The research community reinforces the pressure to “publish or perish.”

Bob, Dr. C, and their institution are part of a broader research community. They all face the competitive pressures generated by their peers, funding sources, journals, and academic societies. What can the research community do to change this norm?

**PERSONAL LEVEL**

Bob is falsifying data

Bob is working hard to publish his research. He is facing a tight deadline and his experiments are not yielding desirable results. He feels that the only way to meet his deadline is to falsify his data.

What leads him to commit research misconduct?

**INSTITUTIONAL LEVEL**

Bob’s lab is under pressure to publish

Dr. C, Bob’s boss, places unreasonable demands on the lab team to produce publishable results. Dr. C is busy and rarely reviews the raw data. Without any oversight, Bob easily falsifies his data.

What can his lab supervisor do to reduce this pressure?

The university rewards academic publications and grants

Dr. C needs more publications to earn tenure. Her department chair requires Dr. C to secure grant funding to maintain her lab. These pressures distract Dr. C from her mentoring responsibilities in the lab.

What can the university do to reward responsible research?

**RESEARCH COMMUNITY LEVEL**

The research community reinforces the pressure to “publish or perish”

Bob, Dr. C, and their institution are part of a broader research community. They all face the competitive pressures generated by their peers, funding sources, journals, and academic societies.

What can the research community do to change this norm?

Citations:

1. For the full definition of research misconduct, see 42 C.F.R. § 93.103.
WAYS SUPERVISORS CAN PROMOTE RESEARCH INTEGRITY

Are you a principal investigator, research coordinator, academic advisor, or mentor? Roles such as these place you in a unique position to cultivate exceptional research practices among the next generation of researchers.

1. BE AVAILABLE & APPROACHABLE
   - Your team wants to learn from YOU!

2. REVIEW RAW DATA
   - You are responsible for the integrity of your team’s data.

3. COMMUNICATE EXPECTATIONS
   - Prevent misunderstandings by making sure everyone is on the same page.

4. PROVIDE TRAINING AND GUIDANCE
   - Avoid making assumptions about anyone’s skills or knowledge.

5. KNOW YOUR RESEARCH INTEGRITY OFFICER
   - Be prepared in case you ever suspect research misconduct.

Find out more:
ori.hhs.gov  @HHS_ORI  #ORIedu
THE RESEARCH COMMUNITY SAFEGUARDS
SCIENTIFIC INTEGRITY

WHAT'S YOUR ROLE?

INSTITUTIONS
Foster a culture of research integrity through mentoring, education, and policies

RESEARCHERS
Reproduce, expand on, and openly debate research results

FUNDING AGENCIES
Ensure funding of quality research through rigorous grant review

WHISTLEBLOWERS
Draw attention to questionable research

GOVERNMENT REGULATORY AGENCIES
Protect humans, animals, and tax dollars in research and handle research misconduct allegations

JOURNALS & PEER REVIEWERS
Scrutinize submissions to disseminate accurate research

Learn more about responsible research with our educational materials:
ori.hhs.gov/resources

ori.hhs.gov @HHS_ORI #ORIedu
POSSIBLE RED FLAGS OF RESEARCH MISCONDUCT

TIME
- Usable data are only generated when there is a pressing deadline
- Experiments are completed faster than usual

RESULTS
- Data are too good to be true
- Findings can’t be replicated by others in the lab

LACK OF TRANSPARENCY
- Raw data can’t be produced when requested
- Research materials and protocols are kept hidden
- Work is mostly done when no one else is around

If you suspect research misconduct
contact your institution’s Research Integrity Officer or ORI at AskORI@hhs.gov

ori.hhs.gov @HHS_ORI #ORledu
Images should clearly and correctly represent research results. Minor image processing may be acceptable but, as depicted below there’s a fine line between enhancing an image and distorting it.

BE AWARE:
Undocumented image manipulations can lead to accusations of research misconduct.

67% of ORI’s closed research misconduct cases involved image manipulation.*

*Between 2011 and 2015

**COLOR ENHANCEMENTS**
Changing the contrast, color, or brightness

- Ensure that the meaning of the image stays the same and fine details are not removed.
- Contrast and saturation were increased causing the background cells to disappear.

**SPlice & PASTE**
Combining multiple images into one image

- Clearly indicate where two images were joined using a dividing line and labels.
- Two images were combined causing them to look like new data.

**CROP**
Cutting out components and resizing

- Use a magnification panel to highlight desired visual data.
- Reference information was selectively removed from the image causing loss of data.

WHAT ELSE MUST YOU DO?

- Clearly document all changes made to an image.
- Retain the unprocessed image for your records.
- Follow journal guidelines for premissible processing.

LEARN MORE ABOUT IMAGE PROCESSING:
http://ori.hhs.gov/ImageProcessing
WRITE ETHICALLY
FROM START TO FINISH

PREPARE

SECONDARY SOURCES
MIGHT HAVE
MISINTERPRETED
THE WORK

HAVE A
THOROUGH
UNDERSTANDING
OF YOUR SOURCES

ACCURATELY
COMMUNICATE
THEIR IDEAS AND
TERMINOLOGY

WRITE

AVOID
SELECTIVE
REPORTING
PRESENT UNBIASED
INFORMATION BY
ACKNOWLEDGING
CONFLICTING EVIDENCE
AND ALTERNATIVE
INTERPRETATIONS

CITE YOUR SOURCES

USE YOUR
OWN WORDS
AND
SENTENCE
STRUCTURE

MAINTAIN
THE INTENDED
MEANING
OF THE SOURCE

OR
QUOTE
VERBATIM
TEXT

PUBLISH

GIFT AUTHORSHIP
IS
UNETHICAL

ONLY INCLUDE
THOSE WHO HAVE
MADE SUBSTANTIAL
CONTRIBUTIONS TO
A PROJECT

AVOID
GHOST
AUTHORSHIP

GIVE PROPER
AUTHORSHIP OR
ACKNOWLEDGMENT TO
THOSE WHO HAVE
CONTRIBUTED TO A PAPER

Learn more about ethical writing: ori.hhs.gov/ethical_writing


ori.hhs.gov @HHS_ORI #ORIedu
RESEARCH TRAINEES
WHAT YOU NEED TO KNOW ABOUT RESEARCH MISCONDUCT

Misconduct Is Not Limited to Published Research

Research misconduct is fabrication, falsification, or plagiarism\(^1\) and can occur in publications, presentations, posters, and grant applications – whether they are funded or unfunded.

Research Misconduct Affects Everyone

Tainted research can have negative implications on individuals in the lab, the larger research community, and in the public’s trust in science.

There Is a Professional You Can Contact

Most institutions refer to this person as the Research Integrity Officer (RIO)\(^2\). You can contact your RIO about questionable practices.

Any C an Report Misconduct

Scientists are obligated to point out errors regardless of their position in the lab. The research community depends on you to report misconduct.

Institutions Have Policies to Protect All Involved

Every institution has a requirement to take all reasonable and practical steps to protect the reputation of those who report research misconduct and anyone falsely accused.

You Can Report Research Misconduct Anonymously

Anyone can contact ORI anonymously by phone or email to address concerns.

Of ORI’s research misconduct cases\(^3\):

- \(12\%\) were reported by research trainees
- \(40\%\) were committed by research trainees

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1 For the full definition of research misconduct, see 42 C.F.R. § 93.103.
2 RIOs may have other titles, such as Chief Compliance Officer, Director of Compliance, Vice President/Dean of Research, or Director of Integrity.
3 Statistics based on closed ORI case findings from 2011–2015. Trainees are students and postdoctoral fellows.

Learn more about responsible research at: ori.hhs.gov
YOU SUSPECT RESEARCH MISCONDUCT
NOW WHAT?

AVOID CONFRONTATION
Direct confrontation may lead to retaliation and/or tampering with evidence.

KEEP NOTES
Document details and save communications related to the misconduct. This will help you recall important information needed by the institution.

EDUCATE YOURSELF
Read your institution’s research misconduct policy or contact the U.S. Office of Research Integrity (ORI) with questions.

SEEK SUPPORT
You may want to get advice from someone you trust to help you consider all options.

CONSULT YOUR RESEARCH INTEGRITY OFFICER (RIO)
RIOs can help you better understand the situation. You can speak in hypotheticals as you consider making an official allegation.

REPORTING MISCONDUCT IS DIFFICULT...BUT IT CAN BE WORTH IT.

PEOPLE OFTEN WORRY ABOUT:
✦ The reputation and career of the accused
✦ How others in the lab will be affected
✦ Implications for their own career
✦ Possible retaliation

REPORTING MISCONDUCT HELPS:
✦ Prevent false and misleading information from entering the research record
✦ Correct the scientific literature
✦ Ensure funding is awarded to responsible research
✦ Protect the public’s trust in science

THINGS TO CONSIDER

WHEN YOU REPORT

BE SPECIFIC
Provide the RIO with specific examples of suspected misconduct and where it occurred (e.g. manuscripts, presentations, posters, grant applications, etc.).

BE AVAILABLE
The RIO may require your help identifying and examining evidence, explaining how the research was falsified, fabricated, or plagiarized, and cooperating as a witness.

BE PREPARED FOR SILENCE
Institutional policies may limit your access to confidential information about research misconduct proceedings.

BE PATIENT
Research misconduct proceedings take considerable effort and time to complete.

MAKE AN INFORMED DECISION
If you want to talk anonymously or report misconduct contact ORI at 240-453-8800 or askORI@hhs.gov.
OBJECTIVE
See if you can detect the research misconduct in this sample results section.

METHODS
Thoroughly review the images below to determine what was falsified or fabricated.

RESULTS
Check your findings with the explanations in the discussion section.

FIGURE 1. COMET ASSAY
The control image was cropped and relabeled as the image for Protein A. It was also intentionally lightened to make the “tails” appear longer.

FIGURE 2. IMMUNOFLOUORESCENCE COLOCALIZATION ASSAY
M1 and M4 are the same image but flipped vertically.

FIGURE 3. WESTERN BLOT
The top panel and bottom panel of Figure 3 are from the same source image. The Protein A blot image has been flipped horizontally and represented as the control blot image.

FIGURE 4. GEL SHIFT ASSAY
Lanes 1, 4, and 5 are from the same image source and were relabeled and reused to represent different experimental conditions.

DISCUSSION

CONCLUSION
Readers play an important role in detecting image manipulations. If you think you see research misconduct, make your concerns known to your institutional Research Integrity Officer.

Learn more about image processing at: http://ori.hhs.gov/ImageProcessing
WHAT DRIVES PEOPLE TO COMMIT RESEARCH MISCONDUCT?

These quotes come from people who admitted to research misconduct in closed Office of Research Integrity cases. Research misconduct is never justified, but it is important to recognize potential drivers of misconduct to better understand how it might be prevented.

POOR SUPERVISION

“I WAS SCARED TO GO TO [MY PI]. HE USED TO SCREAM & YELL AT ME WHEN THINGS DID NOT WORK AS PLANNED.”

INADEQUATE TRAINING

“AFTE[...]

COMPETITIVE PRESSURES

“I FELT IT WAS NECESSARY TO GET A PAPER IN A HIGH-PROFILE JOURNAL IN ORDER TO GET A FACULTY POSITION.”

PERSONAL CIRCUMSTANCES

“[I] HAD BEEN APPLYING FOR A GREEN CARD AND FELT PRESSURED TO MAKE A GOOD PAPER AND GET GOOD PUBLICATIONS.”

INDIVIDUAL PSYCHOLOGY

“HALF OF ME WANTED TO MAKE [MY PI] PROUD. THE OTHER HALF WAS TERRIFIED OF FAILING... SO I FABRICATED A PIECE OF DATA.”

Seek support from a mentor if stressors are impacting your work.