

Responsible Conduct of Research

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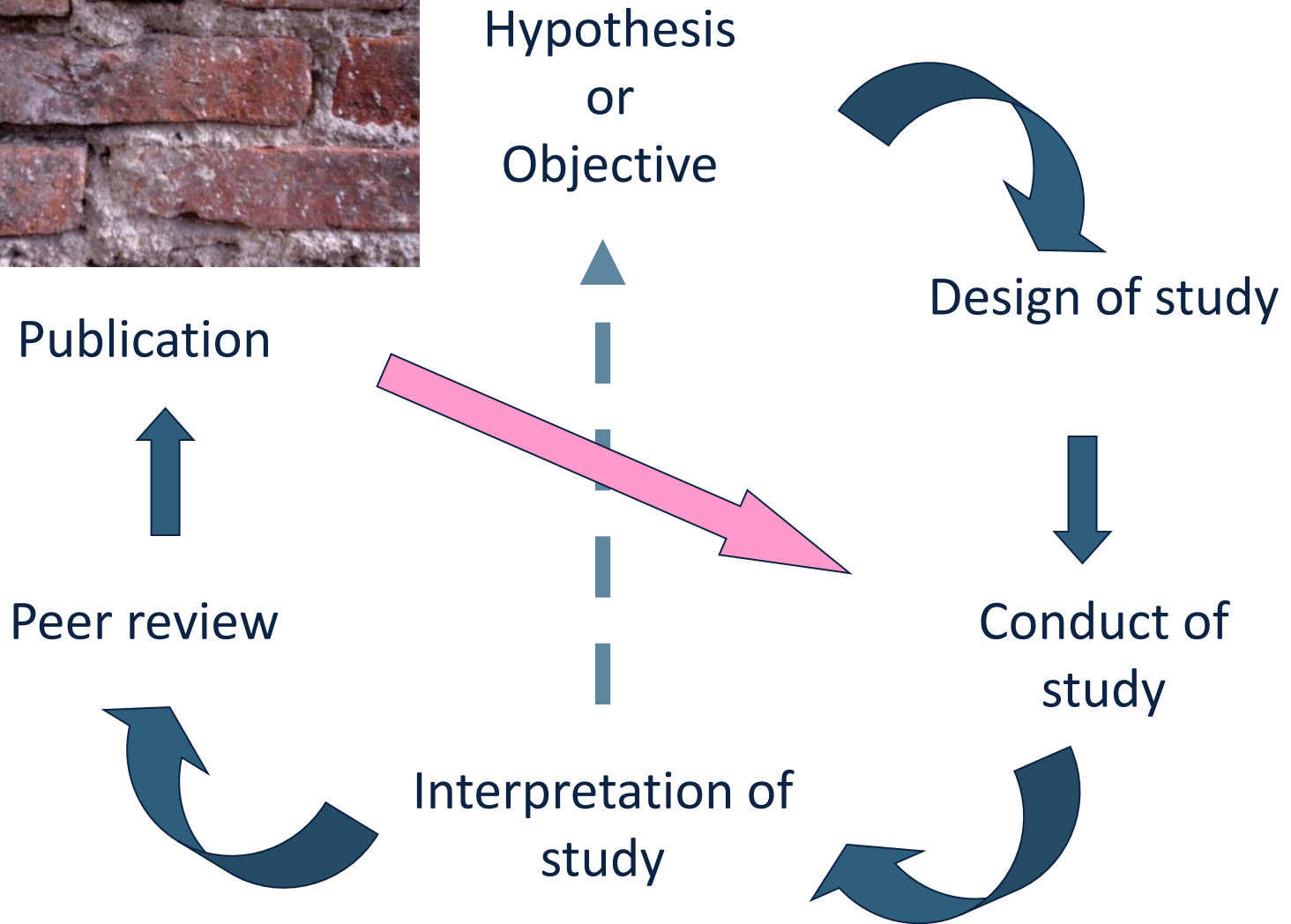
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POSTDOCTORAL STUDIES



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“Everything that a scientist does is a function of what others have done before him; the past is embodied in every new conception and even in the possibility of its being conceived at all.”

Peter Medawar



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Policies
Regulations

Disciplinary Norms
Judgment

Societal and
professional norms
Shared values



Fabrication
Falsification
Plagiarism
Misuse of funds
Abuse of students

Sharing of data
Data interpretation
Authorship
Conflicts of interest
Mentorship

Honesty
Objectivity
Efficiency
Accuracy
Conscientiousness
Of positive value



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Objectives

Students will

- have a better understanding of norms and rules for responsible research conduct
- know where and how to ascertain these
- have improved ability to make judgments on the ethics of the types of actions and decisions inherent in research
- **conduct research responsibly**



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[Intro to the Responsible Conduct of Research](#)

[Ethics and the Responsible Researcher](#)

[Research Misconduct](#)

[Data Acquisition and Management](#)

[Publication Practices and Responsible Authorship](#)

[Peer Review: Role and Process in Life Sciences Research](#)

[Writing with Integrity](#)

[Responsible Mentoring](#)

[Collaborative Research](#)

[Conflicts of Interest in Research](#)

[Human Participants Research and Ethics](#)

[Animal Care and Use](#)

2 hours
face to
face



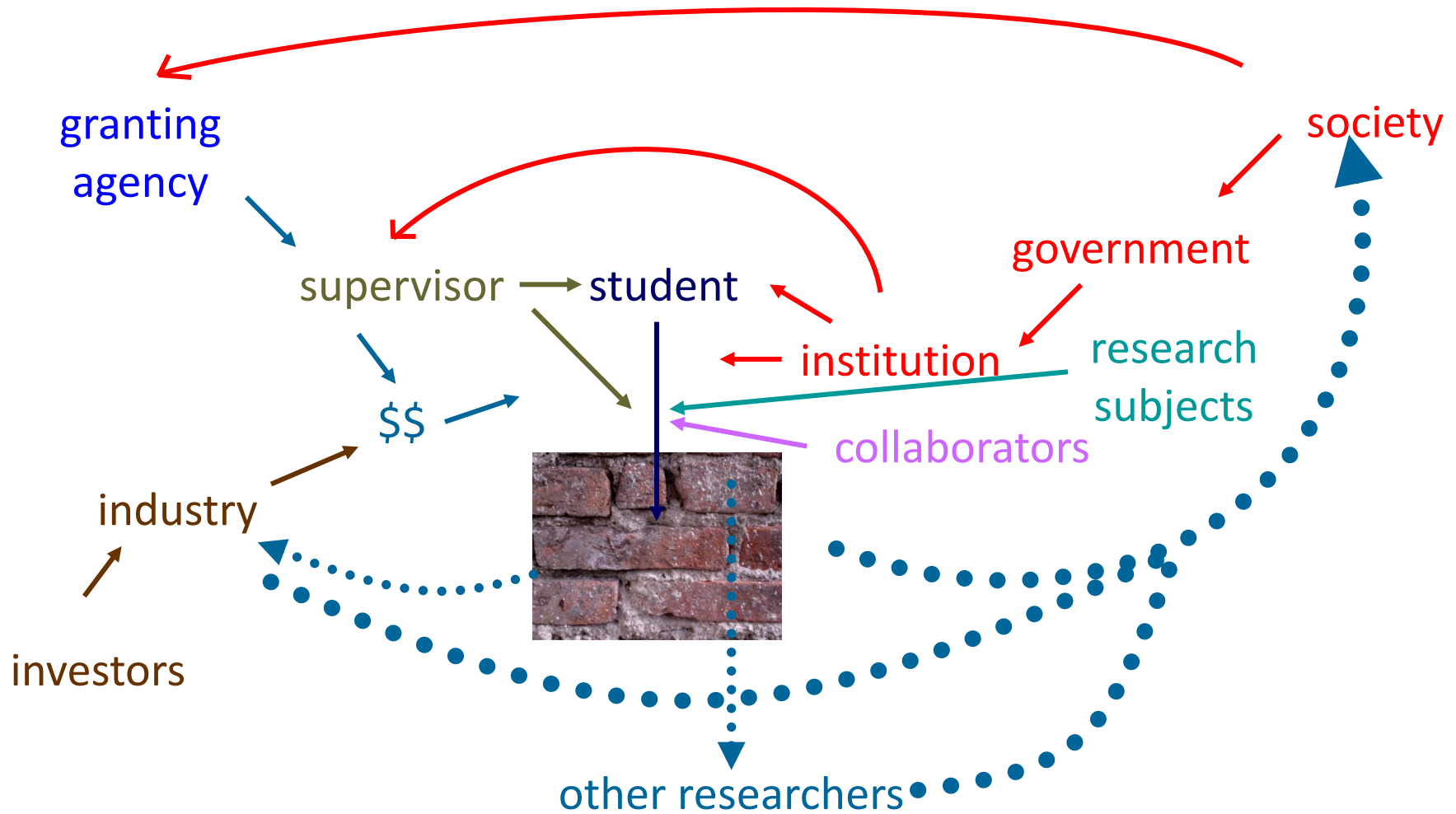
1.5 hours
face to
face

Third time “lucky” ...

- Are there conflicting interests here? What are they?
- How does one differentiate between experiments that “don’t work” vs. those that have negative or unanticipated results?
- Who are the stakeholders?
- What human factors or supervision practices might improve scientific rigour in this lab?



Who are we responsible to?



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What are we responsible for?

Creation of new knowledge that is:

- true (accurate, conclusions are well-justified)
- accessible to other researchers
- able to be independently verified by other researchers
- of benefit to society

Carried out in a manner that:

- makes efficient use of resources
- minimizes impact on people, animals, and the environment
- involves honest, caring, and fair relationships with peers and mentees



Dilemma:



- Conflict between values,
moral imperatives

Duty to facilitate
research of others



Need & duty to
publish

Need to publish in a
timely fashion



Thoroughness,
carefulness, honesty

Financial gain



Objectivity, honesty

Recognition, tenure, etc



Careful (& courageous?)
research



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A Framework for Ethical Decision-Making

Identify the problem(s), determine whether it's an ethical issue.

Get the Facts and Assess the Situation

What individuals and groups have an important stake in the outcome?
What are their legitimate rights, responsibilities and expectations?

Identify options for acting

What are the consequences for all affected parties?
What if everyone in these circumstances did this?

Evaluate each option

Make a decision and test it

Act and reflect on the outcome

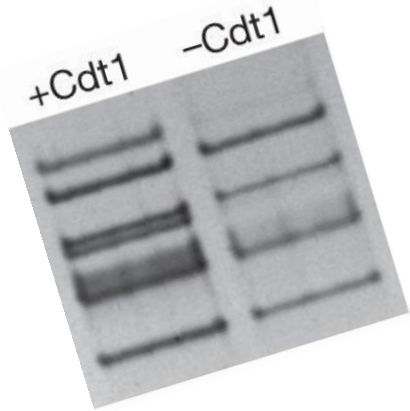


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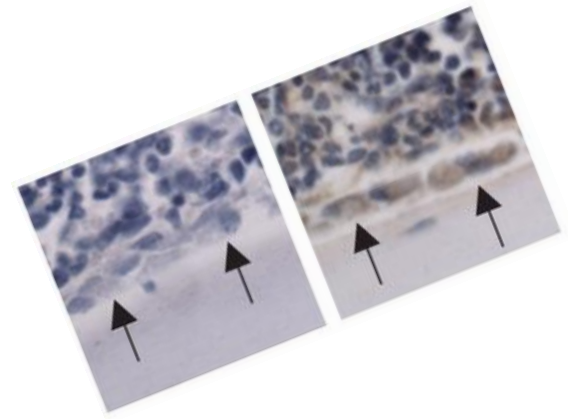
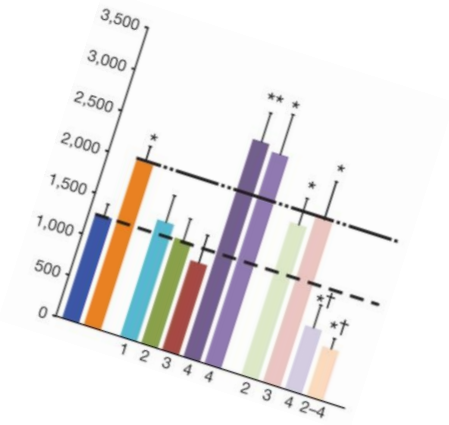
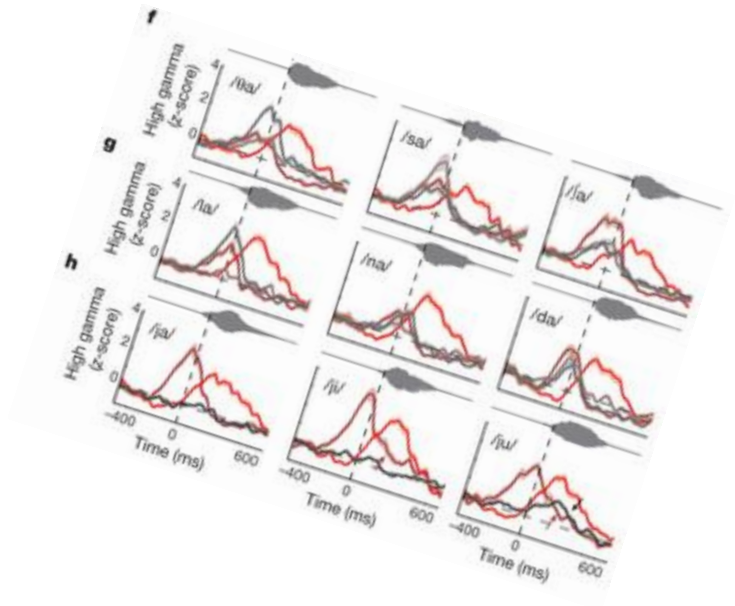
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Data



Obtaining
Recording
Analyzing
Reporting
Ownership
Sharing



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Obtaining Data

Ensure:

- experimental design is free from bias
- sample (if applicable) is appropriate
- conducted carefully
- proper controls are included

If in doubt – ask (mentor, colleague), tell (publication)

“ The first principle is that you must not fool yourself, and you are the easiest person to fool...I'm talking about a specific, extra type of integrity that is [more than just] not lying, but bending over backwards to show how you're maybe wrong” - Richard Feynman, Nobel Laureate



Recording Data

Data books should allow:

1. You and others to easily know
 - WHY you did the experiment
 - WHEN you did the experiment
 - HOW you did the experiment
 - with what reagents you did the experiment
 - your results
 - your conclusions
 - (your interpretation)
 - what you're doing next
2. Others to repeat what you did (several years later)



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Recording Data

Therefore, notebooks should:

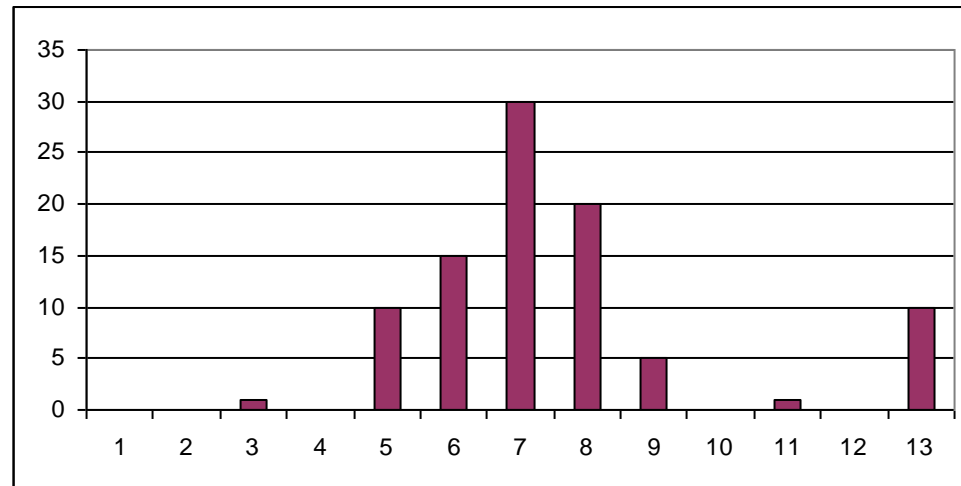
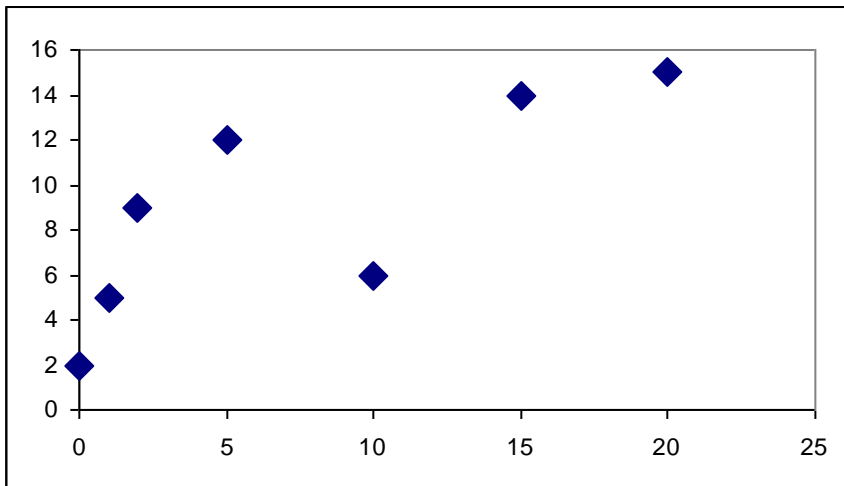
1. Be bound lab notebooks with numbered pages
2. Be in pen, not pencil – legibly, neatly
3. Be recorded as soon as possible after data collected
4. Include all raw data
5. Include calculations
6. Have errors corrected without erasing or obscuring original recording
7. Include correspondence and conversations relating to experiments
8. Include tangible data or information or its location



Analyzing and Reporting Data

Data trimming

- removing data points to fit a desired or more statistically pleasing result



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Analyzing and Reporting Data

Outliers

- if possible, determine likely cause
- decide how to deal with these beforehand if possible
- use statistical methods to assess
- disclose basis for dropping or modifying data



Analyzing and Reporting Data

Data enhancing

“We should conspire to end the fetish of the perfect image.”

“Beautification is a form of misrepresentation.”



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Analyzing and Reporting Data

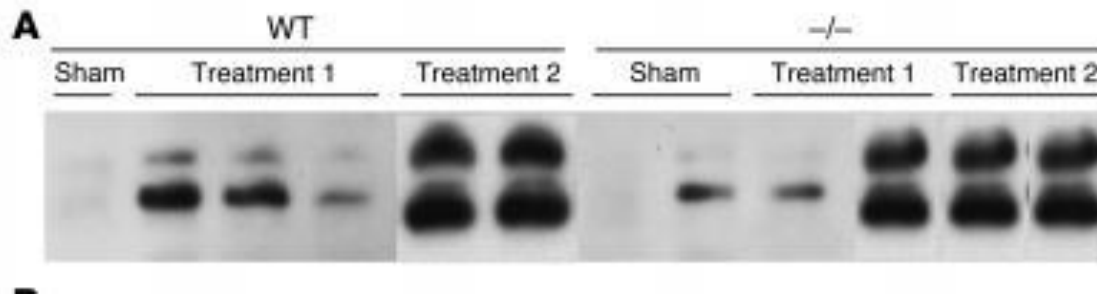
Image data

from *Nature* and *JCI*:

- List all image acquisition tools, image processing software, and key settings and manipulations
- Don't combine images gathered at different times or from different locations unless stated. If juxtaposing images is essential, clearly demarcate borders (eg, black line between lanes).
- Avoid touch-up tools
- Don't remove "important" data by cropping
- Avoid high contrast settings (have grey background)
- Only adjust brightness, contrast, etc equally across image
- Contrast or settings should not be adjusted so that data disappear.
- Do not reuse previously published figures even if cropped/rotated



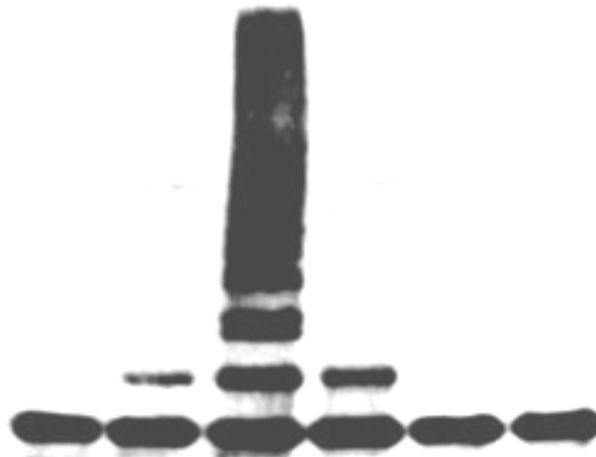
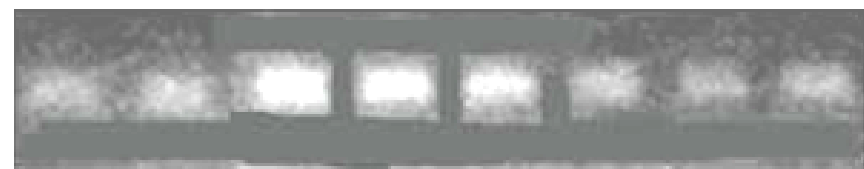
Image data



- Label graphic data clearly
- Keep files well organized
- Take high-resolution pictures from start

Analyzing and Reporting Data

Image data

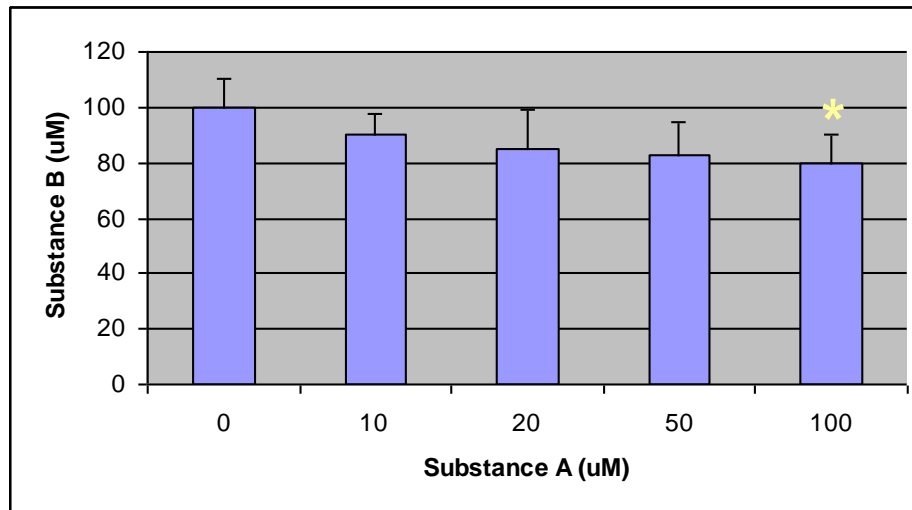
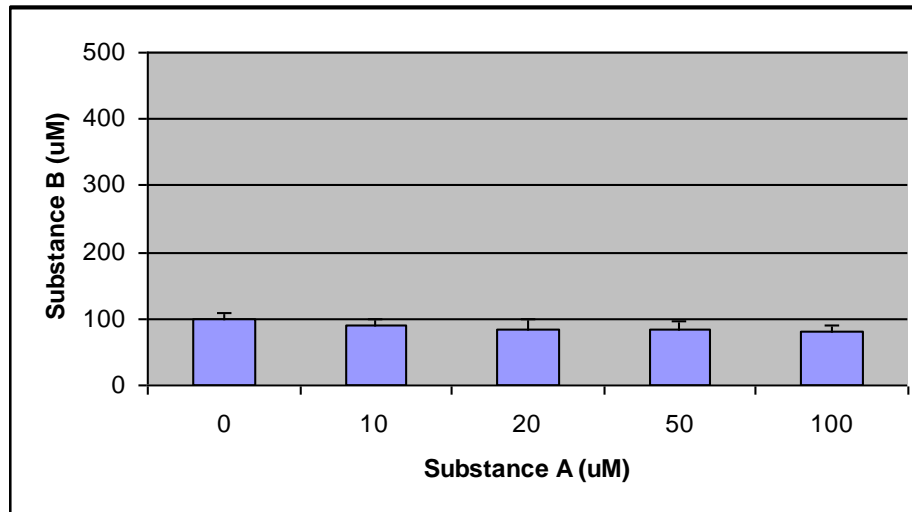


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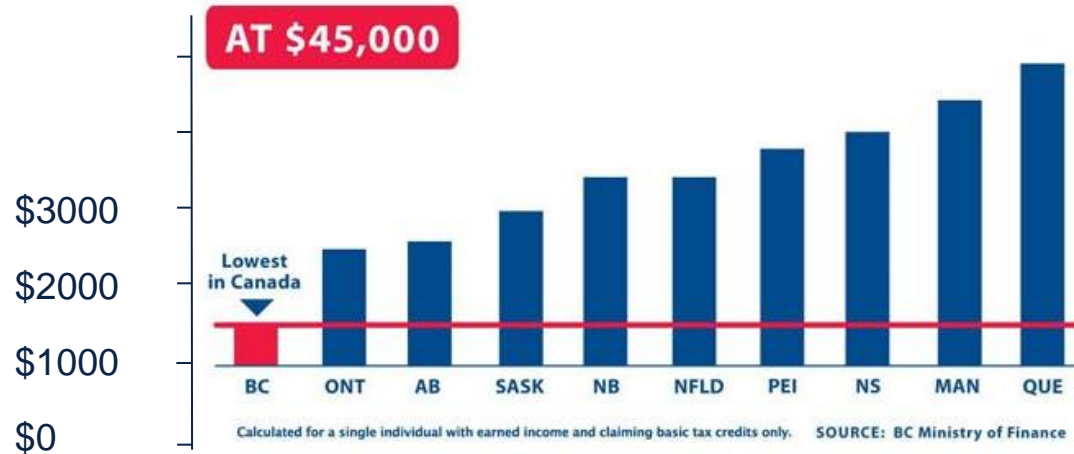
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Graphical data



PROVINCIAL PERSONAL INCOME TAXES



THE VANCOUVER SUN

Premier's tax charts misleading, deceptive, experts say

Made difference between B.C. and other provinces look greater than it is

BY CHAD SKELTON, VANCOUVER SUN OCTOBER 29, 2010



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Analyzing and Reporting Data

Statistical analysis

“Lies, damned lies, and statistics”



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Analyzing and Reporting Data

Statistical analysis

American Statistical Association:

- Use only appropriate methodologies suitable to the data
- Remain current
- Understand the theory, the data, and the methods
- Report assumptions
- Account for all data considered in a study
- Report the data cleaning and screening procedures used
- Address potential confounding variables
- Carefully consider statistical methods (or enlist statistical help) before research is undertaken



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Analyzing and Reporting Data

Interpretation, Discussion

Common errors (honest or otherwise)

- *post hoc or cum hoc, ergo propter hoc* (association \neq cause)
- *a posteriori* hypothesis presented as *a priori*
- not taking into account all factors
- not taking into account all data (yours or others)
- misleading or incomplete description of methods or materials



Ownership of Data (& Intellectual Property)

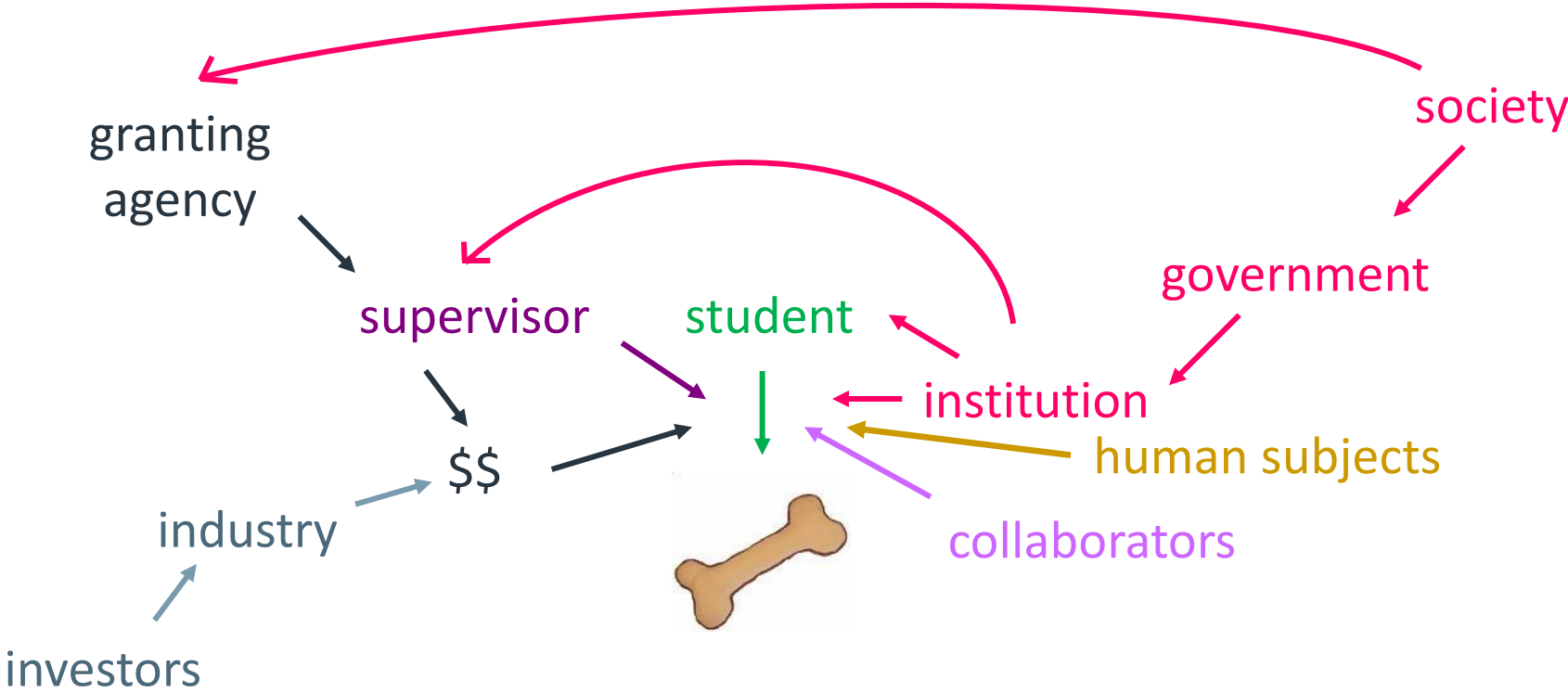


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Ownership of Data (& Intellectual Property)



Ownership of Data (& Intellectual Property)

- Research data usually belong to the institution or jointly by the institution and researcher(s)

Norms

- Individual researchers are generally permitted to have a copy of the study data (after subject identifiers are removed)



Ownership of Data (& Intellectual Property)

Use of data



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Sharing of Data (& Materials)



“An author’s obligation is...to release data and materials to enable others to verify or replicate published findings”

- NATIONAL RESEARCH COUNCIL OF *THE NATIONAL ACADEMIES*

UPSIDE

“the uniform principle for sharing integral data and materials expeditiously”



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Sharing of Data (& Materials)

Corollary Principles & Recommendations

- In publication, include whatever data is necessary to support claims and enable others to replicate them. If impractical, they should be accessible by other means
- Use publicly accessible repositories, if available, by the time of publication.
- Anticipate which materials are likely to be requested and indicate how to obtain them.
- If integral material is patented, provide under a licence for research use.
- It is not acceptable for provider of material to demand an exclusive license to commercialize a new substance from the material or to require collaboration or coauthorship



Sharing of Data (& Materials)

Corollary Principles & Recommendations

- Transfer of requested materials or data should occur within 60 days.
- If this doesn't happen, it is acceptable for the requestor to contact the journal, then the author's institution or funder.
- Recipients should acknowledge the source in publications





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