Integrity and the Responsible Conduct of Research

THE UNIVERSITY OF ARIZONA
Research, Innovation & Impact

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Land Acknowledgement

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

It's 2:00 in the morning...

...and you're out driving with friends.

The roads seem deserted.

You come to a stop sign.

What do you do?

Ethical Decision-Making: A Framework

▶ Issues? Points of Conflict?

▶ Rules and regulations?

▶ Questions?

▶ Resources?

▶ Options? Who is affected and how?

▶ Any biases that you should be aware of?

▶ Decide on a course of action.

Agenda

1. What is the goal of research?
2. Irresponsible/unethical research practices
3. The rules and where they come from
4. Factors and behaviors impacting integrity
5. Your role in ensuring research is conducted **responsibly** and with **integrity**

What is the goal of research?

What does research look like?

What is the fundamental goal of scientific research?

To discover and disseminate truth

(one answer to the question)

Simmons JP, Nelson LD, Simonsohn U. False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant. Psychological Science. 2011;22(11):1359-1366. doi:10.1177/0956797611417632

What does it mean for research to "have integrity"?

Why is integrity important to the research enterprise?

So... why are we here speaking with you today?

It turns out...

▶ Research is not inherently ethical.

▶ Researchers don't always conduct their work with integrity.

Irresponsible/Unethical Research Practices

Research Misconduct

▶ Fabrication
   Making up results and reporting them

▶ Falsification
   Manipulating research materials or results such that the research is not accurately represented in the research record

▶ Plagiarism
   The appropriation of another person's ideas without giving credit
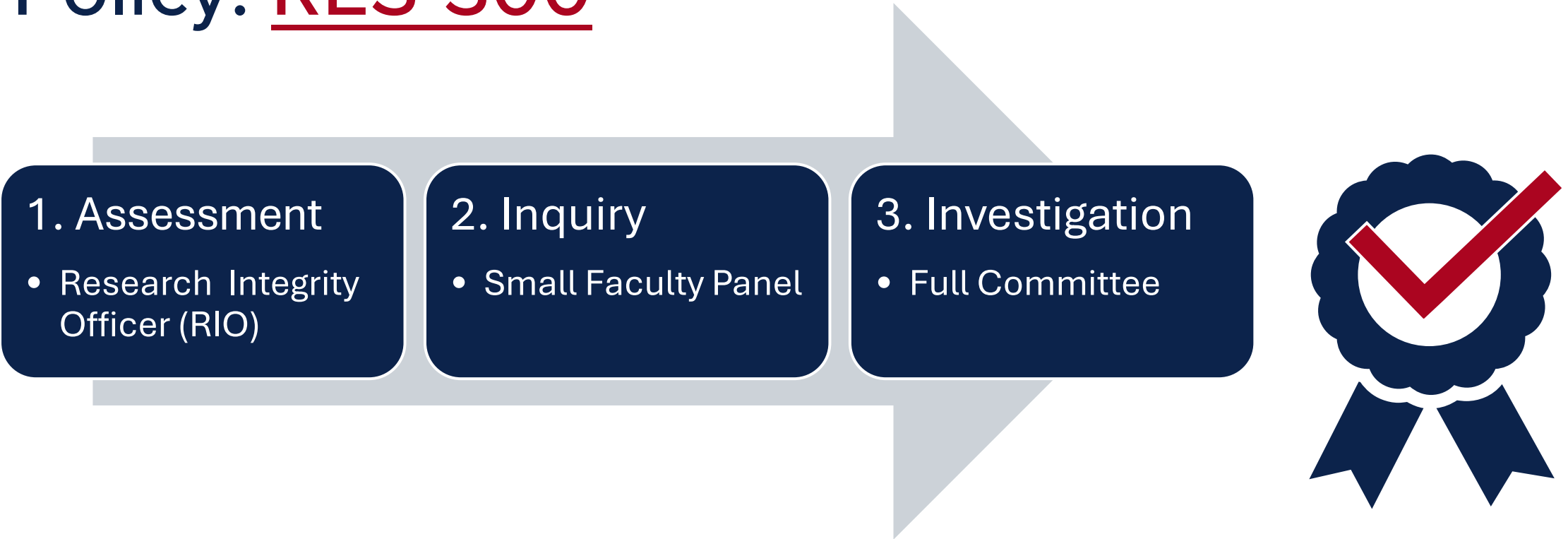
Research Misconduct does not include...

▶ Honest error

▶ Differences in opinion

▶ Disputes about authorship

Finding of Research Misconduct requires

▶ There is a significant departure from accepted practices of the relevant research or scholarly community; **and**

▶ The misconduct is committed knowingly, intentionally, or recklessly; **and**

▶ The allegation is proven by a preponderance of the evidence.

Research Misconduct Proceeding (UA)
Policy: RES-300

1. Assessment
- Research Integrity Officer (RIO)

2. Inquiry
- Small Faculty Panel

3. Investigation
- Full Committee

See also: Procedures for Responding to Allegations of Research Misconduct

The primary concern of research misconduct regulations and policies is to protect the integrity of the research record.

Scenario

Sam, a computer scientist, is working on a new algorithm designed to improve the efficiency of image processing. They had targeted a 30% improvement in the speed of processing. After running their tests, they only saw a 15% improvement, which is still important to the field and is publishable. In their writeup, they decide to avoid mentioning this original target of 30%.

▶ Does this constitute research misconduct?

Detrimental Research Practices
...but not Research Misconduct

▶ Failing to manage data and keep accurate records

▶ Selective reporting of (dependent) variables

▶ Deciding whether to collect more data after looking to see whether the results were significant

▶ Adding authors to a paper who do not qualify for authorship

▶ Contributing to a toxic work environment

▶ Failing to disclose conflicts of interest

▶ Etc.

Case Study:

Stressing the Date

What really happened

▶ Student was removed from the lab and needed to find a new faculty mentor

▶ Mandated supervision/approval from new faculty mentor

▶ Increased oversight/approval from research compliance

▶ Documented on student record

What are the rules and where do they come from?

Three Basic Sources for RCR Rules & Guidance

1. Professional codes

2. Government & institutional regulations and policies

3. Your mentors and peers

Your own personal code of conduct!

Compliance with Regulations and Laws

▶ Conflict of Interest

▶ Export Controls

▶ Human Subjects

▶ Animal Subjects

▶ Lab Safety/Hazardous Materials

▶ Research Security

▶ Tribal Consultation

Professional Responsibility & Practice

▶ Peer Review

▶ Mentor/Mentee Relationships

▶ Data Management

▶ Authorship & Publication

▶ Digital image use

▶ Collaborative Research

▶ Working with industry

▶ Research Integrity

▶ Bias awareness and mitigation

▶ Safe & Inclusive Environments

Doing good science takes more than just research skills!

Different offices and policies apply for varying types of ethical violations and misconduct

▶ Research Misconduct

▶ Violation of animal research protocol

▶ Violation of human research protocol

▶ Failure to disclose financial/personal conflicts of interest

▶ Failure to disclose work with foreign parties

▶ Financial misconduct

UA offices and people that support ethical and safe conduct of research

Research, Innovation & Impact (RII)
Dr. Elliott Cheu, Interim Senior Vice President for Research

The UA Research Community

Research Compliance and Ethics Programs

Education Support

| Your faculty mentor(s) |

Conflict of Interest Program	Export Control Program	Human Subjects Protection Program	Research Laboratory Safety Serv:

Responsible Conduct of Research (RCR) Program

Your research team

| Research Integrity Program | University Animal Care | HIPAA Privacy Program |

- Radiation
- Chemical
- Laser
- Biosafety
- Dive Safety
- Occ Health
- Industrial Hygiene
- Field Safety

Your UBRP colleagues

| Embryonic Stem Cell | Animal Welfare Program | Conflict of Commitment |

Ethics and Compliance Hotline

The University's Ethics and Compliance Hotline is an anonymous, 24/7 resource for reporting concerns about legal or policy violations or unethical conduct.

There are two options for reporting:

▶ Call: 866-364-1908

▶ Report Online: https://compliance.arizona.edu/hotline

The Current State of Research

A few stories from the recent past...

Duke University to Pay $112.5 Million to Settle Claims of Research Misconduct

By Sheila Kaplan

March 25, 2019

nytimes.com

"...[the researcher] had fabricated data linked to as much as $200 million in federal research grants."

A few stories from the recent past…

Stanford president to step down despite probe exonerating him of research misconduct

University investigation finds data manipulation by others in Marc Tessier-Lavigne's lab and says he should have corrected work more "decisively"

19 JUL 2023 · 1:00 PM ET · BY JOCELYN KAISER

"Although several former postdocs spoke positively of Tessier-Lavigne's mentoring, some interviewees described a culture that rewarded 'winners,' postdocs who produced favorable results, and marginalized 'losers.'"

https://www.nytimes.com/2019/03/25/science/duke-settlement-research.html

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A few stories from the recent past...

BLOTS ON A FIELD?

A neuroscience image sleuth finds signs of fabrication in scores of Alzheimer's articles, threatening a reigning theory of the disease

21 JUL 2022 · 2:03 PM ET · BY CHARLES PILLER

"Some Alzheimer's experts now suspect Lesné's studies have misdirected Alzheimer's research for 16 years."

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The Office of Research Integrity (ORI)

Case Summaries

This page contains cases in which administrative actions were imposed due to findings of research misconduct. The list only includes those who CURRENTLY have an imposed administrative actions against them. It does NOT include the names of individuals whose administrative actions periods have expired. Each case is categorized according to the year in which ORI closed the case.

2024

Case Summary: Brigidi, Gian-Stefano

2023

Case Summary: Armstead, William M.
Case Summary: Dannenberg, Andrew J.
Case Summary: Frech, Ivana
Case Summary: He, Johnny J.
Case Summary: Hwa, Lara S.
Case Summary: Jayawardena, Surangi (Suranji)
Case Summary: Laliotis, Yiorgos (Georgios) I.
Case Summary: Martin, Sarah Elizabeth
Case Summary: Spirli, Carlo
Case Summary: Subbaramaiah, Kotha

https://ori.hhs.gov/content/case_summary

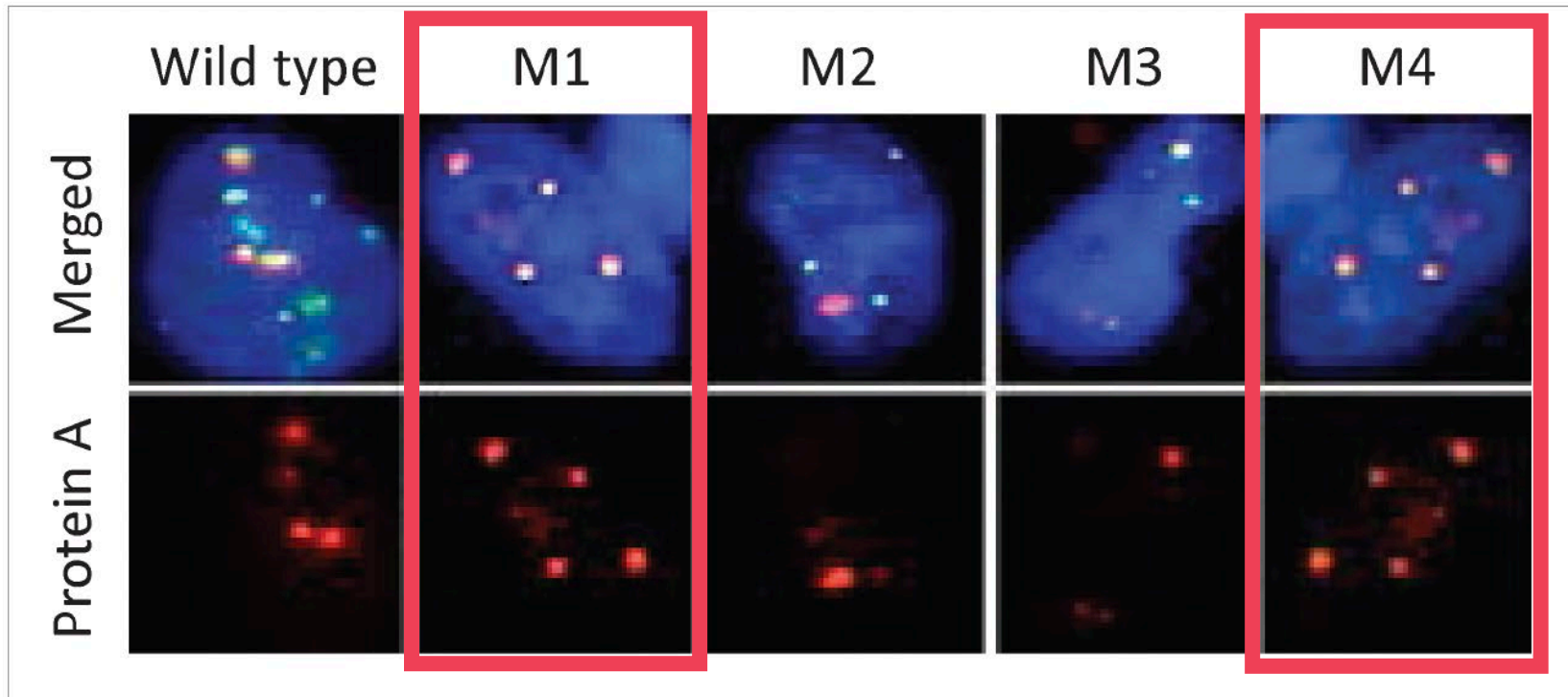# Spot the Research Misconduct

FIGURE 4. GEL SHIFT ASSAY
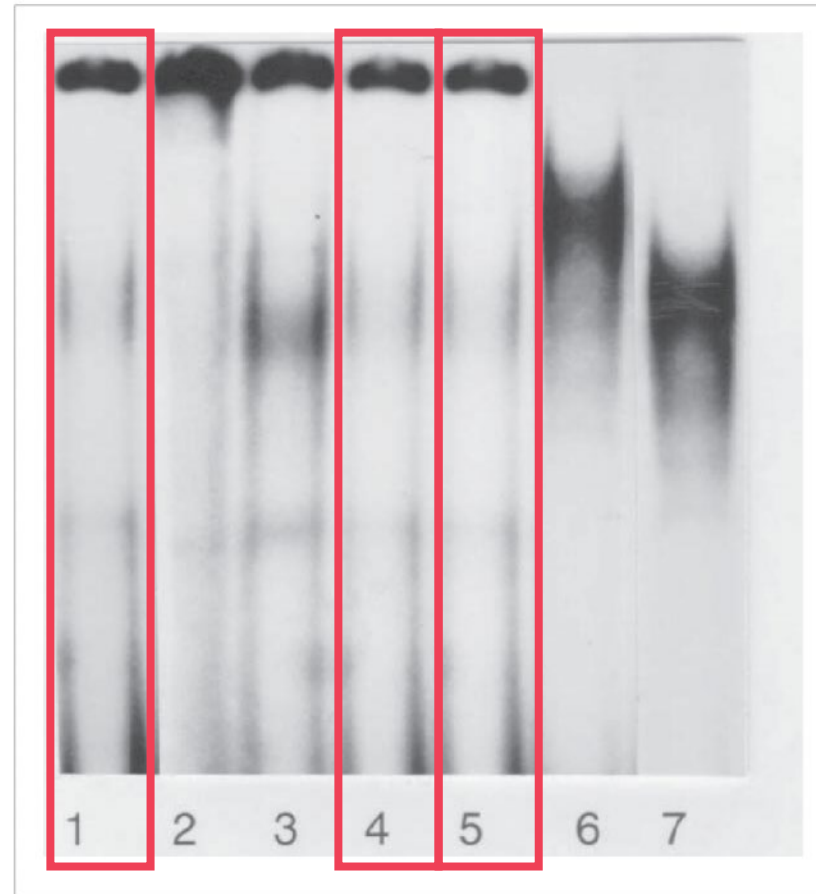
https://ori.hhs.gov/sites/default/files/2020-05/11_Can_you_Spot.pdf

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Spot the Research Misconduct

FIGURE 2. IMMUNOFLUORESCENCE COLOCALIZATION ASSAY

https://ori.hhs.gov/sites/default/files/2020-05/11_Can_you_Spot.pdf

Elizabeth Bik
Microbiologist
Image Sleuth

Identified over 4,000 potential cases of research misconduct

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Scenario

A researcher, Dr. Wildcat, publishes a research paper. He used ChatGPT to write a section of the paper. Dr. Wildcat is the only listed author on the paper.

▶ Is Dr. Wildcat guilty of plagiarism?

Artificial Intelligence (AI) in Research

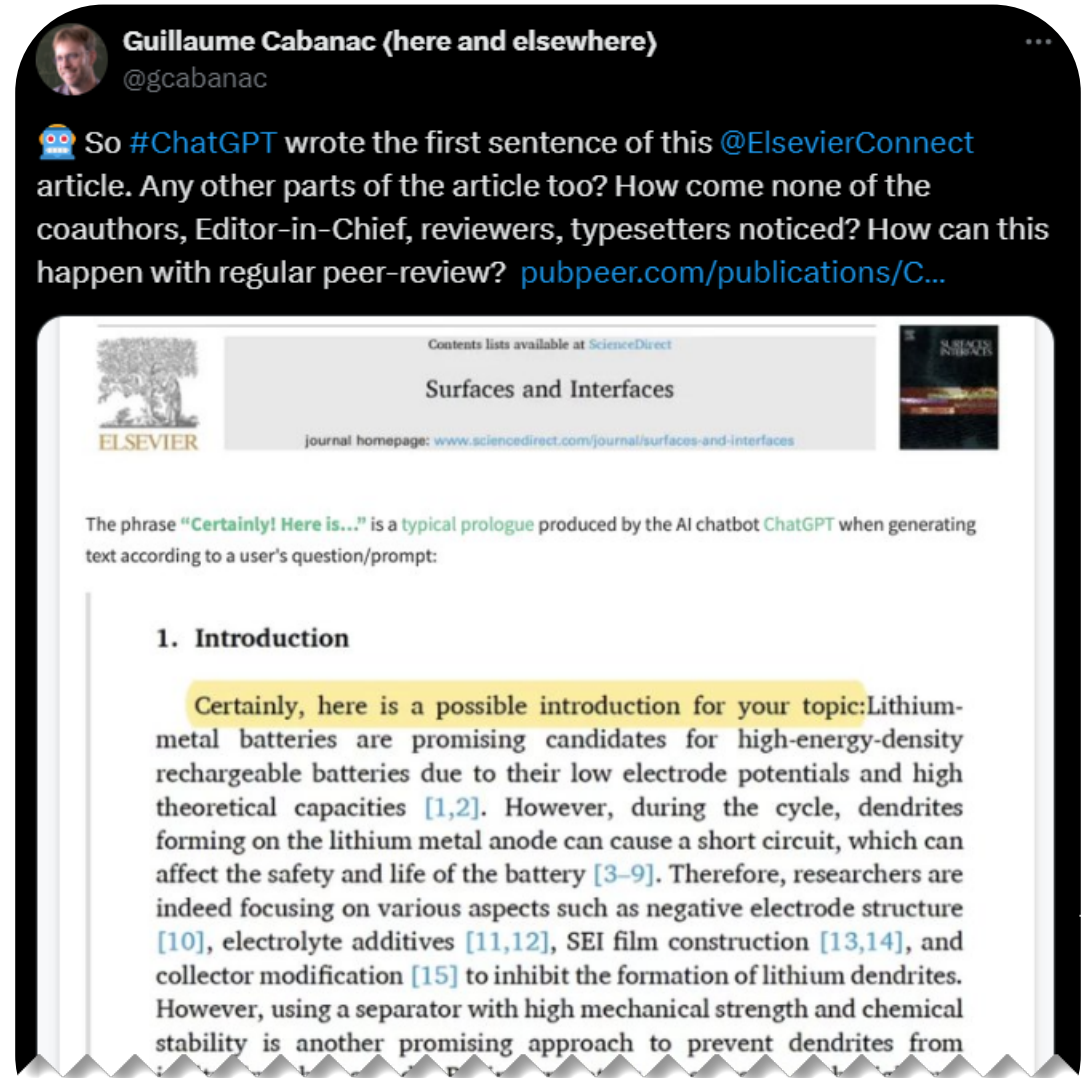### Science journals ban listing of ChatGPT as co-author on papers

Some publishers also banning use of bot in preparation of submissions but others see its adoption as inevitable
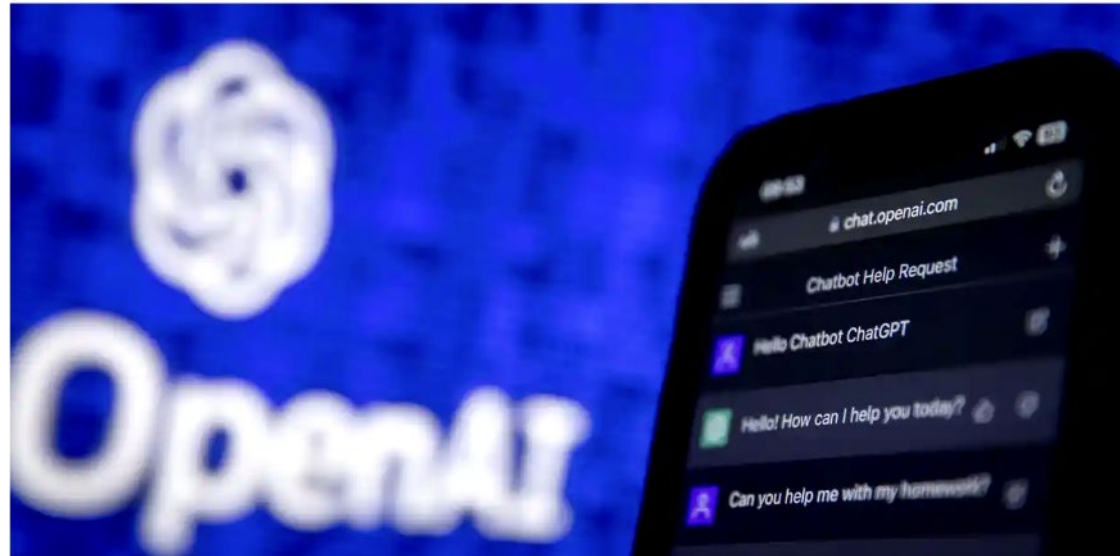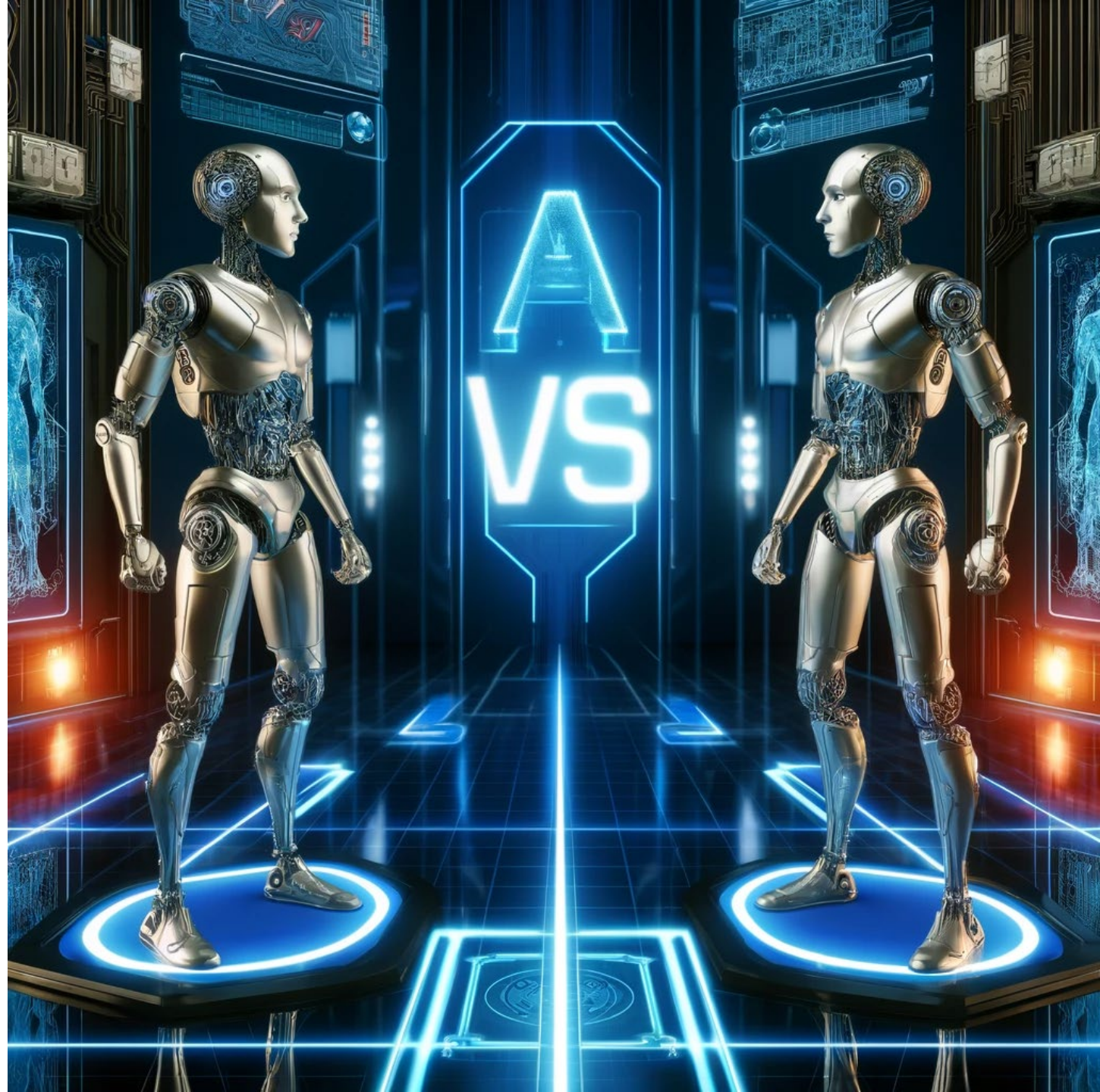
Retraction Watch

Papers and peer reviews with evidence of ChatGPT writing...

95 and counting!

AI vs AI

▶ Large language model (LLM) used to detect other uses of LLMs.

▶ Image manipulation & duplication detection systems

Case Study:

The Lucky Student?

Here's what actually happened

July 12, 2005

Purdue findings support earlier nuclear fusion experiments

WEST LAFAYETTE, Ind. – Researchers at Purdue University have new evidence supporting earlier findings by other scientists who designed an inexpensive "tabletop" device that uses sound waves to produce nuclear fusion reactions.

https://news.uns.purdue.edu/html4ever/2005/050712.Xu.fusion.html

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Here's what actually happened

Yiban Xu and Adam Butt
Download photo
caption below

The technology, in theory, could lead to a new source of clean energy and a host of portable detectors and other applications.

https://news.uns.purdue.edu/html4ever/2005/050712.Xu.fusion.html

Fast forward a few years...

Los Angeles Times

July 19, 2008

The Purdue committee, however, concluded that **[the faculty advisor]** was heavily involved in Xu and Butt's paper and that "the direct assertion of independent confirmation . . . is falsification of the research record and thus is research misconduct."

How could this outcome have been prevented?

Resource: Authorship Guidelines

Per guidelines from the International Committee of Medical Journal Editors (ICMJE), authorship should be based on the following criteria:

▶ Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

▶ Drafting the work or reviewing it critically for important intellectual content; AND

▶ Final approval of the version to be published; AND

▶ Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Factors and behaviors that impact integrity

What behaviors might contribute to research misconduct or questionable research practices?

What **factors** might contribute to research misconduct or questionable research practices?

WHY RESEARCHERS STUMBLED

Instructors on the Professionalism and Integrity Program assessed underlying causes (often more than one) for researchers' lapses.

Proximate cause	Ultimate cause of researcher lapse	% of participants
Lack of attention	Overextended, not detail-oriented or distracted by personal problems.	72%
Unsure of rules	An increase in regulations since researcher began career, lack of mentoring or cultural differences.	56%
Did not prioritze compliance	Failed to recognize seriousness of violations, biased thinking or cultural differences.	56%
Relationship problems, political tensions	Communicated aggressively or worked with difficult personalities.	36%
Staff lacked adequate training or integrity	Failed to provide adequate training, did not create culture of compliance in lab or had difficulty hiring individuals.	28%
Poor communication	Failed to hold regular meetings with research team.	26%
Ambition	Driven personality, desire for promotion or competition for funding.	21%
Conflicting roles (physician–scientist)	Interacted with individuals as both patients and research participants.	21%
Did not anticipate consequences	Failed to consider ways a project could go wrong.	13%
Lack of resources	Inadequate institutional investment in researcher's programme.	10%
Followed poor instructions	Rigid hierarchy in research programme and the absence of positive mentors to consult.	10%

©nature

http://www.nature.com/polopoly_fs/1.20029!/menu/main/topColumns/topLeftColumn/pdf/534173a.pdf

What contributes to researchers engaging in misconduct and unethical research?

What C.K. Gunsalus and
Aaron D. Robinson call
"Career **TRAGEDIES**"

Temptation
Rationalization
Ambition
Group/peer/authority pressure
Entitlement
Deception
Incrementalism
Embarrassment
Stupid Systems

https://www.nature.com/articles/d41586-018-05145-6

"The well-being of science and our society requires that fraud be punished severely. But a heavy focus on fraudsters may also conveniently divert our attention from the fraudster within us all. Who cannot find places where they took a first step, or perhaps several steps, down one slippery slope or another?"

- Jennifer Crocker

Your role in ensuring research is conducted responsibly and with integrity
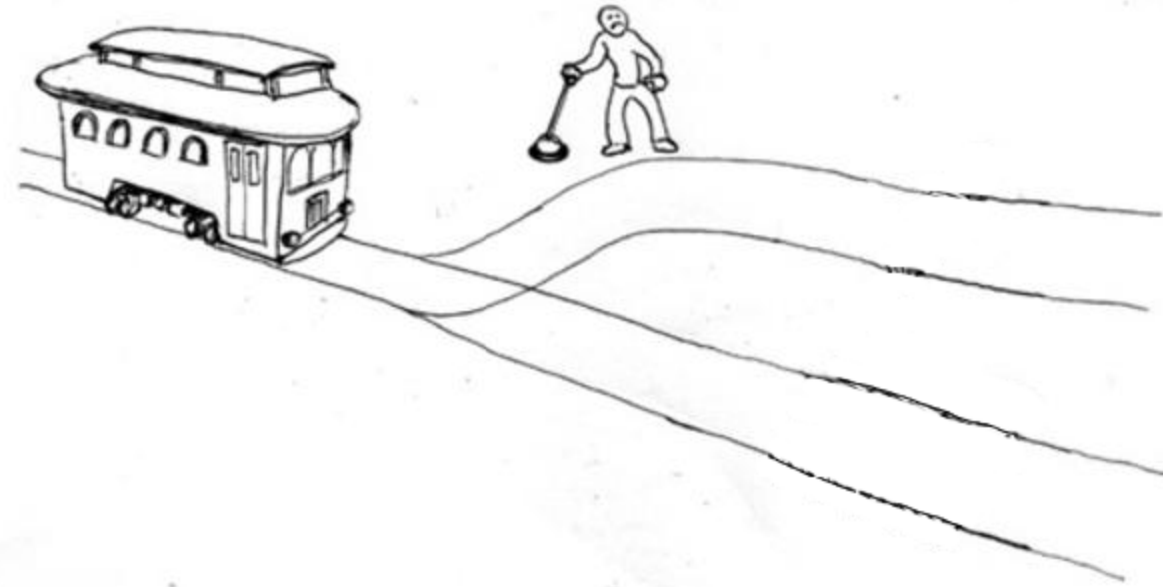
You just encountered what you believe to be research misconduct... what do you do?
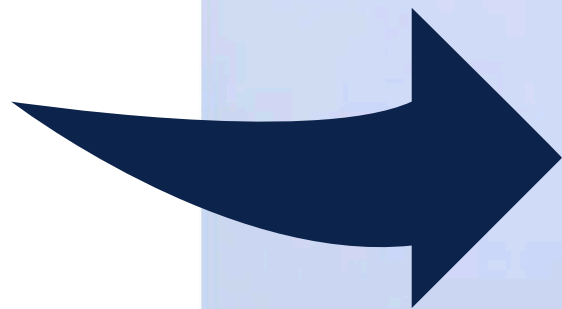
Responsible reporting of possible misconduct

1. Consider alternative explanations—you may be wrong!

2. In light of Rule #1, ask questions, do not make charges

3. Figure out what documentation supports your concerns and where it is

4. Separate your personal and professional concerns

5. Assess your goals

6. Seek advice and listen to it

At every step, go back to Rule #1

Gunsalus, C.K., "How to Blow the Whistle and Still Have a Career Afterwards," *Science and Engineering Ethics* (1998) 4, 51-64.

The more likely reality
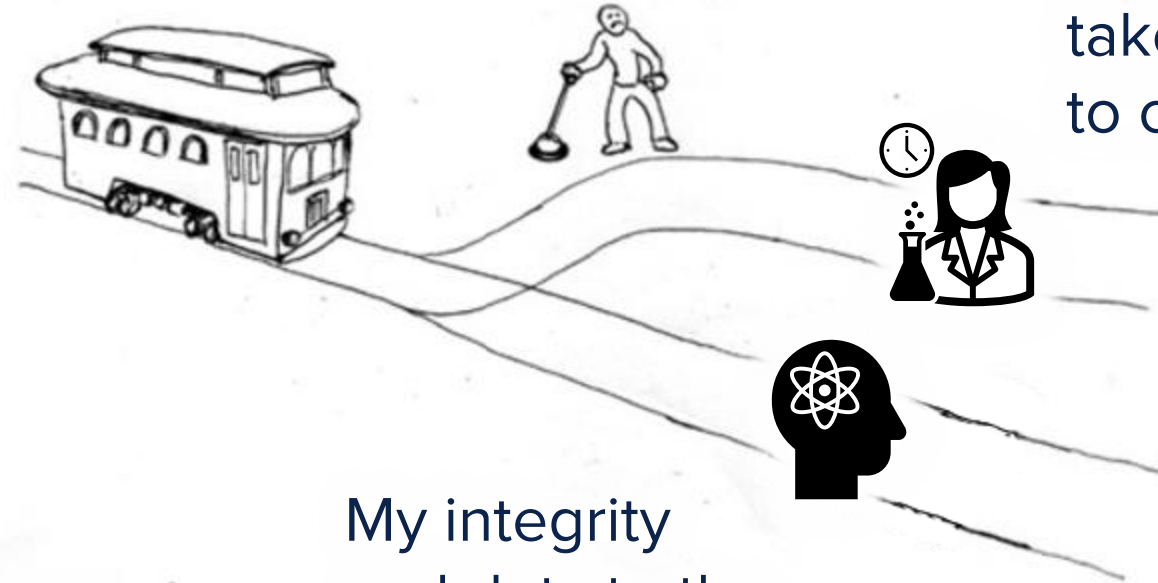
My work that has taken years to complete

My integrity and duty to the research enterprise

Not all Heroes wear capes…

[Susanne Stoll, graduate student] discovered an error that toppled a highly-cited 2014 article…

"Susanne and her co-workers never treated me as a suspect, but as a colleague in the same boat."

- Ben de Haas

Not all Heroes wear capes...

[Frances Arnold] who shared the 2018 Novel Prize in Chemistry has retracted a 2019 paper after being unable to replicate the results.

Frances Arnold ✔
@francesarnold · Follow

It is painful to admit, but important to do so. I apologize to all. I was a bit busy when this was submitted, and did not do my job well.

Retraction Watch

What are some skills or practices that can contribute to ethical research?

A few suggestions

▶ Ask questions when you don't understand.

▶ Take time to explain and help others understand.

▶ It's okay to make mistakes! When you do make a mistake, be transparent about it and take steps to correct it.

▶ If you're feeling stressed or overwhelmed, ask for help.

▶ Give credit when credit is due.

▶ Respect the data, whatever they show.

▶ Seek out good mentors, and as you advance, be a good mentor to others.

ONLY YOU
can prevent
Research Misconduct

Responsible Conduct of Research (RCR) Workshops

- ▶ Peer Review
- ▶ Collaborative Research & Industry
- ▶ Competing Interests
- ▶ Mentoring Relationships
- ▶ Research Misconduct
- ▶ Data Management
- ▶ Human Subjects

- ▶ Overlapping Publications
- ▶ Animal Research
- ▶ Biomedical Research
- ▶ Tribal Consultation
- ▶ Authorship & Publication
- ▶ Safe & Inclusive Research Environments

https://research.arizona.edu/research-compliance/rcr/workshops

If you need to find us...

Research Misconduct Inquiries

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