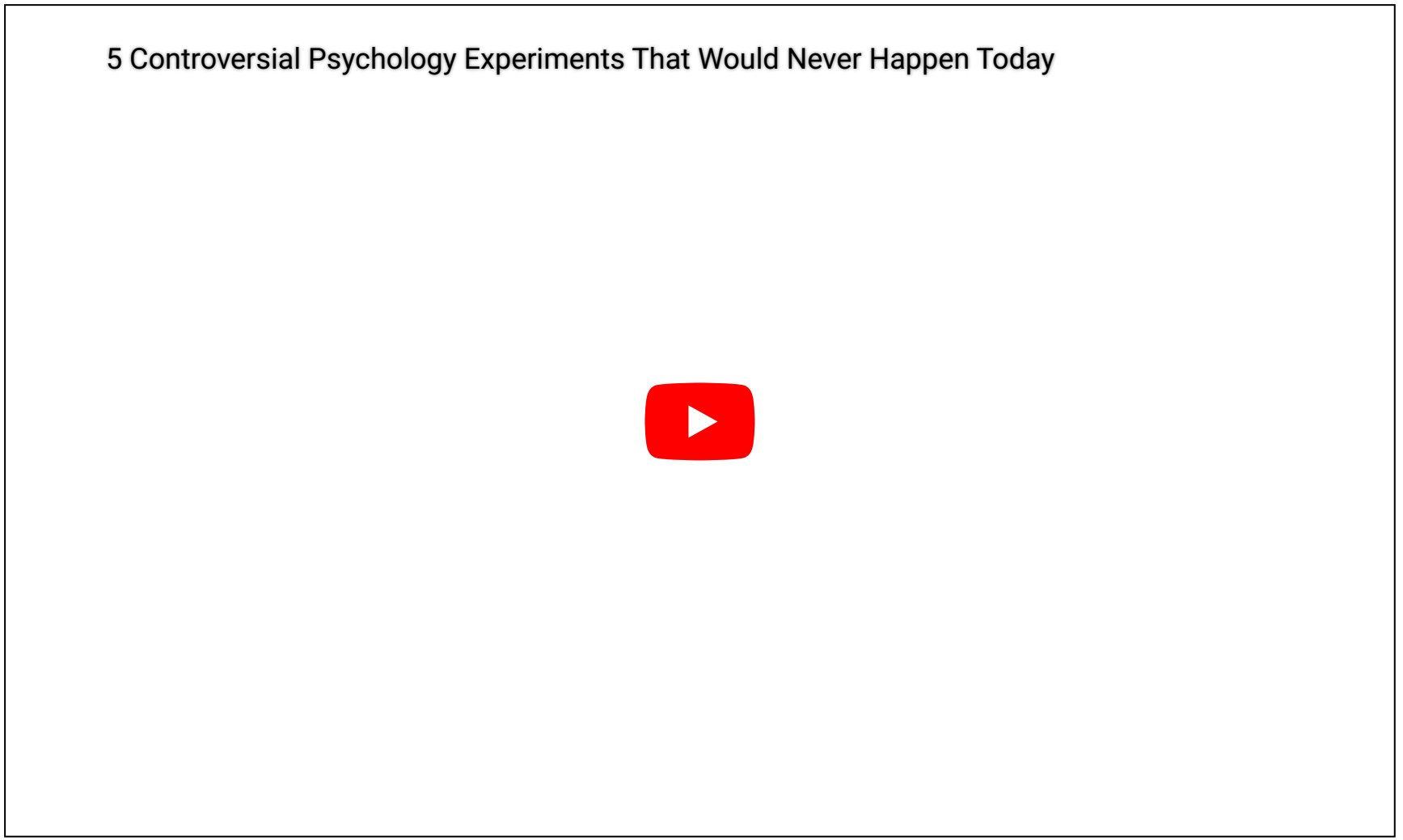
Ethics of Statistical Practice

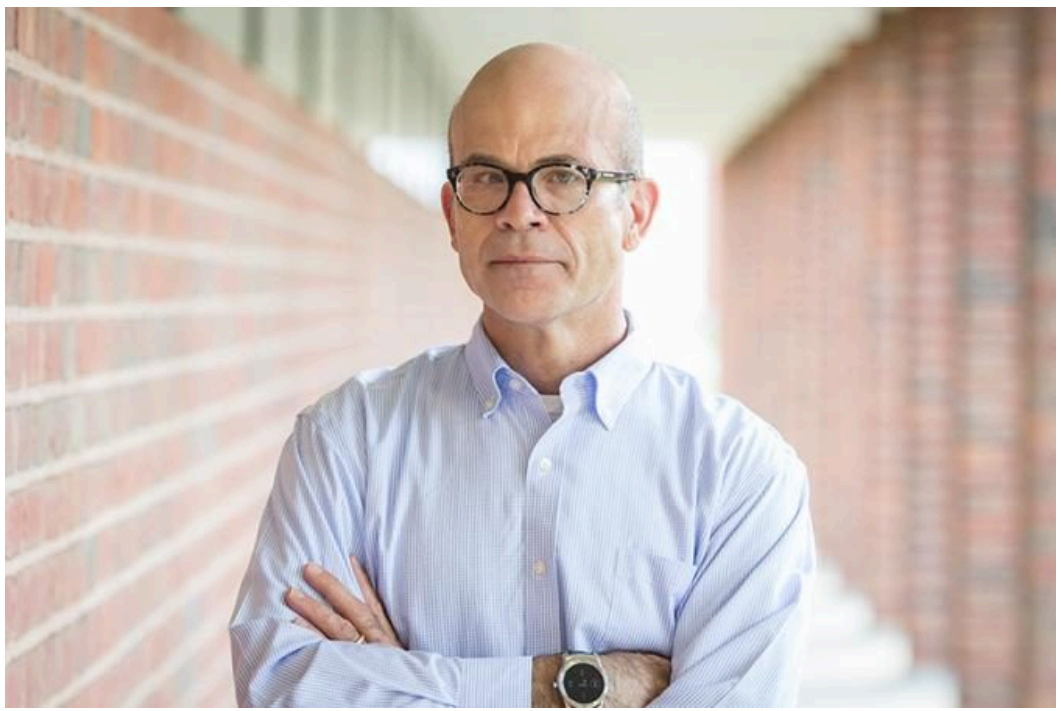
An Example Study



Do you have any concerns with this experiment?

Ethics in Statistics

Data Science professor at UVA, Rafael Alvarado, asked, "**Why are you acquiring data in the first place?** What is the business proposition, what is the scientific motivation? What [is the aspect of the] world that you are interested in studying or affecting, that you are acquiring data and doing analysis for? We call that the area of value because **that is where the purpose of working with data comes from… where data has an influence on the world, where it can either do good or harm… that is where ethics comes in.**"



Dimensions of Ethical Statistics

1. Ethical Statistical Practice
2. Recognizing and correcting unethical behavior in statistics

Dim 1: Ethical Statistical Practice

American Statistical Association Guidance on Ethical Practice:

- **Personal professional integrity and accountability**
- **Responsibilities to research subjects, data subjects, or those directly affected by statistical practices**
- **Integrity of data and methods**
- Responsibilities to stakeholders
- Responsibilities to members of multidisciplinary teams
- Responsibilities to fellow statistical practitioners and the profession
- Responsibilities of leaders, supervisors, and mentors in statistical practice
- Responsibilities regarding potential misconduct

Dim 1: Ethical Statistical Practice

Personal Integrity & Accountability:

- Take responsibility for your work
  - Disclose biases in data
  - Disclose how data was collected
  - Keep a copy of original data
- Support decision making with appropriate methodology
  - Let data (not personal biases) drive decision making
- Be truthful about your capabilities and activities

Dim 1: Ethical Statistical Practice

Responsibilities to research subjects:

Any study involving human subject must be approved by an Institutional Review Board (IRB) and must adhere to The Belmont Report - a 1978 report outlining ethical guidelines for studies:

1. Respect for persons - subjects must be treated as agents and give informed consent.
2. Beneficence – weigh potential benefit against potential harm. Benefit must outweigh the risk.
3. Justice - equal distribution of burdens and benefits of study. All the risk of negative outcome cannot be given to just one group.

Dim 1: Ethical Statistical Practice

Integrity of Data and Methods

- Data Integrity
  - Mitigate limitations, defects, or biases in the data
  - Data should be representative of whole population (if not then disclose it and state who your results apply to)
- Method Integrity
  - Every method has underlying conditions that should be met (if they are not, proceed with caution and warn of potential impacts)
  - Not clearly communicating how the data was analyzed
  - Communicate potential impacts on the interpretation, conclusions, recommendations, decisions, or other results of statistical practices.

Data Integrity & Accountability

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

Duke University's medical school. A dozen papers by a former researcher in the pulmonary, allergy and critical care department have been retracted since reports of falsified data surfaced. Madeline Gray for The New York Times

'U.S. News' Unranks 10 Colleges (for 2 Months)

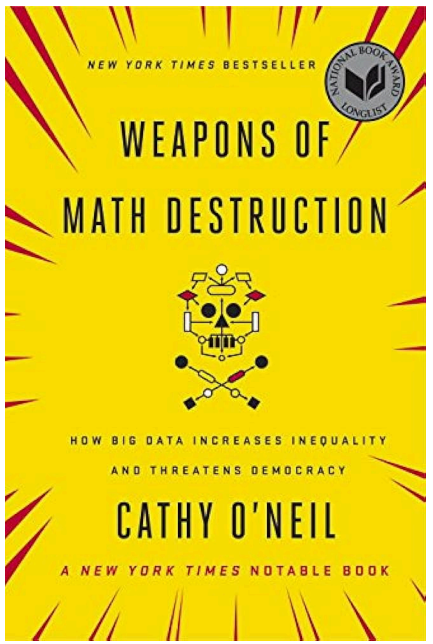
By Scott Jaschik · Published July 13, 2022

U.S. News & World Report has "unranked" 10 colleges for errors in the material they provided for rankings. However, the punishment of the colleges only lasts until the next ranking list is released, which will be this fall.

The colleges punished include Columbia University, which already announced that it is skipping the next rankings as it investigates allegations that its data were, on several points, false.

Dim 2: Recognizing Ethical Issues

Weapons of Math Destruction



- 3 characteristics to help recognize unethical data behavior:
  - Scale
  - Opacity (lacking transparency)
  - Damage

Dim 2: Recognizing Ethical Issues

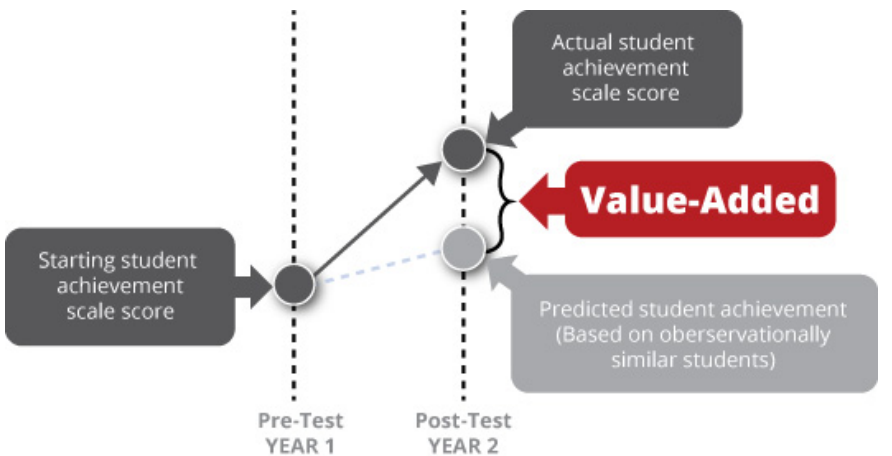
- Scale
  - data and algorithms (a set of rules to make a decision - typically derived from data) being used for a broad class of people
  - Issue: removing individuality and making individuals part of a “collective”
- Opacity
  - data & analyses that is not properly documented OR so complex that no one can understand what the decision rules are
  - Issue: You can’t evaluate discrimination, justice, fairness, etc.
- Damage
  - algorithms being used to make “big decisions” (admittance to school, firing, hiring, loans)
  - Issue: “big decisions” shouldn’t be solely based on algorithms

Example: Teacher Evaluations

Analysis Goal: Identify “bad” teachers

Analysis Tool: Value added model

- “statistical processes” developed by professional statisticians use data on a student’s past test scores and demographics to predict the student’s future test scores
- student’s actual score is then compared to the predicted score
- difference between the predicted and actual scores, if any, is assumed to be due to the teacher



Example: Teacher Evaluations

Discussion: How could value added models be unethically used?

- Scale
- Opacity
- Damage

Conclusions

We are NOT saying:

- Don’t use statistical analysis (and algorithms derived from data)
- All uses of data and algorithms are unethical

We ARE saying:

- Be careful in how you use the data you collect
- Evaluate the potential for good (and bad) of your study & analysis

Terminology

- Ethics in statistical practice
- Identifying ethical issues
- Scale
- Opacity
- Damage