

Bradley Voytek, Ph.D.
UC San Diego

Department of Cognitive Science
Halıcıoğlu Data Science Institute
Neurosciences Graduate Program

bvoytek@ucsd.edu
voyteklab.com

UC San Diego

COGS 9
Introduction to Data Science

Biases & Ethics (continued)

Facebook experiment:

Reviewing the main points

Today's Learning Objective

Determine how data scientists can address ethical concerns while maximizing privacy and minimizing harms.

The Facebook Study: Design

Two parallel experiments; 4 conditions (for each, $N = \sim 155,000$)

Experiment 1: Removing ☺ posts

- Treatment: Each ☺ post “had between a 10% & 90% chance (based on user ID) of being omitted...for that specific viewing.”
- Control: 10%–90% of 46.8% (i.e., 4.68%-42.12%) of eligible posts randomly removed w/o regard to emotional content

Experiment 2: Removing ☹ posts:

- Treatment: Each ☹ post “had between a 10% & 90% chance (based on user ID) of being omitted...for that specific viewing.”
- Control: 10%–90% of 22.4% (i.e., 2.24%-20.16%) of eligible posts randomly removed w/o regard to emotional content

The Facebook Study: Results

Compared to control subjects, subjects exposed to fewer ☺ posts subsequently in their own posts:

- Used 0.1% fewer ☺ words (Cohen's d = 0.02)
- Used 0.04% more ☹ words (Cohen's d = 0.001)
- Produced only 96.7% as many words overall

Compared to control subjects, subjects exposed to fewer ☹ posts subsequently in their own posts:

- Used 0.07% fewer ☹ words (Cohen's d = 0.02)
- Used 0.06% more ☺ words (Cohen's d = 0.008)
- Produced only 99.7% as many words overall

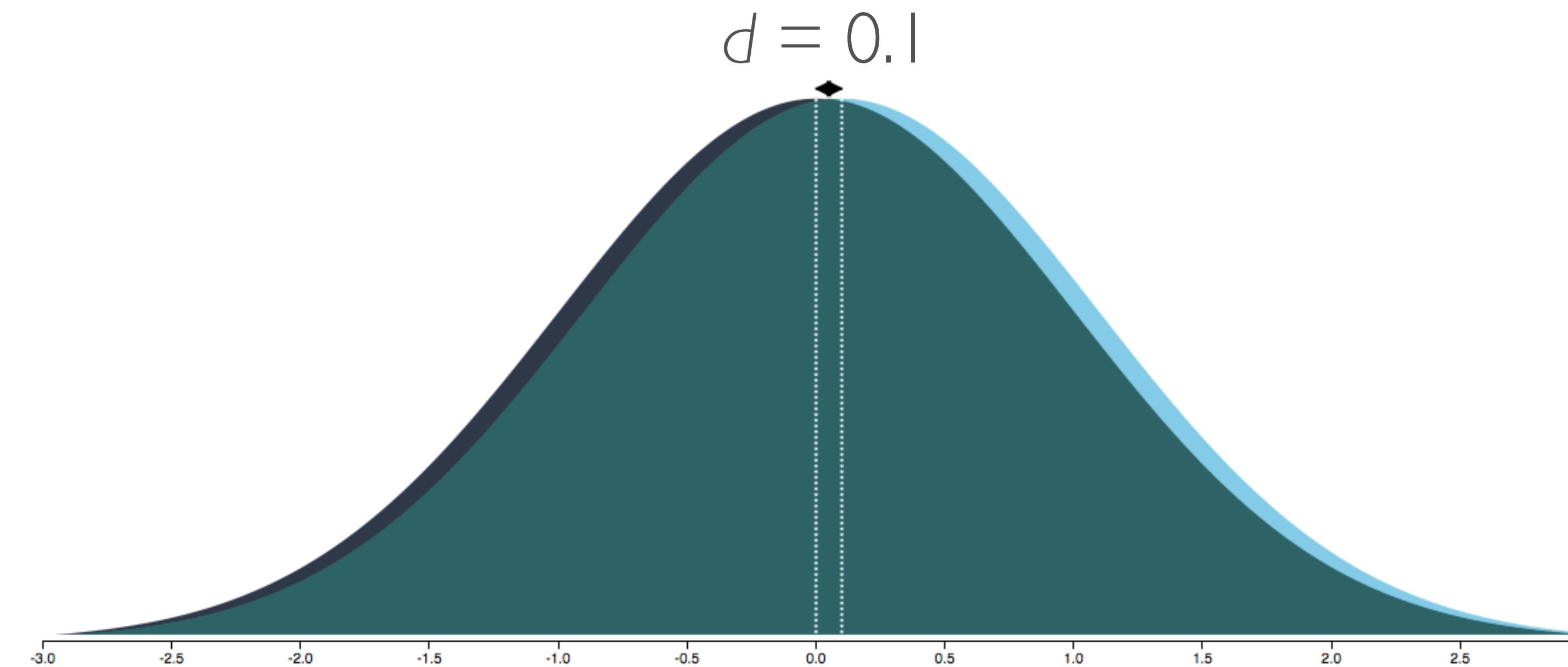
The Facebook Study: Results

Issues of methodology & interpretation:

- Questionable instrument: LIWC 2007
 - not intended for lengthy text
- Questionable coding: “I’m not having a great day.” “Oh great.”

The Facebook Study: Results

“First, these effects, while highly statistically significant, are tiny. The largest effect size reported had a Cohen’s d of 0.02—meaning that eliminating a substantial proportion of emotional content from a user’s feed had the monumental effect of shifting that user’s own emotional word use by two hundredths of a standard deviation.”



The Facebook Study: Results

“To put it in intuitive terms, the effect of condition in the Facebook study is roughly comparable to a hypothetical treatment that increased the average height of the male population in the United States by about one twentieth of an inch (given a standard deviation of ~2.8 inches). Theoretically interesting, perhaps, but not very meaningful in practice.”

The Facebook Study: Objections

- No **IRB review**
- No **informed consent** (except ToS)
- No **debriefing**
- Knowingly **psychologically harmed users**
 - *Guardian*: “deliberately made people sad”
 - *Slate*: “intentionally made thousands upon thousands of people sad”

The Facebook Study: IRB review

In the same manner that natural resources can be treated as a form of currency, human data has become a new currency in today's economy. However, most people don't know how to control their own data or what they're giving up in return for daily tech conveniences. The terms and conditions of personal data management are usually written in very complicated and confusing language, sometimes intentionally.

FACEBOOK SHOULDN'T CHOOSE WHAT STUFF THEY SHOW US TO CONDUCT UNETHICAL PSYCHOLOGICAL RESEARCH.

THEY SHOULD ONLY MAKE THOSE DECISIONS BASED ON, UH...

HOWEVER THEY WERE DOING IT BEFORE.

WHICH WAS PROBABLY ETHICAL, RIGHT?



Editorial Expression of Concern and Correction

PSYCHOLOGICAL AND COGNITIVE SCIENCES

PNAS is publishing an Editorial Expression of Concern regarding the following article: “Experimental evidence of massive-scale emotional contagion through social networks,” by Adam D. I. Kramer, Jamie E. Guillory, and Jeffrey T. Hancock, which appeared in issue 24, June 17, 2014, of *Proc Natl Acad Sci USA* (111:8788–8790; first published June 2, 2014; 10.1073/pnas.1320040111). This paper represents an important and emerging area of social science research that needs to be approached with sensitivity and with vigilance regarding personal privacy issues.

Questions have been raised about the principles of informed consent and opportunity to opt out in connection with the research in this paper. The authors noted in their paper, “[The work] was consistent with Facebook’s Data Use Policy, to which all users agree prior to creating an account on Facebook, constituting informed consent for this research.” When the authors prepared their paper for publication in PNAS, they stated that: “Because this experiment was conducted by Facebook, Inc. for internal purposes, the Cornell University IRB [Institutional Review Board] determined that the project did not fall under Cornell’s Human Research Protection Program.” This statement has since been [confirmed by Cornell University](#).

Obtaining informed consent and allowing participants to opt out are best practices in most instances under the US Department of Health and Human Services Policy for the Protection of Human Research Subjects (the “[Common Rule](#)”). Adherence to the Common Rule is [PNAS policy](#), but as a private company Facebook was under no obligation to conform to the provisions of the Common Rule when it collected the data used by the authors, and the Common Rule does not preclude their use of the data. Based on the information provided by the authors, PNAS editors deemed it appropriate to publish the paper. It is nevertheless a matter of concern that the collection of the data by Facebook may have involved practices that were not fully consistent with the principles of obtaining informed consent and allowing participants to opt out.

Inder M. Verma
Editor-in-Chief

Obtaining informed consent and allowing participants to opt out are best practices in most instances under the US Department of Health and Human Services Policy for the Protection of Human Research Subjects (the “[Common Rule](#)”). Adherence to the Common Rule is [PNAS policy](#), but as a private company Facebook was under no obligation to conform to the provisions of the Common Rule when it collected the data used by the authors, and the Common Rule does not preclude their use of the data. Based on the information provided by the authors, PNAS editors deemed it appropriate to publish the paper. It is nevertheless a matter of concern that the collection of the data by Facebook may have involved practices that were not fully consistent with the principles of obtaining informed consent and allowing participants to opt out.

Pledge for Responsible Data Science

- **I aim to provide a positive impact to our peers, community, and society as a whole, while minimizing harm, discrimination, or inequities that would result as a consequence of my work.**
- **I respect privacy and will adhere to localized laws and governance of personal information.**
- **I am rigorous, scientific, and strive to ensure my work is accurate and reflective of the truth to the best of my ability.**
- **I am transparent and will make my intentions clear with how I use personal information. I am proactive in communicating when there are risks to the above.**

What is “informed consent”?

Individuals know:

- How will their data will be used
- What are the risks and benefits
- What are the consequences

Individuals can:

- Withdraw consent at any time
- Have their data removed

When *isn't* consent required?

I. When minimal risk research can't otherwise be conducted.

or

2. When an activity is designed to assure or improve quality rather than contribute to generalizable knowledge, in which case it doesn't meet the Common Rule's definition of "research," (45 C.F.R. § 46.102(d))

The Facebook experiments fit (1) and could easily have been repackaged to fit (2).

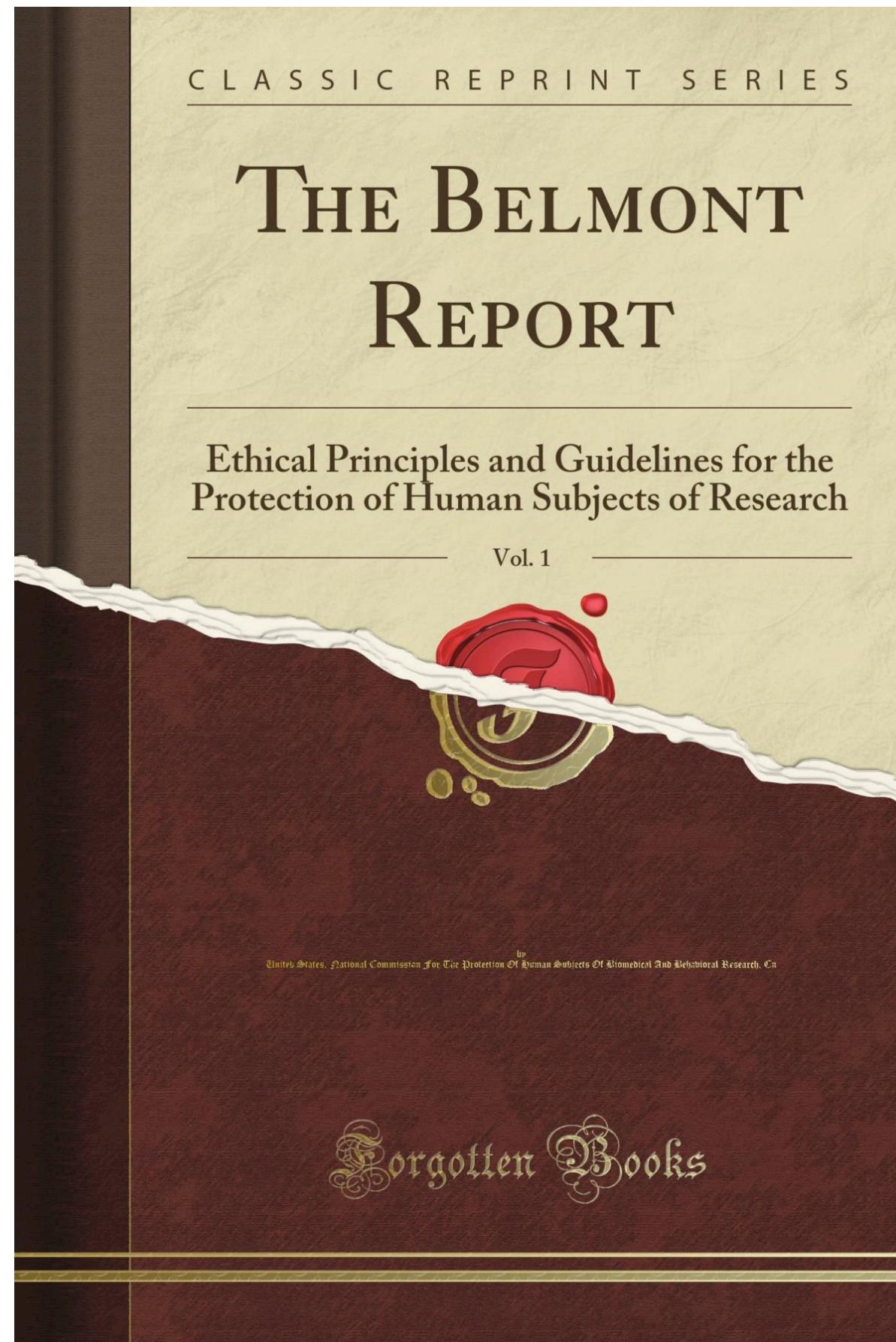
The Common Rule

The Federal Policy for the Protection of Human Subjects

- Requirements for assuring compliance by research institutions
- Requirements for researchers' obtaining and documenting informed consent
- Requirements for Institutional Review Board (IRB) membership, function, operations, review of research, and record keeping.
- Protections for certain vulnerable research subjects
 - pregnant women
 - *in vitro* fertilization and fetuses
 - prisoners
 - children

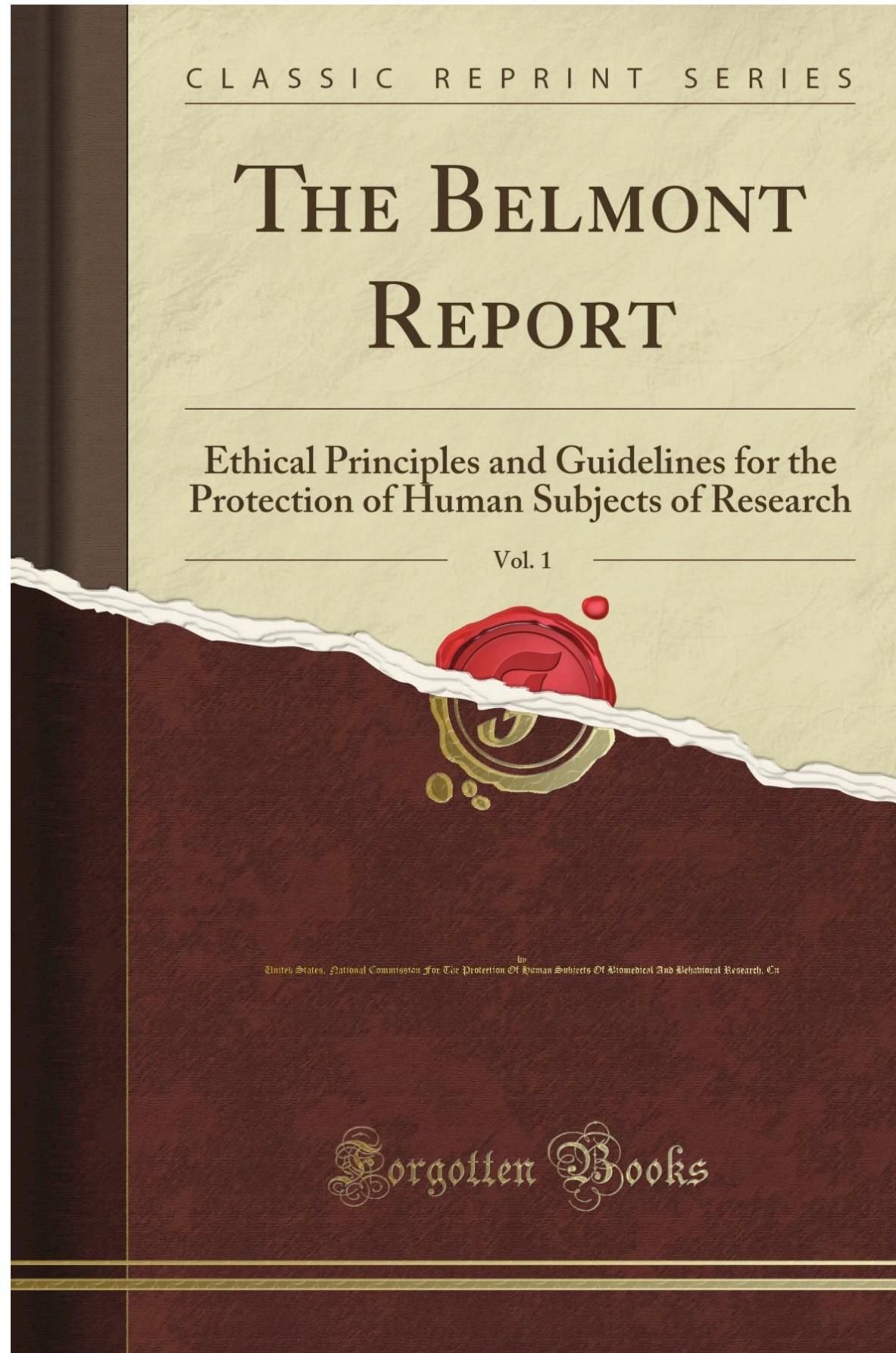
Why are those populations
considered to be “vulnerable”?

The Belmont Report



The Belmont Report, published in 1974 by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, is a statement of basic ethical principles and guidelines that should assist in resolving the ethical problems that surround the conduct of research with human subjects.

The Belmont Report



The Belmont Report presents three principles that today serve as basic concepts in the conduct of research with human subjects:

- Respect for Persons
- Beneficence
- Justice

The principles are intended to "assist scientists, subjects, reviewers and interested citizens to understand the ethical issues inherent in research involving human subjects." It is generally accepted that the principles share equal weight, and the evaluation and conduct of human subjects research are done in the context of all three.

Respect for persons and informed consent

Don't "withhold information necessary to make a considered judgment,
when there are no compelling reasons to do so."

"In **most** cases of research involving human subjects, respect for persons demands that subjects enter into the research voluntarily and with adequate information. In some situations, however, **application of the principle is not obvious.**"

Respect for persons and informed consent

“A special problem of consent arises where informing subjects of some pertinent aspect of the research is likely to impair the validity of the research. In many cases, it is sufficient to indicate to subjects that they are being invited to participate in research of which some features will not be revealed until the research is concluded.”

Beneficence and risk/benefit analysis

“Persons are treated in an ethical manner not only by respecting their decisions and protecting them from harm, but also by **making efforts to secure their well-being**.”

“Beneficence... requires that we protect against risk of harm to subjects and also that we be **concerned about the loss of the substantial benefits that might be gained from research**.”

Beneficence and risk/benefit analysis

“Research also makes it possible to avoid the harm that may result from the application of previously accepted routine practices that on closer investigation turn out to be dangerous.”

“[E]stimates of the probability of harm [must be] reasonable, as judged by known facts or other available studies.”

Justice

“Who ought to receive the benefits of research and bear its burdens? This is a question of justice, in the sense of "fairness in distribution" or "what is deserved..."

“An **injustice** occurs when some benefit to which a person is entitled is denied without good reason or when some burden is imposed unduly....

“Another way of conceiving the principle of justice is that equals ought to be treated equally.”

Justice

“...the selection of research subjects needs to be scrutinized in order to determine whether some classes (e.g., welfare patients, particular racial and ethnic minorities, or persons confined to institutions) are being systematically selected simply because of their easy availability, their compromised position, or their manipulability, rather than for reasons directly related to the problem being studied.”

Justice

“Finally, whenever research supported by public funds leads to the development of therapeutic devices and procedures, **justice demands** both that these not provide advantages only to those who can afford them and that such research should not unduly involve persons from groups unlikely to be among the beneficiaries of subsequent applications of the research.”

The Facebook Study: Legality

Why Isn't Informed Consent Always Legally Or Ethically Required for Human Subjects Research?

- Because research ethics is informed by more than the principle of *respect for persons' autonomy*.
- It's also informed by *beneficence and justice*.
- Balancing these principles yields exceptions to informed consent.

Respect for persons and informed consent

“In all cases of research involving incomplete disclosure, such research is justified only if it is clear that (1) incomplete disclosure is truly necessary to accomplish the goals of the research, (2) there are no undisclosed risks to subjects that are more than minimal, and (3) there is an adequate plan for debriefing subjects, when appropriate, and for dissemination of research results to them.”

Where does that leave us?

“The world is just the A of the A/B test”

— Duncan Watts, Oct. 2014, MIT CodeCon Conference

Facebook has been accused of abusing its power by experimenting, but the alternative is to use its power to set A without knowing A's effects on users.

When do companies have an ethical duty to conduct an experiment as part of quality assurance?

Where does that leave us?

What's the real “experiment” (in the sense of exposure to (un)known risks)?

Subjecting ~310,000 to A/B testing or 1 billion to A? Who are the real guinea pigs?

To avoid badly biased results, FB “withheld information necessary [for users] to make a considered judgment” about whether to participate in the experiment. The alternative was not producing (and hence withholding) data about FB’s everyday risks.

Where does that leave us?

When subjects bear little or no incremental risk from research and stand to benefit from its results, we should take a cue from the *Belmont Report* and the Common Rule.

We're all in these practices — social media, health care — together. Let's make sure they're safe and effective.

Remember...

Data points often represent
people

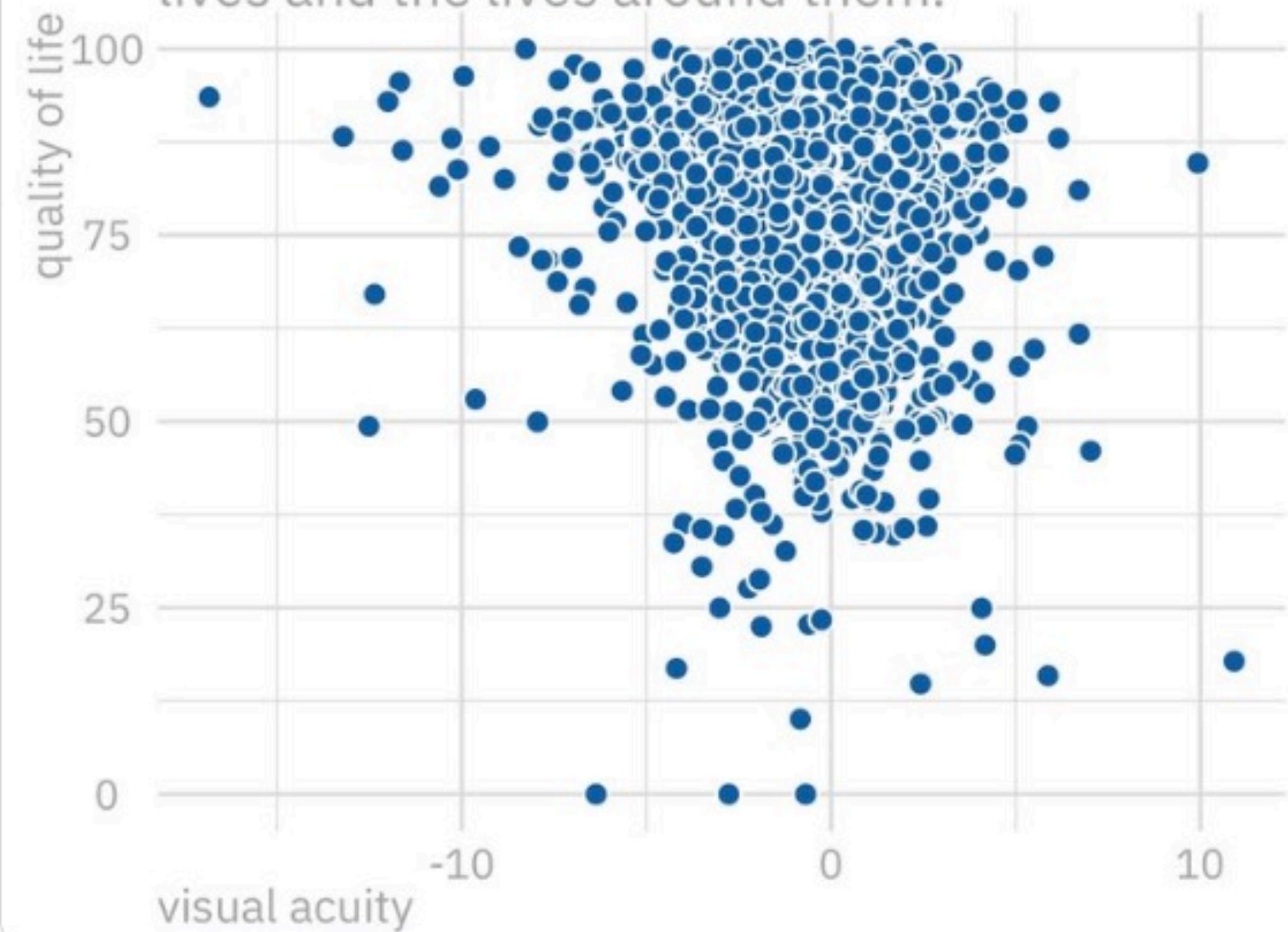


Malcolm Barrett
@malco_barrett

I created a function in my personal `#rstats` package to remind me that, whatever I'm working on, those points represent real people, and if I forgot, I'm a dummy. Plan to incorporate into my regular workflow

These are real people, you dummy

They aren't just data points. Changes in their health have actual impacts on their lives and the lives around them.



What to do?

Example Data Science Ethics Checklist

- Is your team biased?
- Data collection avoid sampling bias?
- Are the data biased?
- Informed consent obtained for all participants?
- Can one's data be removed on request?
- Does our analysis discriminate?
- Is our analysis transparent?
- What are the negative or unintended consequences of our findings?
- Do we have a plan to check for biases going forward and update our algorithm?

You will need to consult
this checklist during your
Final Project!

So data are often people

What can we do with those data?