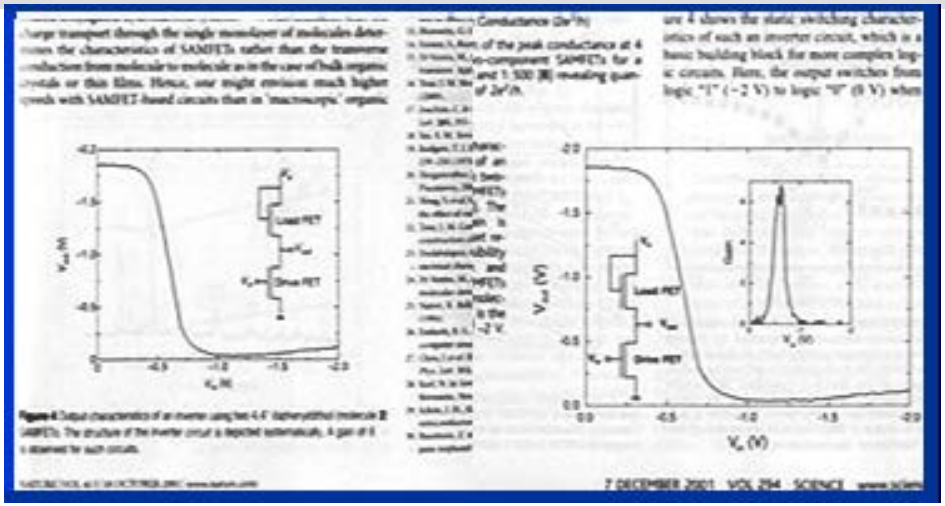
• negligence and lazyness: important publication not cited

(Example “ because NUS library had not subscription to the journal/did no have the book”

• selective citing: data that do not fit your results are not cited to avoid discussion

Always try to uses own wording: If you really cut and paste, put in the reference and put the in the case of verbal citation the cited text in parentheses

The case of Hendrik Schoen



Schön's field of research was condensed matter physics and nanotechnology. (Ph.D. the University of Konstanz in 1997. In late 1997 he was hired by Bell Labs.

In 2001 he had *one research paper every eight days on average*.

In this year he announced in *Nature* that he had produced a transistor on the molecular scale. Schön claimed to have used a thin layer of organic dye molecules to assemble an electric circuit that, when acted on by an electric current, behaved as a transistor. The implications of his work were significant. It would have been the beginning of a move away from silicon-based electronics and towards organic electronics. In other words – a revolution.

Other paper- same graph

IX. Data Substitution: Magnetotransport

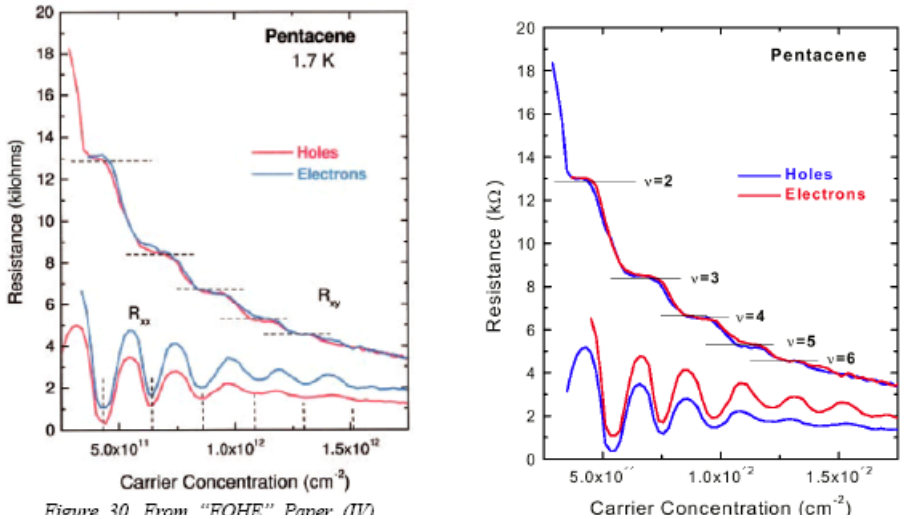


Figure 30. From "EQHE" Paper (IV)

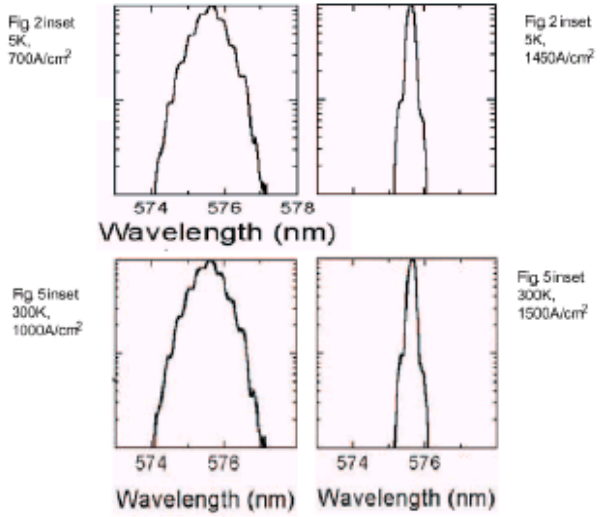


Figure 22. Emission spectrum at temperature of 5K (top) and 300K (bottom) for two injection current levels, from "Laser" Paper (XIV), Figs. 2 and 5.

VIII. Data Substitution: Superconducting T_c versus charge

Allegation

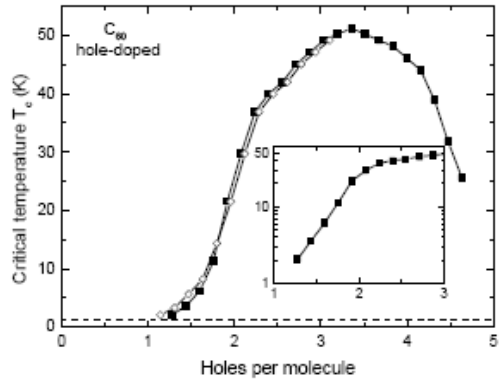
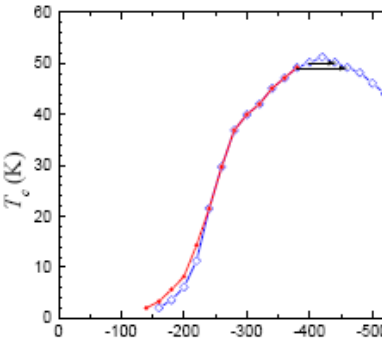


Figure 26. Fig. 2 of "Super C60" Paper (XIX)



V_G (curve 2), $2V_G$ (curve 1)

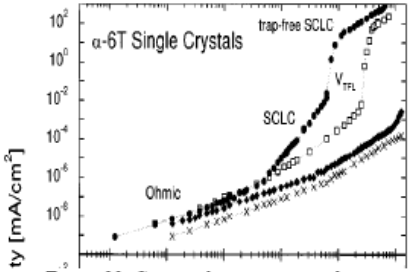


Figure 20. Current density versus voltage illustrating space-charge-limited current, from "Rodlike" Paper (I), Fig. 2.

Very similar current-voltage ("I-V") data

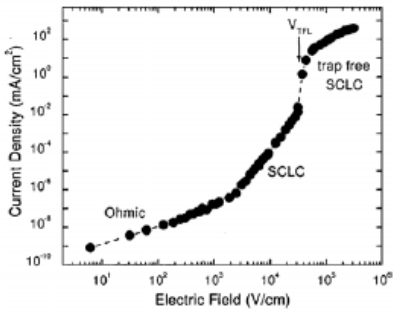


Figure 21. I-V characteristic for space-charge-limited current, from "HolePentacene" Paper (IX), Fig. 2.

The case of Hendrik Schoen

6) No laboratory records (e.g., signed notebook, dated sheets of paper, or data/sample logs) were systematically maintained by Hendrik Schön in the course of the work in question, either with respect to samples, processing, characterization or measurement.

Hendrik Schön maintains that his record keeping practices were not unique for his Department within Bell Labs.

7) All primary electronic data files were deleted by Hendrik Schön. Current records, provided in response to the Committee's request for supporting information on six papers, comprise only secondary, processed data kept in numerous computer files and on loose sheets of paper – and these not systematically so.

Hendrik Schön claims that he had insufficient storage capacity on the old computer available to him and therefore deleted these files, although he acknowledges that other back-up storage options were available. Bertram Batlogg asserts that had this problem been brought to the attention of the management of Bell Labs, they would surely have provided a better computer.

Excerpted from the Report of the Investigation Committee on the possibility of Scientific Misconduct in the work of Hendrik Schon and Coauthors. Bell Labs (September 2002).

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Breach of trust: includes taking or releasing ideas or data which were shared with the legitimate expectation of confidentiality, e.g. use of confidential results without permission from a previous employer, and using ideas from others' grant proposals, award applications, reports, manuscripts or presentations

Once an idea is out, it cannot be put back into the bottle

Do you know Rosalind Franklin ?

…In March of 1953 she presented a research report that included the following key results based on her experimental evidence: that DNA contained two polymeric strands arranged in a coaxial helical structure with a type of symmetry described as "C_2," and that the phosphates were on the outside of the helix.

….[Watson and Crick] did not actually perform experiments, but based their theorizing on bits of information published in the literature, as well as on Dr. Franklin's results, which they obtained, without her knowledge, from an unpublished report she had written for her research director. ….

By guessing the correct position and structural pairing of the nucleotide bases, they were able to construct a model that was consistent with the known facts and that could account for the biological role of DNA. This was the structure that Watson and Crick published in their famous 1953 paper, which resulted in their receiving worldwide recognition as the discoverers of the DNA structure, and ultimately led to the Nobel prize. No mention of Franklin's key contribution appears in their paper.

Excerpt from case study 4 www.wmich.edu/ethics/EXC/cs4.html

Violation of ethical standards

Declaration of Helsinki, "In medical research on human subjects, considerations related to the well-being of the human subject should take precedence over the interests of science and society." In contrast, basic (bench) researchers were traditionally trained to get the most accurate data out of their "biological materials" no-matter-what.

"when obtaining informed consent for a research project, a physician should be particularly cautious if the subject is in a dependent relationship with the physician or may be under duress."

The **Declaration of Helsinki**, was developed by the World Medical Association, as a set of ethical principles for the medical community regarding human experimentation. It has undergone five revisions, the next is due in October 2008 in Seoul.

NUS Code & Procedures on Research Integrity

Violation of regulations and failure to comply with applicable ethical codes: failure to obtain approvals required for work governed by regulations or legislation, e.g. approvals required from the NUS Institutional Review Board ("IRB") and under other bioethics requirements, the NUS Institutional Animal Care and Use Committee ("IACUC") or the Office of Safety, Health & Environment ("OSHE"), failure to observe the conditions set by any relevant authority, failure to disclose significant conflicts of interest, or other failure to comply with the applicable ethical codes.

NUS Code & Procedures on Research Integrity

Misuse of human research subjects, human tissue or other human materials: includes failure to protect the health, safety, privacy or confidentiality of research subjects or material donors, or other failures to follow the requirements of the IRB.

Failure to report observed instances of Research Misconduct: includes covering up or otherwise failing to report breaches of this Code by others.

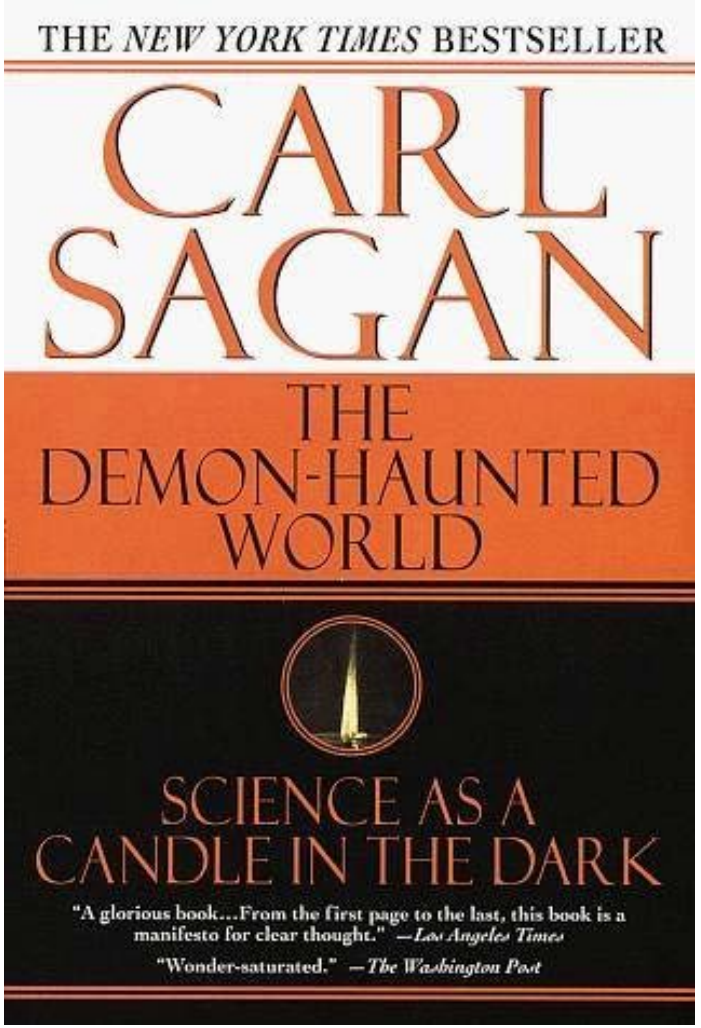
THE BALONEY DETECTION KIT

The demon-haunted world by Carl Sagan

…is intended to explain the scientific method to laypersons, and to encourage people to learn critical or skeptical thinking.

It explains methods to help distinguish between ideas that are considered valid science, and ideas that can be considered pseudoscience.

➔ *when new ideas are offered, they should be tested by means of skeptical thinking, and should stand up to rigorous questioning.*



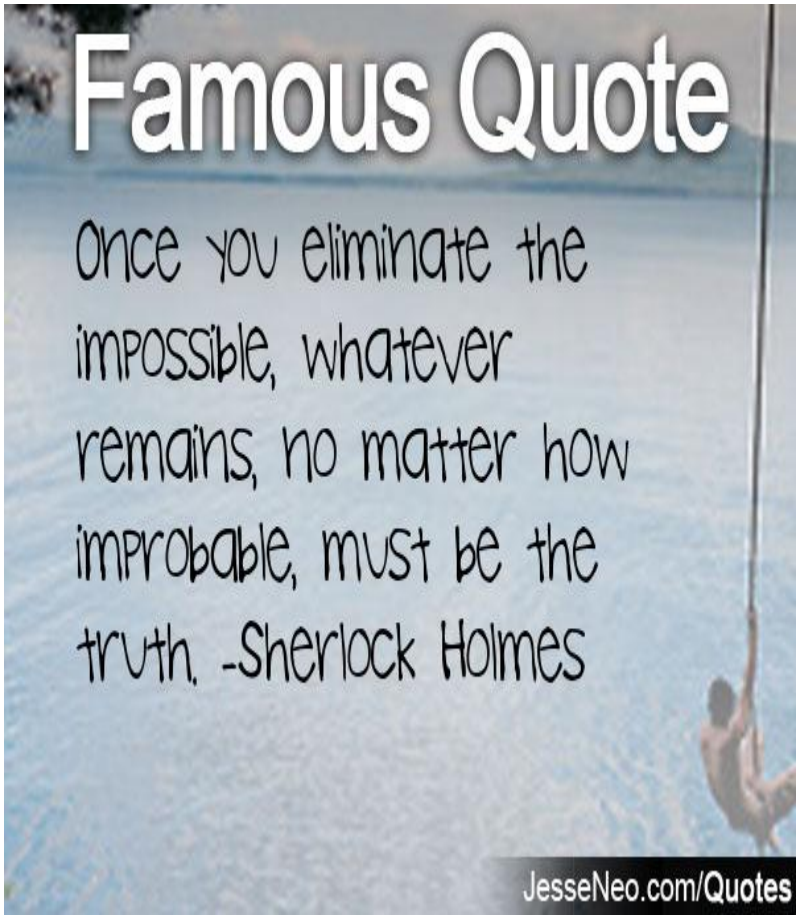
The baloney detection kit

- Independent confirmation of the facts
- Encourage substantive debate on evidence by knowledge-able proponents of all points of view
- Arguments from experts
- Spin more than one hypothesis

The baloney detection kit

- Do not get overly attached to a hypothesis
- Quantify (seek numerical quantity)
- In a chain of argument, every link must work
- Conduct control experiments
- Check for confounding factors - separate the variables
- Always ask whether a hypothesis can be falsified

(Example: *All swans are white. If only one black swan can be found, this hypothesis is falsified.)*


Famous Quote
Once you eliminate the impossible, whatever remains, no matter how improbable, must be the truth. -Sherlock Holmes
JesseNeo.com/Quotes

Common misconceptions of logic and rhetoric

- *A*ttacking the arguer and not the argument
- Argument from "authority“
- Argument from adverse consequences

  (Putting pressure on the decision maker by pointing out dire consequences of an "unfavorable" decision)
- Appeal to ignorance: Absence of evidence is not evidence of absence

  We did not see this and that means that (you just didn’t look!)

The baloney detection kit

- Begging the question (assuming an answer)
- Observational selection (counting hits/forgetting the misses)
- Statistics of small numbers (drawing conclusions from inadequate sample sizes)
- Misunderstanding the nature of statistics
- Inconsistency
- Logical
- Confusion of cause & effect – “it happened after so it was caused by“

  (the street was wet so it has rained / this herb had important medicinal effects , because it has been used for centuries)

The baloney detection kit

- Meaningless question ("what happens when an irresistible force meets an immovable object?)
- Excluded middle - considering only the two extremes in a range of possibilities
- Short-term Vs. long-term
- Slippery slope - a subset of excluded middle - unwarranted extrapolation of the effects
- Confusion of correlation and causation
- Stereotyping a position to make it easier to attack
- Suppressed evidence or half-truths

You **must** ask the following 10 questions

1. How reliable is the source of the claim?

- a given newspaper or TV channel or advertisement
- a not peer reviewed published book or article
- a published article in a scientific journal (peer reviewed)

Pseudoscientists often appear quite reliable, but when examined closely, the facts and figures they cite are distorted, taken out of context or even fabricated.

2. Does this source often make similar claims?

- “Pseudoscientists have a habit of going well beyond the facts. Flood geologists consistently make outrageous claims that bear no relation to geological science. Example: Noah's flood can account for many of the earth's geologic formations

These 10 Questions and subtexts are from Michael Shermer’s article “Baloney Detection in Scientific American 16 November 2001 , own words are in [ ]

You **must** ask the following 10 questions

3. Have the claims been verified by another source?

Who is checking the claims, and even who is checking the checkers?

4. How does the claim fit with what we know about how the world works?

“An extraordinary claim must be placed into a larger context to see how it fits.

5. Has anyone gone out of the way to disprove the claim, or has only supportive evidence been sought?

“This is the confirmation bias, or the tendency to seek confirmatory evidence and to reject or ignore disconfirmatory evidence. Emphasize is on checking and rechecking, verification and replication, and especially attempts to falsify a claim, are so critical. “

You **must** ask the following 10 questions

6. Does the preponderance of evidence point to the claimant's conclusion or to a different one?

The theory of evolution is proved through a convergence of evidence from a number of independent lines of inquiry. Tens of thousands of evidentiary bits add up to a story of the evolution of life. However, creationists focusing on anomalies or currently unexplained phenomena in the history of life.

7. Is the claimant employing the accepted rules of reason and tools of research, or have these been abandoned in favor of others that lead to the desired conclusion?

Search for Extra-terrestrial Intelligence - do they exist? Have they visited us?
One can not employ questionable research techniques to support his own belief.

You **must** ask the following 10 questions

8. Is the claimant providing an [own (scientific] explanation for the observed phenomena or merely denying the existing explanation?

Criticize your opponent and never affirm what you believe yourself to avoid criticism.

9. If the claimant proffers a new explanation, does it account for as many phenomena as the old explanation did?

Their alternative theory does not explain nearly as much of the data as the original / challenged theory does.

10. Do the claimant's personal beliefs and biases drive the conclusions, or vice versa?

How do those biases and beliefs affect their research in practice?

11. Who does benefit from other people believing the claim?

- Are there commercial interests behind this claims leading to a line of research or claimed results?
- Does this foster the advancement of a field, contribute to knowledge or does this just lead to the filling on someone's purse ?

For this very reason, reputable journals demand from authors to disclose any conflicts of interest.

Classical example: scientists that publish about a pharmacological substance and are shareholders of this company making this drug OR clinicians conducting trials while being consultants or board member of the company making this drug.

Think about it

Are there any good reasons that might *justify* fabricating data?

Who is likely to be harmed by fabricating data?

What responsibilities does a scientist have for checking on the trustworthiness of the work of other scientists?

What should a scientist do if he or she has reason to believe that another scientist has fabricated data?

Why is honesty in scientific research important to the scientific community?

Why is honesty in scientific research important for the public?

Remember, it follows that

Your research project is a serious undertaking (FYP, UROP, PhD, no difference !)

- it is like a professional engagement in industry (punctuality, keeping deadlines, meticulous documentation, responsible usage of resources, utmost commitment)

- integrity of your work is important, dishonesty has professional, national , international and personal consequences

Sources and readings

- conduct of research at NUS: Office of Research
- IRB and IACUC at NUS (websites of ORE, OLS)
- the web and other publications, look up review articles in PubMed

CDTL*Brief*

NUS National University of Singapore

Centre for Development of Teaching and Learning — May 2008, Vol. 11 No. 2

This issue of CDTL Brief *on* ***Plagiarism*** *features some issues and concerns about plagiarism discussed during a CDTL workshop on plagiarism in October 2007.*

Some Problems with Plagiarism