A Framework for Ethical Decisions

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Each physicist is a citizen of the community of science. Each shares responsibility for the welfare of this community.

—Statement by the APS

http://www.aps.org/statements/02.2.html

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Physics was shocked to its core in 2002, the work of Bell Labs *wunderkind* Jan Hendrik Schön was discovered to be completely fraudulent (q.v. https://media-bell-labs-com.s3.amazonaws.com/pages/20170403_1709/misconduct-revew-report-lucent.pdf).

You are now "scientists."

Science requires its practitioners to be:

Honest—do not fabricate, misrepresent, manipulate, or destroy data.

Careful—apply rigorous standards.

Skeptical—don't want to believe so much in some result that you lose your objectivity and critical thinking.

Open—share data, methods, theories, equipment; allow others to see your work; be open to criticism.

Generous—give credit to others; do not plagiarize others' work; help others; share resources .

Socially responsible—anticipate the consequences of research; prevent harm to the public and promote social welfare.

A simple analytical method can help you work through ethical questions

- What are the issues and points of conflict?
- What rules and regulations apply? What are your obligations as a scientist? As a human?
- What questions do you need to ask? Of whom?
- What resources are available to you (including your own values)?
- What are your options?
- Who will be affected by the outcome?
- What are you going to ***do***?

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What are your obligations as a scientist?

- honesty
- diligence
- objectivity
- openness
- collegiality and collaboration
- giving credit
- mentoring younger scientists
- social responsibility

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Every profession has a code of conduct that it expects its practitioners to follow.

The APS has written guidelines for professional conduct (q.v. http://www.aps.org/policy/statements/02_2.cfm) and specific statements on responsibilities of coauthors and collaborators, responsibilities of collaborations to archive and verify research records, responsibilities of authors to properly cite others' work, and responsibilities for the ethical treatment of subordinates.

Other professional societies have similar codes:
American Chemical Society (http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=1095&content_id=CNBP_023290&use_sec=true&sec_url_var=region1&__uuid=31581f15-9ea8-4ee7-a7b9-14f84f9ca6fe)
American Mathematical Society (http://www.ams.org/about-us/governance/policy-statements/sec-ethics)
Association for Computing Machinery (http://www.acm.org/about/code-of-ethics)
Institute for Electrical and Electronic Engineers (http://www.ieee.org/about/corporate/governance/p7-8.html)
Materials Research Society (http://www.mrs.org/publication-ethics/)

Funding agencies also have specific ethical standards, and they investigate and prosecute offenders.

What are the issues and points of conflict?

- data ownership and access
- authorship
- plagiarism, cheating, fabrication, falsification
- data selection or manipulation
- skepticism or objectivity
- conflicts of interest
- collegial interactions
- social responsibility

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A variety of ethical issues and conflicts can arise in science.

We usually think of “conflicts of interest” as being financial, but in science they can also arise in reviewing, hiring and promoting, nominating students and colleagues for awards, and other professional activities.

What rules and regulations apply?

- intellectual property
- industrial espionage
- environmental protection
- use of human subjects or vertebrate animals
- hazardous or radioactive materials
- biohazards
- recombinant DNA or fetal stem cell research
- occupational health and safety
- classified or "controlled" research data
- "deemed export"

What questions do you need to ask? Who has the answers?

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As a scientist, you must keep yourself informed of laws and regulations that govern the conduct of your research. "I didn't know I couldn't/shouldn't do that" is not a viable defense.

Violations—even unintentional—can have profoundly adverse consequences:

1. Criminal penalties, including fines and jail
2. Civil penalties, including fines and awards of damages
3. Dismissal from an academic institution or an employer
4. Debarment from federal funding
5. Censure from professional colleagues

You must also understand funding agency policies and rules.
NSF: "Research Misconduct" (https://www.nsf.gov/oig/_pdf/NSF_OIG_SAR_62.pdf)

Since 2010, every NSF-funded investigator must promise not only to be honest him- or herself, but must specifically state in all grant applications that students and postdocs working on a project will be trained in ethical and responsible conduct of research.

What questions do you need to ask?

- What are the "facts" of the issue?
- What additional facts should I consider? Where could I get those answers?
- Who else will be affected by my decision?
- Who can advise me on the legalities of the situation?
- What is the worst thing that could happen?
- What happens if I do nothing?

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Make sure you are fully informed of all the relevant circumstances before you take action or make a decision. Don't jump to conclusions.

What resources are available to you?

- trusted senior colleagues
- a senior administrator (dept head, dean)
- the institution's ethics office
- the institution's office of research
- the Graduate College
- a lawyer
- Office of the Inspector General at the funding agency
- online ethics resources
- your own values

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You do not have to face ethical issues alone; it is every scientist's obligation to help you if you ask for it. Seek help from people you trust who have more experience than you do.

Who will be affected by the outcome?

- you
- your supervisor
- others involved in the group
- the department
- a journal
- the university
- the funding agency
- the progress of science
- society

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It's not all about you. Think broadly about everybody that will be affected by your conduct.

What are your options?

Think through the logical outcomes and consequences of each of your options

Consider the consequences of doing nothing

For you

For everybody else who has a stake in the outcome

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Think about as many possible outcomes as you can imagine. Analyze the problem the same way you would analyze any other problem. Ask yourself, "What is the worst thing that could happen?"

Write down your options. What are the benefits and consequences of each scenario?

If the option is "do nothing," you should still consider the worst-case scenario of taking no action.

What are you going to DO?

Don't just think about what you're going to *do*—*practice* what you're going to *say*

Out loud

Write the words down

Practice on a friend you trust

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Fellowship application to a federal agency*

Nelson, a first-year physics graduate student at Big U., is applying to the U.S. Department of Energy for a graduate research fellowship. He recently joined Professor Railings’ group and has been assigned a research project in collaboration with a more senior student.

The Railings group is working on a manuscript that reports recent research results in a related project, and as a new member of the lab, Nelson expects that he will be a co-author on the paper. However, the fellowship deadline is June 1. Nelson decides that his CV, which is part of the application, would be stronger if the paper is shown as “submitted” rather than “in preparation.”

Without consulting Professor Railings or other members of the lab, Nelson makes up a title and author list for this future paper and shows it on his CV as submitted to *PRL*.

*adapted from “Fabrication in a Grant Proposal,” *On Being a Scientist: A Guide to Responsible Conduct in Research, 3rd ed.* (National Academies Press, Washington DC, 2009).

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Fellowship application to a federal agency*

After the application has been submitted to DOE, the senior student sees a copy of Nelson’s CV that was left in the copier inadvertently and goes to Professor Railings to ask about the “submitted” manuscript. Professor Railings calls Nelson to account for this fictitious paper.

Nelson admits to fabricating the information about the paper in his fellowship application but excuses his actions by saying that he thought the practice was common in physics.

Professor Railings demands that Nelson withdraw his application to DOE, terminates his appointment in the research group, and initiates his dismissal from the university for academic misconduct.

*adapted from “Fabrication in a Grant Proposal,” *On Being a Scientist: A Guide to Responsible Conduct in Research, 3rd ed.* (National Academies Press, Washington DC, 2009).

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What are the issues?

a) authorship
b) misrepresentation of scientific work
c) fabrication of data
d) conflict of interest
e) not sure

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What rules and regulations apply?

a) representation of credentials

b) federal policies on research misconduct

c) University policies on responsible conduct of research

d) federal laws on fraud

e) not sure

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Did Nelson commit academic misconduct?

a) yes

b) no

c) not sure

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Who does not have a stake in the outcome?

a) Prof. Railings
b) other students in Railings' group
c) Big U.
d) DOE
e) not sure

Hint: It's not all about Nelson

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What is Prof. Railings primary obligation?

a) to insist on honesty from all his lab members

b) to appropriately mentor younger scientists

c) to ensure federal laws are followed

d) to protect the financial resources of the DOE, which funds part of his research

e) not sure

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Do researchers routinely misrepresent or exaggerate the publication status of their papers?

a) yes, if the paper is expected to be published anyway

b) no

c) don’t know

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Should Nelson have had Prof. Railings review his application before submission?

a) yes, the PI should review everything that comes out of the lab

b) no, the fellowship was for Nelson alone, based on his own original work

c) not sure

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Were Prof. Railings' actions appropriate?

a) no—he should have taken the incident as a "teachable moment" and mentored Nelson on ethical authorship practices

b) no—he should have waited to see if Nelson got the fellowship before taking action; if Nelson didn't get the fellowship, nobody was hurt

c) no—he should have made Nelson withdraw the application but not kicked him out of the group

d) no—he should have kicked Nelson out of the group because he couldn't trust him, but he should not have had him dismissed from the university

e) not sure

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Nelson is an international student from a non-Western culture. Does that mitigate his misconduct?

a) yes—Railings should have ensured Nelson understood US policies and regulations on ethical conduct when Nelson joined the group

b) no—Nelson had the responsibility to know US law and professional standards when he accepted employment as a research assistant

c) not sure

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After being dismissed from Big U., Nelson still wants to be a physicist and applies to another grad school

a) does the new grad school have the right to know about Nelson’s fabrication

b) does Nelson have an obligation to disclose why he left Big U. in his application/statement of purpose

c) does Prof. Railings have an obligation to inform the new grad school about Nelson’s misconduct

d) can Nelson submit a new application for the DOE fellowship from the new school

e) not sure

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In your case study, decide:

What are the issues and points of conflict?

Who will be affected by the outcome?

What are the consequences?

What is the worst possible outcome?

What happens if you do nothing?

What are your obligations as a scientist?
as a human?

How does your decision reflect your values?

This above all, to thine own self be true
—Hamlet, Act I, Scene 3

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As you read the problem, think of the issues involved:
data ownership and access
plagiarism
authorship
data selection or manipulation
collegial interactions
skepticism
conflict of interest
social responsibility

Identify the interested parties; who has a stake in the outcome?
the project 's principal investigator (PI)
others involved in the group
the university
the funding agency
the progress of science

Assign the following roles in your teams:

- One person who will summarize your case for the class
- One person who will clearly identify the points of conflict and the interested parties
- One person who will present the worst-case scenario
- One person who will present your advice to subject of your case study
- One person who will ask for questions and moderate the class discussion

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