Research Misconduct

Neal Stewart
nealstewart@utk.edu
All of the above in research work flow must have integrity or the system breaks
Responsible Conduct of Research (RCR)

- “Best practices lead to the best research”
- “Rules of the road”
- RCR training required for anyone funded and doing research on funded grants from the NIH, NSF, USDA (including formula funds)—from faculty to undergrads
- Accountability and risk management
“Less than 1% reported?”
Paul Cousins, Director
NCSU Office of Student Conduct

“Each case can cost $1M”
Matt Ronning, Director
NCSU Sponsored Programs

J Cell Biology (166:11-15; 2004) estimates ~20% of papers contain questionable data.

Sanctionable offenses: research misconduct = FFP

Fabrication -- making up data or results and recording or reporting them.

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

Plagiarism -- appropriating and using as one’s own the documented ideas, processes, results, or words of another without giving appropriate credit.
Plagiarism is claiming others’ ideas, sentences, or phrases as one’s own. It is fraudulent and intentional. Also, double publishing and self-plagiarism = plagiarism.
Separating the professionals from the amateurs

• Understanding, summarizing, and precise writing vs. copy and paste and changing it later (or not).

• Telling your story vs. telling someone else’s story (again).

• Materials and methods made useful vs. copied and pasted (again and again).

Are you writing papers for yourself (e.g., your career) or to help others?
Facts about plagiarism

• Most frequent kind of misconduct in publications
• Self-plagiarism is considered plagiarism
• Detected by iThenticate or other plagiarism-checking software to compare submitted text with published papers
• Many journals and granting agencies screen for plagiarism automatically—may or may not tell authors
Self-plagiarism—why do it?

• Publish or perish
• “If it was good (perfect?!?) once, why change it?”
• Lack of command of language
• “I love copy and paste”
• “It’s my stuff”
• Efficiency
• Lazy
Self-plagiarism network

Original building blocks | Self-plagiarism candidates | End products
---|---|---
(Must be fresh)
Idea | Conference abstract | Peer-reviewed journal articles
Early data | Cloned abstracts | Review papers
Grant proposals | Posters | Conference proceedings
Extensive data | | Book chapters
Intellectual property (patents and trademarks) | Grant proposals | Articles for trade and popular magazines

-INTEGRITY-

Books
Fabrication: from mild to wild

- Fudging and white lies “data not shown”
- Filling in ‘data holes’ with what the researcher believes should have been the case
- Making up results of some experiments that didn’t work
- Making up the whole thing
Retraction Watch Leaderboard
Top 10

1. **Yoshitaka Fujii** (total retractions: 183) Sources: Final report of investigating committee, our reporting
2. **Joachim Boldt** (94) Sources: Editors in chief statement, additional coverage
3. **Diederik Stapel** (58) Source: Our cataloging
4. Adrian Maxim (48) Source: IEEE database
5. **Peter Chen** (43) Source: SAGE
6. Hua Zhong (41) Source: Journal
7. **Shigeaki Kato** (39) Source: Our cataloging
8. **Hendrik Schön** (36) Sources: PubMed and Thomson Scientific
9. **Hyung-In Moon** (35) Source: Our cataloging
10. **Naoki Mori** (32) Source: PubMed, our cataloging

retractionwatch.com
Diederik Stapel, the social psychologist who has now retracted 58 papers, spoke as part of the TEDx Braintrain, which took place on a trip from Maastricht to Amsterdam. Among other things, he says he lost his moral compass, but that it’s back.

Last year from Retraction Watch—it was found that Dr. Stapel was “sockpuppeting” on Retraction Watch—leaving comments under the name “Paul.”
Facts about falsification

• Traditionally easiest of the FFP offenses to get away with
• Technology and data vigilantes are changing that dynamic→ people are getting caught, especially image fraud—data fingerprints for altered images
• Probably the most misunderstood form of research misconduct
... And How the Problems Eluded Peer Reviewers and Editors

6 JANUARY 2006 VOL 311 SCIENCE www.sciencemag.org
Rules for changing images

• Do not combine images unless it is clear that they were combined
• Manipulations should be done to entire image
• Ideally, alterations should be disclosed and described
• There should never be the intent to deceive.
• Beware of “over-beautification”…
Case of falsification (with a little fabrication on the side)

GM–crop papers spark probe

Work describing harm from genetically modified crops was cited in Italian Senate hearing.

BY ALISON ABBOTT

Papers that describe harmful effects to animals fed on genetically modified (GM) crops are under scrutiny for alleged data manipulation. The leaked findings of an ongoing investigation at the University of Naples in Italy suggest that images in the papers may have been intentionally altered.

The leader of the lab that carried out the work says that there is no substance to this claim.

The papers’ findings run counter to those of numerous safety tests carried out by food and drug agencies around the world, which indicate that there are no dangers associated with eating GM food. But the work has been widely cited on anti-GM websites — and results of the experiments that the papers describe were referenced in an Italian Senate hearing last July on whether the country should allow cultivation of safety-approved GM crops.

“The case is very important also because these papers have been used politically in the debate on GM crops,” says Italian senator Elena Cattaneo, a neuroscientist at the University of Milan whose concerns about the work triggered the investigation.

Fate of transgenic DNA and evaluation of metabolic effects in goats fed genetically modified soybean and in their offsprings


Food and Nutrition Sciences, 2013, 4, 50-54
http://dx.doi.org/10.4236/fns.2013.46A006 Published Online June 2013 (http://www.scirp.org/journal/fns)

Other Genetically Modified Soybean in a Goat Diet: Influence on Kid Performance


Genetically modified soybean in a goat diet: Influence on kid performance

Vincenzo Mastellone, Raffaella Tudisco', Giovanni Monastra, Maria Elena Pero, Serena Calabrò, Pietro Lombardi, Micaela Grossi, Monica Isabella Cutrignelli, Luigi Avallone, Federico Infascelli

Gamma-Glutamyl Transferase Activity in Kids Born from Goats Fed Genetically Modified Soybean

Small Ruminant Research
Figure 4. Representative data of amplified transgenic DNA fragments. (d) fragments of CP4 EPSPS gene (145 bp) in liver, kidney, spleen, heart, skeletal muscle and blood from control (lines 1 to 6, respectively) and treated (lines 7 to 12, respectively) kids. In each panel, lane M contains a 100-bp DNA ladder, ‘2’ is a negative control (no DNA template), and ‘1’ is a positive control (DNA extracted from Roundup Ready soybean meal).

Figure 1. Representative data of amplified transgenic DNA fragments. (b) fragments of CP4 EPSPS gene (145 bp) in milk and blood from control (lines 1 and 2, respectively) and treated (lines 6 and 7, respectively) goats; in blood, kidney and liver of control (lines 3, 4, 5, respectively) and treated (lines 8, 9, 10, respectively) kids.

Diagnostic blemishes that indicate these are the same gel.

*Brightness of the published images was enhanced for clarity*

https://www.slideshare.net/secret/L8m5Whh4IrvmXZ
Figure 1. Representative electrophoresis gels of amplified DNA in mil\[k\] and blood from control (lines 1 and 3) and treated (lines 2 and 4) goats; (right) liver, kidney, skeletal muscle, spleen, heart and blood from control (lines 1 to 6, respectively) and treated (lines 7 to 12, respectively) kids. In each panel, lane M contains a 100 bp DNA ladder; ‘2’ is a negative control (no DNA template).

Increasing the brightness (top) and inverting the colors (bottom) reveal image manipulation.

https://www.slideshare.net/secret/L8m5Whh4IrvmXZ
Figure 1. Representative data of amplified transgenic DNA fragments. (a) 35S promoter fragments (195 bp) in milk and blood from control (lines 6 and 7, respectively) and treated (lines 1 and 2, respectively) goats; in blood, kidney and liver from control (lines 8, 9, 10, respectively) and treated (lines 3, 4, 5, respectively) kids.

https://www.slideshare.net/secret/L8m5Whh4IrvmXZ
Another case of potential falsification/fabrication?
Other ‘misconduct’

- Harassment or abuse of students or employees
- Inappropriate accounting or using funds inappropriately
- Mentorship failures
- Conflicts of interest/bias (falsification)
- Authorship issues—e.g., ghost authorship, guest authorship
- Institutional affiliation (falsification)
- “Selective” data reporting
- Misappropriating statistics/analysis (falsification)
- Performing a peer review your own paper under an alias
- Purchasing or coercing authorship
Consequences of misconduct or suspected misconduct

- Journal will reject your manuscript
- Journal will ask for original data for their informal investigation
- Journal will contact your institution
- Institution will investigate allegations
- Journal will retract your paper
- You will be “famous” = infamous
- In some cases, PhD degrees (and others) can be retracted: Jan Hendrick Schon
Haruko Obokata, born 1983
PhD, 2011: Waseda University—with stint at Harvard prior to her PhD
Postdoc, 2011-2013; then PI, 2013-2014: RIKEN Center for
Developmental Biology
Principle author on 2 Nature papers in 2014 on using stress to convert
‘normal’ cells to stem cells—papers were retracted later that year. She
resigned from Riken December 2014.
Extreme consequences

Yoshiki Sasai (1962-2014)
1. The case of the ‘data burglary’

- Judy Mikovits: chronic fatigue syndrome researcher and former Director of the Whittemore Peterson Institute
- Fired in September 29 2011
- Arrested in November 2011 after she ‘stole’ 18 lab notebooks ➔ jailed
- The Ventura County, California Sheriff’s Department web site lists Mikovits under booking number 1259336, charged with a felony violation of California Penal Code section 1551.1, “Fugitive From Justice.”
- Charges were dropped after she returned the notebooks to WPI

Mentorship
What I think I look like as a mentor
What it feels like to my students and postdocs

"It's hard to get good people, and even harder to keep them."
Steps for success

• Foster independence and curiosity
• Read-write-read-write is better than webchats, computer games, facebook, youtube
• Grants keep jobs
• Publish every year
• Take risks
• Don’t get discouraged by failure

HAVE A GREAT 2012!
I am, as I’ve said, merely competent. But in the age of incompetence, that makes me extraordinary.”

-- Billy Joel
If you don’t have the data “just make it up”

\[ \text{[Pt}_2\text{(II)}((\text{M}_S\text{,}_S\text{-p-tolyl-binaso})_2(\mu-\text{Cl}))_2][\text{BF}_4]_2 (14): A vial was charged with 100mg (0.126 mmol) 5a and 24mg (0.126 mmol) AgBF}_4. 2ml CH}_2\text{Cl}_2 was added, the vial was covered and the reaction was left stirring in the dark for 2 hours. After this time, the reaction was filtered over celite to remove AgCl. Solvent was then removed to leave a yellow residue in the vial, the remaining clear, yellow solution was concentrated to a volume of about 1ml, and diethyl ether was added in a dropwise manner to the stirred solution to precipitate a yellow solid. The vial was centrifuged so the supernatant solvent could be decanted off by Pasteur pipette. The yellow solid was washed twice more with ether and the dried completely under high vacuum to give 99mg (93% yield) of product.} \]

Emma, please insert NMR data here! where are they? and for this compound, just make up an elemental analysis...

http://cen.acs.org/articles/91/web/2013/08/Insert-Data-Make-First.html
Key concept in mentoring: power differential—the mentor holds the drill and is the glass
THE PLANS:

THE PLAN YOU TELL YOUR ADVISOR:

“I’M GOING TO BE A PROFESSOR AT A MAJOR RESEARCH UNIVERSITY AFTER I GRADUATE.”

THE REAL PLAN:

LOOK FOR CAREER ALTERNATIVES.

THE SECRET PLAN:

BECOME A BAKER/ROCKSTAR/WRITER.
HOW YOU SEE YOURSELF:

- Complex human being
- Hopes
- Dreams
- Aspirations

HOW MOST PROFESSORS SEE YOU:

- Brain
  - So, how's research?
- Stick
**Grad School Utility Chart**

**Where are you?**

<table>
<thead>
<tr>
<th>A LOT</th>
<th>A LITTLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NUMBER OF PAPERS YOU'VE PUBLISHED</strong></td>
<td><strong>A LOT</strong></td>
</tr>
<tr>
<td><strong>How interested your professor is in your project</strong></td>
<td><strong>A LITTLE</strong></td>
</tr>
</tbody>
</table>

- **The Neglected Middle Child**
  - You're productive in a field your advisor doesn't care about anymore. You can graduate whenever you want. Or not. Whatever.

- **Superstar!**
  - Your advisor loves you. Everyone else hates you.

- **Grad School Fodder**
  - Enjoy the free food while you can.

- **Grad School is Hell**
  - You're pretty sure your professor complains about you behind your back.

Source: PHDCOMICS.COM
University of Wisconsin whistleblower case
Case of the questionable grant proposal

• Dr. K reviews a paper and recommends rejection, but sees how an idea in the paper could help his own research.
• Asks his postdoc (PD) to write an NSF proposal and using the “borrowed” idea to fund PD.
• PD thinks the idea is “stolen” and refuses and is fired and Dr. K refuses to write reference.
• Dr. K then writes the proposal and is funded.
• What is ethical/unethical in this situation?

Case of the missing mentor

- 1st yr PhD student Mitch in Dr. D’s lab.
- Mentor meetings are unproductive—Mitch feels lost—not learning quickly.
- Dr. D is a very slow responder to emails, is out of touch and often sick or traveling.
- Dr. D spent little time helping correct/guide Mitch’s proposal and committee is critical
- What should Mitch do?

Collaboration, authorship and publications, peer review, and conflict of interest

http://thekitchensink.letseat.at/
Collaborations

• Compatibility
• Competitiveness
• Same vs different departments/institutions
• Follow the money
• Accountability
• Trust
Authorship

Who should be named as an author on a scientific paper and how should it be decided?
Who is an author? Three schools of thought

• School 1: people who made “substantial contributions” to a study
• School 2: people who meet ICMJE criteria
• School 3: whoever the boss feels deserves it at the moment
ICMJE: International Committee of Medical Journal Editors (icmje.org) criteria: an author meets each of three requirements

1. Substantial contributions
   - Conception/design of the research or
   - Collection of data or
   - Data analysis/interpretation AND

2. Writing the paper or making intellectual contributions on text AND

3. Final approval of the manuscript AND

4. Agreeing to be held accountable
Why does authorship matter?

• Credit where credit is due and morale
  – Mistake 1. Including someone as an author who should not be (the person should be listed in acknowledgements)
  – Mistake 2. Excluding an author who should have been on the author list

• Authors bear some level of responsibility for the work, e.g., if misconduct arises or even through honest error and the paper is retracted
Current issues in journals and authorship

- Bibliometrics: Impact Factor, H-index, etc.
- Predatory publishers and journals: Beall’s list
- Non-indexed journals by SCI et al.
- Honorary authorship—guest or gift authorship is defined as research misconduct at Washington University
- Authorship order
- More and more journals require an authorship contribution statement that describes the roles of each author—think of ICMJE criteria
From a real submission

Author contribution statement:

Wang made the most contribution to this paper, Zheng was inferior, and the others were further inferior.
From a real re-submission:

Author contribution statement:

Wang made the main contribution to this paper: he performed experiments for figures 2, 4, 5 and 6 in this paper; gave original opinions to this paper, drafted out its sketchmap, and wrote it in Chinese. Y Zheng was inferior: he translated this paper into English and also supplied the latest views and references for it. The others were further inferior: Gu gave some valuable suggestions to this paper; Li and Wang provided some supplement materials, such as figures 1 and 3.
Author order

THE AUTHOR LIST: GIVING CREDIT WHERE CREDIT IS DUE

The first author
Senior grad student on the project. Made the figures.

The third author
First year student who actually did the experiments, performed the analysis and wrote the whole paper. Thinks being third author is “fair”.

The second-to-last author
Ambitious assistant professor or post-doc who instigated the paper.


The second author
Grad student in the lab that has nothing to do with this project, but was included because he/she hung around the group meetings (usually for the food).

The middle authors
Author names nobody really reads. Reserved for undergrads and technical staff.

The last author
The head honcho. Hasn’t even read the paper but, hey, he got the funding, and his famous name will get the paper accepted.

www.phdcomics.com  Piled Higher and Deeper by Jorge Cham
ADDRESSING REVIEWER COMMENTS

BAD REVIEWS ON YOUR PAPER? FOLLOW THESE GUIDELINES AND YOU MAY YET GET IT PAST THE EDITOR:

Reviewer comment:
“The method/device/paradigm the authors propose is clearly wrong.”

How NOT to respond:
× “Yes, we know. We thought we could still get a paper out of it. Sorry.”

Correct response:
✓ “The reviewer raises an interesting concern. However, as the focus of this work is exploratory and not performance-based, validation was not found to be of critical importance to the contribution of the paper.”

Reviewer comment:
“The authors fail to reference the work of Smith et al., who solved the same problem 20 years ago.”

How NOT to respond:
× “Huh. We didn’t think anybody had read that. Actually, their solution is better than ours.”

Correct response:
✓ “The reviewer raises an interesting concern. However, our work is based on completely different first principles (we use different variable names), and has a much more attractive graphical user interface.”

Reviewer comment:
“This paper is poorly written and scientifically unsound. I do not recommend it for publication.”

How NOT to respond:
× “You #&@*% reviewer! I know who you are! I’m gonna get you when it’s my turn to review!”

Correct response:
✓ “The reviewer raises an interesting concern. However, we feel the reviewer did not fully comprehend the scope of the work, and misjudged the results based on incorrect assumptions.”

www.phdcomics.com Piled Higher and Deeper by Jorge Cham
Don’t forget acknowledgements

People usually treat the acknowledgements section as an afterthought

Always include funding sources!!
Case study on authorship courtesy of Columbia University RCR

- Susan Jacobs is a PhD student for Dr. Seabrook at Smaller Univ. Susan takes a six month internship in Dr. Frank’s lab at BIG Univ.
- She enjoys weekly lab meetings and being a part of the productive lab. Susan completes a study that began at Smaller and finished at BIG.
- She writes it up for publication with 3 authors: Susan, Frank and Seabrook—she used the ICMJE criteria to determine authorship and gives the ms to Frank and Seabrook. Frank edits the paper and adds a technician, 2 postdocs and 2 grad students in the lab to the authorship list and sends it to all the ‘new authors’ so they can discuss the paper in the next lab meeting.
- Susan is not happy with what happened and talks with Frank, who says he will include her as an author on his next paper led by one of his postdocs. Is anything wrong, and if so, what? What’s next?
Conflicts of interest

• Employee-employer
• Grants-reviewer
• Papers-reviewer
• What else?
Conflicts of interest: not all COI are bad

- University start-up companies
- Consulting: allotted 2 days/month @UTIA
- Scientific advisory boards
- Expert witnessing

Sometimes management of COI instead of avoidance is best choice

Recognition → disclosure → assessment → management
Some examples of COI for university employees

• Directorship or employment outside UT
• Honorarium/salary >$10,000
• IP/patents from outside UT
• Investments >5% ownership
• UT employees/students performing personal services

All of the above also applies to spouse/children
Disclosure

• When in doubt, disclose
• Disclosure form is a tool for compliance for employee
• Newspaper rule
Conflicts of commitment

• Commitments that might not be COI that interfere with job performance
• Volunteer efforts
• ‘Other’ scholarly activities
• What are some other possibilities?
Case study: new drug

- Dr. R is an immunologist whose NIH-funded research found that a compound that can be used to treat lupus-patented by the university where she is on faculty.
- Her univ also received funding from Arthrid, a local company, who is developing her compound into a drug.
- Univ licensed IP to Arthrid—payments + royalty stream.
- Dr. R received $50k consulting/ year + stock + royalties.
- Dr. R works 60 hr/week, including 12 hr/week at Arthrid (as typical, her univ allows 20% consulting).
- Arthrid wants to run clinical trials at univ hospital with Dr. R. as PI.
- Dr. R. strongly encourages her postdoc to help run the clinical trials and PD will get consulting + stock (2%).

How many conflicts of interest/commitment can you find?