Scientific Ethics and Professional Integrity

"The community of scientists is bound by a set of values, traditions, and standards that embody honesty, integrity, objectivity, and collegiality. These values are reflected in the particular principles and practices characteristic of specific scientific disciplines."

Panel on Scientific Responsibility and the Conduct of Research. Committee on Science, Engineering, and Public Policy. National Academy of Sciences, National Academy of Engineering, Institute of Medicine. *Responsible Science: Ensuring the Integrity of the Research Process*, Volume 1 (Washington, D.C.: National Academy Press, 1992),

Workshop Goals

- acknowledge and identify ethical challenges we all face
- clarify expectations and standards of conduct
- raise our shared awareness of these issues
- provide a framework for deliberation and action
- identify resources that are available to you

Workshop Structure

- initial survey of our shared experiences
- case studies to prompt discussion
- overview of the professional ethics landscape
- workshop assessment

Please start by answering the initial survey at

http://physics.harvard.edu/ew

Dimensions of Ethics & Integrity

Publications and Authorship

Intellectual Property

Mentoring others vs. self-promotion

Academic Misconduct

Academic Fraud

Plagiarism

Conflict of Interest

Professional Interactions with Others

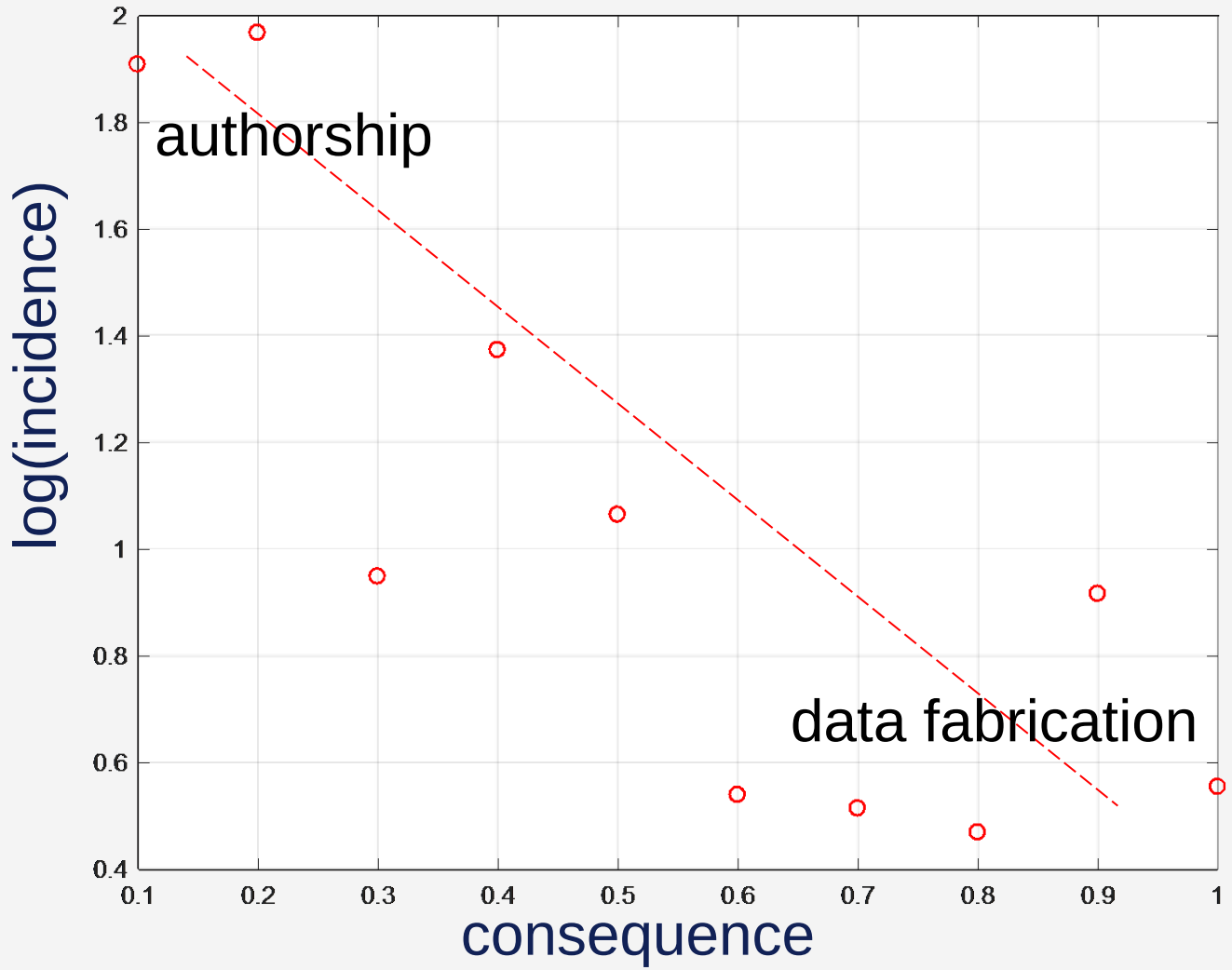
Your Societal Obligations

Figure 1. Distribution of ethics violation categories of which junior members of the American Physical Society reported having personal knowledge. Of the junior members responding to APS ethics survey, 39% cited one or more of these transgressions.

(Kirby & Houle, Physics Today 2004)

Take a look at the Physics Today articles in your handouts.

A conjecture… lower-impact ethical challenges are more common than rare high-consequence ones



https://www.theguardian.com/education/2012/aug/31/harvard-university-cheating-scandal

Harvard University probes plagiarism outbreak involving 125 students

Half the students in Ivy League college's Introduction to Congress class may have copied each other's final exams

The scandal may be the largest cheating ring to have hit an elite Ivy League college in recent memory. Photograph: Mark Peterson/ Corbis

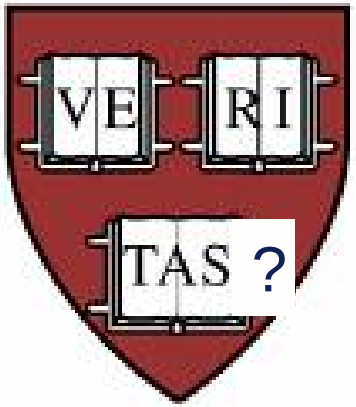
The Harvard Crimson

Embattled Professor Marc Hauser Will Resign from Harvard

Controversial professor came under fire for allegedly faking data

By GAUTAM S. KUMAR and JULIA L. RYAN, CRIMSON STAFF WRITERS July 19, 2011

POLINA BARTIK



Psychology Professor Marc D. Hauser will resign his tenured position at the University, ending a career at Harvard that began with promise but was marred by a research misconduct investigation.

KAREN L. NOBER
EXECUTIVE DIRECTOR

Media Contact

David Giannotti
Communications Division Chief
617-371-9505

For Immediate Release - June 21, 2012

Ethics Commission Imposes $25,000 Civil Penalty on UMass-Boston Physics Professor Gang Sun for Conflict of Interest Law Violations

Hired his wife on numerous occasions to work as his research assistant and teaching assistant

The State Ethics Commission approved a Disposition Agreement ("Agreement") in which University of Massachusetts at Boston ("UMass-Boston") Physics Professor Gang Sun ("Sun") admitted to violating G. L. c. 268A, the conflict of interest law, by hiring his wife on numerous occasions to work as his paid research assistant and paid teaching assistant at UMass-Boston. Pursuant to the Agreement, Sun paid a $25,000 civil penalty.

According to the Agreement, from 2003 to 2011, Sun repeatedly hired his wife, Fen-Yen Chang ("Chang"), to work for him under various UMass-Boston contracts as Sun's research assistant and as his teaching assistant. Chang was paid a total of $455,000 for her work under those contracts. In 11 instances, Sun hired Chang as his research assistant to perform work that was funded by the Air Force Research Laboratory at Hanscom Air Force Base. In 3 instances, Sun hired Chang as his teaching assistant to perform work that was directly funded by UMass-Boston. Sun served as the sole supervisor of his wife's work. When Sun was hired by UMass-Boston in 1993, he signed a contract in which he agreed to comply with UMass-Boston's Academic

THE DAILY ILLINI

The independent student newspaper at the University of Illinois

UI professors found in violation of Ethics Act

BY MAGGIE SULLIVAN

SEPTEMBER 27, 2015

Filed under News

Nearly two years after physics professor George Gollin's unsuccessful campaign for democratic congressional candidate, three University professors became the subject of an ethics investigation by the Illinois Executive Commission.

Leon Dash, journalism professor, Nancy Blake, literature professor and Laura Greene, physics professor, were found in violation of the Ethics Act which led to the investigation.

"Any violation of the Ethics Act's prohibition on use of State property or time for political purposes is serious enough to warrant inquiry," said Daniel Hurtado, chief of staff and general counsel of the office of executive inspector general.

Dash said he was considered to be in violation of the act because of a one-sentence email reply to Gollin, sent to his University account, in which Gollin asked Dash to introduce him as a candidate at a local Democratic Party meeting.

In a public statement to the Office of the Executive Inspector General, Laura Greene said she did not intentionally violate the act, and therefore, the law does not apply to her situation.

"It is abundantly clear that an unintentional and inadvertent use of a State email account for a political purpose is not a misappropriation of State property." Greene stated.

Additionally, she said she felt the findings ignored both the facts and the law.

"I have been a long-time zealous advocate for the University of Illinois, as well as a tireless and ethical professor of physics," Greene said. "A couple of email exchanges that inadvertently took place on my University email account and that were not even initiated by me simply do not justify the conclusions in the report."

Dash said he met with two investigators from the Springfield Ethic Commission office in May 2014.

"One of the investigators had called me to set a meeting date and indicated I was the subject of an ethics violation, but think as I might, I could not recall any ethics violation," Dash said. "When the two investigators met with me, they showed me my one-sentence reply to Professor Gollin."

Dash said he told the ethics investigators the error was an "inadvertent mistake" and he said he felt they were doing their job.

Hurtado said Dash, Greene and Blake could have avoided the ethics inquiry by paying closer attention to the Ethics Act, or consulting with their ethics officer.

Higher Proportion of Misconduct Findings at Junior Levels…

Misconduct Findings by Academic Rank of Respondents: 1994–2003

Academic Rank	*Respondents*		*Misconduct*		*Percent*
	N	%	N	%	*Misconduct*
Professor	40	15	6	5	15
Associate Professor	55	20	24	18	44
Assistant Professor	30	11	13	10	43
Postdocs	44	16	27	20	61
Research Associates/Assistants	22	8	17	13	77
Student	22	8	14	10	64
Technician	47	17	31	23	66
None/Unknown	14	5	1	1	7
TOTAL	274	100	133	100	49

https://ori.hhs.gov/images/ddblock/vol13_no1.pdf

Observations thus far…

- Many physicists are confronted with (diverse) ethical issues.
- There are recent examples of unethical actions, at Harvard.
- There are numerous examples of ethical breaches in our field.
- The majority of these are avoidable.

So….why do ethics violations happen?

Decision-making and Environment

Stress

Communication

Resources

Structure of lab

Management style

Ignorance

Intellectual Integrity- the Foundation of Science

"Each physicist is a citizen of the community of science. Each shares responsibility for the welfare of this community. Science is best advanced when there is mutual trust, based upon honest behavior, throughout the community. Acts of deception, or any other acts that deliberately compromise the advancement of science, are unacceptable. Honesty must be regarded as the cornerstone of ethics in science. Professional integrity in the formulation, conduct, and reporting of physics activities reflects not only on the reputations of individual physicists and their organizations, but also on the image and credibility of the physics profession as perceived by scientific colleagues, government and the public. It is important that the tradition of ethical behavior be carefully maintained and transmitted with enthusiasm to future generations."

(APS Guidelines for Professional Conduct)

Please read our first case study-

Amanda and the code breakthrough

and write down answers to the questions that pertain to this case

One possible structured approach

1. *Identify clearly the moral and ethical tensions in the situation*
2. *Identify the stakeholders and consider the situation from each of their perspectives and interests.*
3. *Identify clearly the obligations, rights, and responsibilities of those involved.*
4. *Consider the courses of action in the context of your ethical compass, your obligations, and the above considerations.*

Numerous resources to help you navigate these issues

- Family and friends
- Co-workers and colleagues
- Experienced faculty here, from outside your subfield
- Mentors and advisors from prior institutions
- Departmental Staff
- Department Chair

  chair@physics.harvard.edu
- FAS Dean of Science, FAS Dean, GSAS Dean

- Harvard's FAS Research Integrity Officer (RIO)

  https://research.fas.harvard.edu/research-integrity
- University Ombudsman's Office

  https://ombudsman.harvard.edu/
- FAS Office for Postdoctoral Affairs

  http://www.postdoc.harvard.edu

Let’s take a tour across the landscape of scientific ethics & professional integrity

misconduct

data and code disposition, curation, replication, and access

conflicts of interest

authorship issues

plagiarism

refereeing

citations

professional interactions

mentoring

changes in the ethical landscape

Error vs. misconduct

The U.S. NSF defines three types of research misconduct: fabrication, falsification, and plagiarism.

Fabrication is making up results and recording or reporting them.

Falsification is manipulating research materials, equipment, or processes or changing or omitting data or results such that the research is not accurately represented in the research record.

Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

(http://en.wikipedia.org/wiki/Research_misconduct)

Honest mistakes are OK.
Lying and intellectual theft are not.

The New York Times

Scientific Fraud in Physics

Panel Says Bell Labs Scientist Faked Discoveries in Physics

By **KENNETH CHANG** SEPT. 26, 2002

A series of extraordinary advances in physics claimed by scientists at Bell Labs relied on fraudulent data, a committee investigating the matter reported yesterday.

The findings, in effect, dismiss as fiction results from 17 papers that had been promoted as major breakthroughs in physics, including claims last fall that Bell Labs had created molecular-scale transistors.

The committee concluded that data in the disputed research, published between 1998 and 2001, had been improperly manipulated, even fabricated, confirming suspicions raised by outside scientists in May. The committee placed the blame for the deceit on one Bell Labs scientist, Dr. J. Hendrik Schön.

"He committed scientific misconduct," said Dr. Malcolm R. Beasley, a professor of applied physics at Stanford University who headed the committee. "Nobody else did."

Bell Labs immediately fired Dr. Schön, 32, a scientist who a year ago had

Experimental techniques, curation, and provenance of data and code

How do you document your work?

Is your documentation adequate for you to reconstruct your thinking and analysis a decade from now?

How about others- could an expert replicate your analysis using the information you're retaining?

How are you storing your code and data/results, and for how long will you retain them?

How do you decide when to exclude data points?

What justification is there for retaining proprietary access to data sets?

Conflicts of Interest

A potential conflict of interest arises when you, or someone close to you, stands to benefit from your actions. Examples include:

- Preferential procurements
- Biased hiring
- Reviewing papers or proposals in which you have an interest
- Any commercial links, or stock ownership ties
- Providing evaluations in inappropriate situations
- Biases in favor of current or past collaborators
- Biases against current or past competitors (or collaborators!)
- Supervisory relationships that align with personal relationships

Disclosure!

Authorship

Publications are the primary product of our research enterprise.

What level of contribution merits inclusion on the author list?

"Gift authors": inclusion of people who did no work.

"Ghost authors": excluding people who contributed.

What criteria determine the order of authors?

Intellectual creativity and effectiveness is how we keep score.

Publications are the record of this.

I suspect that authorship issues will arise frequently for you.

Work through case study #2-

Farshad and the added author

and write down answers to the questions that pertain to this case

Authorship (APS guidelines)

"Authorship should be limited to those who have made a significant contribution to the concept, design, execution or interpretation of the research study. All those who have made significant contributions should be offered the opportunity to be listed as authors. Other individuals who have contributed to the study should be acknowledged, but not identified as authors.

Collaborations are expected to have a process to archive and verify the research record; to facilitate internal communication and allow all authors to be fully aware of the entire work; and respond to questions concerning the joint work and enable other responsible scientists to share the data. All members of a collaboration should be familiar with, and understand, the process."

Some questions regarding authorship…

- What criteria determine inclusion on the author list?
- In what order should authors be listed?
  - *Alphabetical?*
  - *Hierarchical?*
  - *Two-tiered?*
  - *In order of their contribution?*
- Who decides or arbitrates authorship issues or disputes?
- What about technicians?
- What about undergraduates?
- What about "giving" first authorship to the postdoc who's about to go on the job market?
- What circumstances would prompt you to take your name *off* a paper?
- At what stage in a project is it appropriate to raise authorship issues?
- See handout materials on authorship issues…

Plagiarism

Plagiarists run amok

Recently, Ars was informed that a number of papers with a set of overlapping authors were being withdrawn from the arXiv, a repository of publications and drafts in the physical sciences. We confirmed that several papers were no longer available and that their entries now lead to text that states, "This paper has been removed by arXiv administrators because it plagiarizes... " followed by a list of the sources of the plagiarized material (an example is here).

In at least one case, the final publication had been withdrawn but an earlier draft version was still available. Comparisons of the text (PDF) with the sources it was plagiarized from reveal the blatant nature of the fraud. Section 1 of that paper begins with an extensive copying of the introduction of a 2003 paper (PDF; copying starts with the second sentence of the introduction). Section 3 of the fraudulent work begins with a similarly large excerpt from the introduction of a different publication (PDF) that also dates from 2003. Although the arXiv has acted on the plagiarism, the fraudulent publication currently remains available at the *Journal of High Energy Physics*.

https://arstechnica.com/features/2007/08/plagiarism-and-falsified-data-slip-into-the-scientific-literature/

Refereeing

"Peer review provides advice concerning research proposals, the publication of research results and career advancement of colleagues. It is an essential component of the scientific process. Peer review can serve its intended function only if the members of the scientific community are prepared to provide thorough, fair and objective evaluations based on requisite expertise. Although peer review can be difficult and time-consuming, scientists have an obligation to participate in the process. Privileged information or ideas that are obtained through peer review must be kept confidential and not used for competitive gain. Reviewers should disclose conflicts of interest resulting from direct competitive, collaborative, or other relationships with any of the authors, and avoid cases in which such conflicts preclude an objective evaluation."

(APS Guidelines for Professional Conduct)

Conflicts of Interest and Refereeing- Discussion

You're asked to review a paper written by a team doing a competing project. Tensions are high and there is a history of mistrust.

- How do you handle this situation?
- What obligations do you have, if you elect to proceed?
- Can you (or should you) tell your collaborators about what's in the paper?
- Imagine the competing team's submitted paper (for which you're the referee) is compelling and has outperformed your own team's project. But your advisor is about to buy a tremendously expensive piece of equipment. Do you play ignorant, knowing the money is going to be wasted?

Ethical Interactions

Swiss university dissolves astronomy institute after misconduct allegations

By **Gretchen Vogel** | Oct. 25, 2017 , 6:15 PM

In August, ETH Zurich in Switzerland quietly dissolved its institute for astronomy. Today it launched an official investigation into allegations that led to its closure: that a leading professor there mistreated graduate students for more than a decade, while the administration ignored complaints against her. The professor's spouse had been head of the institute.

The allegations came to light Sunday **in a story in the *NZZ am Sonntag*** newspaper, which did not name the professors involved. The former head of the institute was cosmologist Simon Lilly, and his wife is astrophysicist Marcella Carollo. Both are now on sabbatical.

The university administration today **issued a statement** describing how several students brought complaints to the university ombudsperson early this year, charging that "a female professor" had "demonstrated inept management conduct toward many of her graduate students." The university's executive board took on the case in February. It decided in March that the affected students would be reassigned to a different supervisor and that the professor would be given "close support" if asked to supervise students in the future.

http://www.sciencemag.org/news/2017/10/swiss-university-dissolves-astronomy-institute-after-misconduct-allegations

Citations: Giving credit where credit is due

"Authors have an obligation to their colleagues and the physics community to include a set of references that communicates the precedents, sources, and context of the reported work. Proper referencing gives credit to those whose research has informed or led to the work in question, helps to avoid duplication of effort, and increases the value of a paper by guiding the reader to related materials. It is the responsibility of authors to have surveyed prior work in the area and to include relevant references. Proper and complete referencing is an essential part of any physics research publication. Deliberate omission of a pertinent author or reference is unethical and unacceptable."

(APS Guidelines)

Unintended Consequences, and Social Responsibility.

What responsibility do you bear for the potential application of your ideas in ways that you did not expect?

What responsibility do you have to contribute to solving some of the world's toughest technical challenges: energy, environmental, security…?

How do you feel about working in the defense sector?

To what extent have you reconciled your roles as a scientist, as an educator, and as a citizen of your nation and of the world?

Mentoring vs. Self-Promotion

A graduate student has been working closely with you on a project. You are about to apply for a second postdoc, and the student is applying for her first one, in the same year. You have jointly obtained superb results, and you both want to present a talk at the upcoming high-prestige meeting. Only one talk on this topic will be accepted.

What do you do?

How will you balance your own interests against those of others?

Pause Here for Additional Questions/Comments/Discussion?

Evolving Aspects of Scientific Ethics

Data: public vs. proprietary

See http://blogs.discovermagazine.com/cosmicvariance/2006/06/23/should-the-data-be-public/

Code: open source vs. proprietary

Commercial Interests and Intellectual Property

Open access to publications vs. journal subscriptions

Authorship order on papers

Downloading overheads from conference presentations and writing a paper based on digitizing the graphs

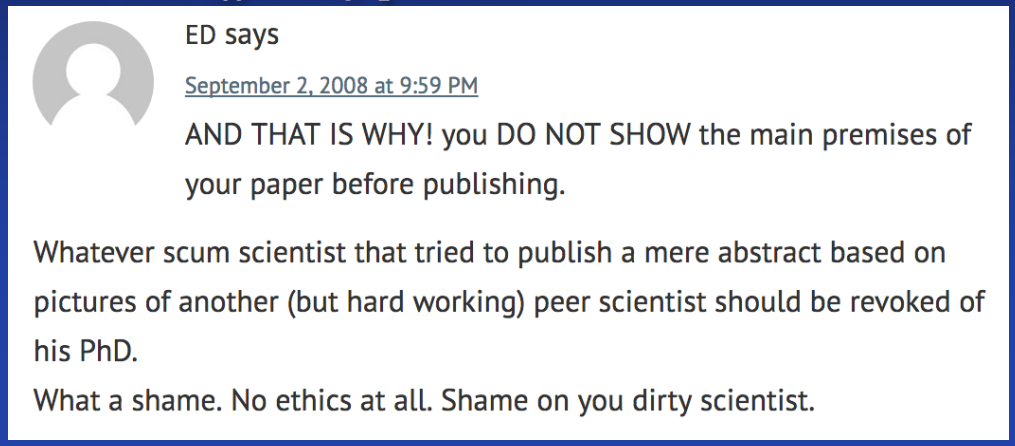
Preprint server culture vs. peer reviewed papers

Numerous topics in life and medical sciences:

- *stem cell research*
- *human subject research protocols*
- *financial relationships to drug companies*

More evolving ethics….

"The preliminary data points for positron and antiproton fluxes plotted in our figures have been extracted from a photo of the slides taken during the talk, and can thereby slightly differ from the data that the PAMELA collaboration will officially publish"
arXiv:0808.3867



ED says

September 2, 2008 at 9:59 PM

AND THAT IS WHY! you DO NOT SHOW the main premises of your paper before publishing.

Whatever scum scientist that tried to publish a mere abstract based on pictures of another (but hard working) peer scientist should be revoked of his PhD.

What a shame. No ethics at all. Shame on you dirty scientist.

https://www.universetoday.com/17568/pushing-the-polite-boundaries-of-science-about-dark-matter/

"Tony Readhead gave a talk at the Jan 2002 AAS meeting, and showed a slide of the CBI measurements of the CMB angular power spectrum. Max Tegmark took a picture of it and inserted the jpeg into the powerpoint for his talk later in the session. When nothing had been posted to the arxiv by late February, I asked Max for a copy of the jpeg and measured the data points off of it. You can do a very good job since you have the plot frame with tick marks, although it is easier to get data from postscript files. I used these points in a few talks I gave, but not any published papers."

Ned Wright post at http://www.andrewjaffe.net/blog/science/000368.html

Reporting Ethical Violations

Project Principal Investigator

Department Chair

University Chief Research Compliance Officer

University Research Integrity Officer

University Deans, Provost, President

Federal Agencies

The press, in a case of total systemic failure or cover-up.

In the US, “Whistleblower” laws protect individuals who disclose violations from repercussion.

The Federal Government Cares

TABLE 7: HHS ADMINISTRATIVE ACTIONS IMPOSED IN CLOSED INVESTIGATIONS WITH MISCONDUCT FINDINGS OR ADMINISTRATIVE ACTIONS, 2007

HHS administrative action	*Duration*	*Number of actions*
Debarment or voluntary exclusion	Lifetime	1
Debarment or voluntary exclusion	5 years	2
Debarment or voluntary exclusion	3 years	4
Prohibition from serving as an advisor for PHS	Lifetime	1
Prohibition from serving as an advisor for PHS	5 years	2
Prohibition from serving as an advisor for PHS	4 years	1
Prohibition from serving as an advisor for PHS	3 years	6
Supervision plan required	4 years	1
Supervision plan required	3 years	2
Certification of work	3 years	1
Retraction and/or correction of articles	–	1

From http://ori.dhhs.gov/documents/annual_reports/ori_annual_report_2007.pdf

THE WATCHDOGS

Should science fraudsters have to serve jail time?

By IVAN ORANSKY @ivanoransky *and* ADAM MARCUS @armarcus / AUGUST 4, 2016

SAUL LOEB/AFP/GETTY IMAGES

We have earned the public's trust- let's keep it

the harris poll

PRESTIGE OF 30 PROFESSIONS AND OCCUPATIONS
Summary Grid

"Below is a list of occupations. For each how, if at all, prestigious do you find the occupation?"

Base: All adults

		MORE PRESTIGE (NET)	Has a great deal of prestige	Has prestige	**LESS PRESTIGE (NET)**	Has not that much prestige	Not at all prestigious
Doctor	%	**90**	51	39	**10**	6	4
Scientist	%	**83**	37	46	**17**	11	6
Firefighter	%	**80**	40	40	**20**	14	6
Military officer	%	**78**	38	40	**22**	15	7
Engineer	%	**76**	22	54	**24**	16	8
Nurse	%	**76**	31	44	**24**	18	6
Architect	%	**72**	20	52	**28**	19	9
Emergency medical technician (EMT)	%	**72**	29	43	**28**	21	7
Veterinarian	%	**71**	24	48	**29**	20	9
Police officer	%	**67**	28	39	**33**	24	10
Teacher	%	**65**	28	37	**35**	25	10
Entrepreneur	%	**65**	19	46	**35**	26	9
Chef	%	**62**	12	50	**38**	29	9
Athlete	%	**62**	23	39	**38**	23	15

http://media.theharrispoll.com/documents/Prestigious+Occupations_Data+Tables.pdf

You have a reputation to maintain… keep it

Improper claims of credit: an example

George Smoot was the leader of the COBE Differential Microwave Radiometer (DMR) experiment, which discovered the fluctuations in the cosmic background radiation. He deserved to share the 2006 Nobel Prize for this discovery. However, he angered his colleagues by

- having LBL issue a press release claiming credit, after signing an agreement that only NASA would issue COBE press releases
- claiming credit in his book with Keay Davidson, *Wrinkles in Time* (1994), for scientific achievements of younger colleagues.

One consequence: George Smoot was excluded from the WMAP team, although he is a collaborator on Planck, to be launched in 2008.

Primack

While ~~I~~ was writing my Physics Today review of Smoot's book, I was asked by an editor to contact Rainier Weiss, the chair of the COBE Science Team. He, Ned Wright, and David Wilkinson told me about Smoot's misdeeds, and I mentioned one such instance in my review (Physics Today, Sept. 1994, pp. 90-91).

Joel Primack colloquium on Ethics & Physics, http://physics.ucsc.edu/~joel/EthicsColloquium.pdf

Some Closing Thoughts and Suggestions…

- You have a responsibility to yourself, to your colleagues, to your institution, and to society at large to act with integrity. Hold yourself to a high standard and set an example.
- Your reputation is an important asset.
- Don’t avoid hard conversations. The sooner you face up to difficult situations, the sooner they’ll be resolved.
- Think about the principles and values that will guide your actions when confronted with an ethically difficult situation, ahead of time.
- When faced with a challenging situation, step back and gain perspective.
- Make sure you clearly understand norms and expectations.
- Lead your life in accord with your core values.
- Reach out to others for help and advice.

Thanks to…

Bonnie Currier

Stephen Kargere

Marina Werbeloff

Cristy McGoff

Please fill out the workshop evaluation survey at

http://physics.harvard.edu/ew

Resources at FAS, in addition to those at the Department level

Research Integrity concerns:

- Research Integrity Officer
- PI and Department Chair
- Chair of the Committee on Professional Conduct (CPC)

Data Management

- IQSS
- Dataverse *https://dataverse.org/*
- Library *https://guides.library.harvard.edu/dmp*
- Data Science Institute

Intellectual Property

- Office of the Vice Provost for Research *https://vpr.harvard.edu/pages/intellectual-property-policy*

Conflict of Interest Management

- FAS Research Administration Services *https://research.fas.harvard.edu/conflicts-of-interest*
- Office of the Vice Provost *https://vpr.harvard.edu/pages/financial-conflict-interest-policy*

Harvard Guide to Using Sources

https://usingsources.fas.harvard.edu/