

# Welcome (Again!) to MATH 4100/COMP 5360– Introduction to Data Science

## Data Science Ethics

February 14, 2023

While we are waiting for class to start, think  
about your answer to:

*What are ethics?*

# **What are ethics?**

# What are ethics?

- Shared principles and values that help us distinguish right from wrong.
- Cornerstone of civilization
- The basis for the rules we all voluntarily choose to follow for the betterment of all of us.

# Example: We don't steal due to our ethics.

- Even if we can get away with it!



Adapted from Dr. H.V. Jagadish Data Science Ethics at Future Learn  
Image from <https://openclipart.org/image/2000px/313728>

# Ethics are not Laws

Is it **legal** for me to lie to you?

Is it **ethical**?

# Ethics are not Laws

Is it **legal** for me to lie to you?

Is it **ethical**?

- Just because something is legal, does not mean it is ethical.
- Just because something is ethical, does not mean it is legal.

**Ethics are something you have to  
decide for yourself.**

**Ethics are something you have to  
decide for yourself.**

**...but often policies follow agreed  
upon ethics.**

# Abuses of human subjects in biomedical research led to modern codes of research ethics

Nazi experimentation on WWII concentration camp prisoners.

- Nuremberg Code
- Declaration of Helsinki



Image from  
[http://broughttolife.sciencemuseum.org.uk/broughttolife/techniques/  
nurembergcode](http://broughttolife.sciencemuseum.org.uk/broughttolife/techniques/nurembergcode)

# Abuses of human subjects in biomedical research led to modern codes of research ethics

Nazi experimentation on WWII concentration camp prisoners.

- Nuremberg Code
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USA, Tuskegee Study of Untreated Syphilis in Black Men

- National Commission for the Protection of Human Subjects of Biomedical & Behavior Research
- Belmont report

# When did these experiments come to an end?



**Nuremburg hearings on Nazi concentration camp experiments**

Image from

<http://broughttolife.sciencemuseum.org.uk/broughttolife/techniques/nurembergcode>



**Tuskegee Study of Untreated Syphilis in Black Men**

[https://en.wikipedia.org/wiki/Tuskegee\\_syphilis\\_experiment#/media/File:Tuskegee-syphilis-study\\_doctor-injecting-subject.jpg](https://en.wikipedia.org/wiki/Tuskegee_syphilis_experiment#/media/File:Tuskegee-syphilis-study_doctor-injecting-subject.jpg)

# Abuses of human subjects in biomedical research led to modern codes of research ethics

Nazi experimentation on WWII concentration camp prisoners.

- Nuremberg Code (1947)
- Declaration of Helsinki (1964)

USA, Tuskegee Study of Untreated Syphilis in Black Men

- National Commission for the Protection of Human Subjects of Biomedical & Behavior Research (1974)
- Belmont report (1979)

**“But we’re data scientists.”**

**“We’re not doing medical experiments”**

**“But we’re data scientists.”**

**“We’re not doing medical experiments”**

**There are risks beyond medical experiments.**

# Social science research also shown to carry risks of harm

- Milgram's Obedience to Authority study



## Public Announcement

**WE WILL PAY YOU \$4.00 FOR  
ONE HOUR OF YOUR TIME**

### **Persons Needed for a Study of Memory**

\*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

\*Each person who participates will be paid \$4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

\*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

\*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

\*You will be paid \$4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

TO:

PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY,  
YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in  
this study of memory and learning. I am between the ages of 20 and  
50. I will be paid \$4.00 (plus 50c carfare) if I participate.

NAME (Please Print). . . . .

ADDRESS . . . . .

TELEPHONE NO. . . . . Best time to call you . . . . .

AGE . . . . . OCCUPATION . . . . . SEX . . . . .

CAN YOU COME:

WEEKDAYS . . . . . EVENINGS . . . . . WEEKENDS . . . . .

Adapted from CITI Program, Image from  
<http://content.time.com/time/health/article/0,8599,1867735,00.html>

# Social science research also shown to carry risks of harm

- Milgram's Obedience to Authority study (1961)
- Zimbardo's Stanford Prison experiment (1971)



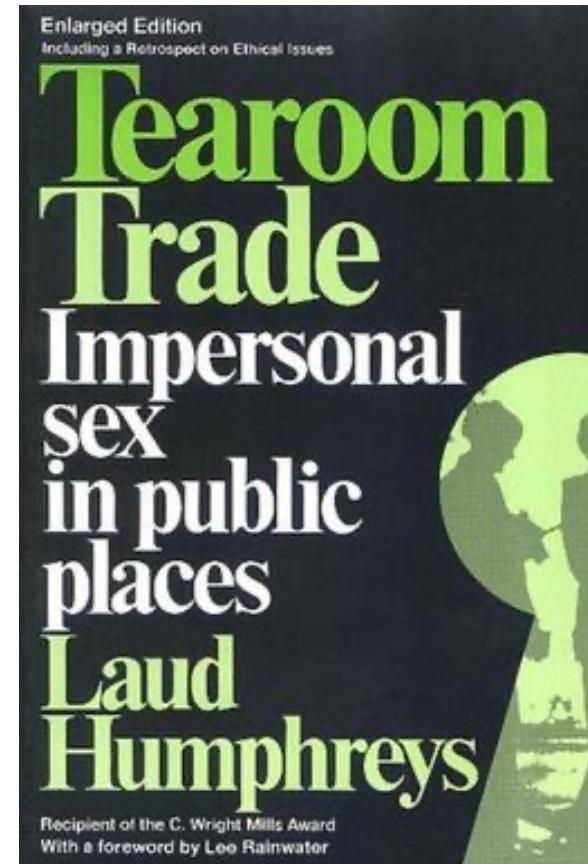
Adapted from CITI Program, image from  
<https://www.insidehighered.com/news/2018/06/20/new-stanford-prison-experiment-revelations-question-findings>

# Social science research also shown to carry risks of harm

- Milgram's Obedience to Authority study (1961)
- Zimbardo's Stanford Prison experiment (1971)
- Humphreys' Tearoom Trade study (1970)

Risks:

- Psychological well-being
- Privacy
- Autonomy
- Reputation



# “Tastes, Ties, and Time” Study

THE CHRONICLE OF HIGHER EDUCATION NEWS OPINION AD

≡ SECTIONS FEATURED: [The Latest on the Coronavirus and Higher Ed](#) [Supporting Students Through a Stressful Transition](#)

TECHNOLOGY [f](#) [t](#) [e](#) [p](#) [73](#)

## Harvard Researchers Accused of Breaching Students' Privacy

Social-network project shows promise and peril of doing social science online



Adapted from CITI Program, “Five Ethical Provocations in HCI Research” (Brown et al. 2016), & <https://www.chronicle.com/article/Harvards-Privacy-Meltdown/128166>

Collected data about students, matching Facebook data and university records.

Dataset was released publicly with names removed.

➤ However, it was not difficult to de-anonymize.

Students were not informed of this study.

**Would you be comfortable with this?**

**What if it was your internet search history?**

# “Tastes, Ties, and Time” Study

THE CHRONICLE OF HIGHER EDUCATION    NEWS    OPINION    AD

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TECHNOLOGY

     73

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Collected data about students, matching Facebook data and university records.

- Student workers helped collect the Facebook data, some of whom may have privileged access to Harvard-only groups and settings

Dataset was released publicly with names removed.

- However, it was not difficult to de-anonymize.

Students were not informed of this study.

**Would you be comfortable with this?**

**What if it was your internet search history?**

# Who owns data? Who controls data?

**Getty Images is suing the creators of AI art tool Stable Diffusion for scraping its content** / Getty Images claims Stability AI ‘unlawfully’ scraped millions of images from its site. It’s a significant escalation in the developing legal battles between generative AI firms and content creators.

By [JAMES VINCENT](#)

Jan 17, 2023, 3:30 AM MST | [□](#)



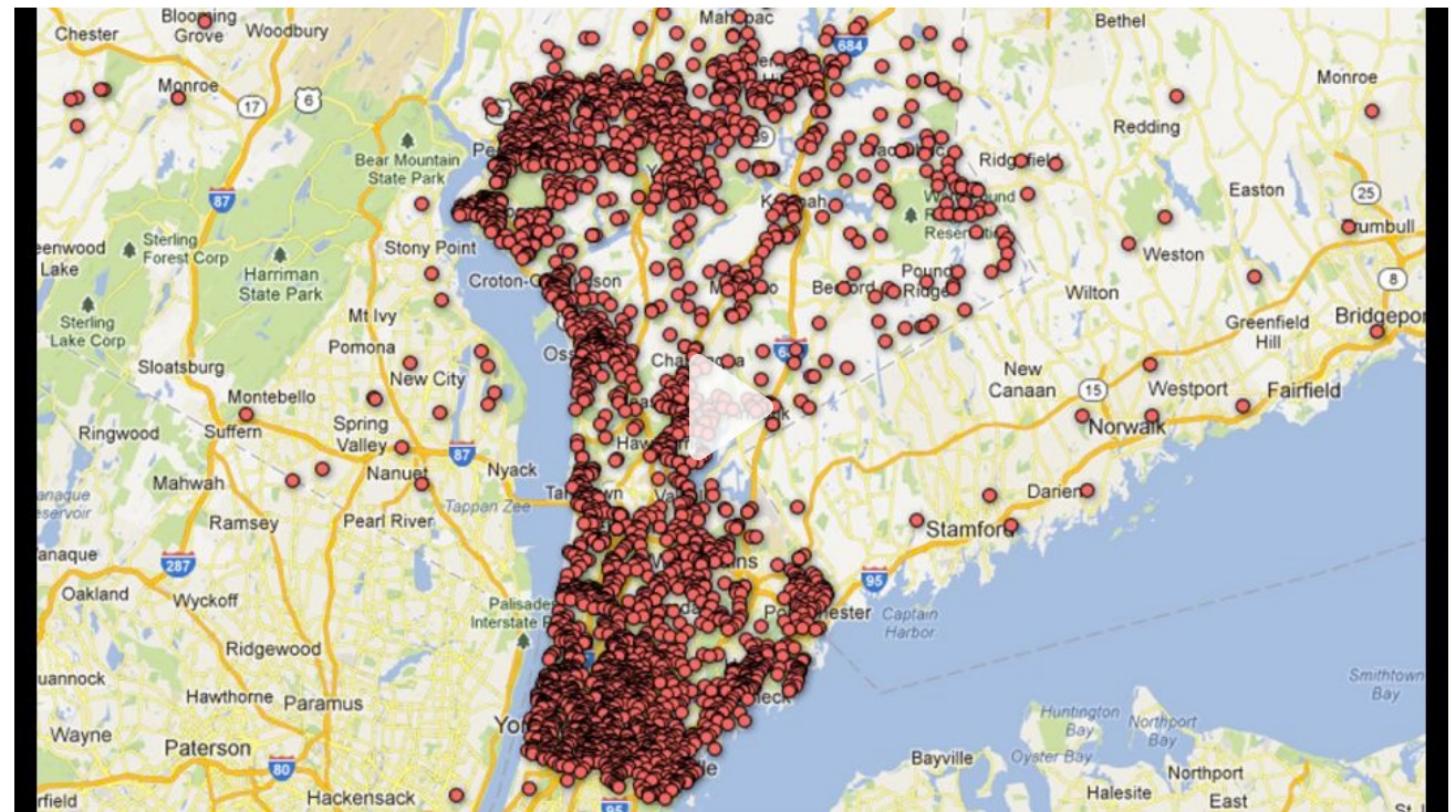
# Who owns data? Who controls data?

# What's private?

# Newspaper sparks outrage for publishing names, addresses of gun permit holders

KC Maas and Josh Levs, CNN

Updated 10:23 AM EST, Thu December 27, 2012



Newspaper's gun permit map causes outcry

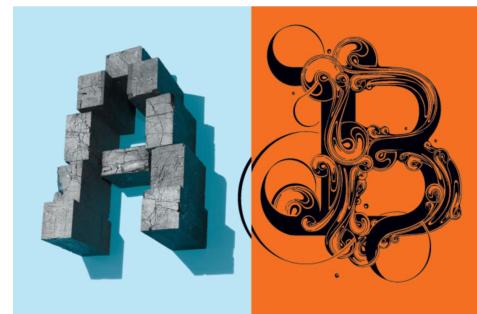
#### Video Ad Feedback

02:40 - Source: [CNN](#)

# Is Facebook purposefully making you sad?

Facebook experiment biased shown posts to be either more positive or more negative to see how users would react.

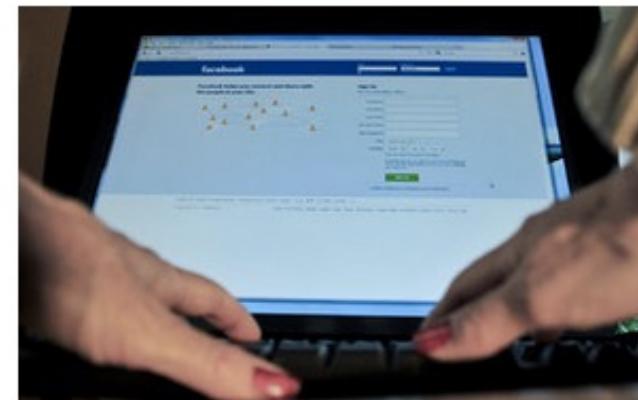
Is this “just an A/B test”?



TECHNOLOGY

## ***Facebook Tinkers With Users’ Emotions in News Feed Experiment, Stirring Outcry***

By VINDU GOEL JUNE 29, 2014



Facebook revealed that it had altered the news feeds of over half a million users in its study. Karen Bleier/Agence France-Presse — Getty Images

To [Facebook](#), we are all lab rats.

Facebook routinely adjusts its users’ news feeds — testing out the number of ads they see or the size of photos that appear — often without their knowledge. It is all for the purpose, the company says, of creating a more alluring and useful product.

But last week, Facebook revealed that it had manipulated the news feeds of over half a million randomly selected users to change the number of positive and negative posts they saw. It was part of a psychological study to

# Ethical Principles in Human Subjects Research

The Belmont Report put forth three key principles:

- Respect for persons
- Beneficence
- Justice



# Respect for Persons

*“individuals should be treated as autonomous agents, and second, that persons with diminished autonomy are entitled to protection”*

- **Autonomy** means people must be able to make informed decisions about their actions and well-being.
- Participation in research should be **Voluntary at all times**.
- **Informed Consent** is the process by which people exercise their autonomy to volunteer to participate.
- Included in the informed consent should be notification of any risks or harm that could occur.

# Beneficence

*Beneficence is an obligation to not only protect participants from harm, but “maximize possible benefits and minimize possible harms.”*

Common risks in non-medical research can include:

- Psychological distress
- Fatigue
- Loss of privacy
- Reputational harm

# Justice

*Justice is an obligation that those who bear the burdens of the research should not differ from those who receive the benefits.*

Historically, often the poor participated in the experiments while the rich received the rewards.

Similarly, prisoners have been used as subjects with no hope of receiving the rewards.

# Research experiments with human subjects require ethical review

Research organizations, like the University of Utah, have **Institutional Review Boards (IRB)** which must approve of proposed research before it can go forward.



The IRB considers the **balance** of respect for persons, beneficence, and justice when making their determination.

- Review includes informed consent documents
- Harms and benefits included in application
- Handling of personally identifiable information (privacy) also considered.

**IRB approval **does not** mean an experiment is ethical.**

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**Lack of IRB approval **does not** mean an experiment is unethical.**

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*IRB approval indicates to the scientific community that a panel of experts found the experiment to be consistent with ethical standards.*

# IRB approval does not mean an experiment is ethical.

The New York Times

LOG IN

TECHNOLOGY

## *Facebook Tinkers With Users' Emotions in News Feed Experiment, Stirring Outcry*

By VINDU GOEL JUNE 29, 2014

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To [Facebook](#), we are all lab rats.

Facebook routinely adjusts its users' news feeds — testing out the number of ads they see or the size of photos that appear — often without their knowledge. It is all for the purpose, the company says, of creating a more alluring and useful product.

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Facebook revealed that it had altered the news feeds of over half a million users in its study. Karen Bleier/Agence France-Presse — Getty Images

*This allegedly had IRB approval at one point...*

# But...

*Is Facebook trying to make you sad?*

IRB only consulted after experiment was run.  
Unclear if consent was in terms of service.

- Is consent in terms of service informed consent?

TECHNOLOGY

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# Some initial concerns...

The following issues are frequent:

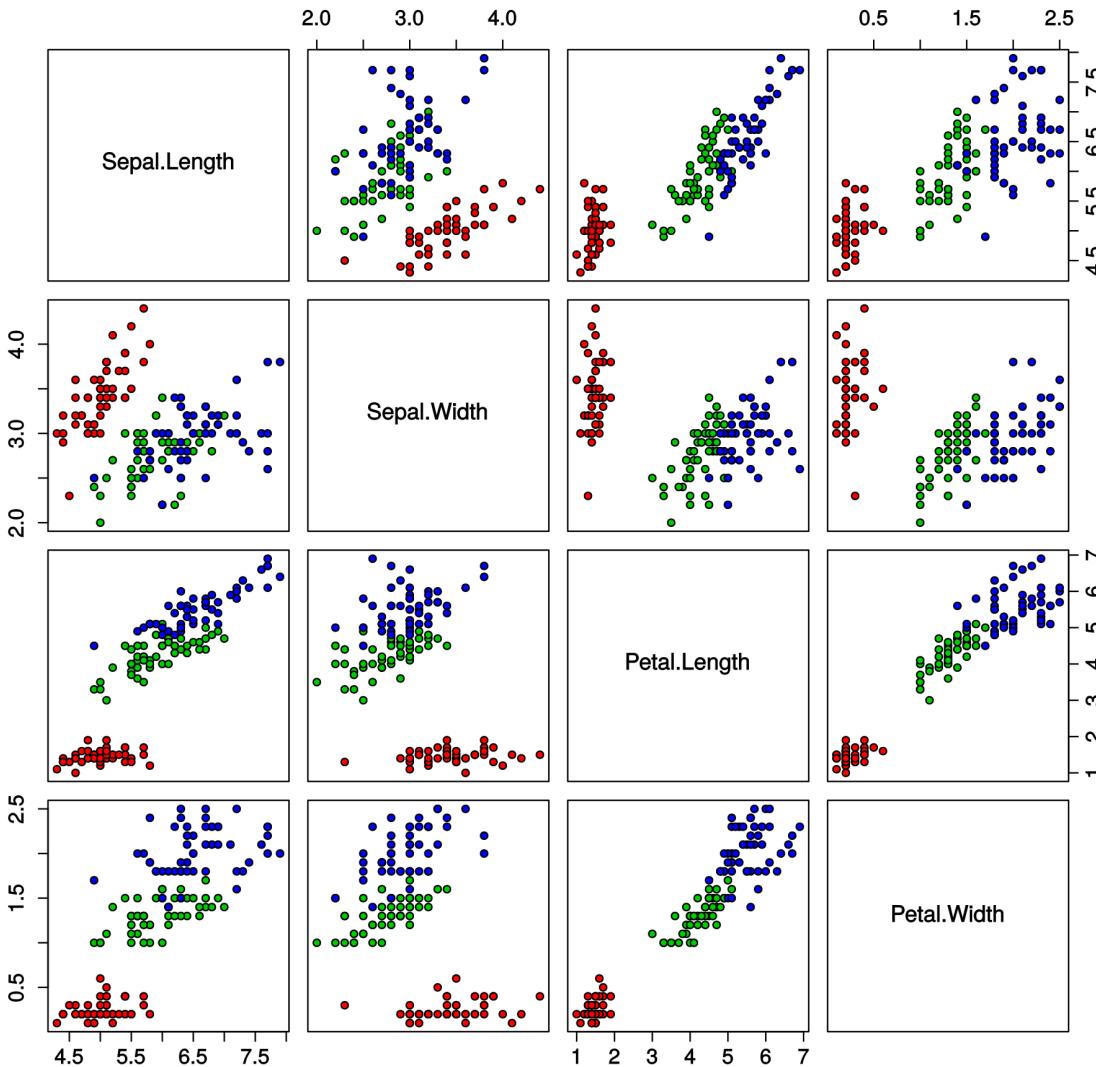
- Privacy, particularly in light of personalization & social media.
- Informed consent and volunteering
- Psychological well-being
  - With personal data or in special settings (e.g., medical apps & devices)
  - Frustration, Fatigue, Discovering you are color blind
- Applicability across cultural and demographic groups

# **Data Science and Societal Consequence**

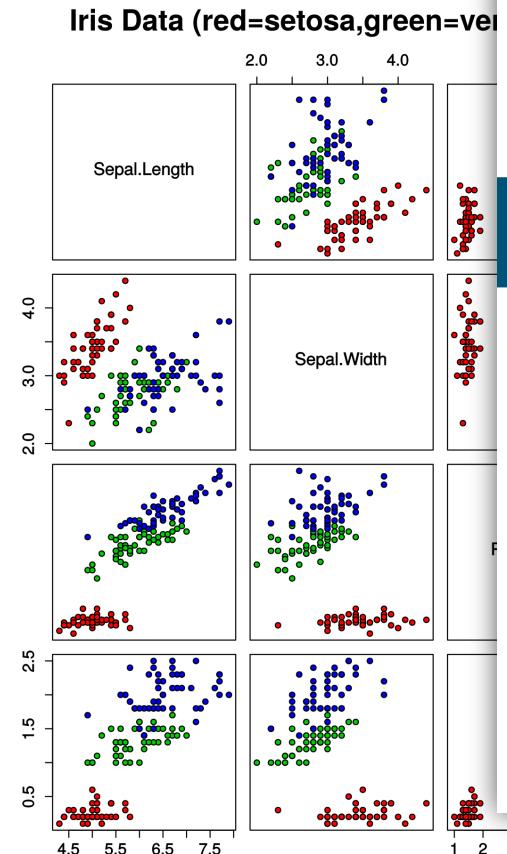
# Show of hands: How many of you are familiar with the Iris dataset?



Iris Data (red=setosa,green=versicolor,blue=virginica)



# Do you know where Fisher's iris data set was initially published?



Annals of Eugenics / Volume 7, Issue 2 / p. 179-188

Free Access

## THE USE OF MULTIPLE MEASUREMENTS IN TAXONOMIC PROBLEMS

R. A. FISHER Sc.D., F.R.S.

First published: September 1936

<https://doi.org/10.1111/j.1469-1809.1936.tb02137.x>

Citations: 8,332

About

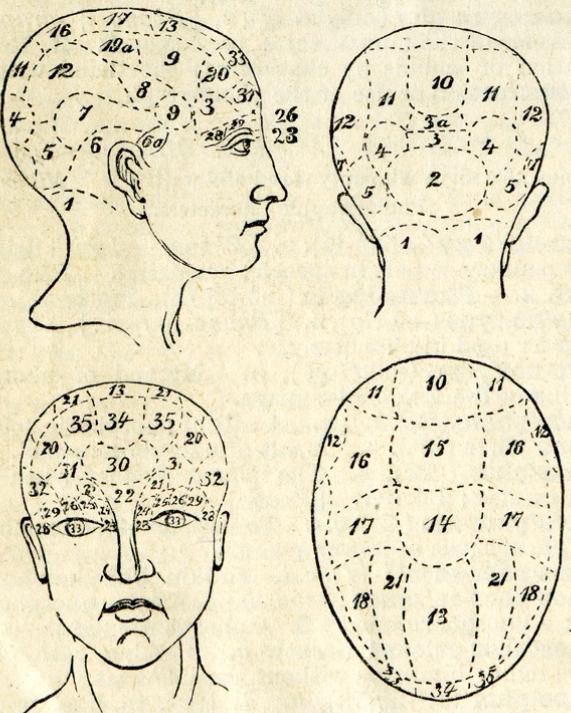


## Abstract

The articles published by the Annals of Eugenics (1925–1954) have been made available online as an historical archive intended for scholarly use. The work of eugenicists was often pervaded by prejudice against racial, ethnic and disabled groups. The online publication of this material for scholarly research purposes is not an endorsement of those views nor a promotion of eugenics in any way.

# Phrenology, 1895

**Phren/o-logy** (-nōl'ō-jy), *n.* [Gr. φρήν, φρενός + -logy.] **1.** Science of the special functions of the several parts of the brain, or of the supposed connection between the faculties of the mind and organs in the brain. **2.** Physiological hypothesis that mental faculties, and traits of character, are shown on the surface of the head or skull; craniology. — **Phren/o-gist**, *n.* — **Phren/o-log'ic** (frēn'ō-lōj'ik), **Phren/o-log'ic-al**, *a.*

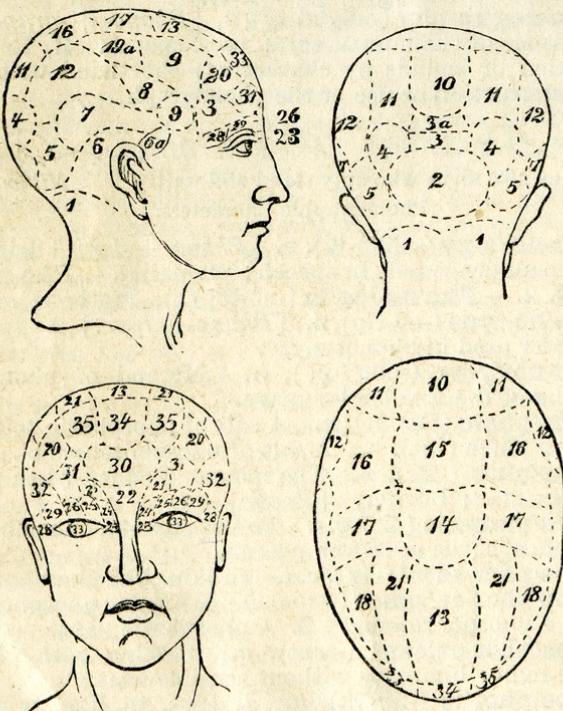


A Chart of Phrenology.

**1** Amativeness ; **2** Philoprogenitiveness ; **3** Concentrateness ; **3 a** Inhabitiveness ; **4** Adhesiveness ; **5** Combativeness ; **6** Destructiveness ; **6 a** Alimentiveness ; **7** Secretiveness ; **8** Acquisitiveness ; **9** Constructiveness ; **10** Self-esteem ; **11** Love of Approbation ; **12** Cautiousness ; **13** Benevolence ; **14** Veneration ; **15** Firmness ; **16** Conscientiousness ; **17** Hope ; **18** Wonder ; **19** Ideality ; **19 a** (Not determined) ; **20** Wit ; **21** Imitation ; **22** Individuality ; **23** Form ; **24** Size ; **25** Weight ; **26** Coloring ; **27** Locality ; **28** Number ; **29** Order ; **30** Eventuality ; **31** Time ; **32** Tune ; **33** Language ; **34** Comparison ; **35** Causality. [Some raise the number of organs to forty-three.]

# Phrenology, 2016

**Phren/o-logy** (-nōl'ō-jē), *n.* [Gr. φρήν, φρενός + -logy.] **1.** Science of the special functions of the several parts of the brain, or of the supposed connection between the faculties of the mind and organs in the brain. **2.** Physiological hypothesis that mental faculties, and traits of character, are shown on the surface of the head or skull; craniology. — **Phren/o-gist**, *n.* — **Phren/o-log'ic** (frēn'ō-lōj'ik), **Phren/o-log'ic-al**, *a.*



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arXiv:1611.04135v2 [cs.CV] 21 Nov 2016

## Automated Inference on Criminality using Face Images

Xiaolin Wu

McMaster University

Shanghai Jiao Tong University

xwu510@gmail.com

Xi Zhang

Shanghai Jiao Tong University

zhangxi\_19930818@sjtu.edu.cn

### Abstract

We study, for the first time, automated inference on criminality based solely on still face images, which can remove any biases of subjective judgments of human classifiers. Via supervised machine learning, we build four classifiers (logistic regression, KNN, SVM, CNN) using face images of 1856 real persons controlled for race, gender, age, and facial expressions, nearly half of whom were identified as criminals, for discriminating between criminals and non-criminals. All four classifiers perform consistently well, empirically establish the validity of automated face image inference on criminality, despite the historical controversies surrounding this line of enquiry. Also, some distinguishing structural features for predicting criminality are found by machine learning. Above all, the most interesting discovery of this research is that criminal and non-criminal face images populate two quite distinctive manifolds, whose variation among criminal faces is significantly greater than that of the non-criminal faces. The two manifolds of criminal and non-criminal faces appear to be non-overlapping, with the non-criminal manifold lying in a higher-dimensional space, with a smaller span, exhibiting a law of "normative". The faces of non-criminals. In other words, the faces of criminals have a greater degree of resemblance compared with the faces of criminals, or criminals have a higher degree of dissimilarity in facial appearance than non-criminals.



(a) Three samples in criminal ID photo set  $S_c$ .



(b) Three samples in non-criminal ID photo set  $S_n$ .

Figure 1. Sample ID photos in our data set.

of static face images [33]. This method can synthesize a representative (average) face image for a set of input face images scored closely on any of the four aforementioned social percepts. The ranking of these synthesized face im-

**Data Science allows us to discriminate so  
much faster now.**

# Is it okay for employers to do an internet search on interviewees?

## Google Targeted Advertising – Name Search

Ad related to latanya sweeney ⓘ

[\*\*Latanya Sweeney Truth\*\*](#)

[www.instantcheckmate.com/](http://www.instantcheckmate.com/)

Looking for Latanya Sweeney? Check Latanya Sweeney's Arrests.

Ads by Google

[\*\*Latanya Sweeney, Arrested?\*\*](#)

1) Enter Name and State. 2) Access Full Background Checks Instantly.

[www.instantcheckmate.com/](http://www.instantcheckmate.com/)

[\*\*Latanya Sweeney\*\*](#)

Public Records Found For: Latanya Sweeney. View Now.

[www.publicrecords.com/](http://www.publicrecords.com/)

[\*\*La Tanya\*\*](#)

Search for La Tanya Look Up Fast Results now!

[www.ask.com/La+Tanya](http://www.ask.com/La+Tanya)

Ads by Google

[\*\*Kirsten Lindquist\*\*](#)

Get Kirsten Lindquist Find Kirsten Lindquist

[www.ask.com/Kirsten+Lindquist](http://www.ask.com/Kirsten+Lindquist)

[\*\*We Found:Kristen Lindquist\*\*](#)

1) Contact Kristen Lindquist - Free Info! 2) Current Phone, Address & More.

[www.peoplesmart.com/](http://www.peoplesmart.com/)

[Search by Phone](#)

[Background Checks](#)

[Public Records](#)

[Search by Email](#)

[Search by Address](#)

[Criminal Records](#)

[\*\*Kristen Lindquist\*\*](#)

Public Records Found For: Kristen Lindquist. View Now.

[www.publicrecords.com/](http://www.publicrecords.com/)

# instantcheckmate.com advertised for Latanya, not Kirsten, but...

**LATANYA SWEENEY**  
1420 Centre Ave  
Pittsburgh, PA 15219  
DOB: Oct 27, 1959 (53 years old)

**Personal**  
Name, aliases, birthdate, phone numbers, etc.

**Location**  
Detailed address history and related data, maps, etc.

**Related Persons**  
Known family members, business associates, roommates, etc.

**Marriage / Divorce**  
Marriage and divorce records on file...

**Criminal History**  
Arrest records, speeding tickets, mugshots, etc.

**Licenses**  
FAA licenses, DEA licenses, Other Licenses, etc.

**Sex Offenders**  
Sex offenders living near Latanya Sweeney's primary location.

**Certified**

**Criminal History**

Rate This Content: ★★★★★

This section contains possible citation, arrest, and criminal records for the subject of this report. While our database does contain hundreds of millions of arrest records, different counties have different rules regarding what information they will and will not release.

We share with you as much information as we possibly can, but a clean slate here should not be interpreted as a guarantee that Latanya Sweeney has never been arrested; it simply means that we were not able to locate any matching arrest records in the data that is available to us.

**Possible Matching Arrest Records**

Name	County and State	Offenses	View Details
No matching arrest records were found.			

**KRISTEN LINDQUIST**  
730 Hawthorne Ln  
Charlotte, NC 28204  
DOB: Nov 30, 1984 (28 years old)

**Personal**  
Name, aliases, birthdate, phone numbers, etc.

**Location**  
Detailed address history and related data, maps, etc.

**Related Persons**  
Known family members, business associates, roommates, etc.

**Marriage / Divorce**  
Marriage and divorce records on file...

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Rate This Content: ★★★★★

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**Possible Matching Arrest Records**

Name	County and State	Offenses	View Details
1 Kristen Marie Lindquist	Individual NC courts	Criminal/traffic	<a href="#">View Details</a>
2 Kristen Marie Lindquist	NC Admin Office of Courts demographic criminal	Criminal/traffic	<a href="#">View Details</a>
3 Kristen Marie Lindquist	NC Admin Office of Courts demographic criminal	Criminal/traffic	<a href="#">View Details</a>



# Who is Latanya Sweeney?

The images on the previous slides are from her paper “Discrimination in Online Ad Delivery”

HOME / FACULTY PROFILES / LATANYA SWEENEY



**Daniel Paul Professor of the Practice of Government and Technology, HKS and FAS**

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617-998-1726

[Profile](#)

[Selected Publications](#)

[Sponsored Projects](#)

[Outside Professional Activities](#)

**Latanya Sweeney** is the Daniel Paul Professor of the Practice of Government and Technology at the Harvard Kennedy School and in the Harvard Faculty of Arts and Sciences, director and founder of the [Public Interest Tech Lab](#), Editor-in-Chief of [Technology Science](#), director and founder of the [Data Privacy Lab](#), former Chief Technology Officer at the U.S. Federal Trade Commission and Distinguished Career Professor of Computer Science, Technology and Policy at Carnegie Mellon University, Latanya Sweeney has 3 patents, more than [100 academic publications](#), pioneered the field known as data privacy, launched the emerging area known as algorithmic fairness, and was first to present technology challenges in U.S. elections. Her work is explicitly cited in two U.S. regulations.



# But once we know about the problem, surely...

c cnn.com/2009/TECH/12/22/hp.webcams/index.html

## HP looking into claim webcams can't see black people

By Mallory Simon, CNN

December 23, 2009 7:25 p.m. EST



A YouTube video shows co-workers trying out an HP webcam with motion-tracking and facial recognition software.

(CNN) -- Can Hewlett-Packard's motion-tracking webcams see black people? It's a question posed on a now-viral YouTube video and the company says it's looking into it.

In the video, two co-workers take turns in front of the camera -- the webcam appears to follow Wanda Zamen as she sways in front of the screen and stays still as Desi Cryer moves about.

HP acknowledged in a statement e-mailed to

CNN that the cameras may have issues with contrast recognition in certain lighting situations. The webcams, built into HP's new computers, are supposed to keep people's faces and bodies in proportion and centered on the screen as they move.

The video went viral over the weekend, garnering more than 400,000 YouTube page views and a slew of comments on Twitter.

It was something neither Zamen nor Cryer expected to happen.

### STORY HIGHLIGHTS

- **NEW:** Video was meant to be humorous showing of software glitch, co-workers say

- Co-workers: Motion-tracking webcam moves with white woman, not black man

- "I think my blackness is interfering with the computer's ability to follow me," user says

# 11 years...

c cnn.com/2009/TECH/12/22/hp.webcams/index.html

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Opinion

## Software that monitors students during tests perpetuates inequality and violates their privacy

The coronavirus pandemic created a surge in demand for exam proctoring tools. Here's why universities should stop using them.

by Shea Swauger

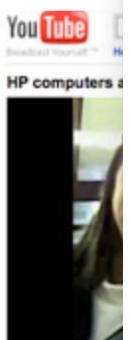
August 7, 2020



# 11 years...

c cnn.com/2009/TECH/12/22/hp.webcams/index.html

**HP locks black students out of tests** By Mallory Sims December 23, 2009  
oppression like racism and sexism. Now these same biases are showing up in test proctoring software that disproportionately hurts marginalized students.



A YouTube video with motion-tracking software.

## STORY HIGHLIGHTS

- **NEW:** Video was a humorous show about a glitch, co-workers

- Co-workers: Motion-tracking webcam moves with white woman, not black man

- "I think my blackness is interfering with the computer's ability to follow me," user says

A Black woman at my university once told me that whenever she used Proctorio's test proctoring software, it always prompted her to shine more light on her face. The software couldn't validate her identity and she was denied access to tests so often that she had to go to her professor to make other arrangements. Her white peers never had this problem.

Similar kinds of discrimination can happen if a student is

tracking your skin tone and centered on the screen as they move.

The video went viral over the weekend, garnering more than 400,000 YouTube page views and a slew of comments on Twitter.

It was something neither Zamen nor Cryer expected to happen.

Opinion

**That monitors students during tests creates inequality and violates their privacy**

The pandemic created a surge in demand for exam proctoring tools. Here's why we should stop using them.

August 7, 2020



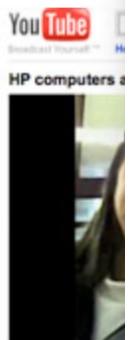
12 years...



cnn.com/2009/TECH/12/22/hp.w...

## HP looks at black students oppression like racism showing up in test scores disproportionately

By Mallory Sims  
December 23, 2009



A YouTube video with motion-tracking software.

### STORY HIGHLIGHTS

- **NEW:** Video was a humorous show about a software glitch, co-workers say

- Co-workers: Motion-tracking webcam moves with white woman, not black man

- "I think my blackness is interfering with the computer's ability to follow me," user says

A Black woman at a roller skating rink says she used Proctorio's motion-tracking software to prompt her to show up to tests so often that she had to make arrangements. Her

Similar kinds of discrimination have been reported in schools across the country.

The video went viral on YouTube page views.

It was something

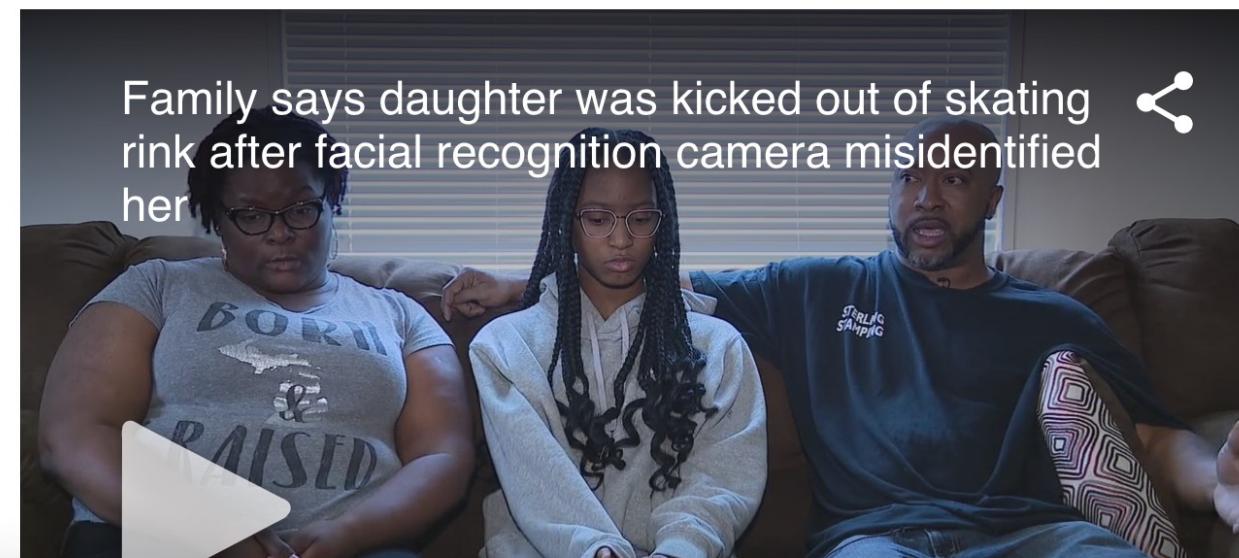
## Black teen kicked out of skating rink after facial recognition camera misidentified her

By Randy Wimbley and David Komer online producer | Published July 14, 2021 | Updated July 16, 2021  
| Crime and Public Safety | FOX 2 Detroit



**FOX 2** - A local roller skating rink is coming under fire for its use of facial recognition software after a teenager was banned for allegedly getting into a brawl there.

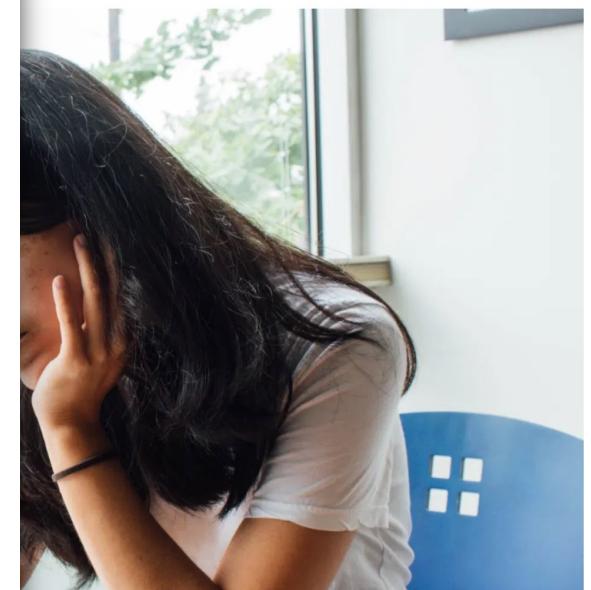
"To me, it's basically racial profiling," said the girl's mother Juliea Robinson. "You're just saying every young Black, brown girl with glasses fits the profile and that's not right."



## Students during tests violates their privacy

Demand for exam proctoring tools. Here's why

August 7, 2020



46



Andreas Mueller

@amuellerm1



Follow

Gender neutral pronouns get translated to gender stereotypes by Google translate #FATML

The screenshot shows two separate instances of the Google Translate interface side-by-side.

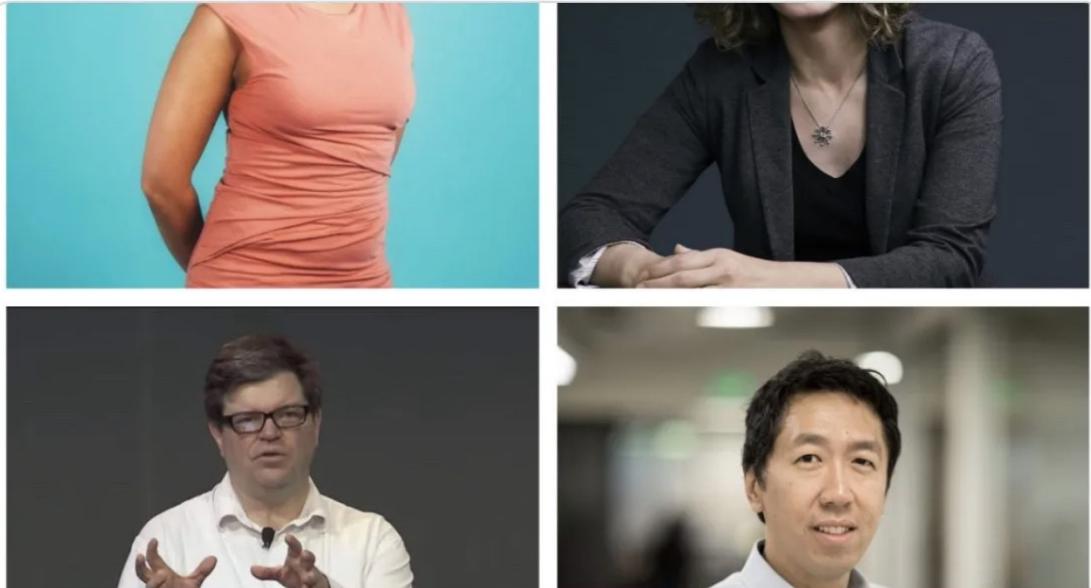
**Top Instance:** The source text "o bir doktor" is entered in the left input field. The target text "he is a doctor" is displayed in the right output field. The entire row has a light purple background.

**Bottom Instance:** The source text "o bir hemşire" is entered in the left input field. The target text "she is a nurse" is displayed in the right output field. The entire row has a light purple background.

Both instances show the standard Google Translate UI with language selection dropdowns at the top, a central input/output area, and a "Translate" button at the bottom right of each row.



AI predictions for 2019 from Yann LeCun, Hilary Mason, Andrew Ng, and Rumman Chowdhury [wp.me/p8wLEc-ahoT](https://wp.me/p8wLEc-ahoT) by @kharijohnson



AI predictions for 2019 from Yann LeCun, Hilary Mason, Andrew Ng, and Rum...  
VentureBeat spoke with Google Brain cofounder Andrew Ng, Fast Forward Labs founder Hilary Mason, Facebook AI Research founder Yann LeCun, and ...

venturebeat.com

<https://roberthoeijmakers.medium.com/ai-automated-cropping-in-twitter-fc404ca4e281>



**Tony "Abolish (Pol)ICE" Arcieri**   
@bascule



Trying a horrible experiment...

Which will the Twitter algorithm pick: Mitch McConnell or Barack Obama?



The tweet on the experiment with the faces of Mitch McConnell and Barack Obama combined on a long stretching original that requires cropping.



Rumman  
Chowdhury

[@ruchowdh](#)

Director, Twitter META

Only on Twitter

[@Twitter](#)

[#OnlyOnTwitter](#)

# Sharing learnings about our image cropping algorithm

By [Rumman Chowdhury](#)

Wednesday, 19 May 2021

In [October](#) 2020, we held our [image cropping algorithm](#) accountable. As part of our [commitment](#) to transparency, that we'd analyze our image cropping algorithm over the next few months, our teams have been working to assess algorithms for potential bias and gain a better understanding of whether there was a problem at hand. Today, we're sharing the results of our assessment and a link to [reproducing](#) our analysis.

Here's what we found:

- In comparisons of men and women, there was an 8% difference from demographic parity in favor of women.
- In comparisons of black and white individuals, there was a 4% difference from demographic parity in favor of white individuals.
- In comparisons of black and white women, there was a 7% difference from demographic parity in favor of white women.
- In comparisons of black and white men, there was a 2% difference from demographic parity in favor of white men.



Rumman  
Chowdhury

@ruchowdh

Director, Twitter AI Ethics

Only on Twitter

@Twitter

#OnlyOnTwitter

Insights

# Sharing learnings about our image cropping algorithm

By [Rumman Chowdhury](#)

Wednesday, 19 May 2021

## Twitter's world-class ML Ethics, Transparency and Accountability (META) team was fired when Elon Musk bought the company

- In comparisons of men and women, there was an 8% difference from demographic parity in favor of white women.
- In comparisons of black and white individuals, there was a 4% difference from demographic parity in favor of white individuals.
- In comparisons of black and white women, there was a 7% difference from demographic parity in favor of white women.
- In comparisons of black and white men, there was a 2% difference from demographic parity in favor of white men.

# A similar team at Google was gutted after they brought up concerns with large language models...

## On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?



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The Aether

### ABSTRACT

The past 3 years of work in NLP have been characterized by the development and deployment of ever larger language models, especially for English. BERT, its variants, GPT-2/3, and others, most recently Switch-C, have pushed the boundaries of the possible both through architectural innovations and through sheer size. Using these pretrained models and the methodology of fine-tuning them for specific tasks, researchers have extended the state of the art on a wide array of tasks as measured by leaderboards on specific benchmarks for English. In this paper, we take a step back and ask: How big is too big? What are the possible risks associated with this technology and what paths are available for mitigating those risks? We provide recommendations including weighing the environmental and financial costs first, investing resources into curating and carefully documenting datasets rather than ingesting everything on the web, carrying out pre-development exercises evaluating how the planned approach fits into research and development goals and supports stakeholder values, and encouraging research directions beyond ever larger language models.

alone, we have seen the emergence of BERT and its variants [39, 70, 74, 113, 146], GPT-2 [106], T-NLG [112], GPT-3 [25], and most recently Switch-C [43], with institutions seemingly competing to produce ever larger LMs. While investigating properties of LMs and how they change with size holds scientific interest, and large LMs have shown improvements on various tasks (§2), we ask whether enough thought has been put into the potential risks associated with developing them and strategies to mitigate these risks.

We first consider environmental risks. Echoing a line of recent work outlining the environmental and financial costs of deep learning systems [129], we encourage the research community to prioritize these impacts. One way this can be done is by reporting costs and evaluating works based on the amount of resources they consume [57]. As we outline in §3, increasing the environmental and financial costs of these models doubly punishes marginalized communities that are least likely to benefit from the progress achieved by large LMs and most likely to be harmed by negative environmental consequences of its resource consumption. At the scale we are discussing (outlined in §2), the first consideration should be the environmental cost.

**A similar team at Google was gutted after they brought up concerns with large language models...**

### 3 ENVIRONMENTAL AND FINANCIAL COST

Strubell et al. recently benchmarked model training and development costs in terms of dollars and estimated  $CO_2$  emissions [129]. While the average human is responsible for an estimated 5t  $CO_2e$  per year,<sup>2</sup> the authors trained a Transformer (big) model [136] with neural architecture search and estimated that the training procedure emitted 284t of  $CO_2$ . Training a single BERT base model (without hyperparameter tuning) on GPUs was estimated to require as much energy as a trans-American flight.

### 4 UNFATHOMABLE TRAINING DATA

The size of data available on the web has enabled deep learning models to achieve high accuracy on specific benchmarks in NLP and computer vision applications. However, in both application areas, the training data has been shown to have problematic characteristics [18, 38, 42, 47, 61] resulting in models that encode stereotypical and derogatory associations along gender, race, ethnicity, and disability status [11, 12, 69, 69, 132, 132, 157]. In this section, we discuss how large, uncurated, Internet-based datasets encode the dominant/hegemonic view, which further harms people at the margins, and recommend significant resource allocation towards dataset curation and documentation practices.

# Is ChatGPT destroying the environment?

What about the environmental cost of creating in the first place (e.g., training, etc)?

ST

Are you destroying the environment?



As an artificial intelligence language model, I do not have a physical form, and I do not consume resources or generate waste like humans or machines. Therefore, I do not contribute to environmental destruction directly. However, the technology that powers me and other AI systems, such as data centers and computing hardware, can have significant environmental impacts.



The use of data centers and computing hardware can result in energy consumption, which can lead to greenhouse gas emissions and contribute to climate change. The manufacturing and disposal of these devices can also generate electronic waste, which can be harmful to the environment.

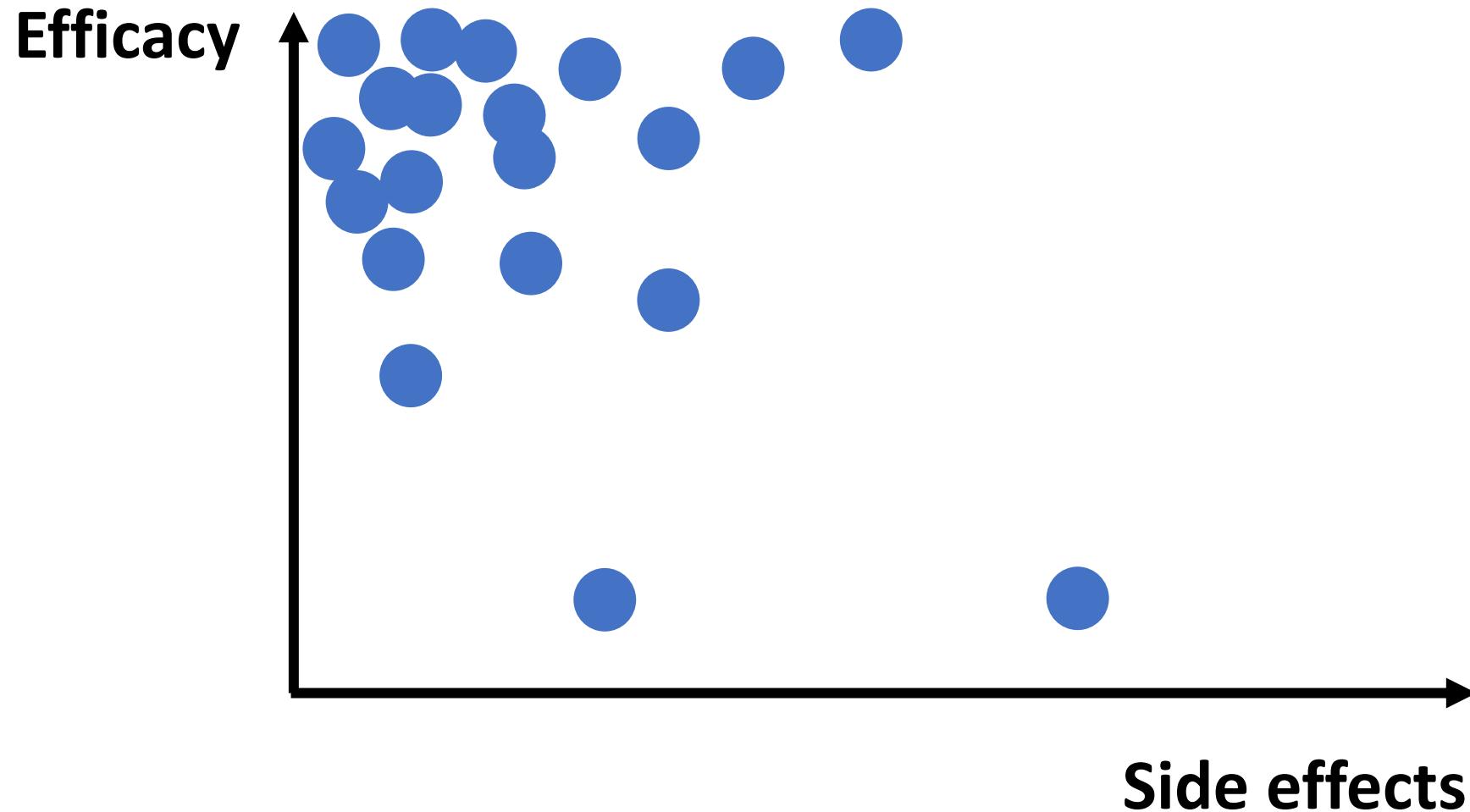
It is important for humans to consider the environmental impacts of their technology usage and strive to use technology in a sustainable and responsible manner. As an AI language model, I am designed to provide helpful and informative responses to users while using as few resources as possible, and I am constantly being improved to reduce my environmental impact.

# The dangers of avoiding difficult data...

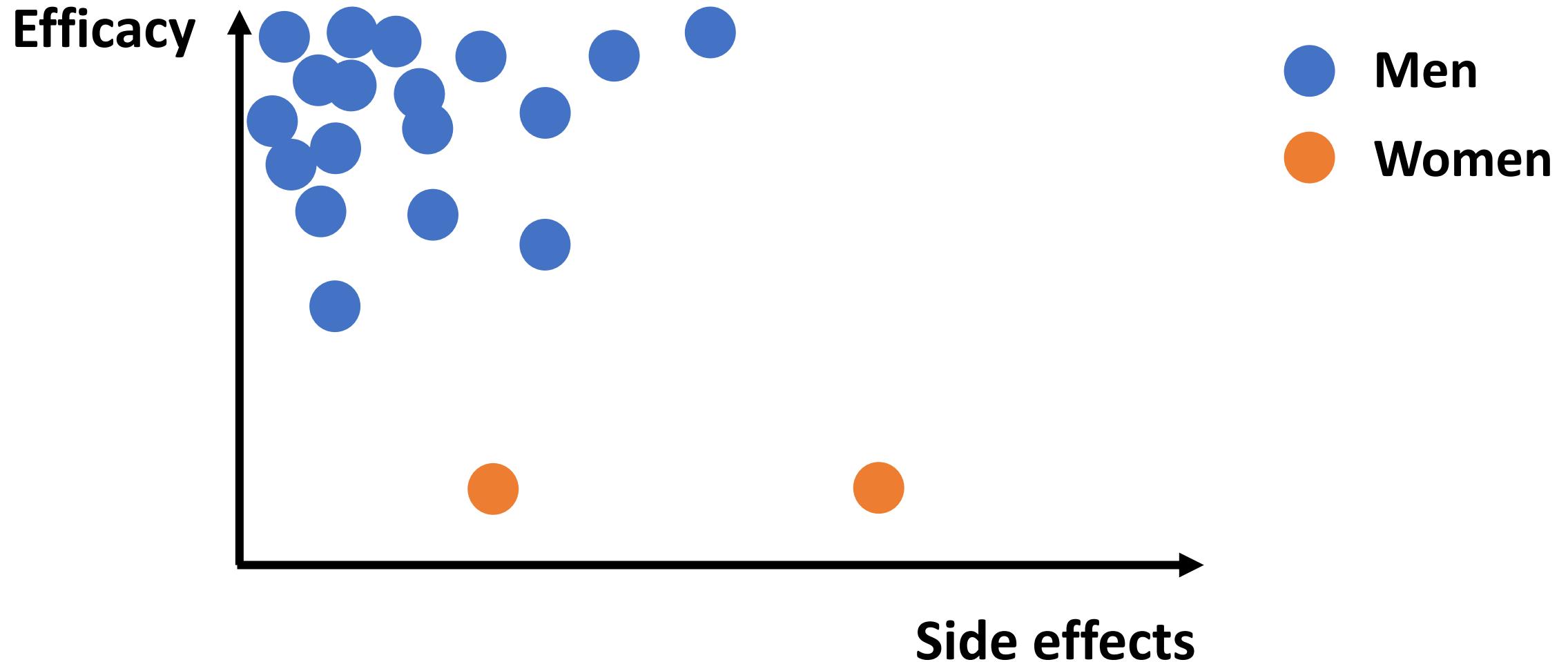
Women have mainly been excluded from studies in pharmacology. This manifests in the exclusion of subject sex in the data parameters/summary and lack of separate analyses between male and female data. Possible dangers of sex exclusion within pharmacological studies include disproportionate burden of adverse side effects and a lack of drug educational materials, all of which call for increased discussion, accountability and regulation within research.

Researchers mention the female reproductive cycle and hormone differences as potential reasons for the lack of female experimentation in pharmacological studies. During the stages of [menopause](#), women experience changes in reproductive hormones (mainly estrogen) and physical state, which is perceived by researchers as a [change in baseline conditions](#) and increased difficulty for accurate study. Additionally, [at least 26.1% of women aged 15-49 in the United States from 2015 to 2017 were using some form of hormonal birth control](#), which disrupts natural hormone levels in those women. The most popular form of birth control, the oral contraceptive pill, [contains and releases estrogen and/or progestin](#) to prevent pregnancies. Thus, women using hormonal contraception may also be classified as suboptimal for study, similar to menopausal women.

# The drug works great for 90% of the people!



# The drug works great for 90% of the people!

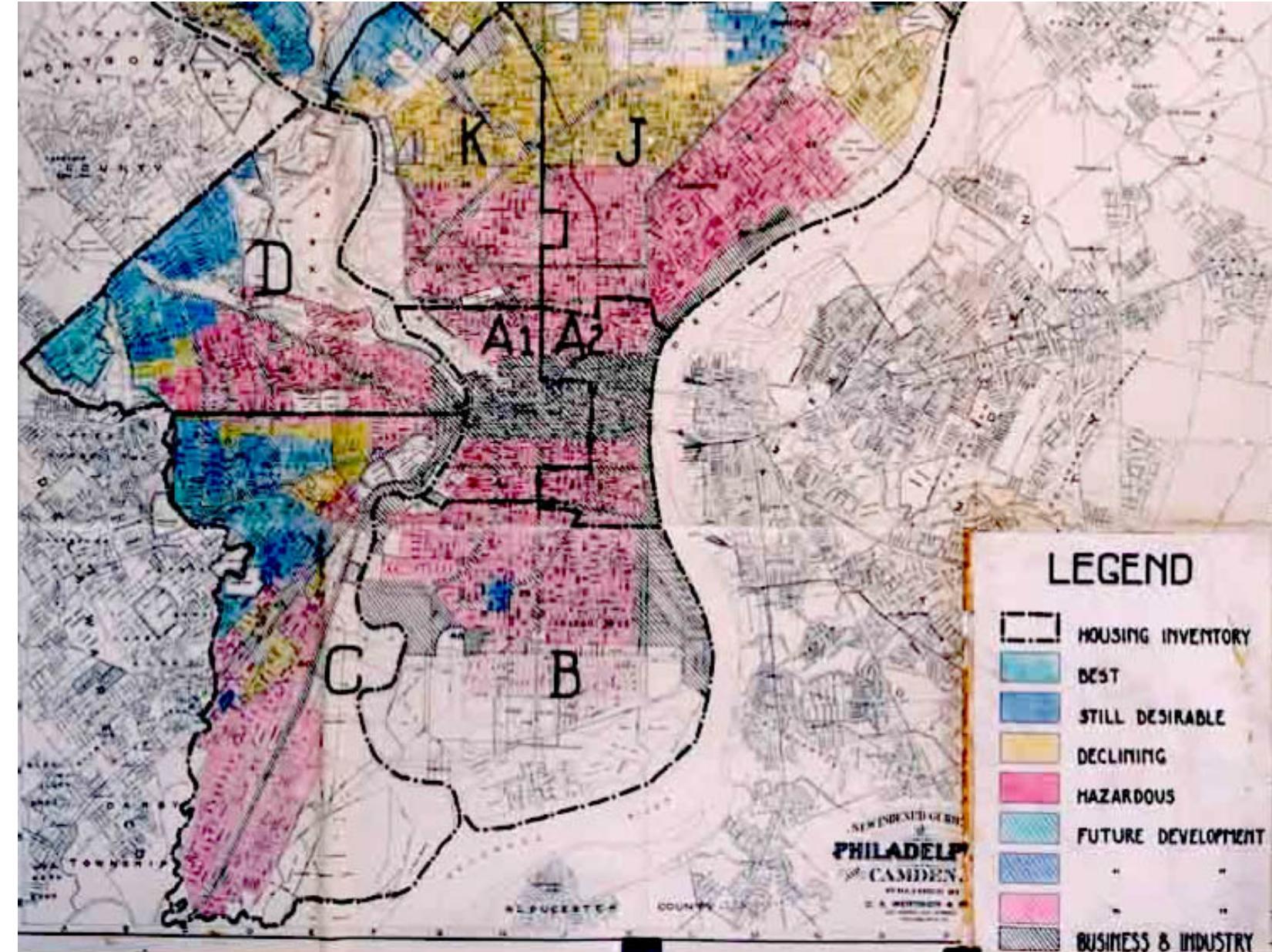


Attributes can proxy.

## Redlining

Rather than directly discriminate on race, banks discriminated based on location.

The result was the same.



# **Interpreting Data Science: Over-reliance on p and p-hacking**

# Recall p-values

A **p-value** is the probability of obtaining a test statistic more extreme than the one you observed from your data, assuming the null hypothesis is true.

In other words, if the Null Hypothesis were true, the p-value is the probability that due to random variation you would sample data more contradictory.

It's the Type I error rate if you were to run the experiment many times.

# What the p-value **IS NOT**

The **p-value IS NOT** guaranteeing anything about your particular experiment. It considers if you were to repeat your experiment many times.

The **p-value IS NOT** the probability that the null hypothesis is true.

The p-value is a measure of both size of the effect and precision of the measurement.

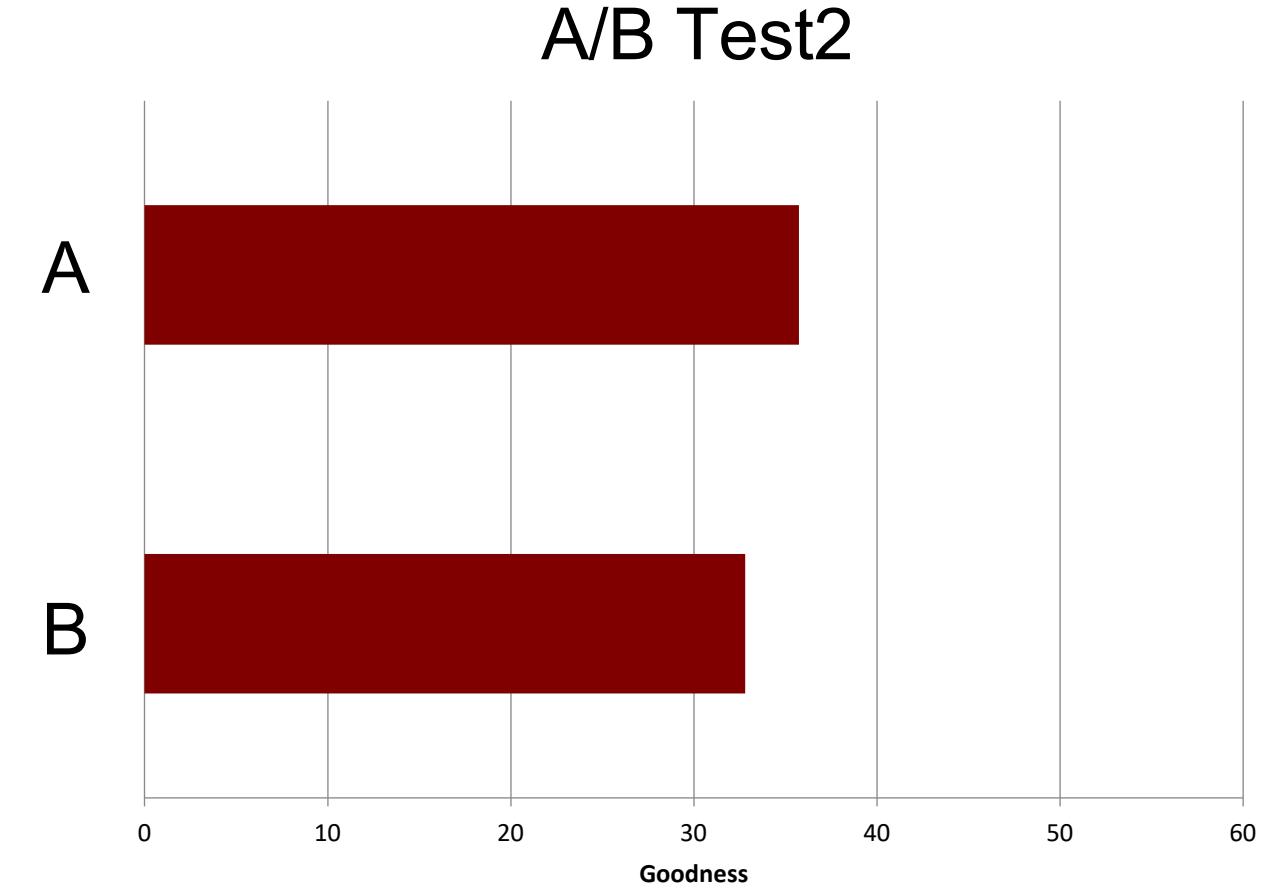
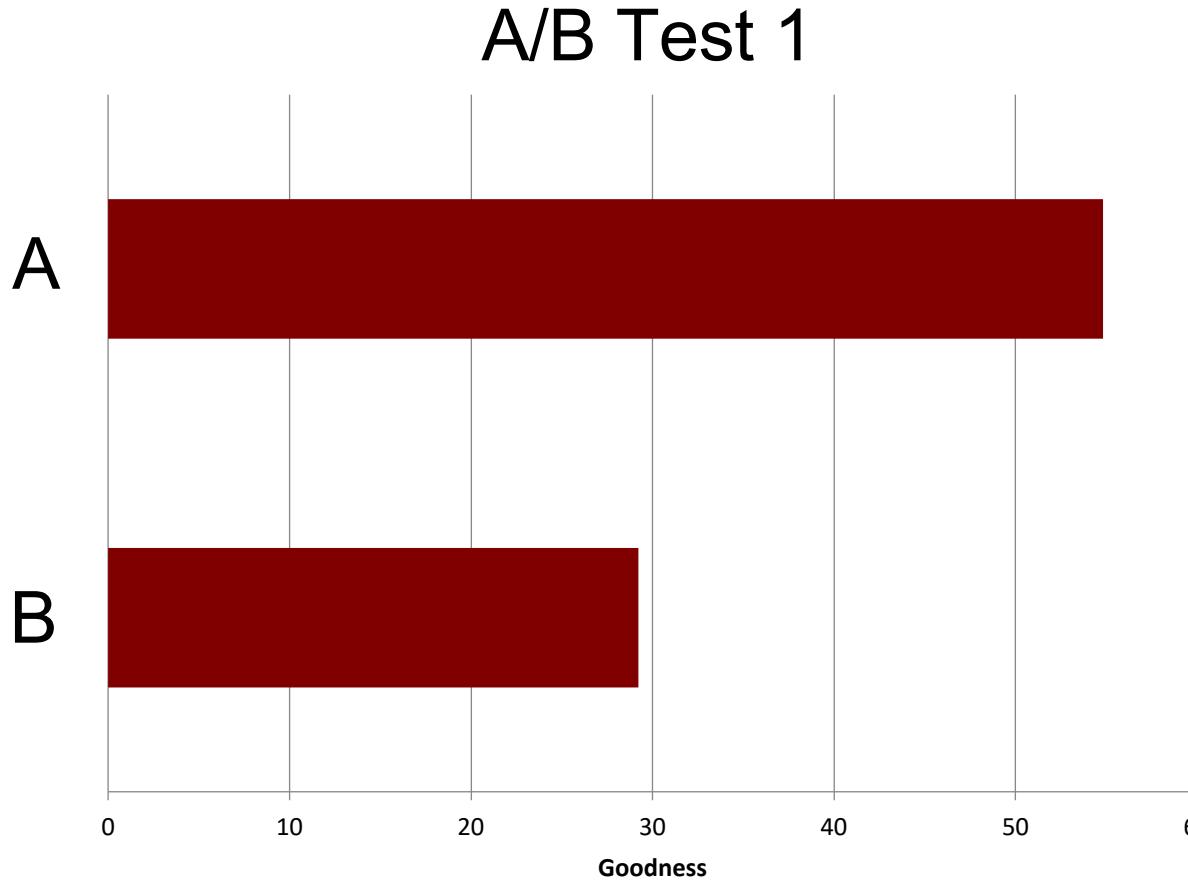
$$t = \frac{\bar{x} - \mu_0}{s / \sqrt{n}}$$

Difference in means  
(effect size)

Sampling error  
(measurement precision)

t-test example

# These experiments could have the same p-value...



# **Statistical Significance**

**IS NOT**

# **Scientific Significance**

## Examples of ES Measures

Sample ES	Description	Example
Mean, $M$	Original units	Mean response time, $M = 462$ ms.
Difference between two means	Original units	The average price of milk increased last year by \$0.12/L, from \$1.14/L to \$1.26/L.
Median, $Mdn$	Original units	Median response time, $Mdn = 385$ ms.
Percentage	Units-free	35.5% of respondents were in favor. 0.7% of responses were errors.
Frequency	Units-free	39 states ran a deficit.
Correlation, $r$	Units-free	Income correlated with age ( $r = .28$ ).
Cohen's $d$	Standardized	The average effect of psychotherapy was $d = 0.68$ (see Chapters 7 and 11).
Regression weight, $b$	Original units	The slope of the regression line for income against age was $b = \$1,350/\text{year}$ .
Regression weight, $\beta$	Standardized	The $\beta$ -weight for age in the regression was .23.
Proportion of variance, $R^2$	Units-free	Three variables of age, education, and family status in the multiple regression together gave $R^2 = .48$ .
Risk	Units-free	The risk that a child has a bicycle accident in the next year is 1/45.
Relative risk	Units-free	A boy is 1.4 times as likely as a girl to have a bicycle accident in the next year.
Proportion of variance, $\omega^2$ (Greek omega-squared)	Units-free	In the analysis of variance, the independent variable age accounted for $\omega^2 = 21.5\%$ of total variance.

# Possible Effect Sizes

From *Understanding The New Statistics: Effect Sizes, Confidence Intervals, and Meta-Analysis*, Geoff Cumming, 2011

# Experiments typically report p, but should also report effect size.

American Psychological Association suggests reporting effect sizes in both the units from the experiment (original units) and a standardized measure.

Original units are easier to understand for the experiment at hand.

Standardized units help for future meta-analyses.

Effect size should also be reported as a confidence interval.

# Standardized Effect Size: Cohen's d

Cohen's d standardizes difference of the means versus the standard deviation.

Some fields have adopted interpretations of this standardized value to meaning like “small” (0.2) or “large” (0.8) but no community consensus in visualization.

# **Lack of Statistical Significance**

**IS NOT**

# **Lack of Scientific Significance**

# Exploratory studies inform future studies

- May help determine what should be studied in more depth
- May help design the bounds of an experiment

Example:

the painkiller Vioxx was tested in a clinical trial against Naproxen, a general already-on-the-market painkiller. During the trial one person died that was taking Naproxen. For Vioxx however, five people died. The difference *was not statistically significant*,  $p > 0.05$ , and thus written off as unimportant. The lawsuits against Vioxx in 2005 proved the researchers wrong: The real-life, and regrettably more powerful test, showed that Vioxx severely—although initially not significantly—raised risks of cardiovascular side effects.

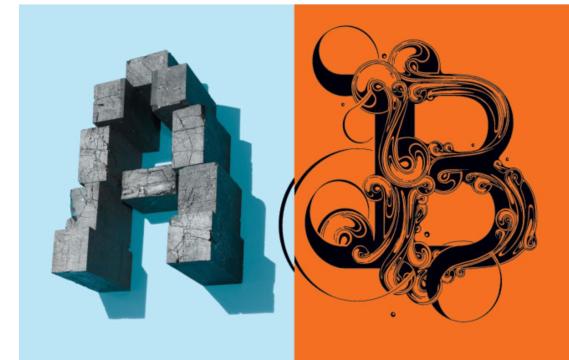
# Recall: A/B Testing

Let's say I'm running an A/B Test on two website designs.

I think A is better than B, but my result is not statistically significant.

I wait for more data and run the test again. This time  $p < 0.05$ .

What can I say?



# Running multiple experiments is common and leads to problems...

Common multiple experiments:

- Comparing more than two conditions
- Recording multiple dependent variables

If you're running multiple tests, then having a probability of 0.05 of finding a statistic more extreme than your own becomes quite large – random sampling error producing something extreme becomes likely.

# Corrections for Multiple Testing

The **Bonferroni** correction can account for this by dividing your desired significance by the number of tests.

Several other corrections are available and may be applicable depending on your assumptions.

**But there are more ways to run multiple tests...**

**1 CHOOSE A POLITICAL PARTY**

**Republicans**      **Democrats**

---

**2 DEFINE TERMS**

Which politicians do you want to include?

Presidents  
 Governors  
 Senators  
 Representatives

---

How do you want to measure economic performance?

Employment  
 Inflation  
 GDP  
 Stock prices

---

Other options

Factor in power  
 Weight more powerful positions more heavily

Exclude recessions  
 Don't include economic recessions

**3 IS THERE A RELATIONSHIP?**

Given how you've defined your terms, does the economy do better, worse or about the same when more Democrats are in power? Each dot below represents one month of data.

**4 IS YOUR RESULT SIGNIFICANT?**

If there were no connection between the economy and politics, what is the probability that you'd get results at least as strong as yours? That probability is your p-value, and by convention, you need a p-value of 0.05 or less to get published.

**Result: Publishable**

You achieved a p-value of **less than 0.01** and showed that **Democrats have a positive effect on the economy**. Get ready to be published!

---

If you're interested in reading real (and more rigorous) studies on the connection between politics and the economy, see the work of Larry Bartels and Alan Blinder and Mark Watson.

Data from The @unitedstates Project, National Governors Association, Bureau of Labor Statistics, Federal Reserve Bank of St. Louis and Yahoo Finance.

# p-hacking

It's easy to toy around with the variables and slice and dice to find a significant result while ignoring your multiple tests along the way.

**1 CHOOSE A POLITICAL PARTY**

---

**2 DEFINE TERMS**

Which politicians do you want to include?

Presidents  
 Governors  
 Senators  
 Representatives

How do you want to measure economic performance?

Employment  
 Inflation  
 GDP  
 Stock prices

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Factor in power  
 Weight more powerful positions more heavily

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 Don't include economic recessions

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If there were no connection between the economy and politics, what is the probability that you'd get results at least as strong as yours? That probability is your p-value, and by convention, you need a p-value of 0.05 or less to get published.

A BETTER ECONOMY

# p-hacking

It's easy to toy around with the variables and play with the data to find a significant result while ignoring your multiple tests along the way.

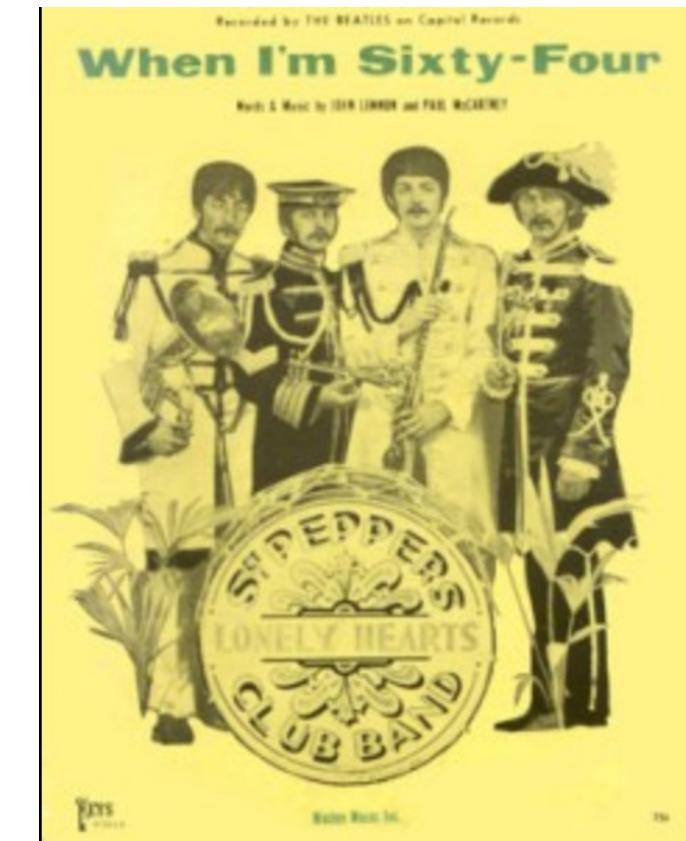
<https://projects.fivethirtyeight.com/p-hacking/>

# Example: Listening to “When I’m Sixty-Four” Decreases Chronological Age

## ***Study 2: musical contrast and chronological rejuvenation***

Using the same method as in Study 1, we asked 20 University of Pennsylvania undergraduates to listen to either “When I’m Sixty-Four” by The Beatles or “Kalimba.” Then, in an ostensibly unrelated task, they indicated their birth date (mm/dd/yyyy) and their father’s age. We used father’s age to control for variation in baseline age across participants.

An ANCOVA revealed the predicted effect: According to their birth dates, people were nearly a year-and-a-half younger after listening to “When I’m Sixty-Four” (adjusted  $M = 20.1$  years) rather than to “Kalimba” (adjusted  $M = 21.5$  years),  $F(1, 17) = 4.92, p = .040$ .



From *False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant*, Simmons et al., 2011 & Image from [https://en.wikipedia.org/wiki/File:When\\_I%27m\\_sixty\\_four.jpg](https://en.wikipedia.org/wiki/File:When_I%27m_sixty_four.jpg)

# But the reality....

**Table 3.** Study 2: Original Report (in Bolded Text) and the Requirement-Compliant Report (With Addition of Gray Text)

**Using the same method as in Study 1, we asked 20 34 University of Pennsylvania undergraduates to listen only to either “When I’m Sixty-Four” by The Beatles or “Kalimba” or “Hot Potato” by the Wiggles.** We conducted our analyses after every session of approximately 10 participants; we did not decide in advance when to terminate data collection. **Then, in an ostensibly unrelated task, they indicated only their birth date (mm/dd/yyyy) and** how old they felt, how much they would enjoy eating at a diner, the square root of 100, their agreement with “computers are complicated machines,” **their father’s age**, their mother’s age, whether they would take advantage of an early-bird special, their political orientation, which of four Canadian quarterbacks they believed won an award, how often they refer to the past as “the good old days,” and their gender. **We used father’s age to control for variation in baseline age across participants.**

An ANCOVA revealed the predicted effect: According to their birth dates, people were nearly a year-and-a-half younger after listening to “When I’m Sixty-Four” (adjusted  $M = 20.1$  years) rather than to “Kalimba” (adjusted  $M = 21.5$  years),  $F(1, 17) = 4.92, p = .040$ . Without controlling for father’s age, the age difference was smaller and did not reach significance ( $M_s = 20.3$  and 21.2, respectively),  $F(1, 18) = 1.01, p = .33$ .

# I Fooled Millions Into Thinking Chocolate Helps Weight Loss. Here's How.



John Bohannon

5/27/15 4:23PM • Filed to

ars TECHNICA

SCIENCE —

## “Mindless Eating,” or how to life of research into question

Now questioning: 3,700 citations in 25 different journals over 20+ years.

CATHLEEN O'GRADY - 4/24/2017, 4:30 AM



“Slim by Chocolate” found that people who ate a chocolate bar every day were more likely to lose weight than those who didn’t, according to a newspaper, just

## Everyone Is Missing the Point About Brian Wansink and P-Hacking

There are more crucial lessons to learn from the replication crisis.

By ANDREW GELMAN

OCT 08, 2018 • 11:00 AM



Brian Wansink during the 2013 Discovery Vitality Summit in Johannesburg, South Africa.

Lefty Shivambu/Gallo Images/Getty Images

*This post originally appeared on [the author's website](#).*

Last month, Brian Wansink, the Cornell University researcher and retraction

# “Researcher Degrees of Freedom”

In addition to independent and dependent variables, the researcher chooses:

- How many participants
- How often to run the analyses versus collecting data
- Whether to do the analysis with covariates
- Whether to report on all conditions
- Whether to report on all experiments
- How to handle missing data
- How to handle outliers
- The definition of an outlier

**How do we correct  
for all of this?**

From *False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant*,  
Simmons et al., 2011

## **Table 2.** Simple Solution to the Problem of False-Positive Publications

### Requirements for authors

1. Authors must decide the rule for terminating data collection before data collection begins and report this rule in the article.
2. Authors must collect at least 20 observations per cell or else provide a compelling cost-of-data-collection justification.
3. Authors must list all variables collected in a study.
4. Authors must report all experimental conditions, including failed manipulations.
5. If observations are eliminated, authors must also report what the statistical results are if those observations are included.
6. If an analysis includes a covariate, authors must report the statistical results of the analysis without the covariate.

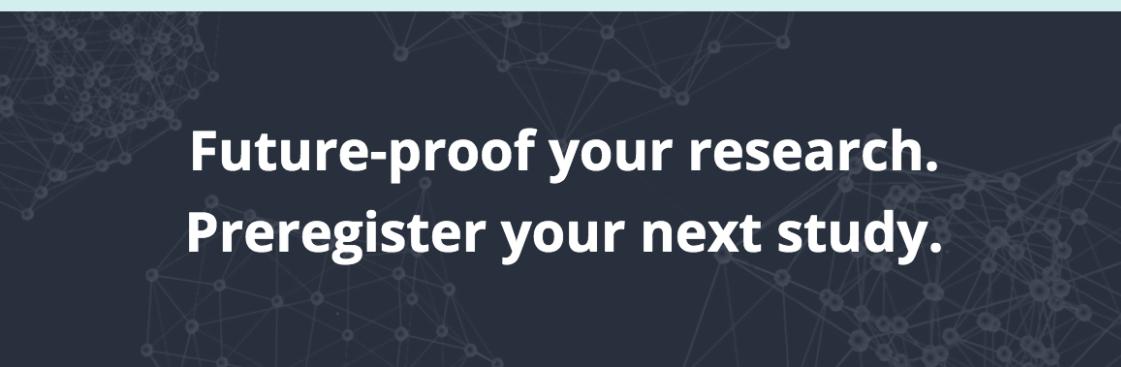
Better Reporting allows us to assess better

From *False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant*, Simmons et al., 2011



Help support open science today.

Donate Now



Future-proof your research.  
Preregister your next study.

## What is Preregistration?

When you preregister your research, you're simply specifying your research plan in advance of your study and submitting it to a registry.

Preregistration separates *hypothesis-generating* (exploratory) from *hypothesis-testing* (confirmatory) research. Both are important. But the same data cannot be used to generate *and* test a hypothesis, which can happen unintentionally and reduce the credibility of your



# Pre-registration

State ahead of time:

- What will be studied
- What are the hypotheses
- What data will be collected
- What is the analysis procedure

From  
<https://wsciedmag.org/news/2018/09/more-and-more-scientists-are-preregistering-their-studies-should-you>, Image from: <https://www.cos.io/our-services/prereg/>

In a survey of 41 papers in 2005-2006, found major issues:

- Not enough information reported:
  - Missing p-values (only “ $p<0.05$ ” reported)
  - Missing means (!!)
  - Missing standard deviations (can’t check test)
  - Missing the test used
- Failure to check assumptions
  - Tests are particular to study design & data character!
- Over-testing (multiple-tests)
- Picking the wrong test

Better  
Reporting  
allows us to  
assess better

# **Strong methods and better reporting provides rigor in both quantitative and qualitative data studies.**

- Leverage methodologies
  - These have been refined and improved over years and people
- Be Transparent
  - The community should be able to examine what you did. Be clear in reporting your methodologies and implementation. Make your data and analysis available for inspection.
- Abundant data strengthens claims, but be cognizant of what your data is truly sampling
- Inspect research carefully, your own and that of others

**There may be times when you're the only  
one who realizes the ethical problems.**

**Be prepared for what you're going to do.**



# The code I'm still ashamed of

Bill Sourour

November 13, 2016

If you write code for a living, there's a chance that at some point in your career, someone will ask you to code something a little deceitful – if not outright unethical.

This happened to me back in the year 2000. And it's something I'll never be able to forget.

I wrote my first line of code at 6 years old. I'm no prodigy though. I had a lot

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One of the projects I was assigned to involved a drug that was targeted at women. The graphics and general style of the website made it clear that the client wanted to specifically target teenage girls.

One of the features of this website was a quiz that asked girls a series of questions and recommended a type of drug based on their answers.

Remember, this website was posing as a general information site. It was not clearly an advertisement for any particular drug.

When I received the requirements, they contained the questions for the quiz, along with multiple choice answers for each question.

Missing from the requirements was any indication of what I should do with the answers at the end of the quiz. So what rules determined what treatment the quiz would recommend?

“The quiz doesn’t work,” she said.

“Oh. What’s broken?” I asked.

“Well, it seems that no matter what I do, the quiz recommends the client’s drug as the best possible treatment. The only exception is if I say I’m allergic. Or if I say I am already taking it.”

“Yes. That’s what the requirements say to do. Everything leads to the client’s drug.”

“Oh. Okay. Cool.”

And she was off.

I wish I could tell you that when I first saw those requirements they bothered me. I wish I could tell you that it felt wrong to code something that was basically designed to trick young girls. But the truth is, I didn’t think much of it at the time. I had a job to do, and I did it.

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say I'm allergic. Or if I say I am already taking it."

"Yes. That's what the client's drug."

"Oh. Okay. Cool."

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I wish I could tell you that bothered me. I wish I could was basically designed to much of it at the time. I had a job to do, and I did it.

Nothing that we were doing was illegal. As the youngest developer on my team, I was making good money for my age. And in the end, I understood that the real purpose of the site was to push a particular drug. So, I chalked this tactic up to "marketing."

The day of the dinner, shortly before leaving the office, a colleague emailed me a link to a news report online. It was about a young girl who had taken the drug I'd built the website for.

She had killed herself.

It turned out that among the main side effects of that drug were severe depression and suicidal thoughts.



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There are a million and one ways for me to rationalize my part in later suicides and severe depression. Even today, there is ongoing litigation with former patients.

It's easy to make an argument that I had no part in it at all. Still, I've never felt okay about writing that code.