

Lecture 1: Learning Open Science

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Thank You

- A large debt to my former graduate students
- These talented, innovative young people are perfectly capable of telling me all the things I do wrong.

What is Open Science

- Making your work transparent to the community
 - Data
 - Code
 - Materials
 - Preregistration

Why Open Science

Do It For The Good of The Scientific Community



Why Not Open Science

- I don't want people to see that my data are messy
- I don't want people to know I code poorly
- I don't want people to know I am disorganized
- I might be unfairly criticized



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- **I might be fairly criticized**



Why Open Science

Do It For Yourself

- Fewer mistakes
- Less time reconstructing your workflow
- Make more judicious decisions
- Better understand the strengths and weaknesses of your research

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- Better understand the strengths and weaknesses of your research
- More self compassion

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Vulnerability and Self Compassion

https://www.ted.com/talks/brene_brown_the_power_of_vulnerability?language=en

You May Find That You Have:

- Programmed an experiment that does not randomize properly
- Analyzed the wrong data
- Waded through countless disorganized files to (not) find something

Q: So, what is your personal strategy for cutting down on mistakes?

Baldwin



"Which brings us to my next point."

Baldwin

- I am not a meticulous person



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Baldwin

- I am not a meticulous person
- I don't even like meticulous people



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"Which brings us to my next point."

Baldwin

- I am not a meticulous person
- I don't even like meticulous people
- Meticulousness works until it doesn't
- And when it doesn't, all there is left is a feeling of failure.



"Which brings us to my next point."

Me?

- I wrote a paper about minimizing mistakes in psychological science.
- After the paper was accepted, I emailed a zipped directory with the source, pdf, and all figures to the typesetter.
- I emailed the wrong version.
- Much thanks to Michele Nathan for catching this consequential error

Your Turn. Care to share?

Are Mistakes Common?

- How often are mistakes made.
- Malformed Tests, Nuijten, Hartgerink, Van Assen, Epskamp, & Wicherts (2016)
- Found just under half the papers in the last 30 years had at least one malformed test.
- Who knows the frequency of undetected errors in the literature

Are Mistakes Serious?

- S. J. Gould, *Mismeasure of Man*
- Whenever a scientist made a mistake in calculation, it almost invariably went in the direction of the scientists hypothesis
- Reason: People double and triple check results that go in their preferred direction.
- Mundane mistakes as QRPs.

Mistakes Stress Test

1. You collect data across several machines. You have just discovered that the keyboard in Room 3 is sticky, and it must be hit multiple times to record a single keystroke. You have no idea how long this condition has been in play, but are sure the keyboard was fine last year. Can you identify all the data that has been obtained in Room 3 this year for inspection?

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2. You have returned to a project after a long hiatus. You notice that the data have been previously cleaned by a colleague who, unfortunately, is no longer around. Do you have a system for recording these cleaning decisions?

3. The new colleague has just changed the refresh rates on just one of the computers to run her psychophysics experiment. She did so through the control panel and outside the experimental software. This is both possible and common in Windows and Mac OS. Unfortunately, the change affects the timing of the other experiments run on the same computer. Do you have a record of which sessions were run at which refresh settings?

Present You is Up Against Past You

- Your Most Important Collaborator? You, 12 months ago.
- Your Worst Collaborator? You, 12 months ago.
- Can present you really predict what future you will and won't remember in 12 months? How about in 15 years?

Topics For Today

- Theory of High Reliability Organizations
- A Lab Culture Focused on Mistakes
 - Standardization
 - Audit Trail
 - Coding, Integration, and Automatization
- Radical Open Science and Born Open Data
- Dealing With Vulnerability