Ethics (+ Accessibility)

Data Visualization



Based on slides from Alex Cabrera, Katherine Ye, Arvind Satyanarayan, and Michael Correll



What you will learn today

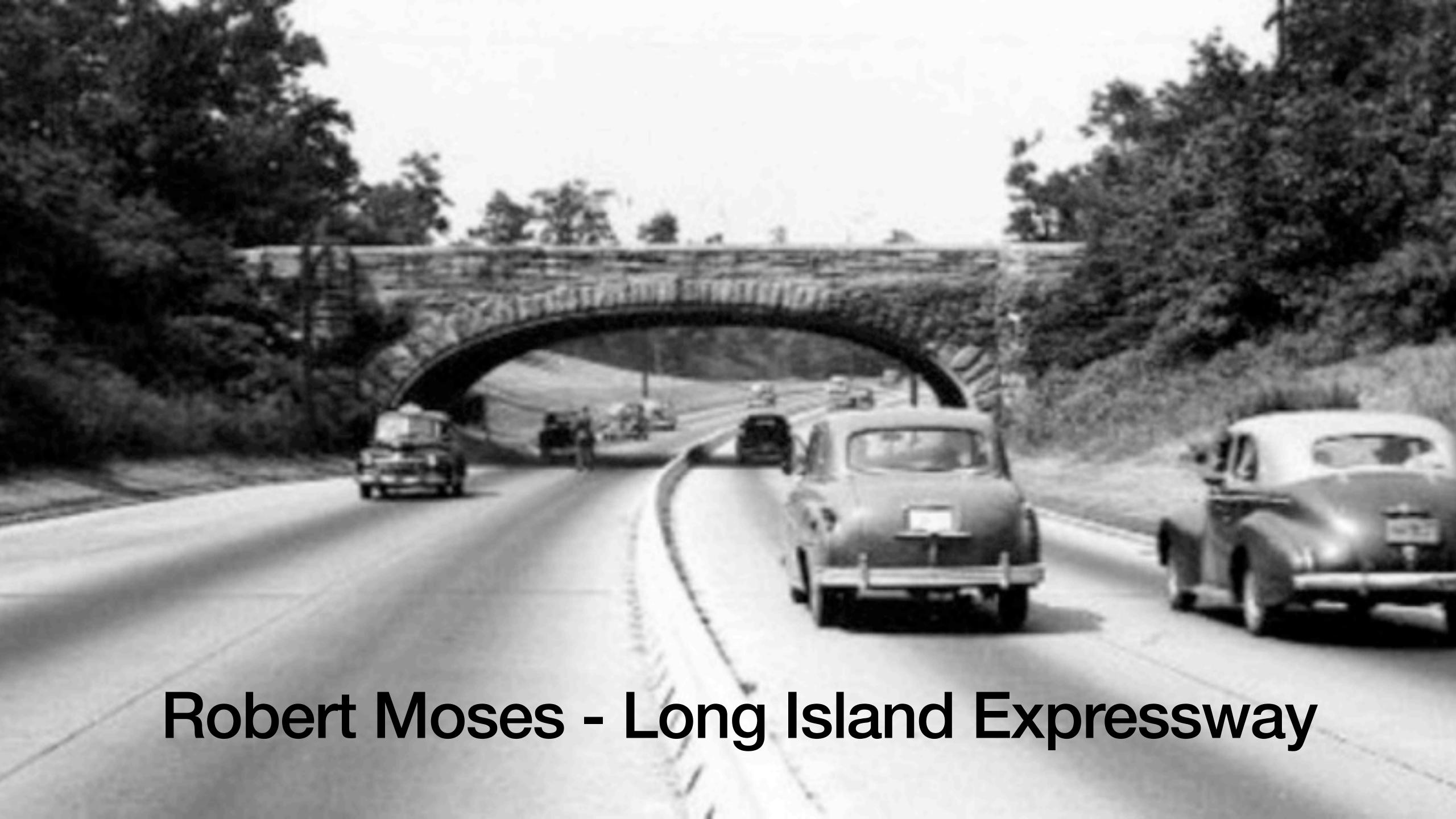
What are the ethical concerns and decisions you might face as a data scientist and visualization practitioner in the real world?

Goals

- Understand what ethics are (at a high level)
- Evaluate the quality and ethical implications of visualizations
- Think critically about
 - the politics and persuasion of visualization
 - data and its limitations/biases
 - who has access to and is impacted by visualization



Artifacts/technology can be used for political aims



Is technology neutral, but used for political aims?



LANGDON WINNER

Do Artifacts Have Politics?

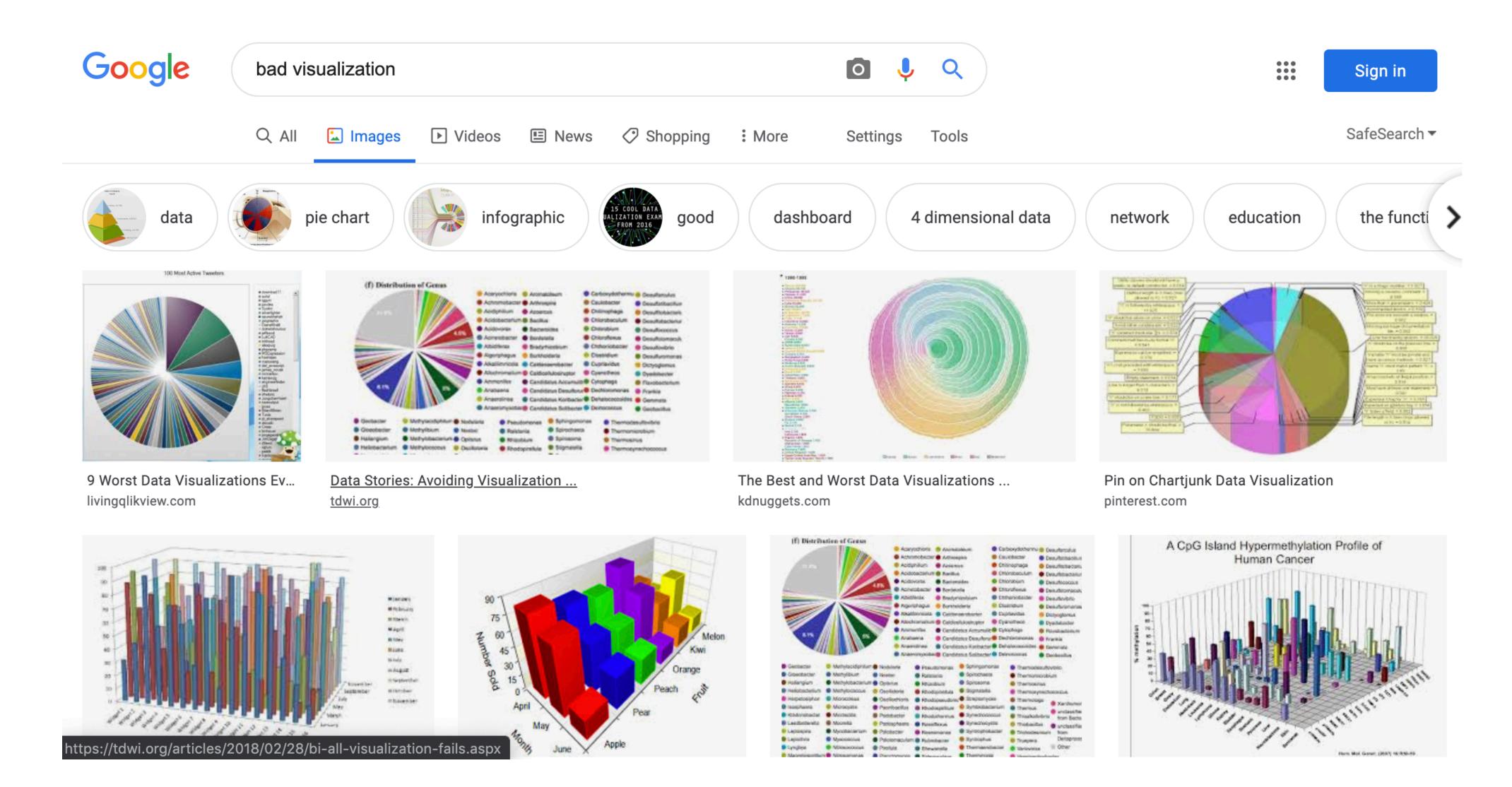
In controversies about technology and society, there is no idea more provocative than the notion that technical things have political qualities. At issue is the claim that the machines, structures, and systems of modern material culture can be accurately judged not only for their contributions of efficiency and productivity, not merely for their positive and negative environmental side effects, but also for the ways in which they can embody specific forms of power and authority. Since ideas of this kind have a persistent and troubling presence in discussions about the meaning of technology, they deserve explicit attention.¹



"The process of observing the world and quantifying it is a political act, and deserves ethical consideration"

Michael Correll

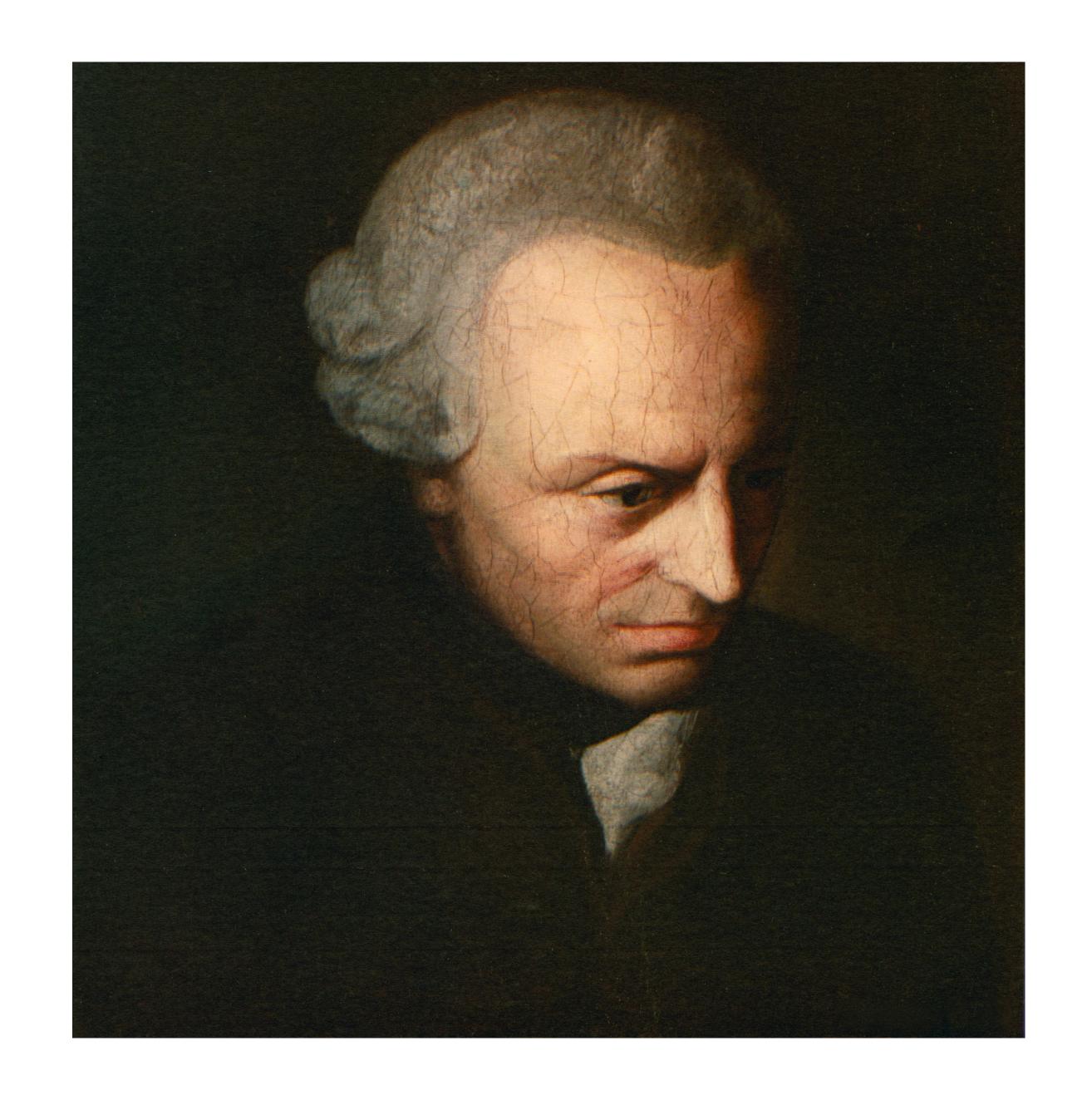
What is a bad visualization?



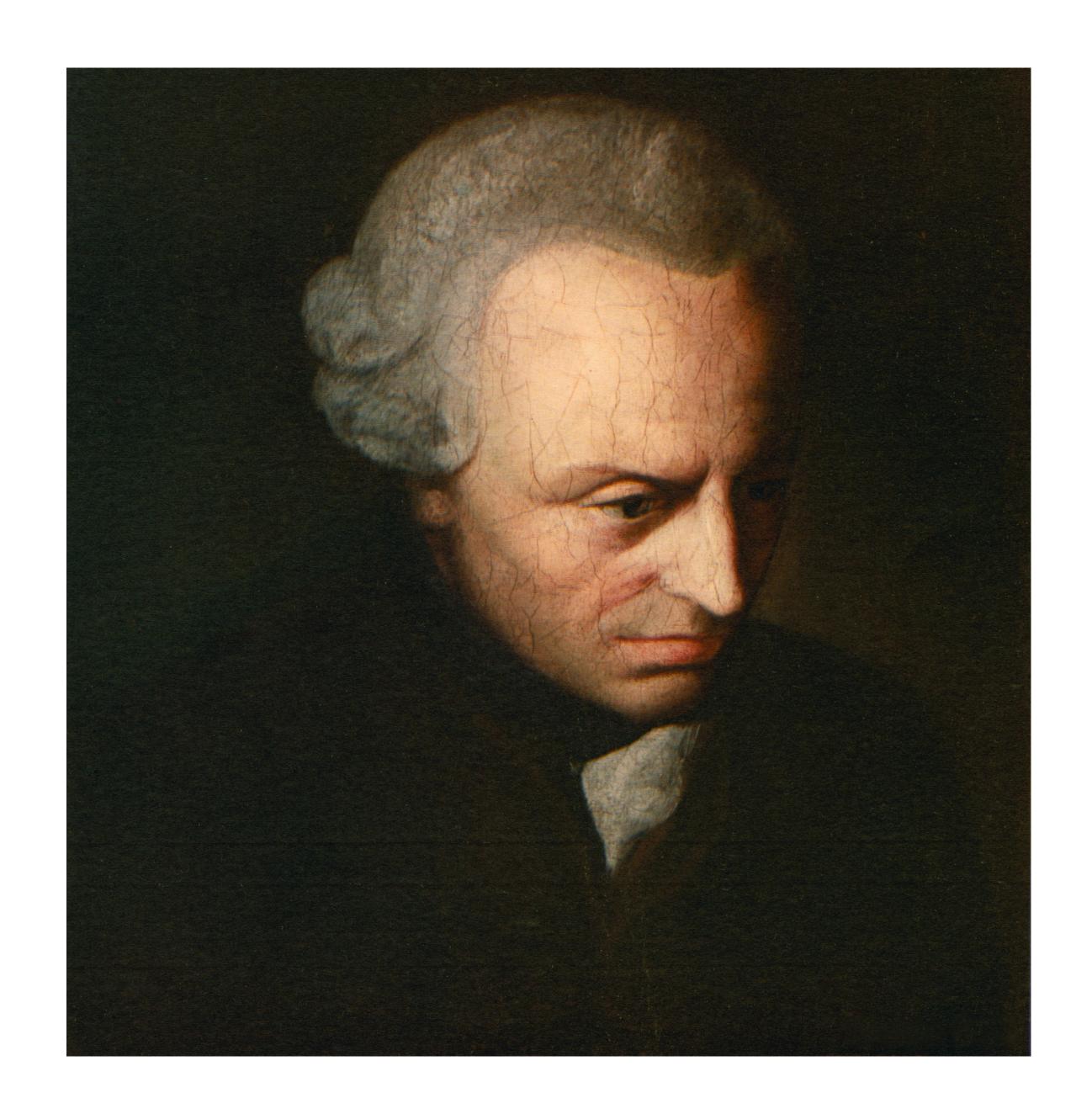
If visualizations are inherently political and our common perception of "bad" visualizations is limited:

How do we judge the value and ethics of visualizations?

What is *bad*? And what is *good*? How do we "know" or not?

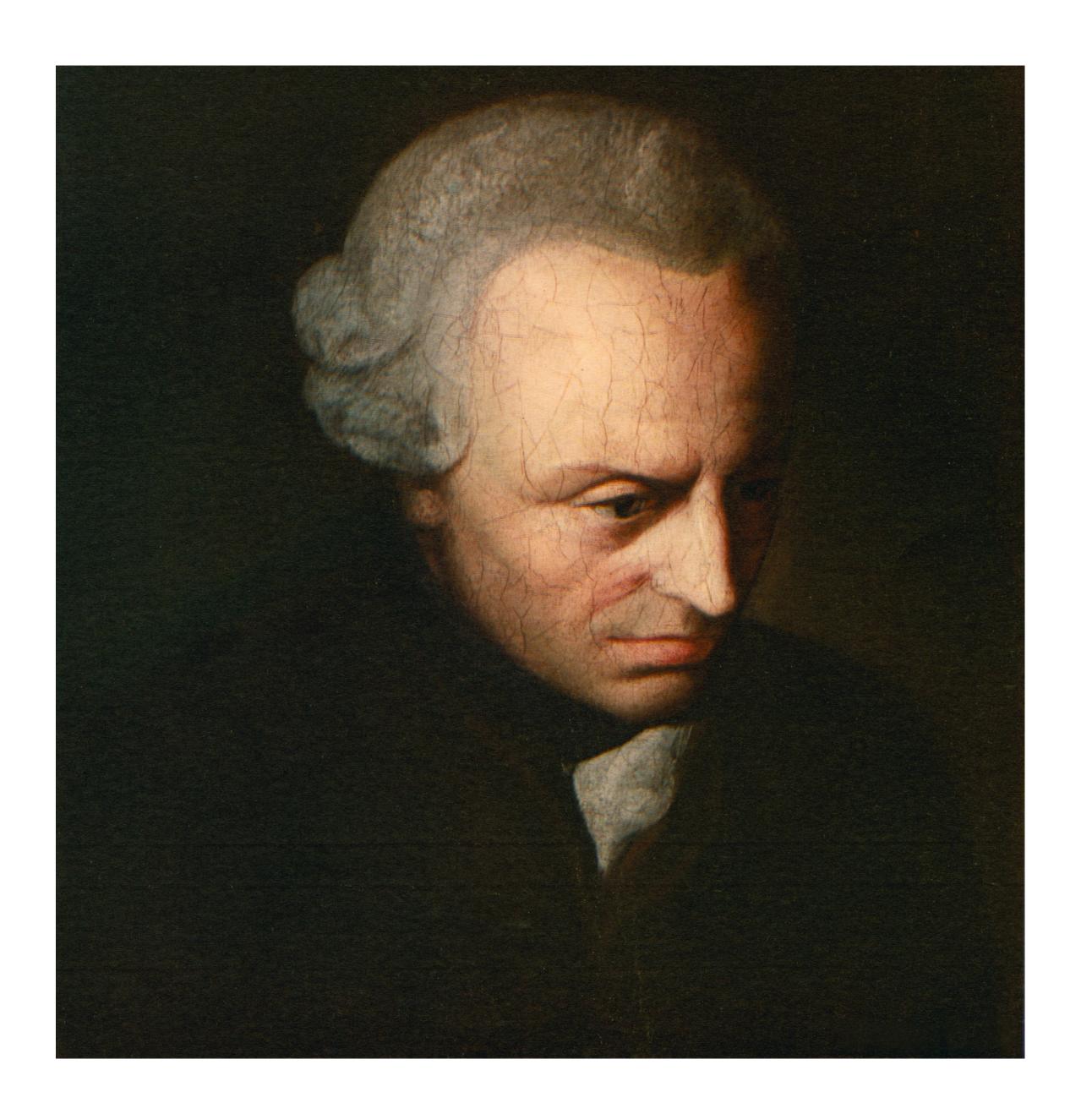


Example: Immanuel Kant



Deontological ethics

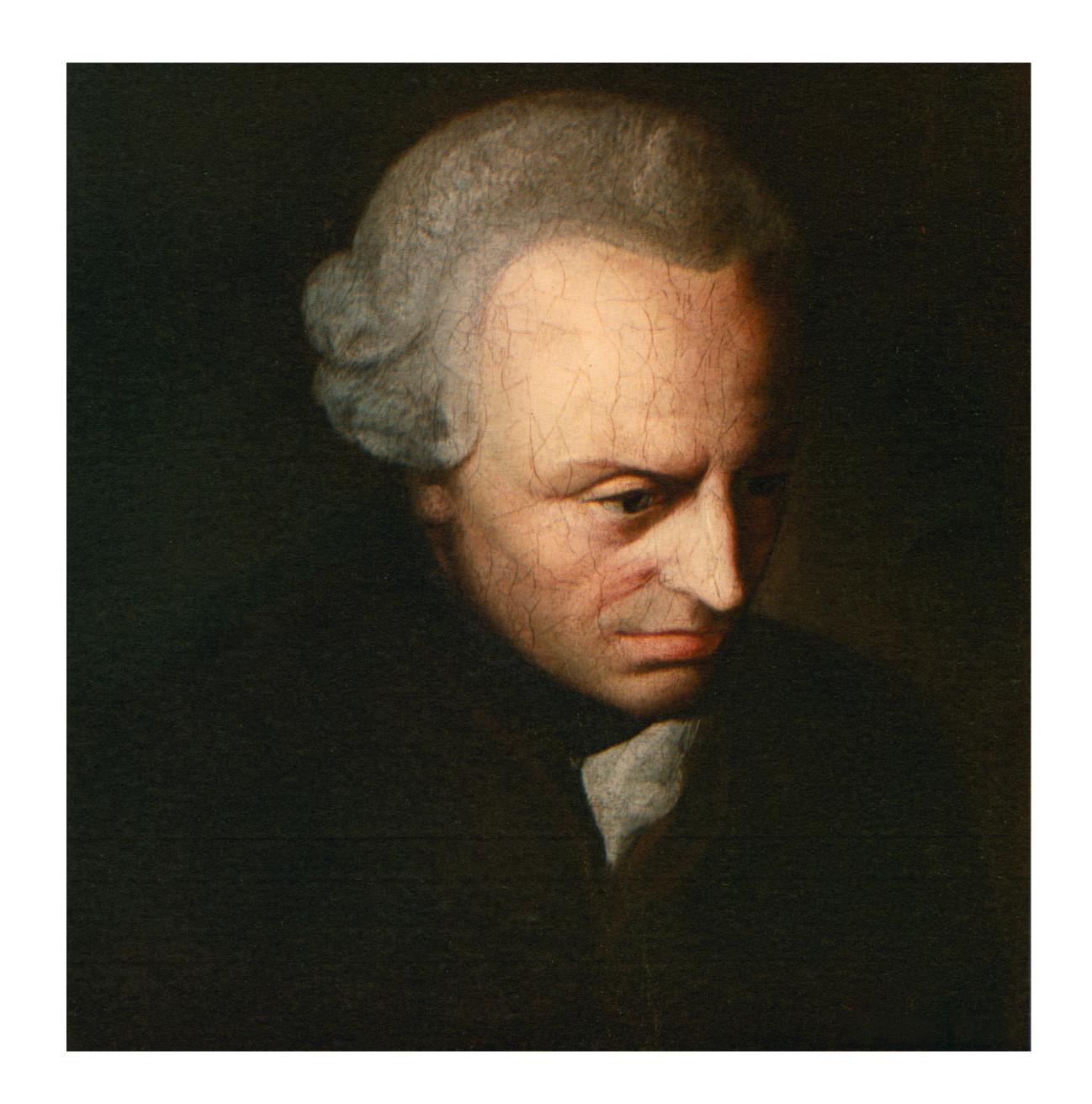
Example: Immanuel Kant



Deontological ethics

Example: Immanuel Kant

An act is ethical based on whether it follows *rules*, ie "do not lie."

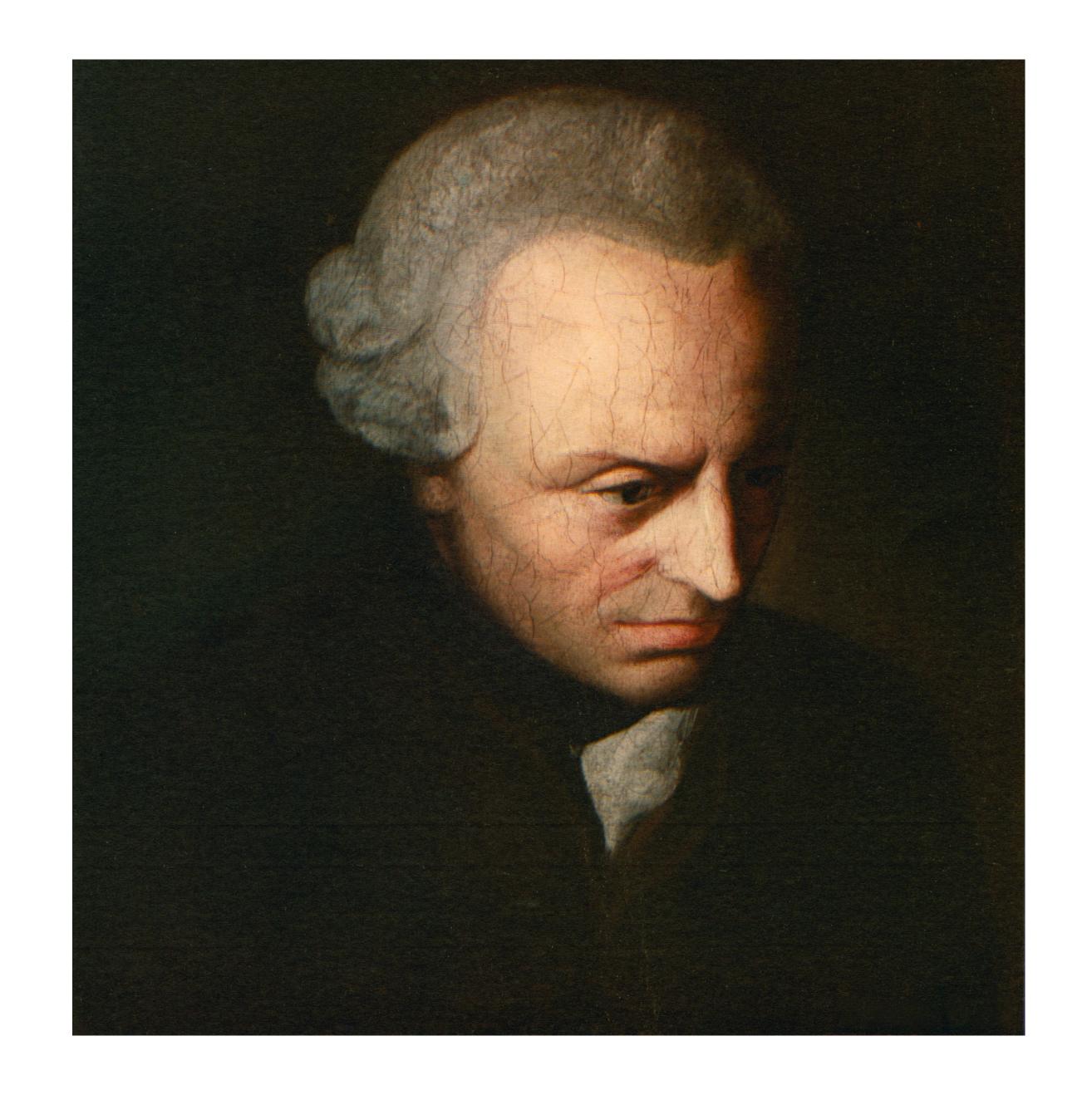


Deontological ethics

Example: Immanuel Kant

An act is ethical based on whether it follows *rules*, ie "do not lie."

Kant argued for the existence of universal rules (his "categorical imperative"): "Act only on that maxim whereby you can at the same time will that it should become a universal law"



Tufte's "lie factor"

LF = Effect in graphic / effect in data

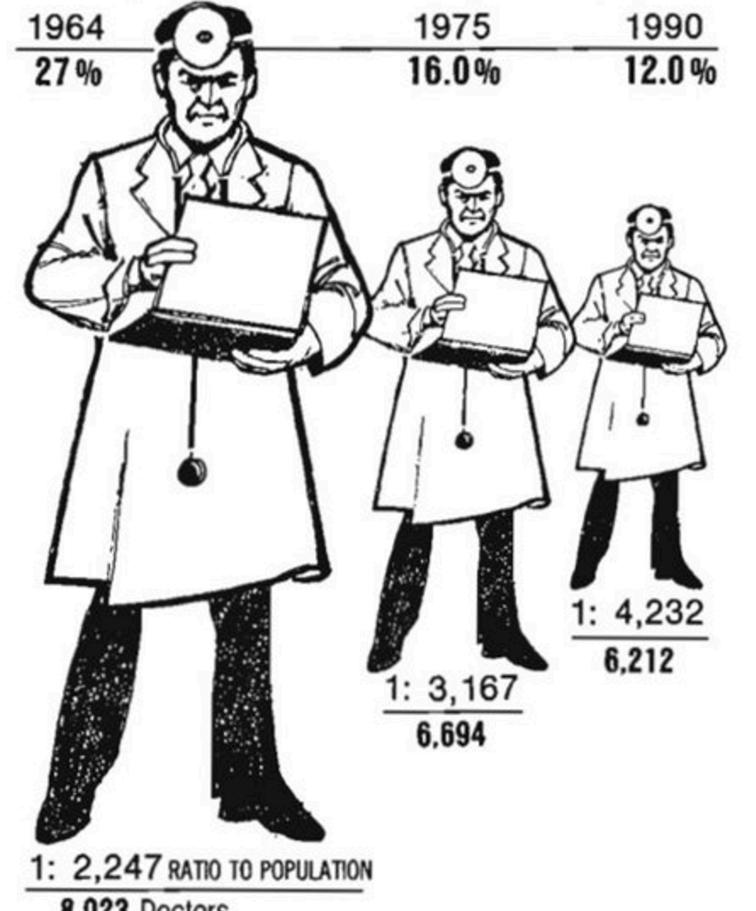
If LF!= 1, then it is lying!

This image?

LF = 2.8!

THE SHRINKING FAMILY DOCTOR In California

Percentage of Doctors Devoted Solely to Family Practice



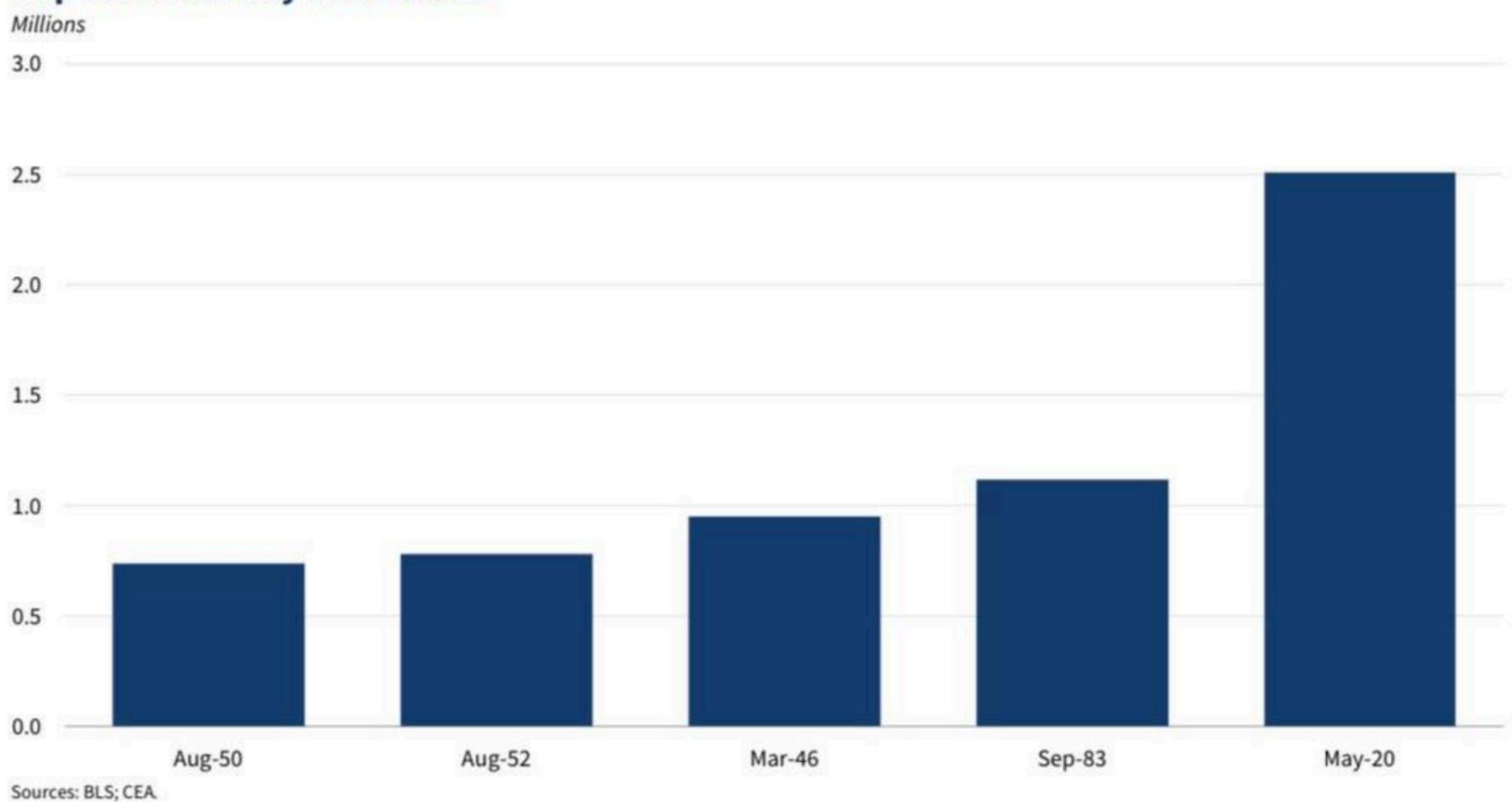
8,023 Doctors





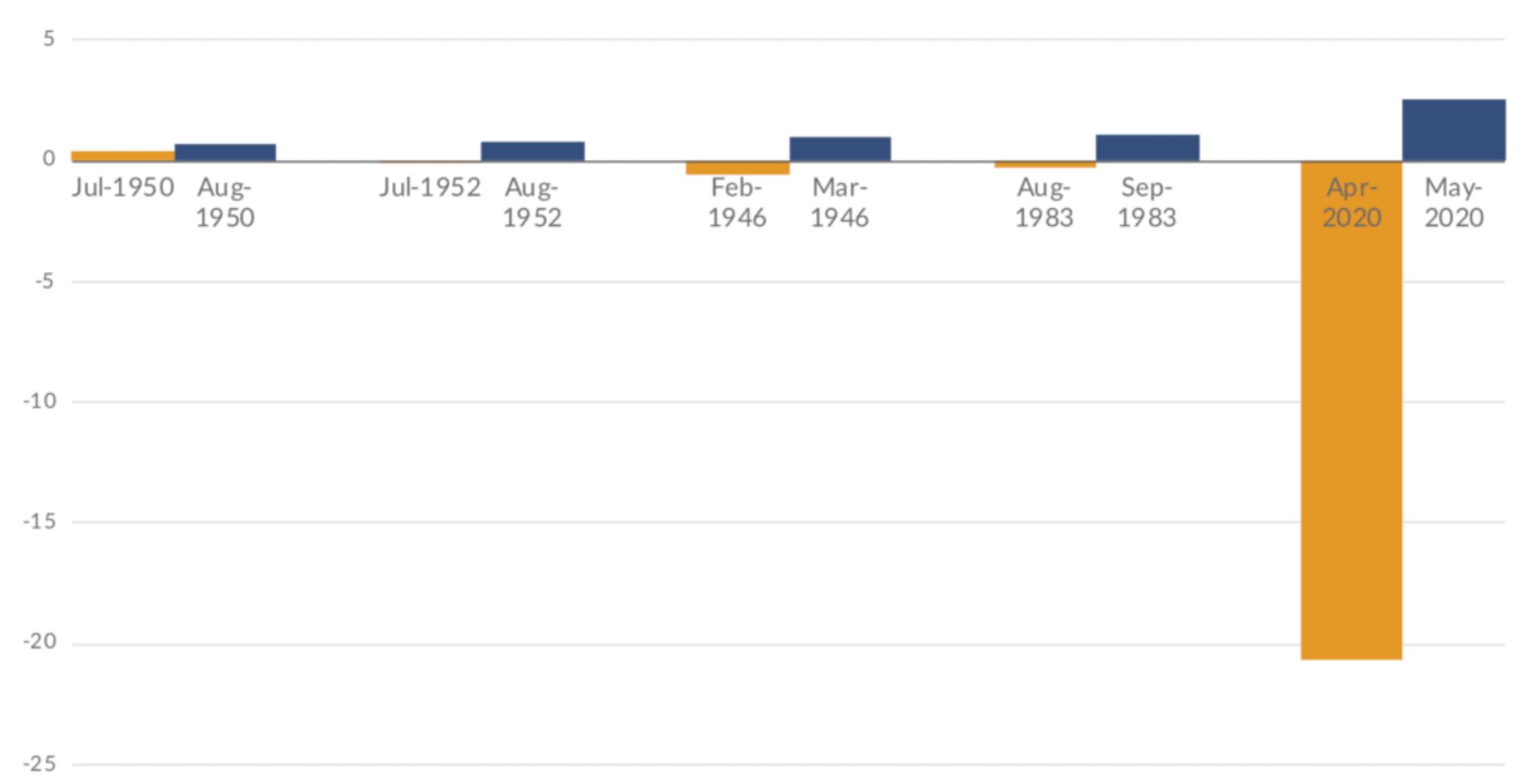
Greatest Top Five Monthly Jobs Gains in HISTORY. We are #1!

Top Five Monthly Jobs Gains

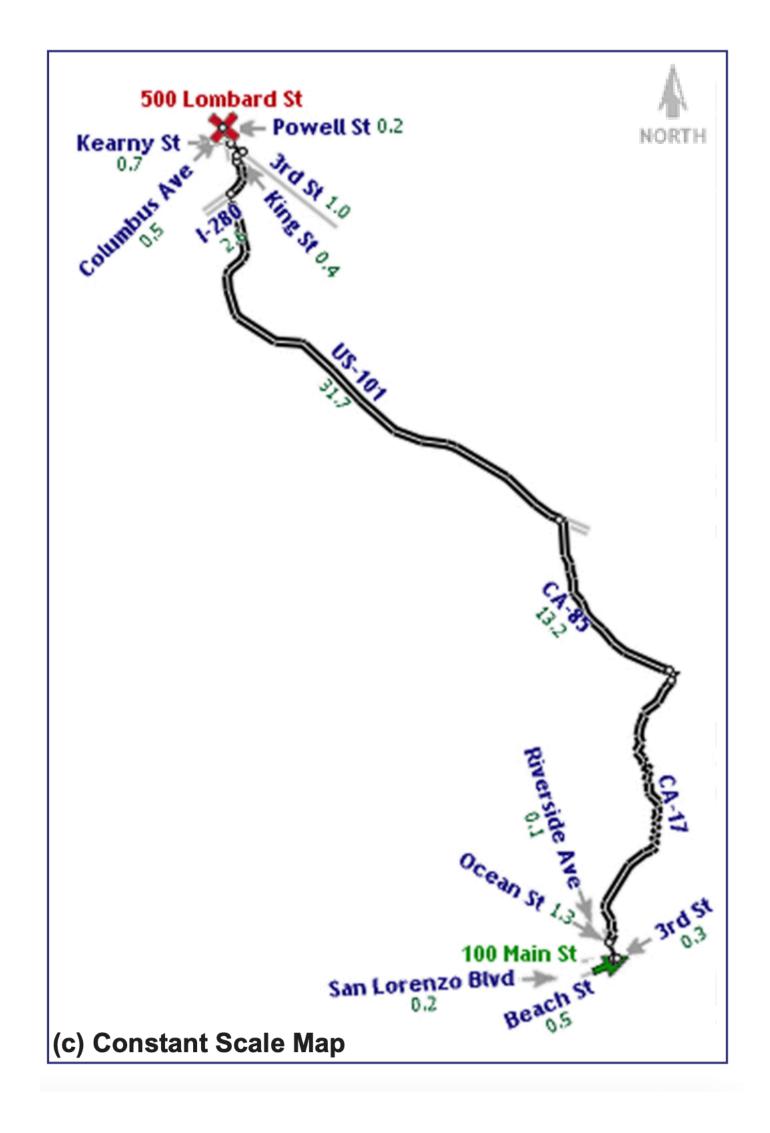


Top Five Monthly Jobs Gains...and the month before

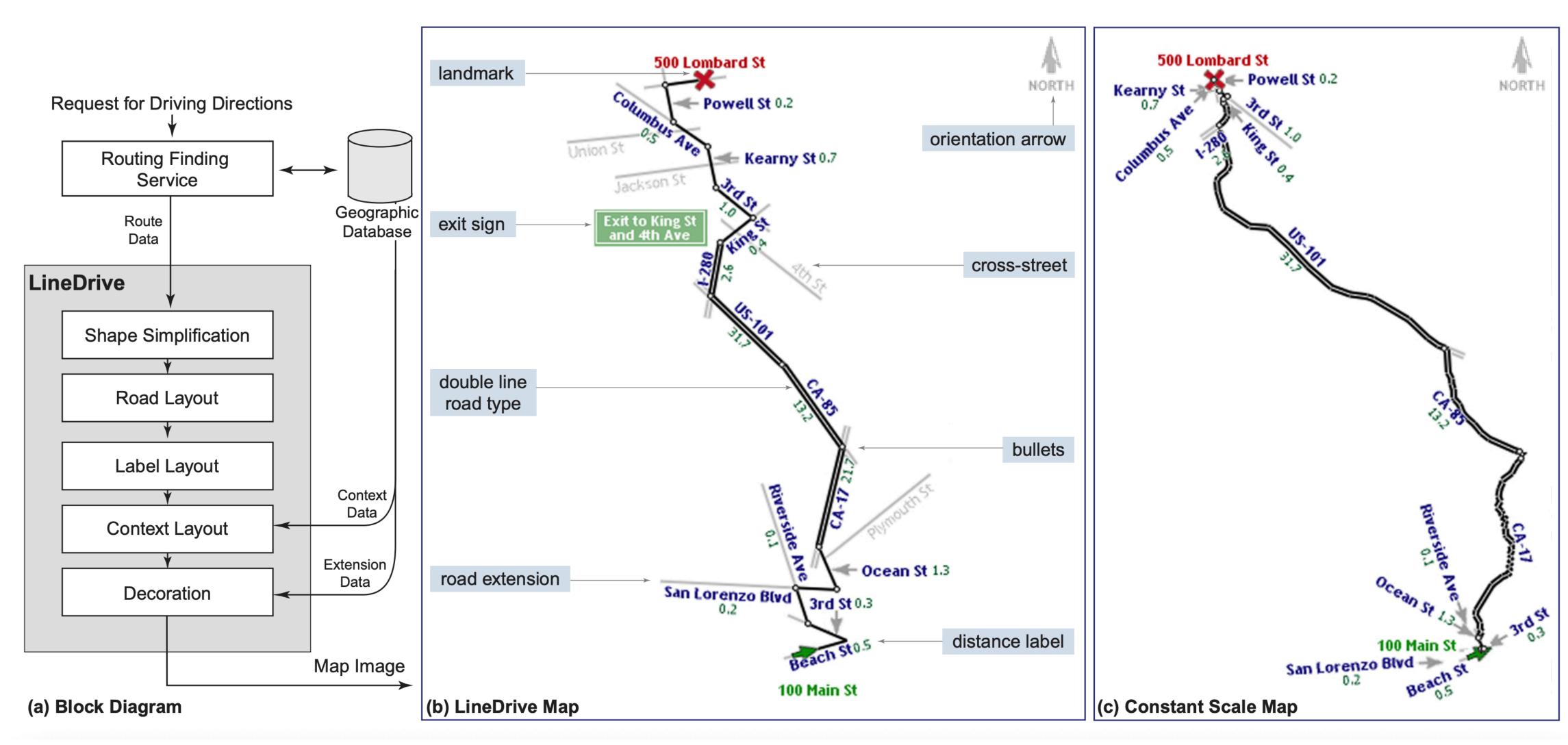
Millions



But is "truth" in pixels objectively good?



What if a "lie" in pixels has a better consequence? (more on this later)



"While it may seem like an extreme statement, I think the ideology of almost all current information visualization is anathema to humanistic thought, antipathetic to its aims and values. The persuasive and seductive rhetorical force of visualization performs such a powerful reification of information that graphics such as Google Maps are taken to be simply a presentation of "what is," as if all critical thought had been precipitously and completely jettisoned."

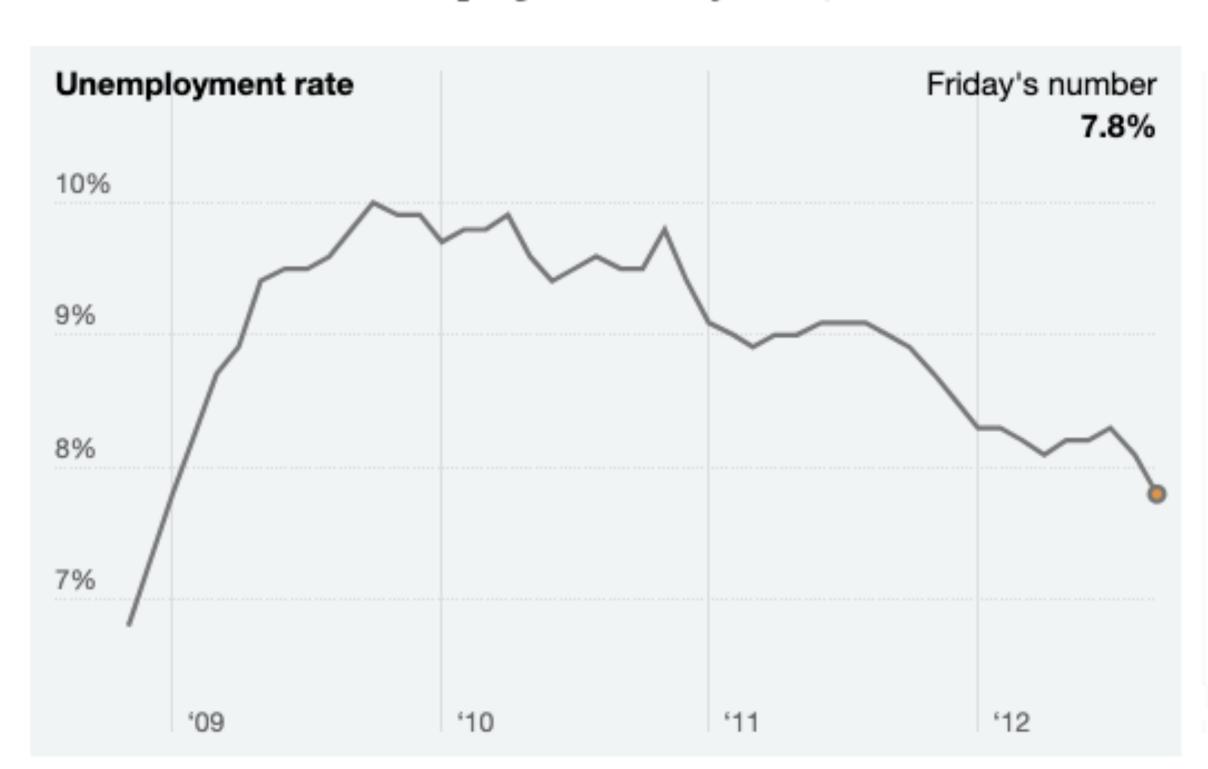
Johanna Drucker

Humanistic theory and digital scholarship

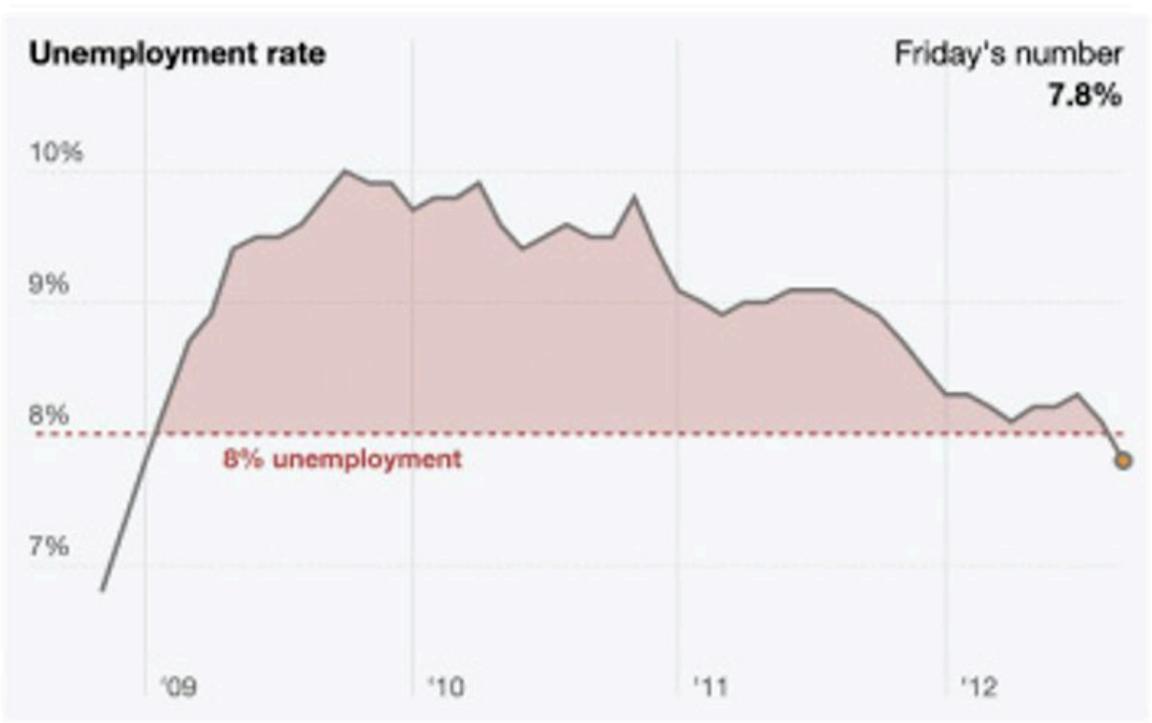
Visualization gives aura of objectivity

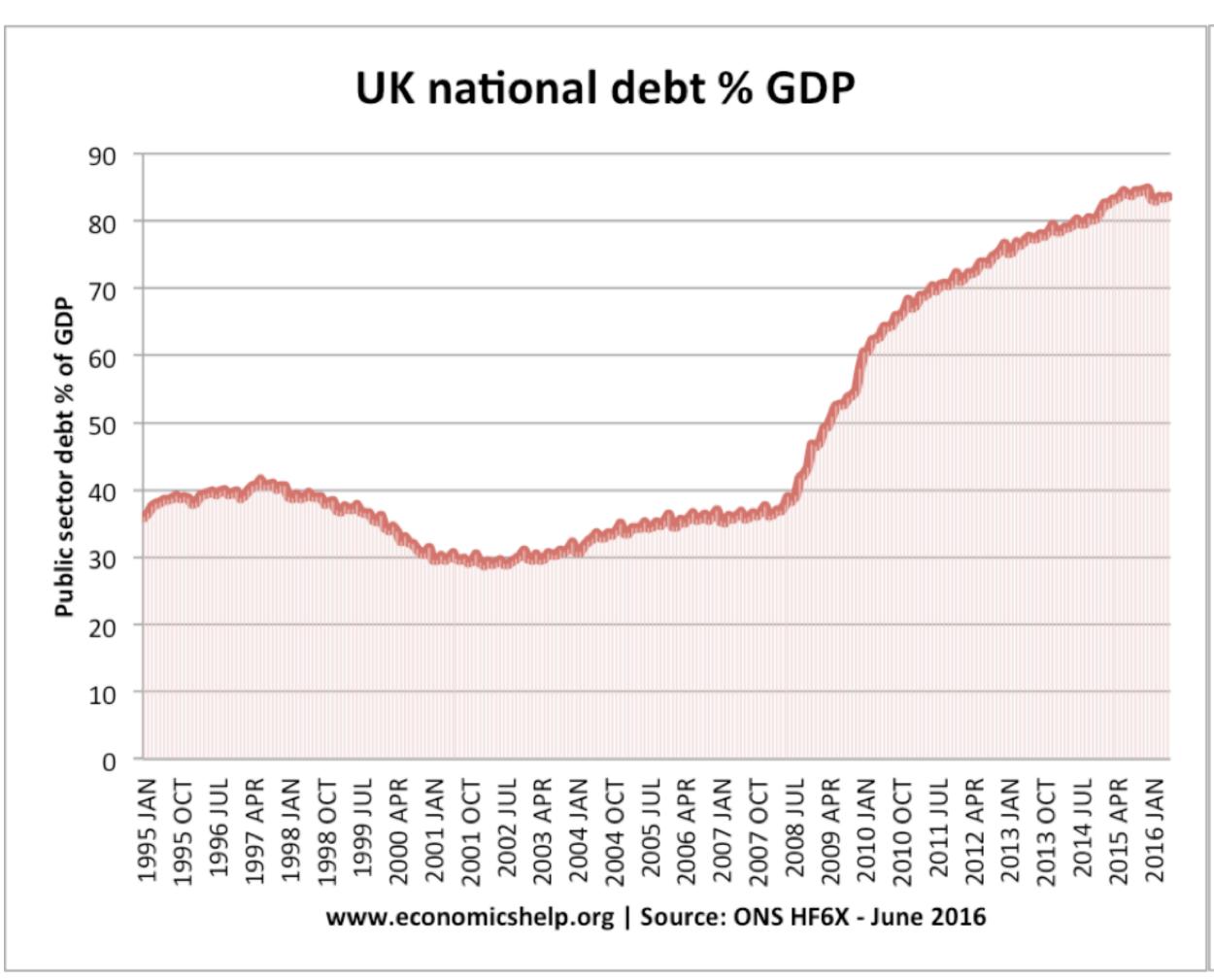
Do not have to be explicitly skewed to tell a story

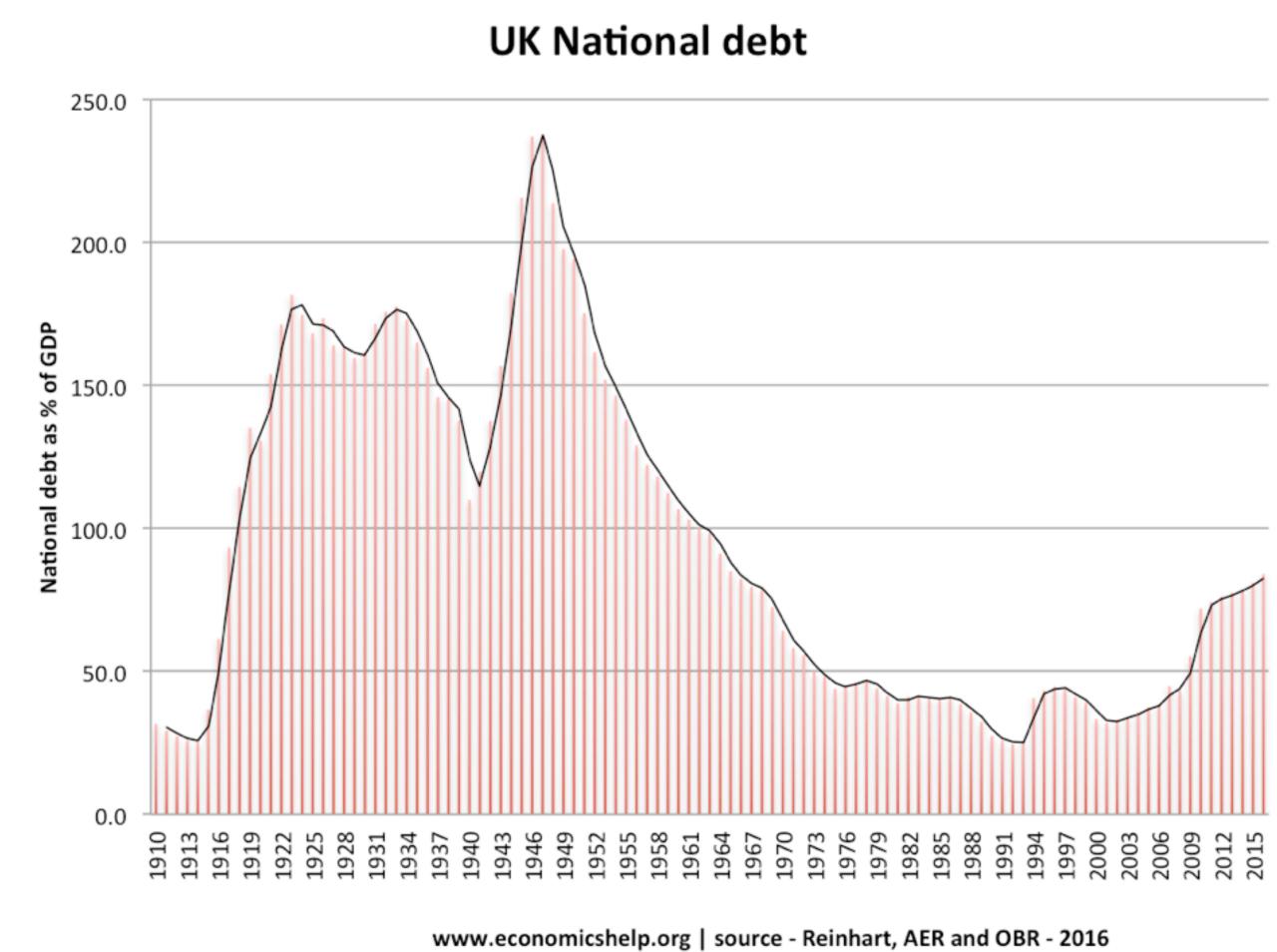




The rate was above 8 percent for 43 months.

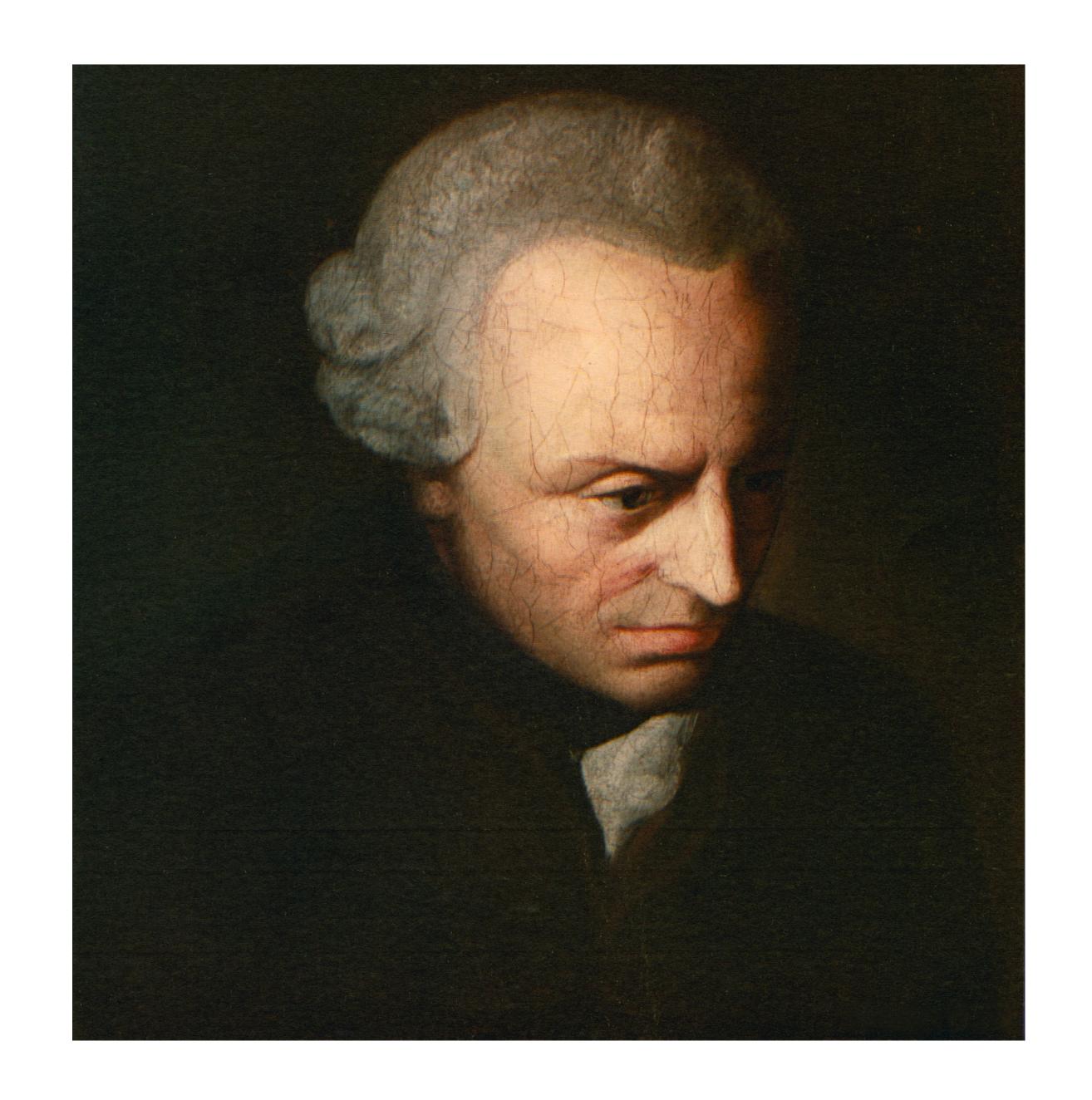






Deontological ethics Limits?

- How do you handle edge cases or rules that have holes?
- Who decides which rules exist and why?
- How do you define and interpret rules? Who arbitrates that?
- Can the rules change?
- What about rules that aren't universal?



Role ethics

Example: Confucius



Role ethics

Example: Confucius

You have a role to play, and being "good" means you fulfill the obligations of that role.

Society expects different things from different roles, so obligations can be different for different people.



Hippocratic Oath

Oath of Ethics taken by Doctors

• First ethical principles in medicine, 300-500 BC

Modified version of the text still used to swear in doctors.

It has also been adopted in other fields such as business



An "oath" (or guidelines) for researchers, journalists

ACM CODE OF ETHICS

Computing professionals' actions CHANGE THE WORLD. They should reflect upon the wider impact of their work, consistently supporting the public good.

GENERAL ETHICAL PRINCIPLES.

Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing. Avoid harm. Be honest and trustworthy. Be fair and take action not to discriminate. Respect the work required to produce new ideas, inventions, and creative works, and computing artifacts. Respect privacy. Honor confidentiality.

PROFESSIONAL RESPONSIBILITIES.

Strive to achieve high quality in both the processes and products of professional work. Maintain high standards of professional competence, conduct, and ethical practice. Know and respect existing rules pertaining to professional work. Accept and provide appropriate professional review. Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks. Perform work only in areas of competence. Foster public awareness and understanding of computing, related technologies, and their consequences. Access computing and communication resources only when authorized or when compelled by the public good. Design and implement systems that are robustly and usably secure.

PROFESSIONAL LEADERSHIP PRINCIPLES.

Ensure that the public good is the central concern during all professional computing work. Articulate, encourage acceptance of, and evaluate fulfillment of social responsibilities by members of the organization or group. Manage personnel and resources to enhance the quality of working life. Articulate, apply, and support policies and processes that reflect the principles of the Code. Create opportunities for members of the organization or group to grow as professionals. Use care when modifying or retiring systems. Recognize and take special care of systems that become integrated in the infrastucture of society.

https://www.acm.org/code-of-ethics



Members of the Society of Professional Journalists believe that public enlightenment is the forerunner of justice and the foundation of democracy Ethical journalism strives to ensure the free exchange of information that is accurate, fair and thorough. An ethical journalist acts with integrity. The Society declares these four principles as the foundation of ethical journalism and encourages their use in its practice by all people in all media

SEEK TRUTH AND REPORT IT

Ethical journalism should be accurate and fair, lournalists should be honest and courageous in gathering, reporting and interpreting

- ➤ Take responsibility for the accuracy of their work. Verify information before releasing it. Use original sources whenever possible.
- Remember that neither speed nor format excuses inaccuracy. > Provide context. Take special care not to misrepresent or oversimplify in
- promoting, previewing or summarizing a story. ▶ Gather, update and correct information throughout the life of a news story.
- Be cautious when making promises, but keep the promises they make. ▶ Identify sources clearly. The public is entitled to as much information as possible to judge the reliability and motivations of sources.
- ▶ Consider sources' motives before promising anonymity. Reserve anonymity for sources who may face danger, retribution or other harm, and have information that cannot be obtained elsewhere. Explain why anonymity was granted.
- Diligently seek subjects of news coverage to allow them to respond to criticism or allegations of wrongdoing.
- Avoid undercover or other surreptitious methods of gathering information unless traditional, open methods will not yield information vital to the public. ▶ Be vigilant and courageous about holding those with power accountable.
- Give voice to the voiceless. Support the open and civil exchange of views, even views they find repugnant. ▶ Recognize a special obligation to serve as watchdogs over public affairs and
- government. Seek to ensure that the public's business is conducted in the open, and that public records are open to all.
- Provide access to source material when it is relevant and appropriate. ▶ Boldly tell the story of the diversity and magnitude of the human experience. Seek sources whose voices we seldom hear.
- Avoid stereotyping. Journalists should examine the ways their values and experiences may shape their reporting.
- Never deliberately distort facts or context, including visual information. Clearly label illustrations and re-enectments.
- Never plagiarize. Always attribute.

MINIMIZE HARM

the public as human beings deserving of respect.

Pursuit of the news is not a license for arrogance or undue intrusiveness.

- Show compassion for those who may be affected by news coverage. Use heightened sensitivity when dealing with juveniles, victims of sex crimes. and sources or subjects who are inexperienced or unable to give consent. Consider cultural differences in approach and treatment.
- Recognize that legal access to information differs from an ethical justification to publish or broadcast.
- > Realize that private people have a greater right to control information about themselves than public figures and others who seek power, influence or attention. Weigh the consequences of publishing or broadcasting personal
- Avoid pendering to lurid curiosity, even if others do.
- Balance a suspect's right to a fair trial with the public's right to know. Consider the implications of identifying criminal suspects before they face legal charges
- > Consider the long-term implications of the extended reach and permanence of publication. Provide updated and more complete information as appropriate,

The highest and primary obligation of ethical journalism is to serve

- Avoid conflicts of interest, real or perceived. Disclose unavoidable conflicts.
- Refuse gifts, favors, fees, free travel and special treatment, and avoid political and other outside activities that may compromise integrity or impartiality, or may damage credibility.
- Be wary of sources offering information for favors or money; do not pay for access to news, identify content provided by outside sources, whether paid
- ▶ Deny favored treatment to advertisers, donors or any other special interests, and resist internal and external pressure to influence coverage.
- Distinguish news from advertising and shun hybrids that blur the lines between the two. Prominently label sponsored content.

Ethical journalism means taking responsibility for one's work and explaining one's decisions to the public.

BE ACCOUNTABLE AND TRANSPARENT

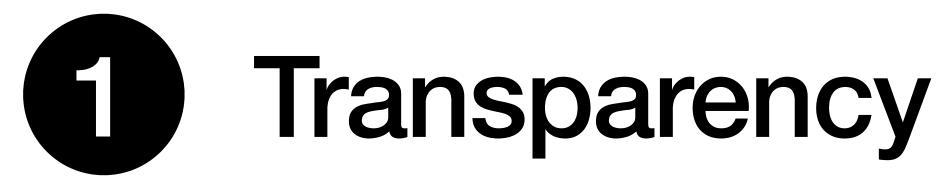
Journalists should

- ▶ Evolain ethical choices and processes to audiences. Encourage a civil dialogue with the public about journalistic practices, coverage and news
- Respond guickly to guestions about accuracy, clarity and fairness Acknowledge mistakes and correct them promptly and prominently, Explain
- corrections and clarifications carefully and clearly.
- ► Balance the public's need for information against potential harm or discomfort. ► Expose unethical conduct in journalism, including within their organizations.
 - Abide by the same high standards they expect of others.

It is not a set of rules, rather a guide that encourages all who engage in journalism to take responsibility for the information they provide, regardless of medium. The code should be read as a whole; individual principles should not be taken out of context. It is not, nor can it be under the first Amendment, legally enforceable.

Guidelines for ethical data visualization

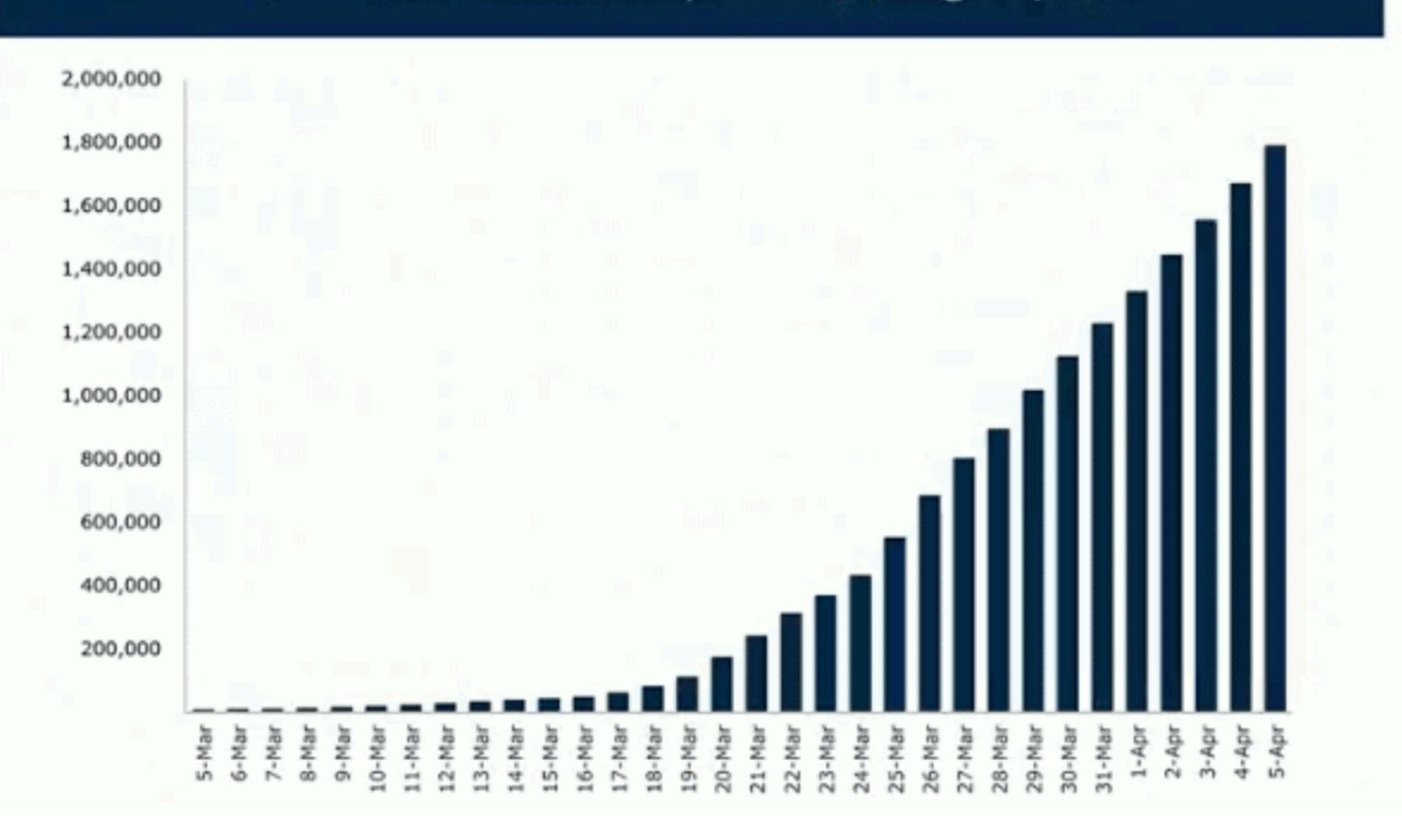
A non-exhaustive list

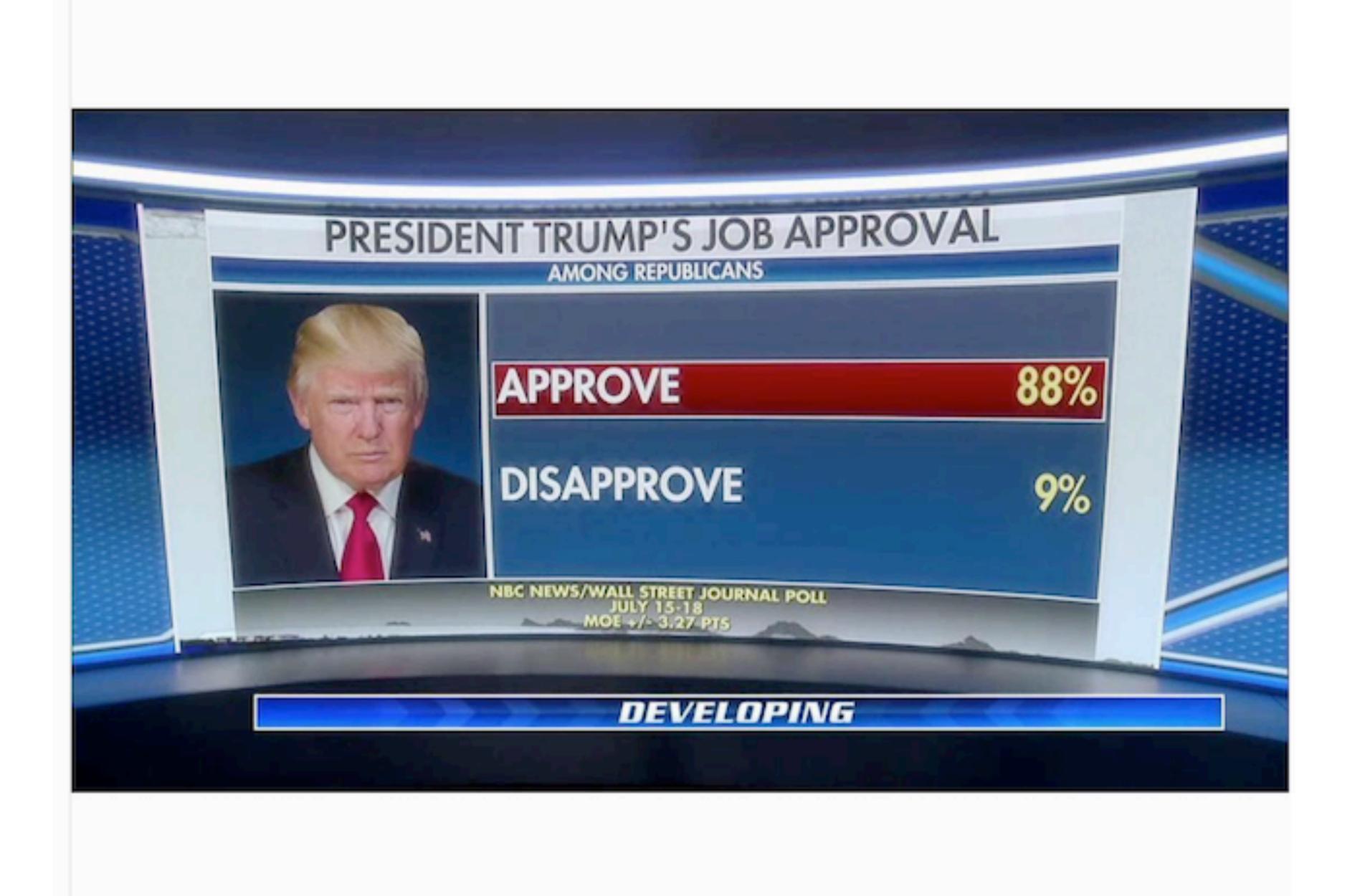


Tell your data's story, its uncertainty, and its assumptions,

COVID-19 TESTING IN THE U.S.

>1,790,000 tests completed through April 5





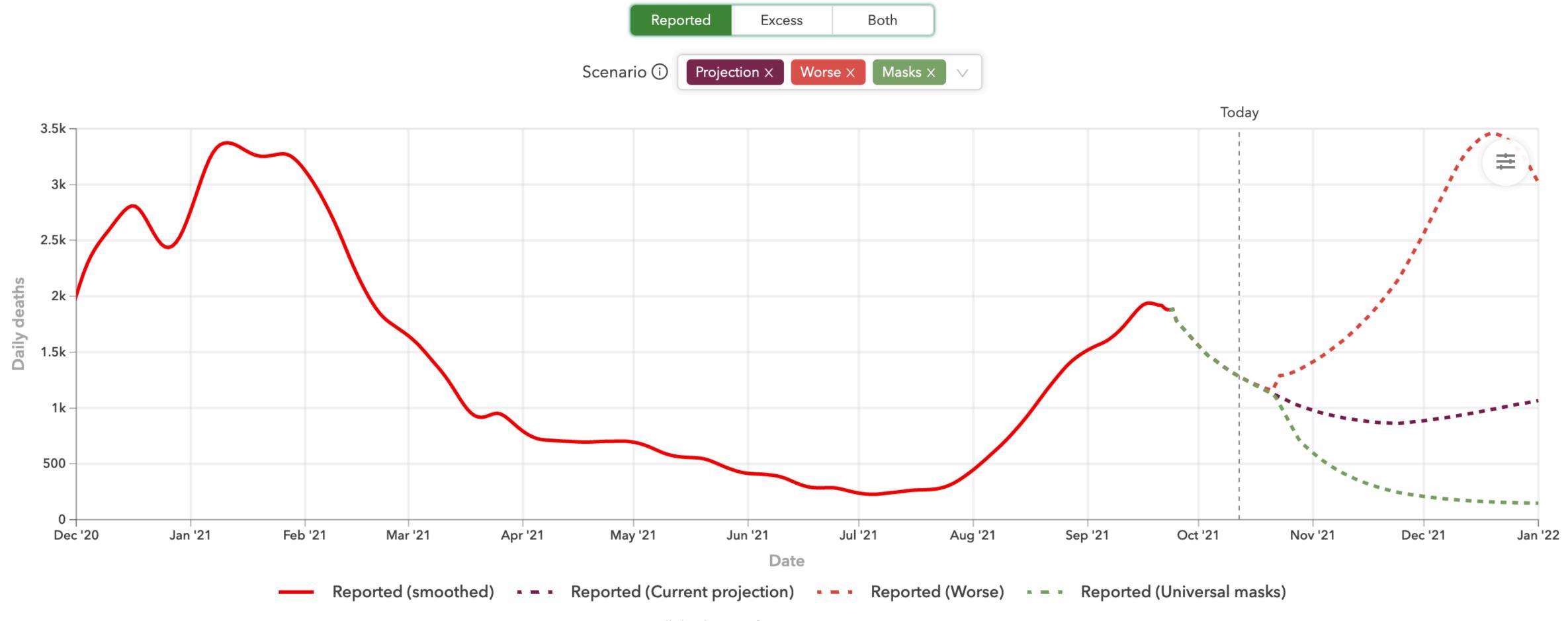
Daily deaths 🗹

∠ Trend

∠ Compare

Мар

Daily deaths is the best indicator of the progression of the pandemic, although there is generally a 17-21 day lag between infection and deaths.



Guidelines for ethical data visualization

A non-exhaustive list

Transparency

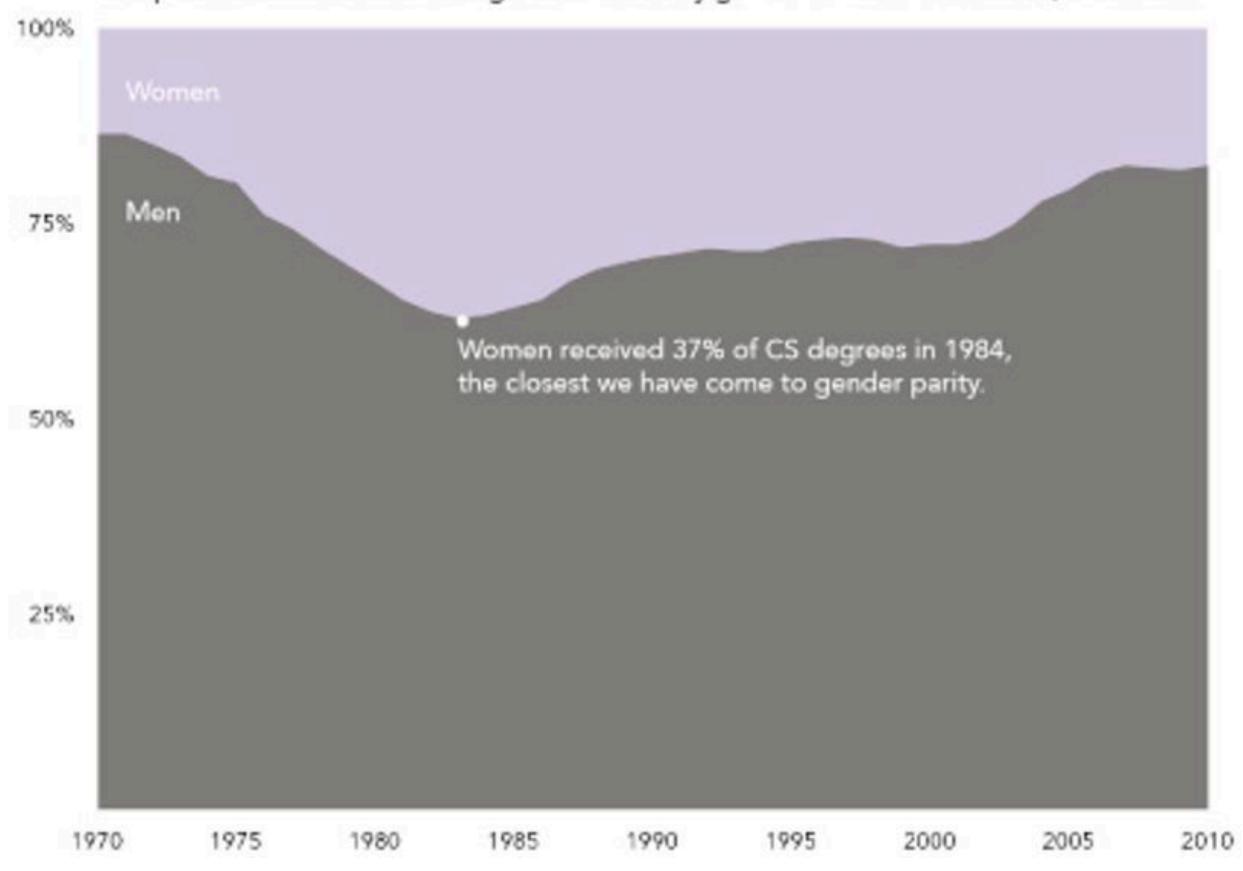
Tell your data's story, its uncertainty, and its assumptions,

2 Empower marginalized voices

Question power, humanize data

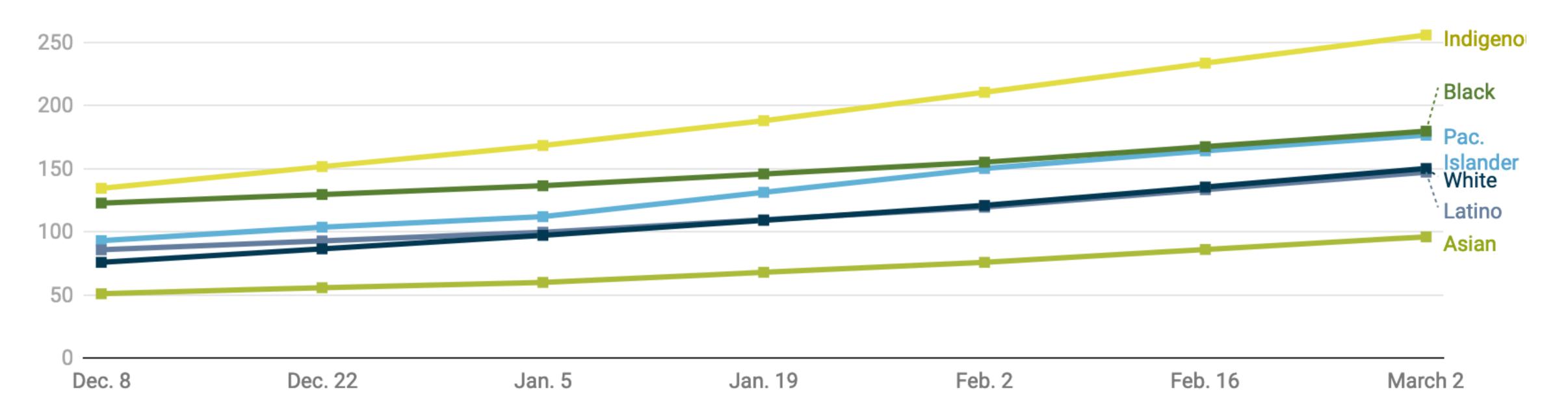
Computer Science, the Man Factory

Computer science bachelor's degrees awarded by gender in the United States, 1970-2010

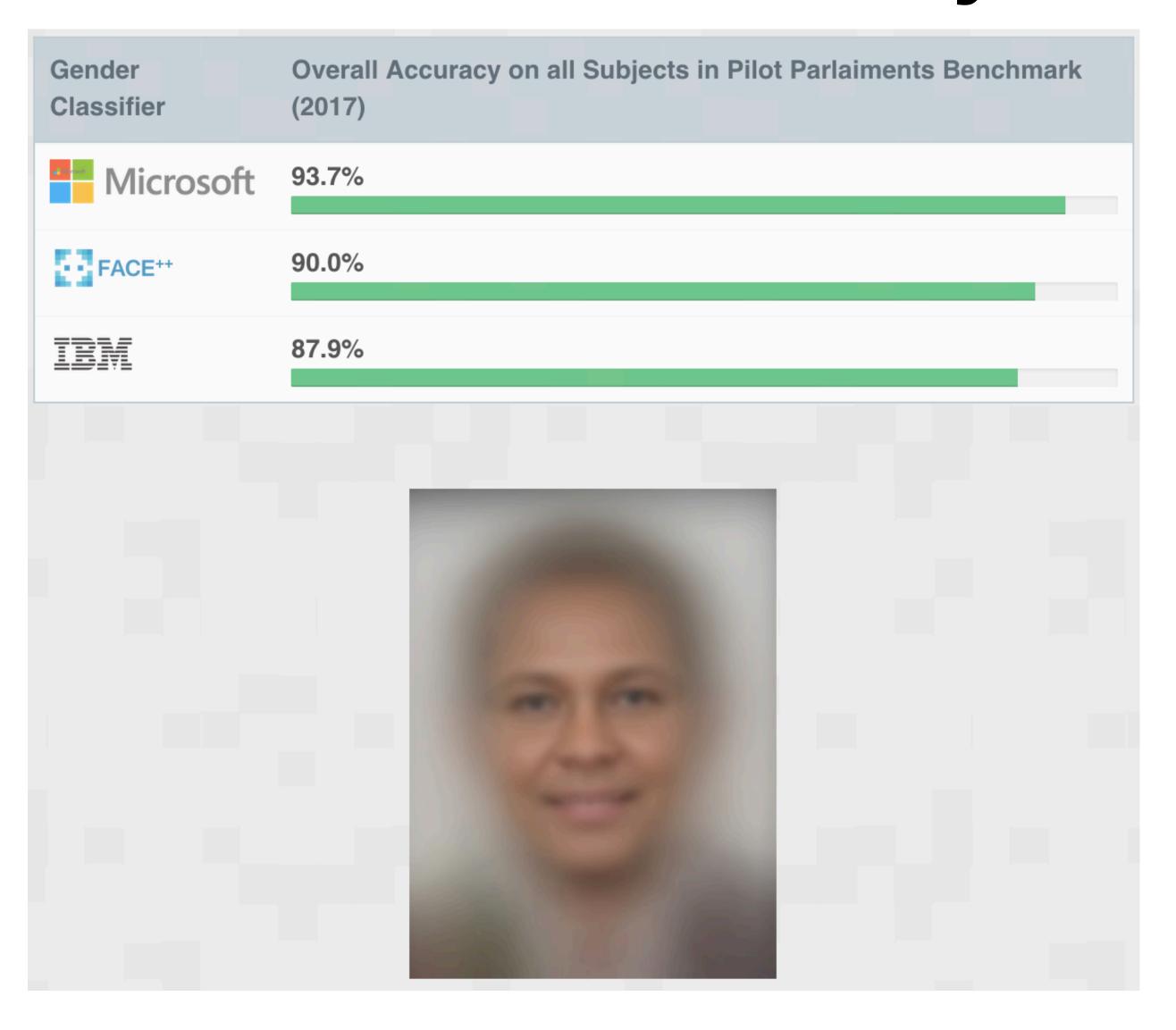


Indigenous, Black & Pacific Islander Americans have experienced the highest death tolls from COVID-19

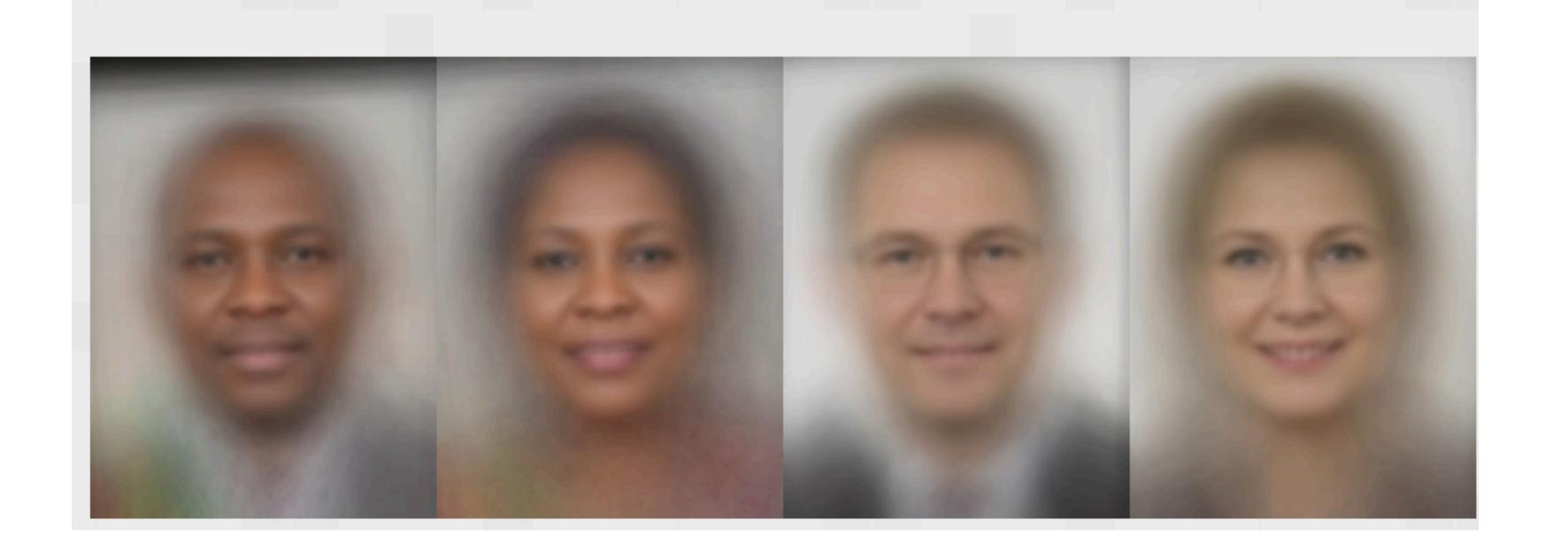
Cumulative actual (crude) COVID-19 mortality rates per 100,000, by race and ethnicity, Dec. 8, 2020-March 2, 2021



Gender Shades - Intersectionality



Gender Classifier	Darker Male	Darker Female	Lighter Male	Lighter Female	Largest
Microsoft	94.0%	79.2%	100%	98.3%	20.8%
FACE++	99.3%	65.5%	99.2%	94.0%	33.8%
IBM	88.0%	65.3%	99.7%	92.9%	34.4%



Guidelines for ethical data visualization

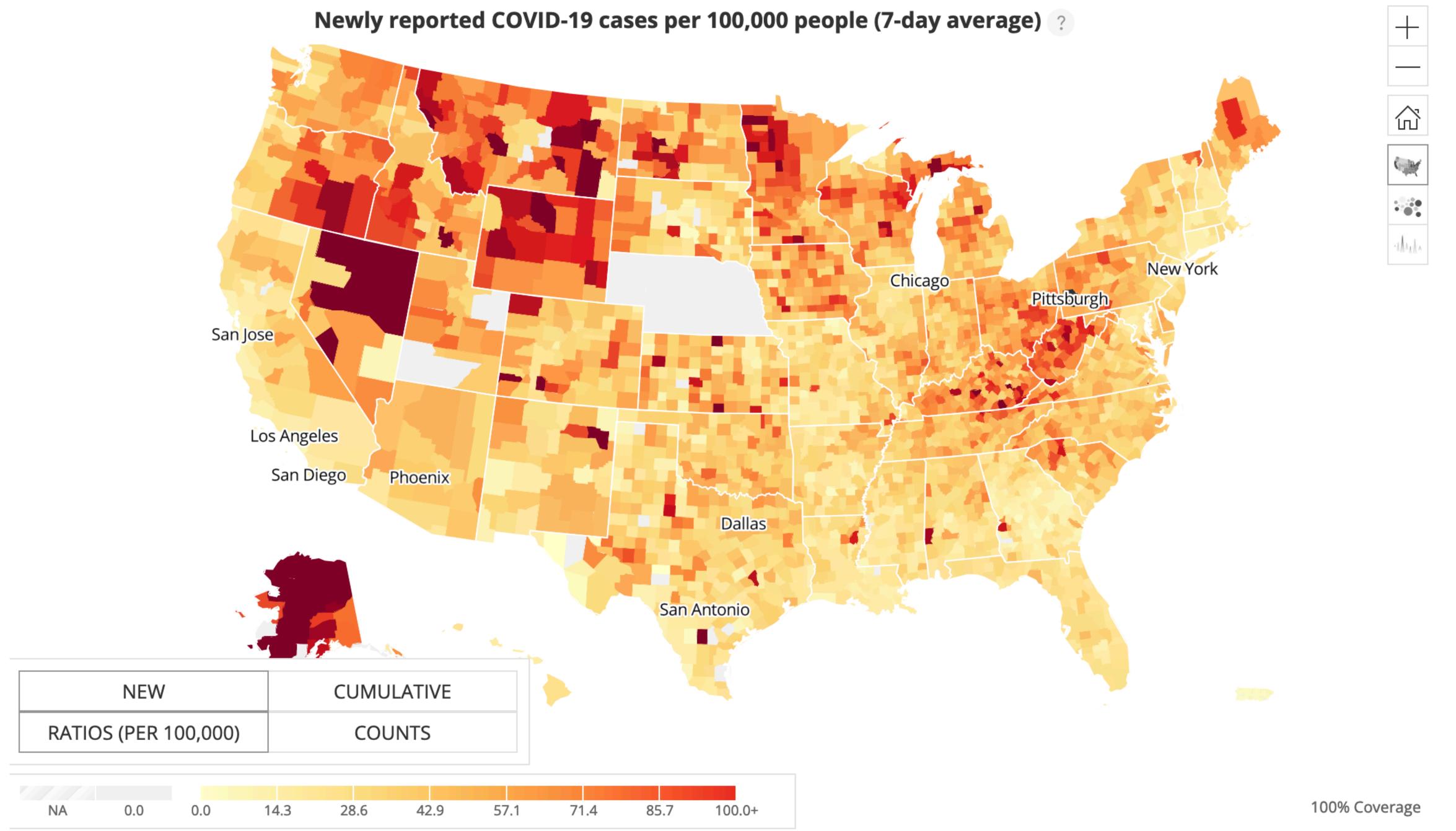
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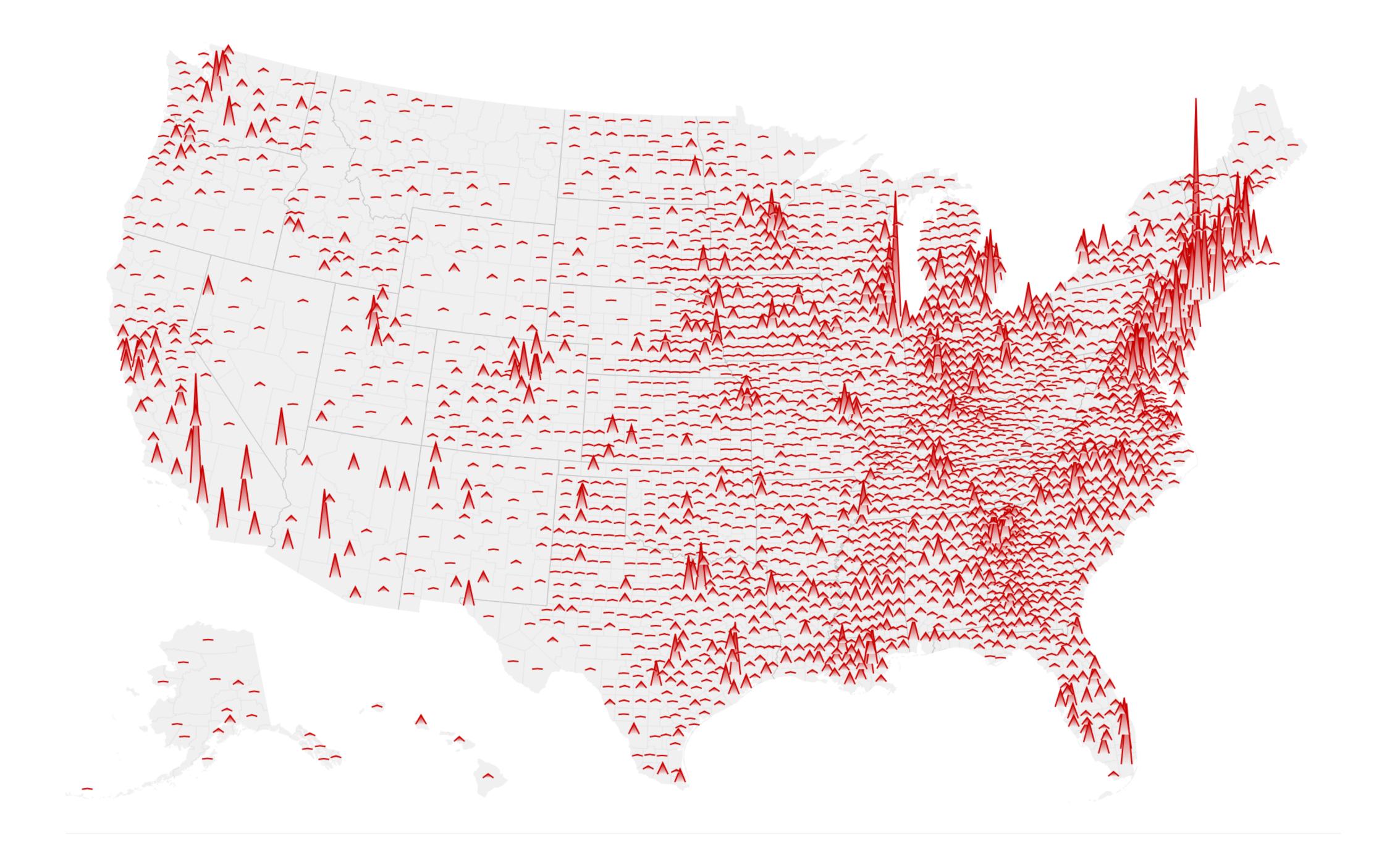
- Transparency
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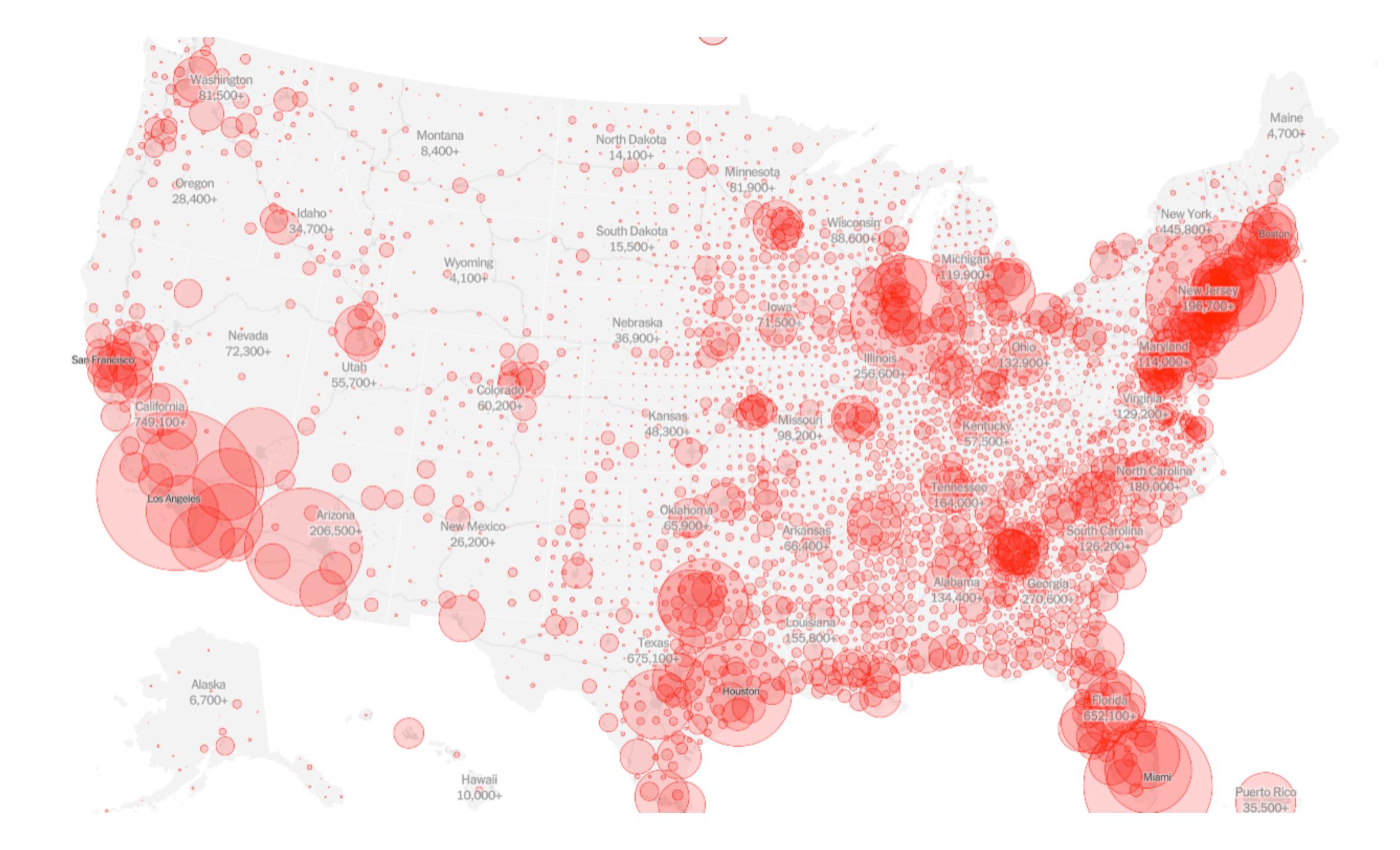
Question power, humanize data

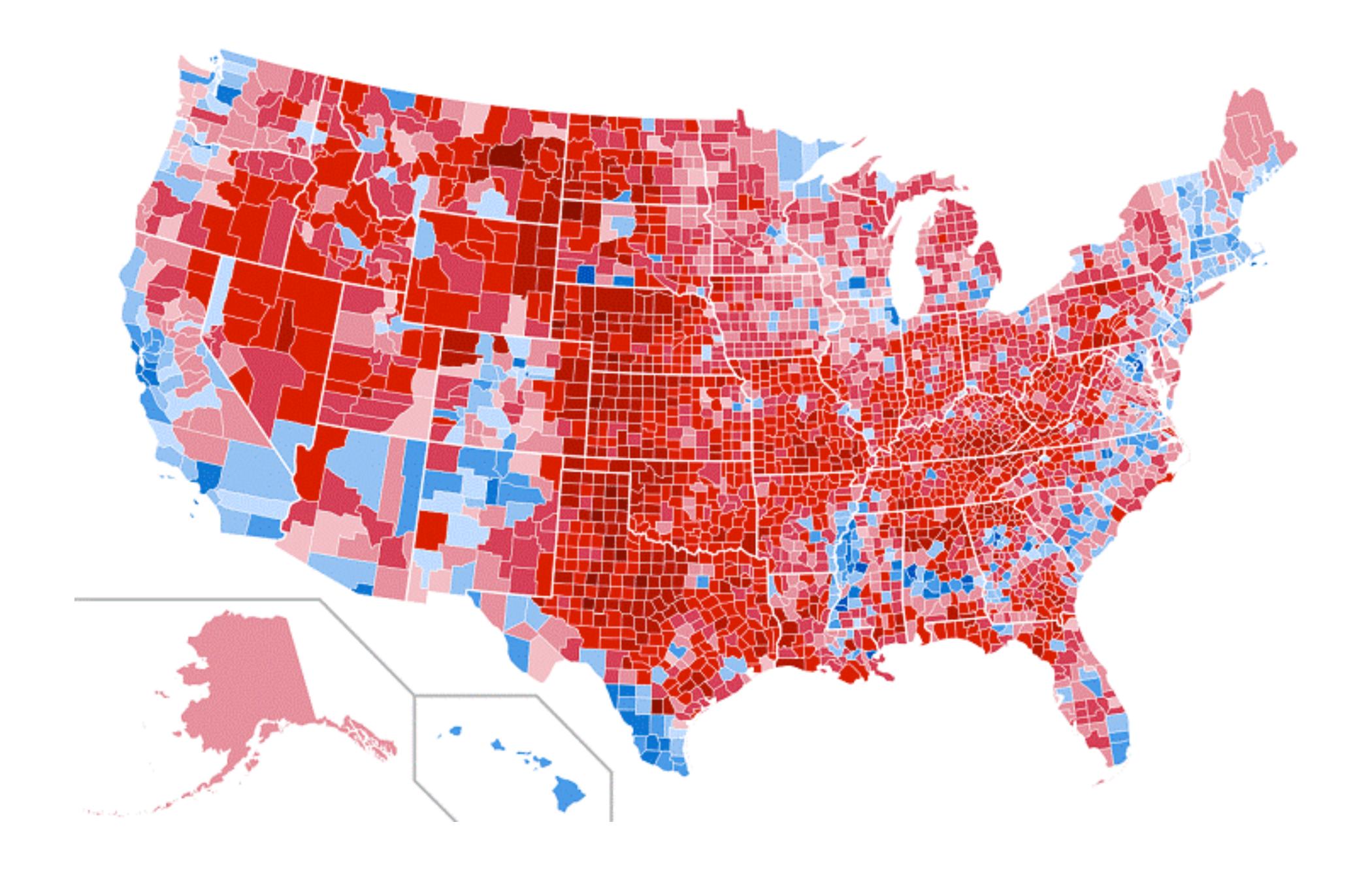
Consider your story and its perception

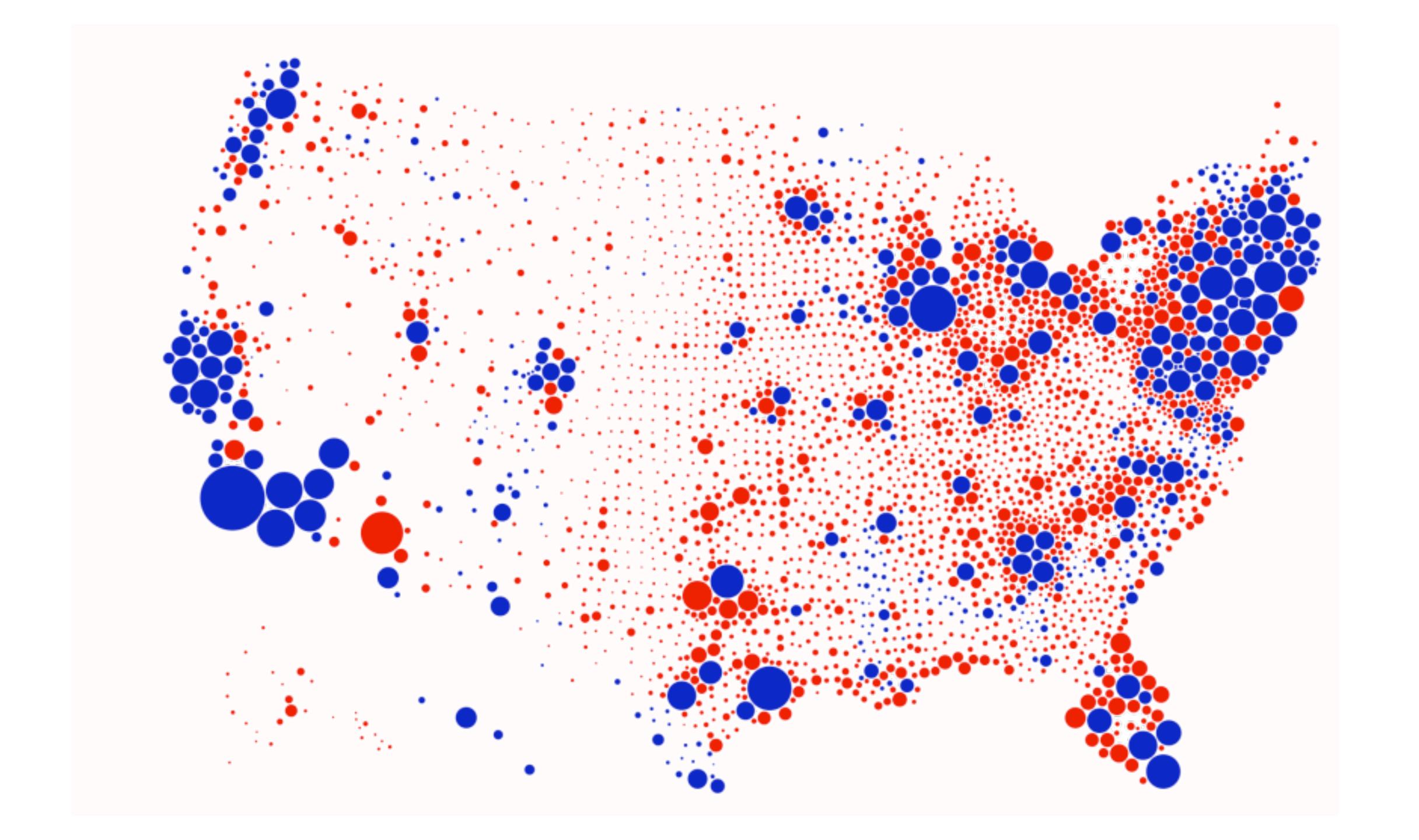
How will your visualization be perceived? How will people use it? And who can use it?

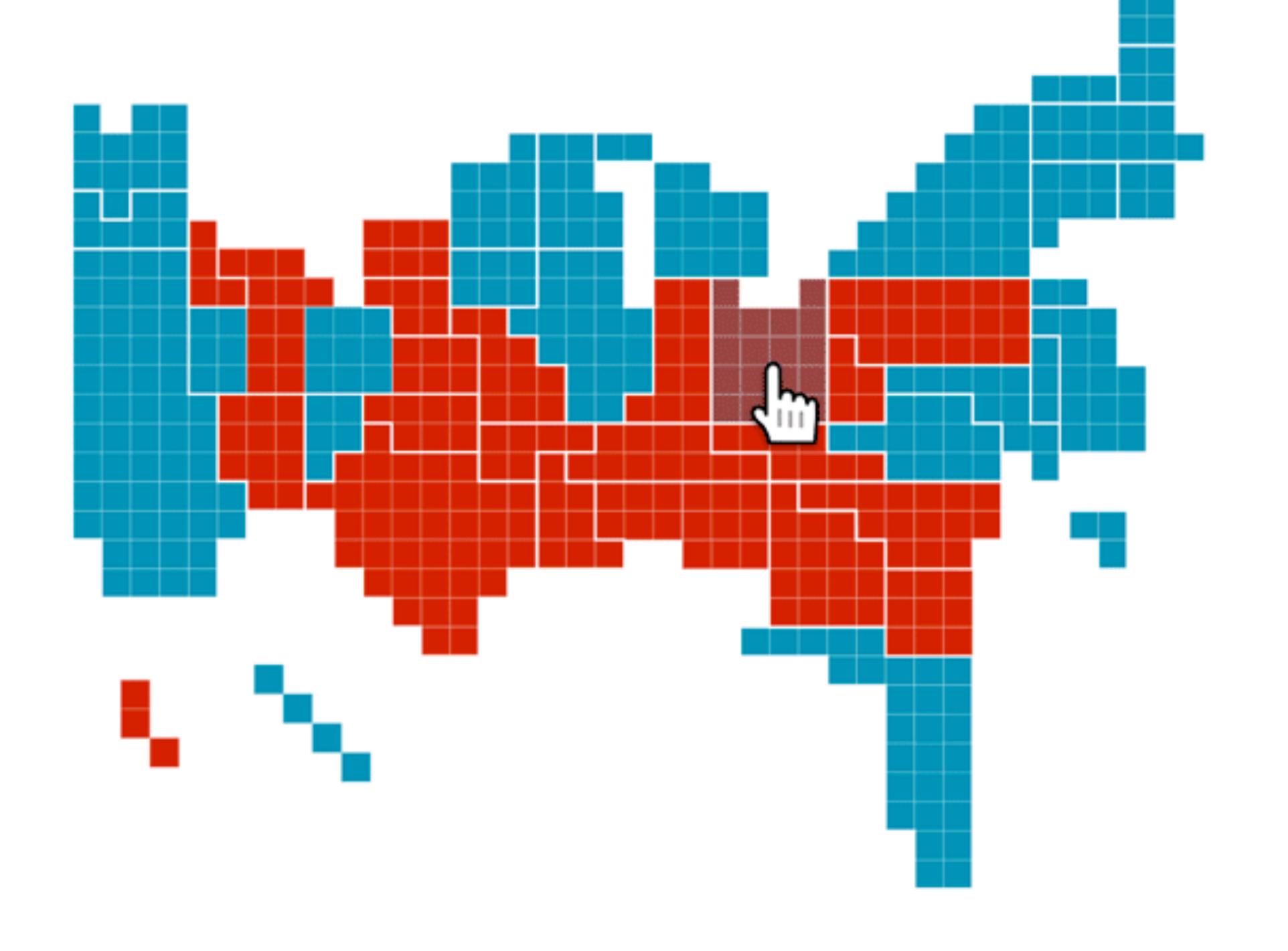












Role ethics

Limits?



Role ethics

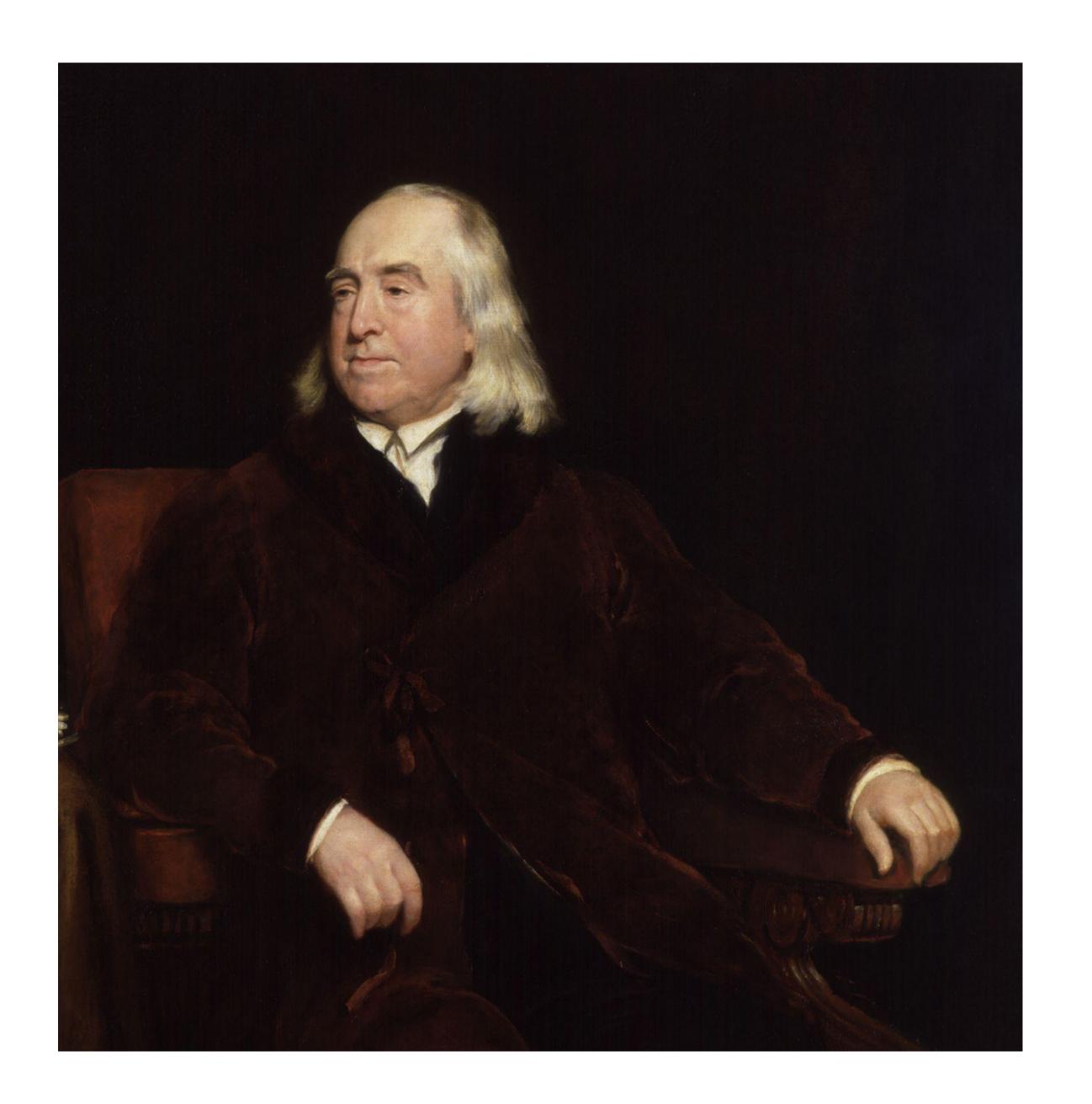
Limits?

- Who gives you your roles?
- What if you have roles with conflicting obligations?
- What if some roles accomplish harm? (le "just following orders")
- What if nobody has the roles we need or roles that accomplish good are hard or unrewarding?



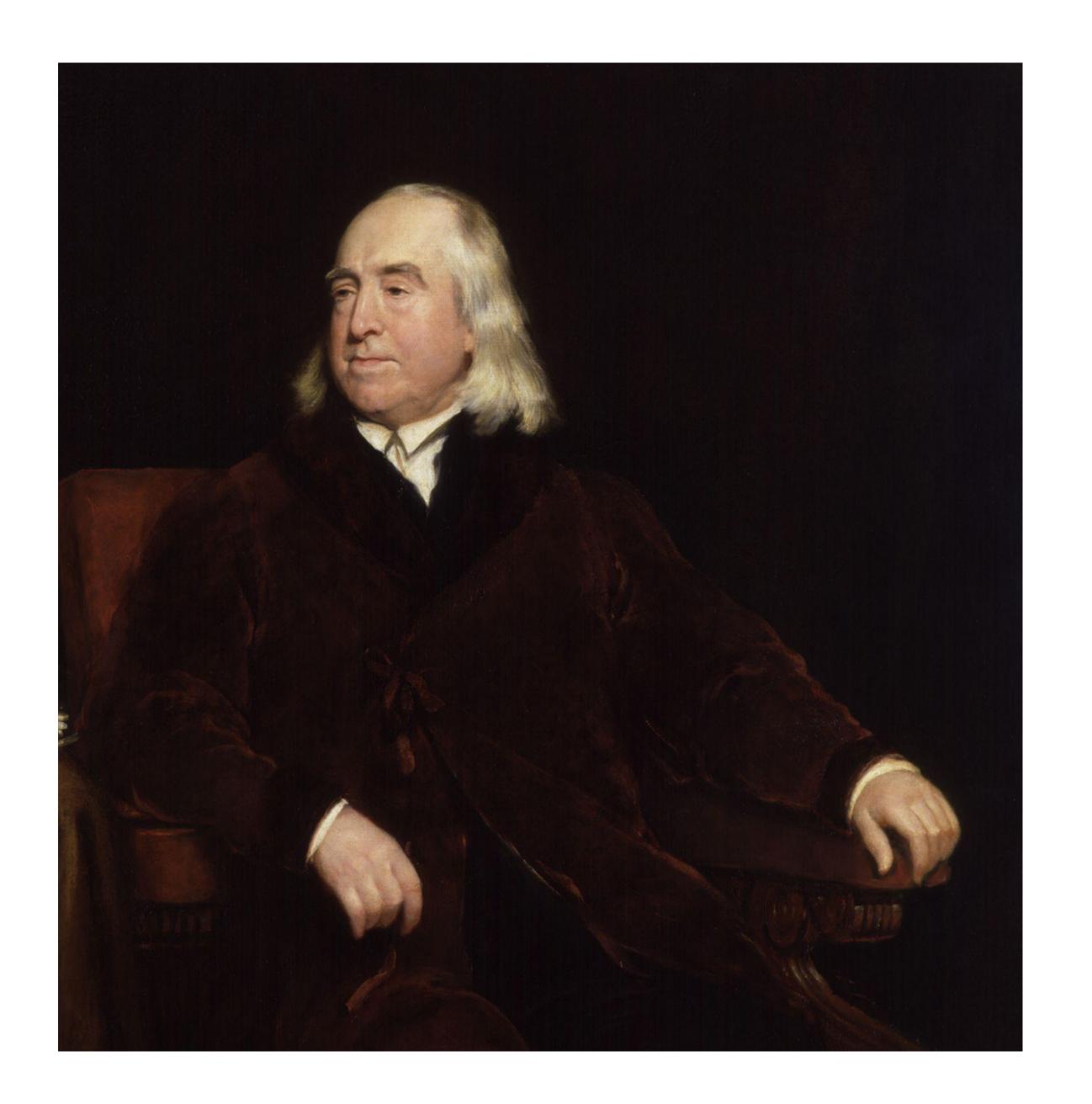
Consequentialist ethics

Example: Jeremy Bentham



Consequentialist ethics Example: Jeremy Bentham

An action is ethical or unethical based on *outcomes* or *consequences* (referred to as the "telos" or "teleological").



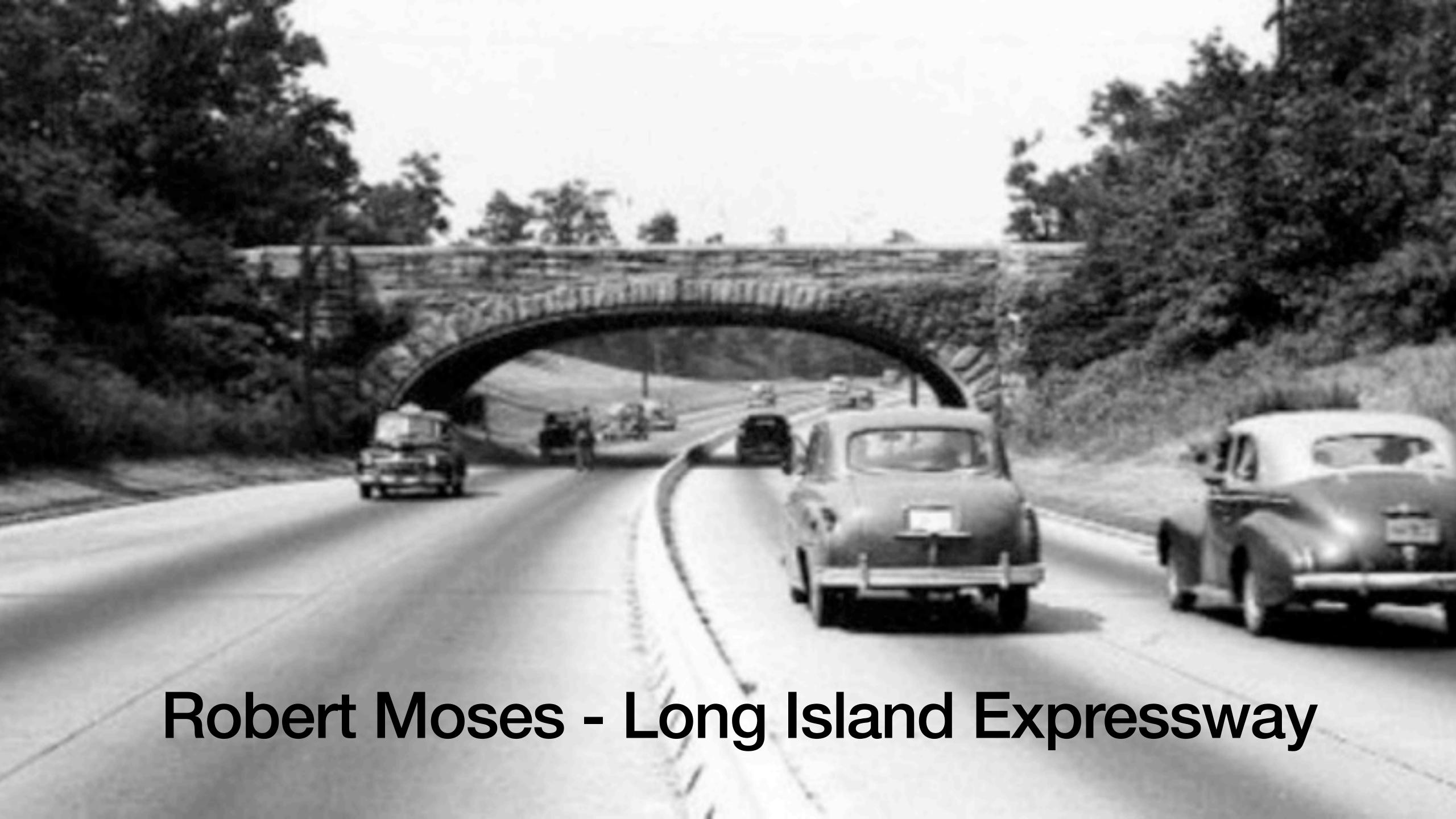
Consequentialist ethics Example: Jeremy Bentham

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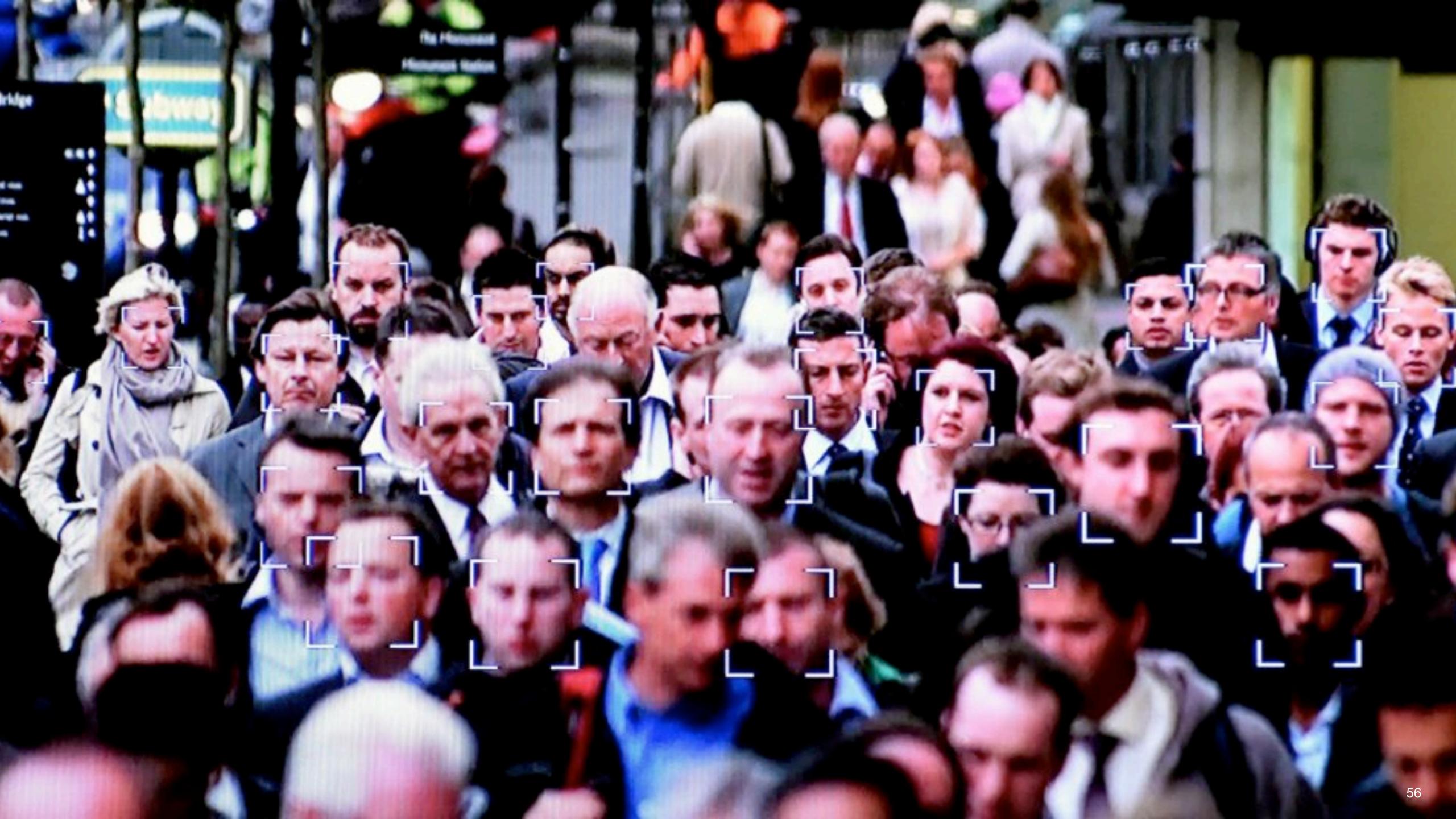
Bentham is credited for *utilitarianism*, or the idea that if you can measure outcomes, you can *optimize for their utility*, ie good.

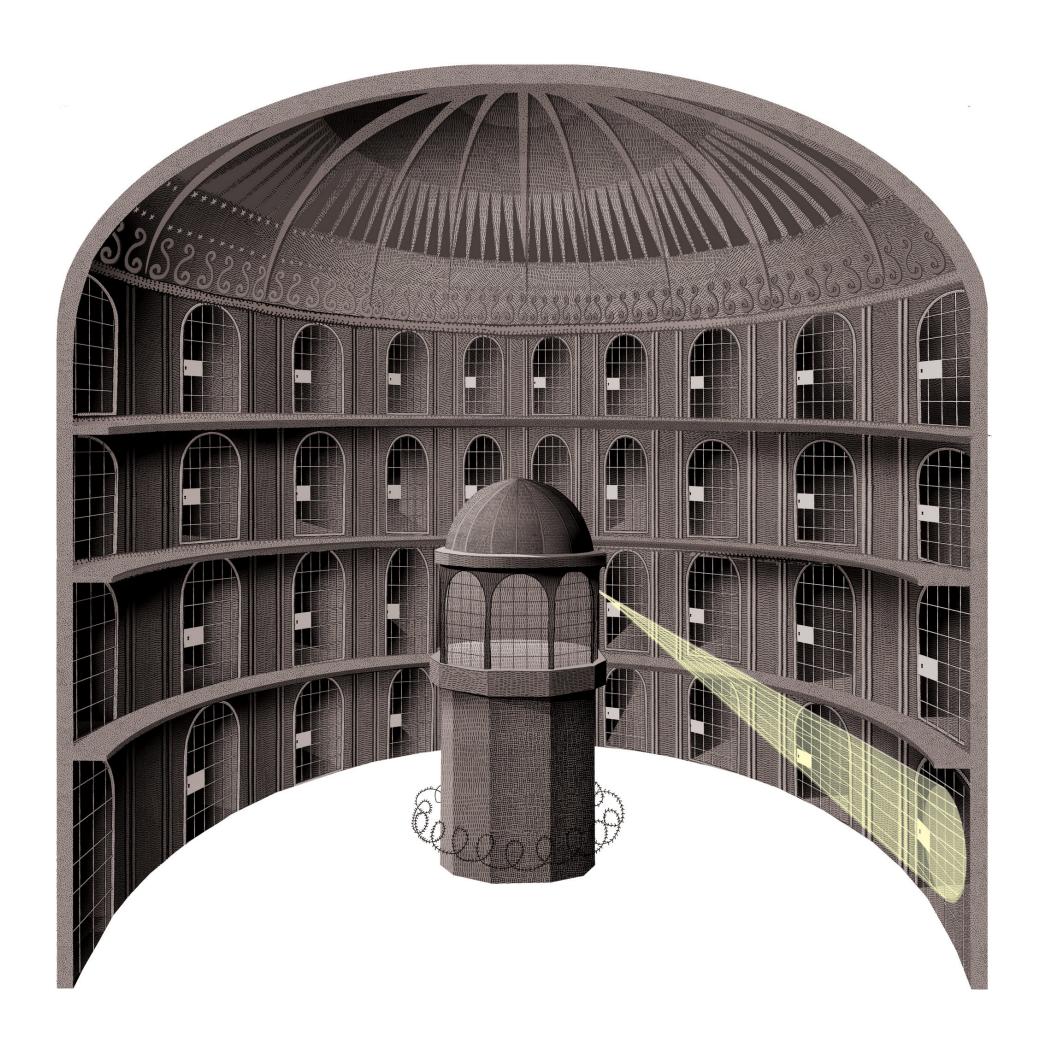






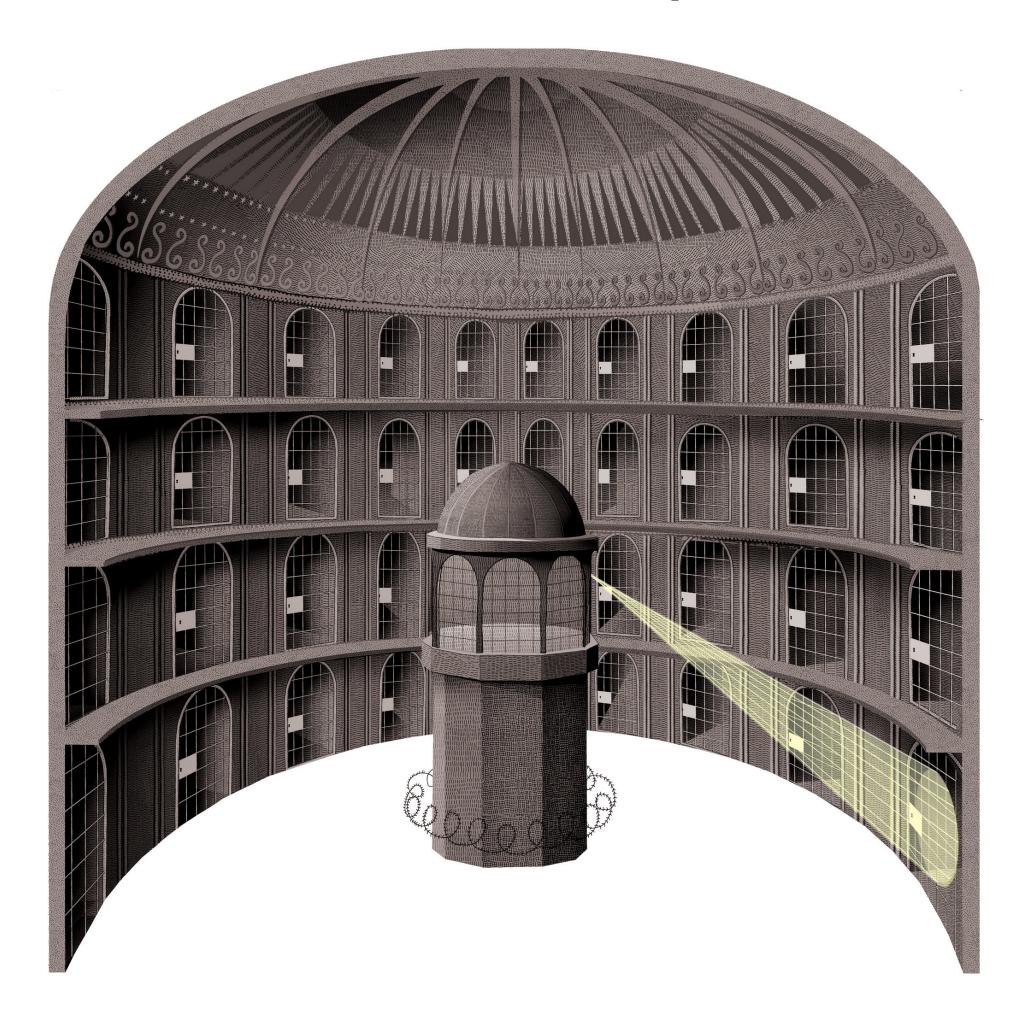






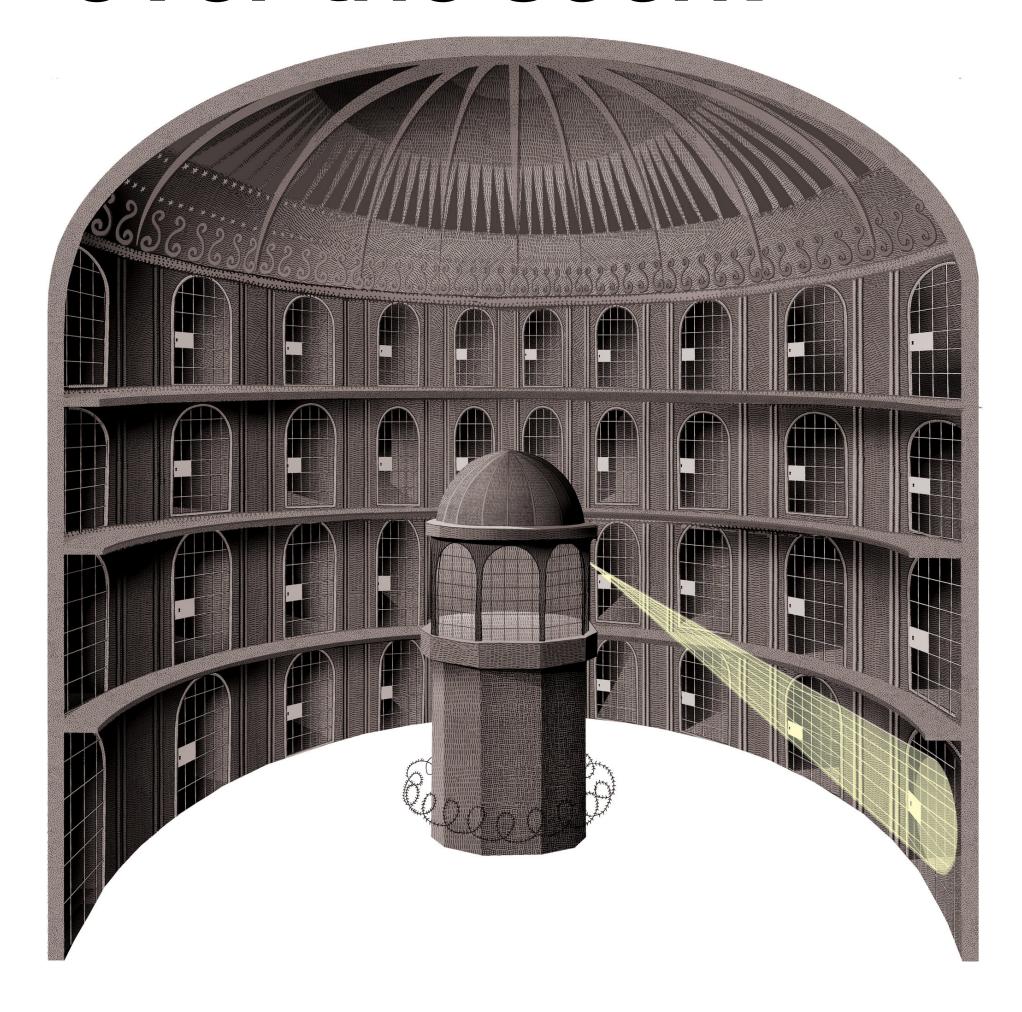
The panopticon

Surveillance, data/capta, and utility





The seer has power over the seen.

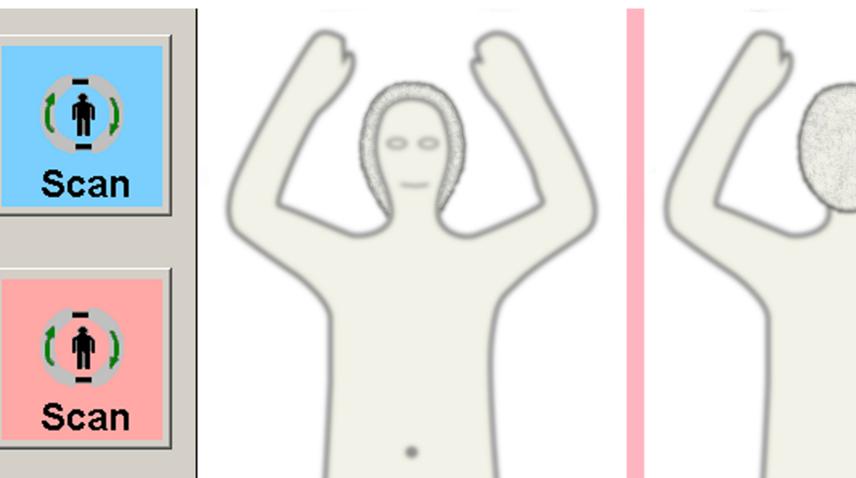




On consequential ethics, ask: How might my visualization result in harm?

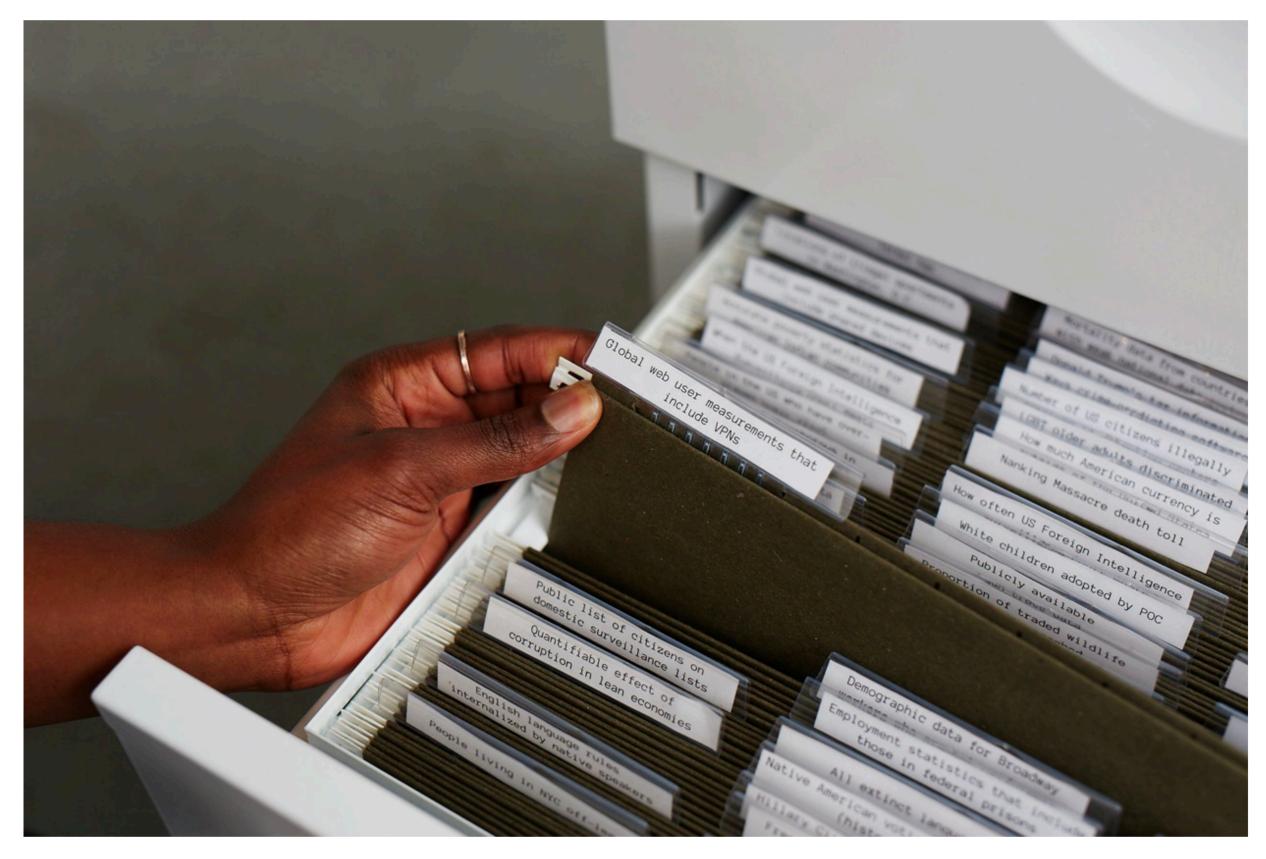
The New Hork Times Opinion Flying While Trans The T.S.A. subjects transgender passengers like me to humiliating and dehumanizing treatment.





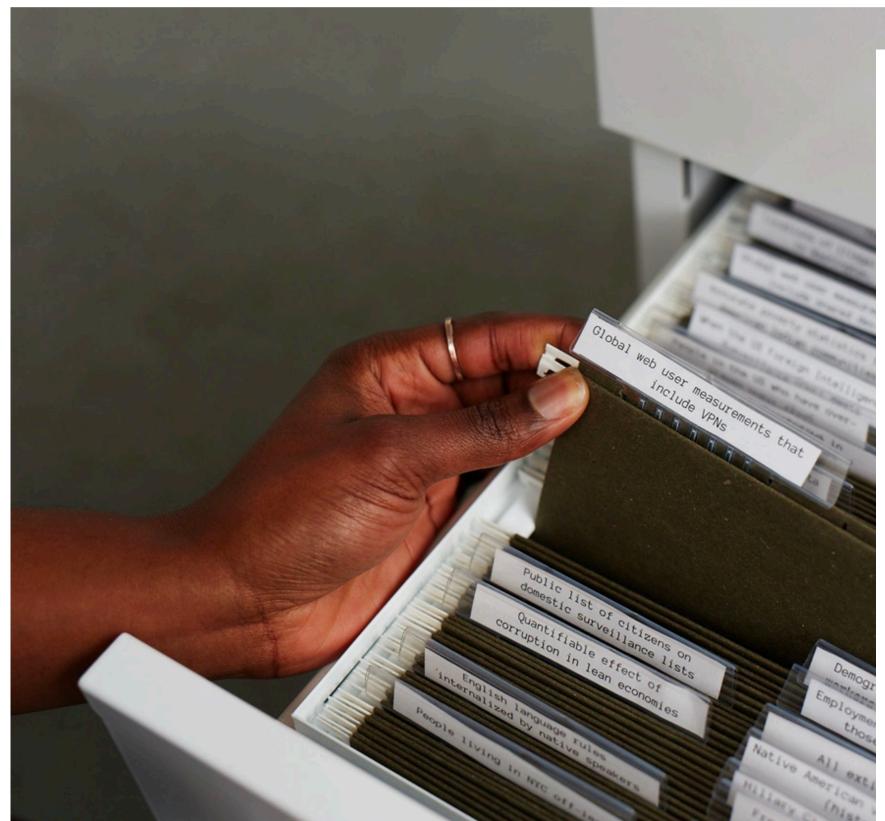
Power isn't inherently bad, either! Remember: we are thinking of consequences.

Power isn't inherently bad, either! Remember: we are thinking of consequences.



http://mimionuoha.com/the-library-of-missing-datasets, Mimi Onuoha

Can we imagine capturing information which could *liberate* us?



http://mimionuoha.com/the-library-of-missing-datasets, Mimi Onuoha

An Incomplete List of Missing Data Sets

This list will always be incomplete, and is designed to be illustrative rather than comprehensive. It also comes primarily from the perspective of the U.S, though the complete list of datasets features far more international examples.

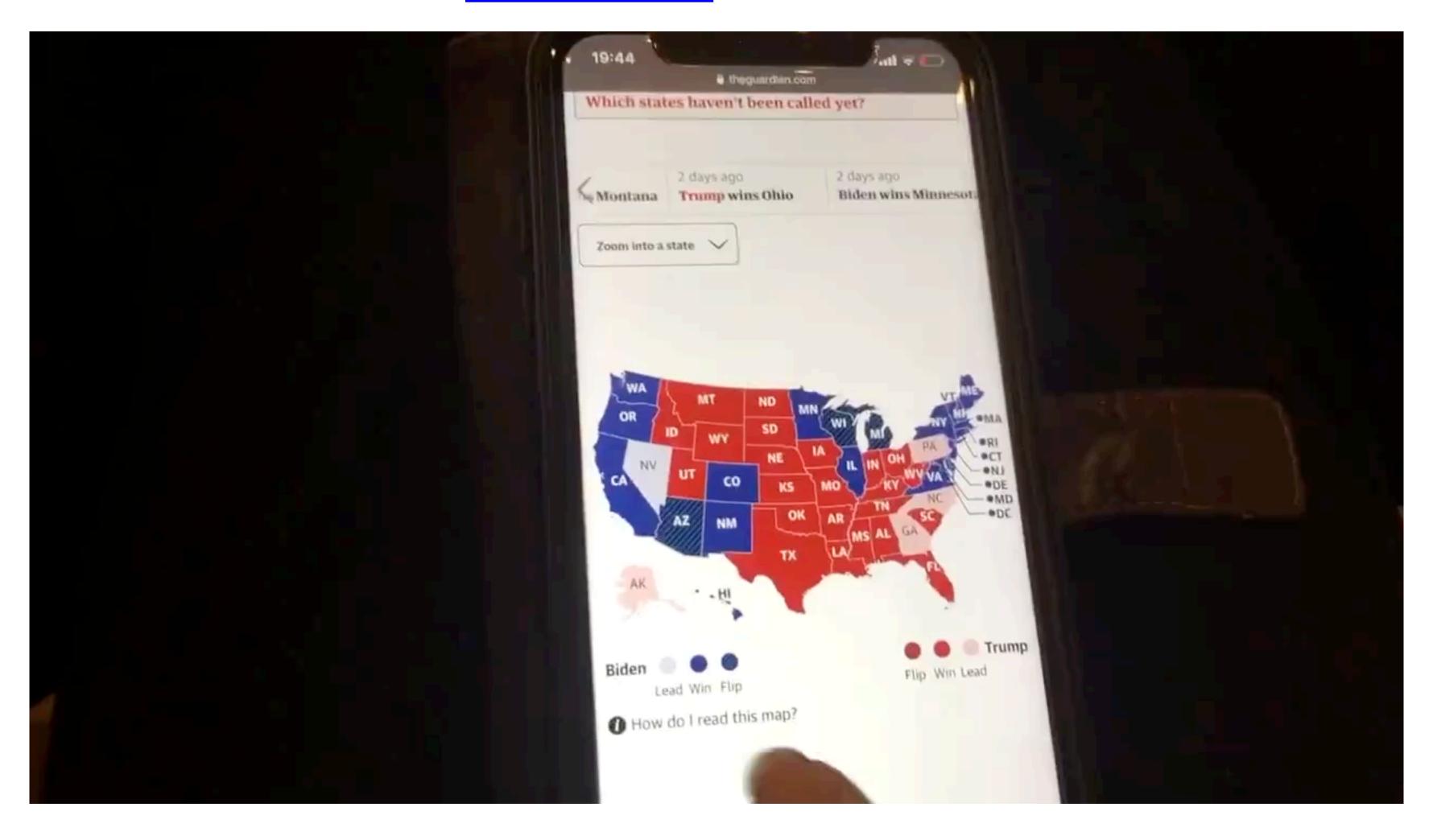
- Civilians killed in encounters with police or law enforcement agencies [update: this is no longer a missing dataset]
- Sales and prices in the art world (and relationships between artists and gallerists)
- People excluded from public housing because of criminal records
- Trans people killed or injured in instances of hate crime (note: existing records are notably unreliable or incomplete)
- · Poverty and employment statistics that include people who are behind bars
- Muslim mosques/communities surveilled by the FBI/CIA
- Mobility for older adults with physical disabilities or cognitive impairments
- · LGBT older adults discriminated against in housing
- Undocumented immigrants currently incarcerated and/or underpaid
- Undocumented immigrants for whom prosecutorial discretion has been used to justify release or general punishment
- Measurements for global web users that take into account shared devices and VPNs
- Firm statistics on how often police arrest women for making false rape reports
- Master database that details if/which Americans are registered to vote in multiple states
- Total number of local and state police departments using stingray phone trackers (IMSI-catchers)
- How much Spotify pays each of its artists per play of song

Who is excluded from visualization?

A short introduction to disability and the ethics of accessibility in visualization

What is an inaccessible experience like?

Credit: Sarah Fossheim on twitter



(Consequentialist ethics)

Exclusion is bad, but so are painful "inclusive" experiences (which are common!)

So "accessibility:" What is it?

Accessibility:

1. The qualities that make an experience open or usable to all.

Accessibility:

- 1. The qualities that make an experience open or usable to all.
- 2. The qualities that make an experience open or usable specifically for people with disabilities.

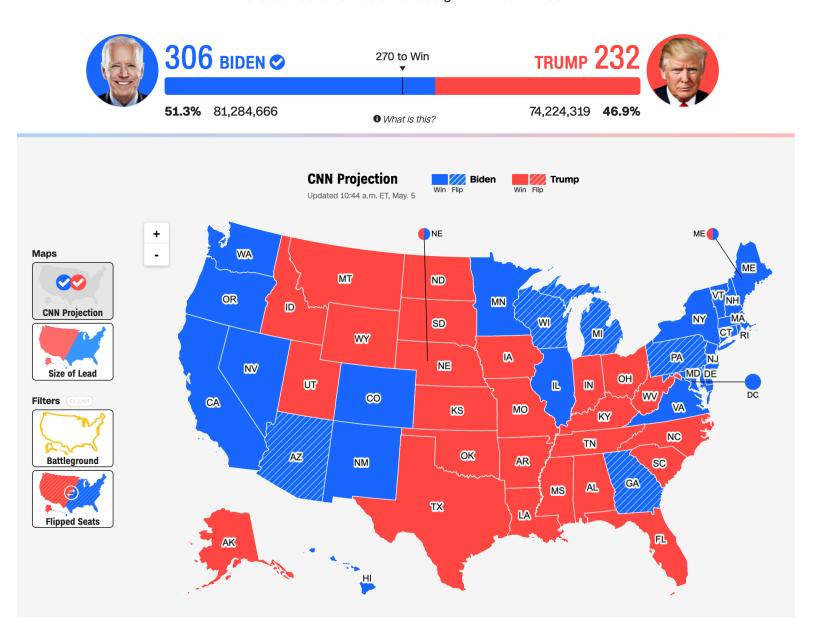
People with disabilities have a right to:

Participate in politics

PRESIDENTIAL RESULTS

Joe Biden wins election to be the 46th US President

Pennsylvania's 20 electoral votes put native son Joe Biden above the 270 needed to become the 46th President of the United States. Born in Scranton, the former vice president and longtime Delaware senator defeated Donald Trump, the first President to lose a reelection bid since George H.W. Bush in 1992.



Credit: CNN

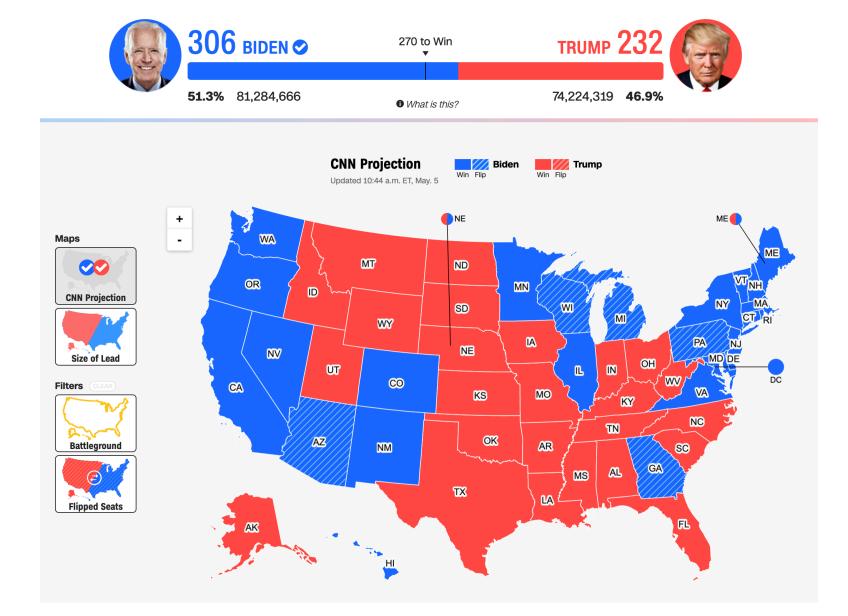
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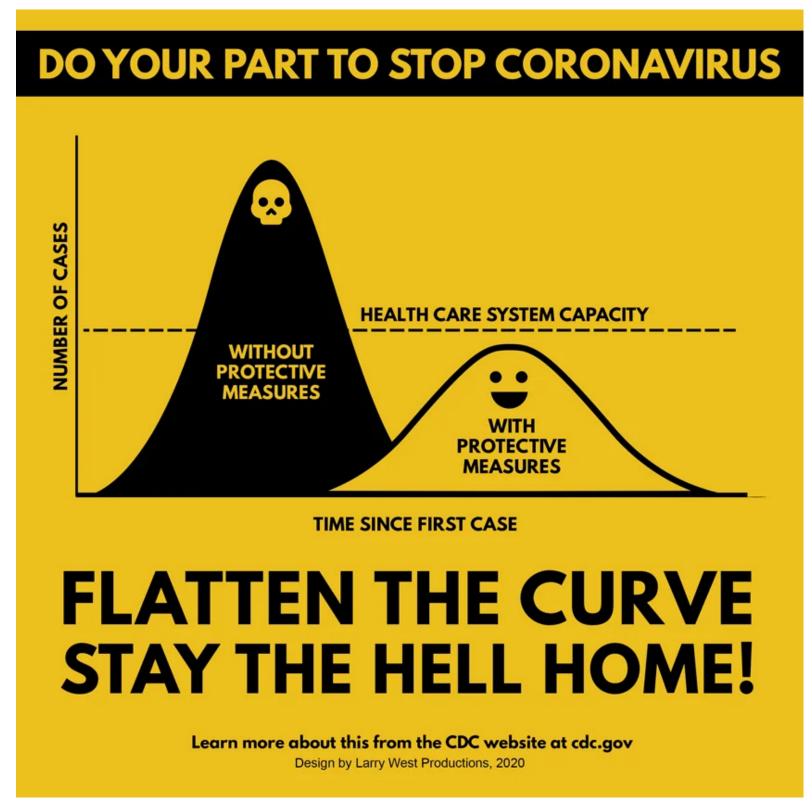
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Make informed decisions



Credit: CNN Credit: Reddit

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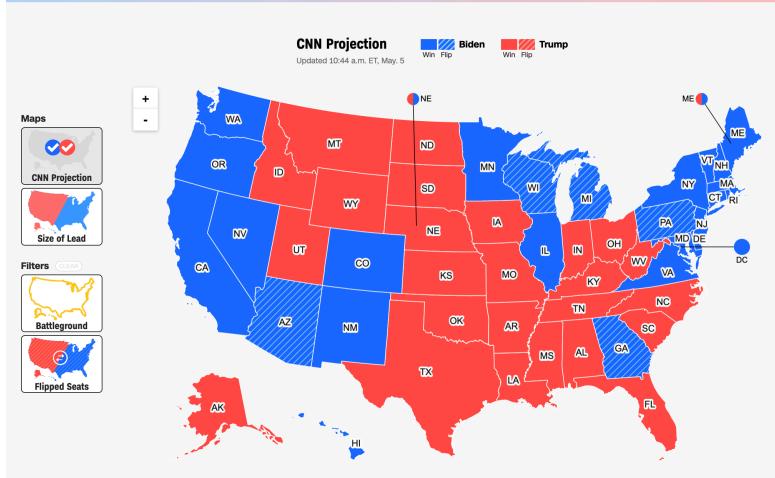
Participate in politics

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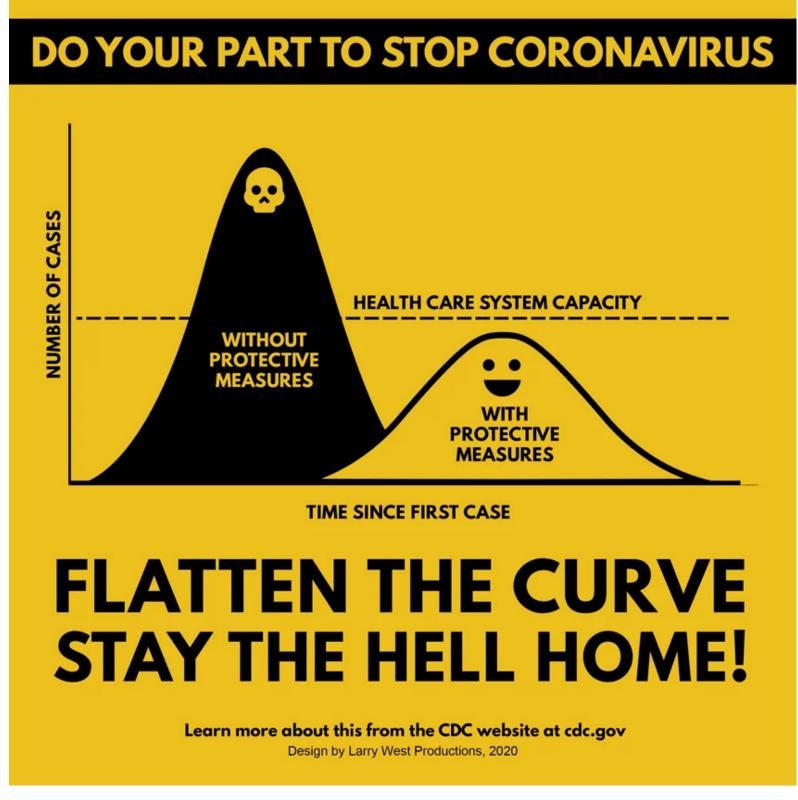
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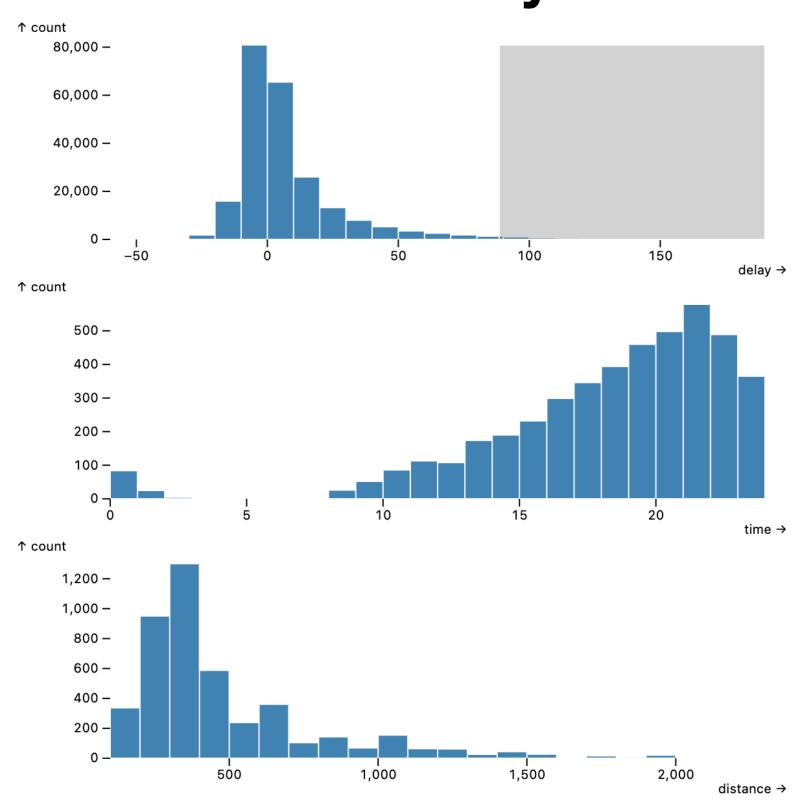
Credit: CNN

Make informed decisions



Credit: Reddit

Analyze data quickly and efficiently



Credit: Our research

People with disabilities should be able to:

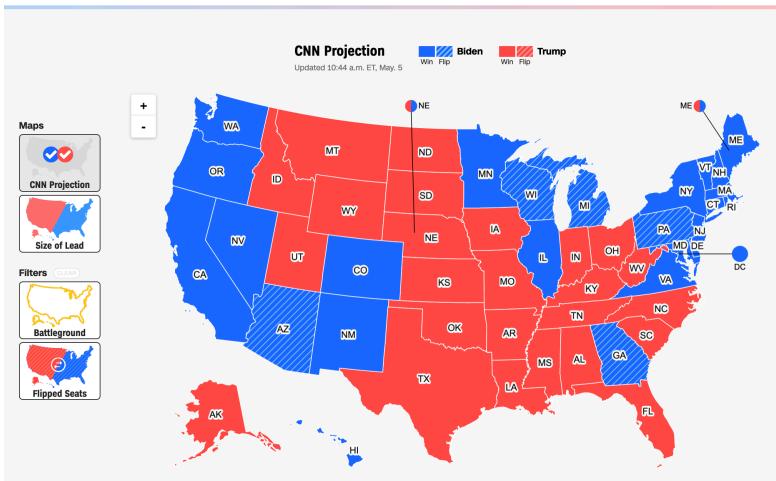
Participate in politics

PRESIDENTIAL RESULTS

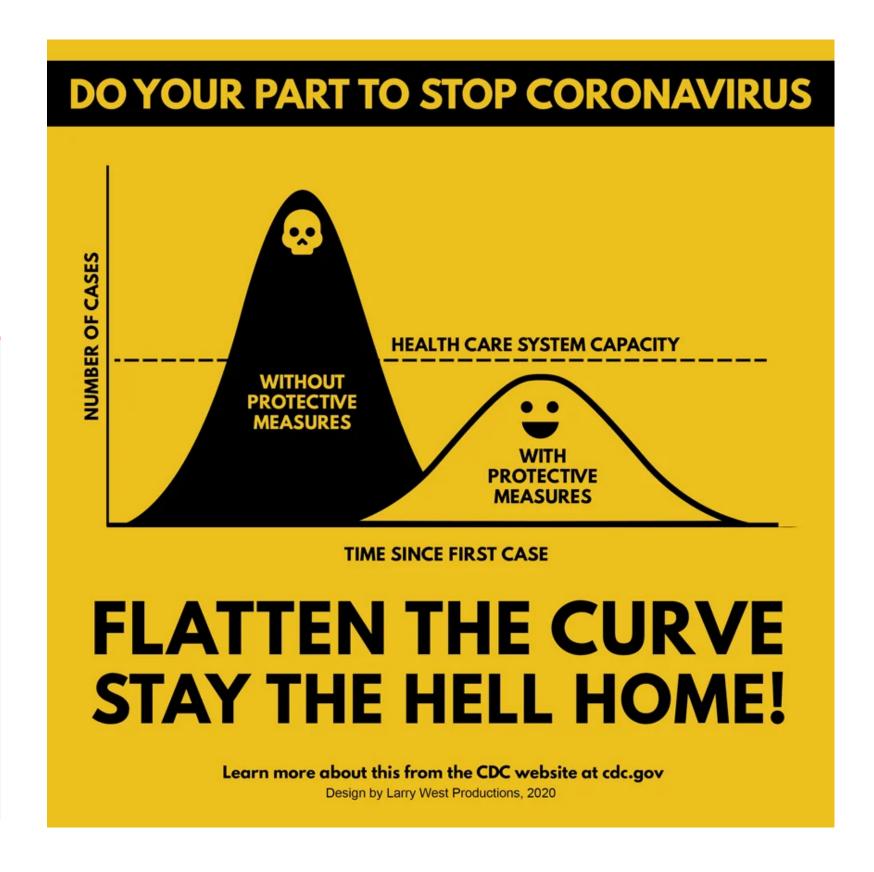
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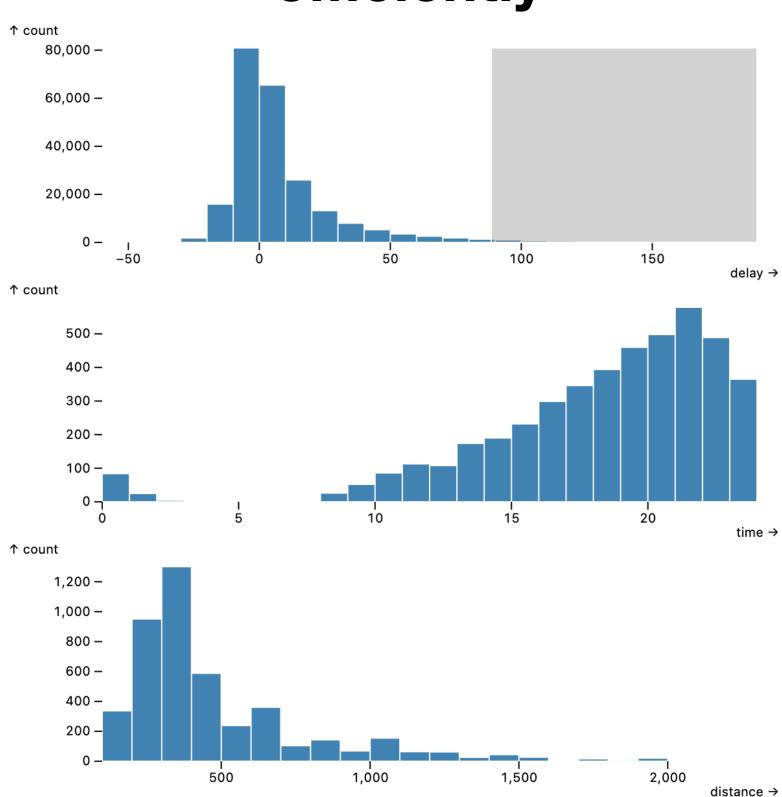




Make informed decisions

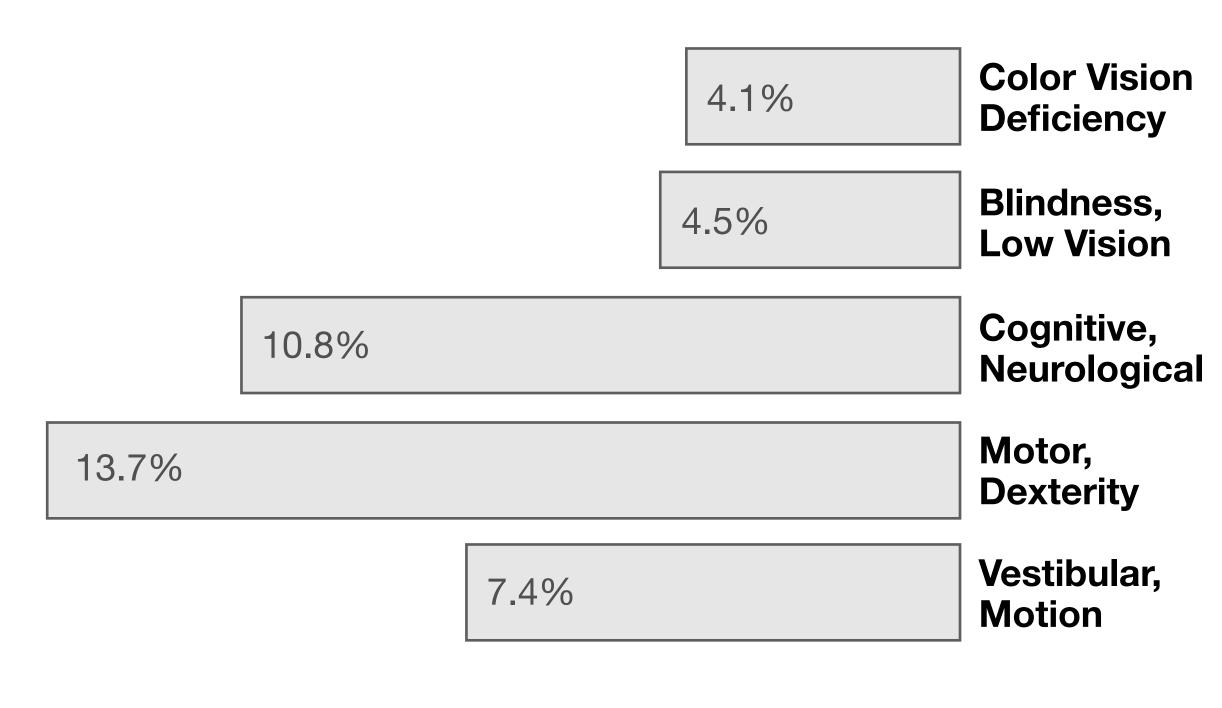


Analyze data quickly and efficiently



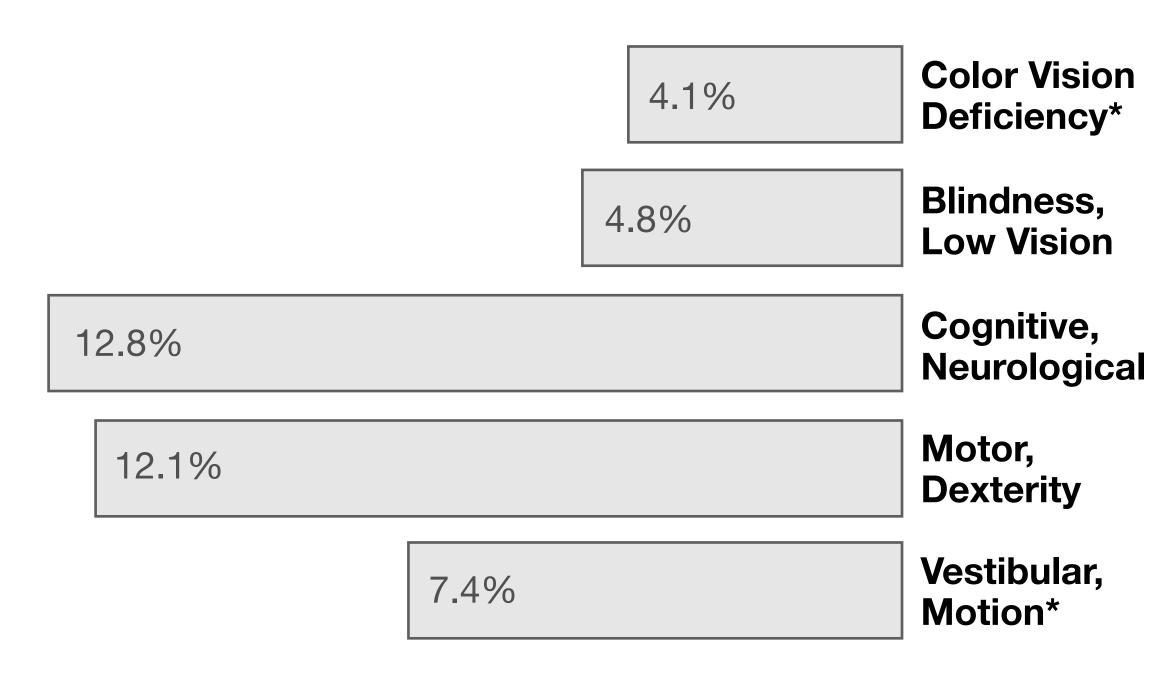
Credit: Our research

Credit: Reddit



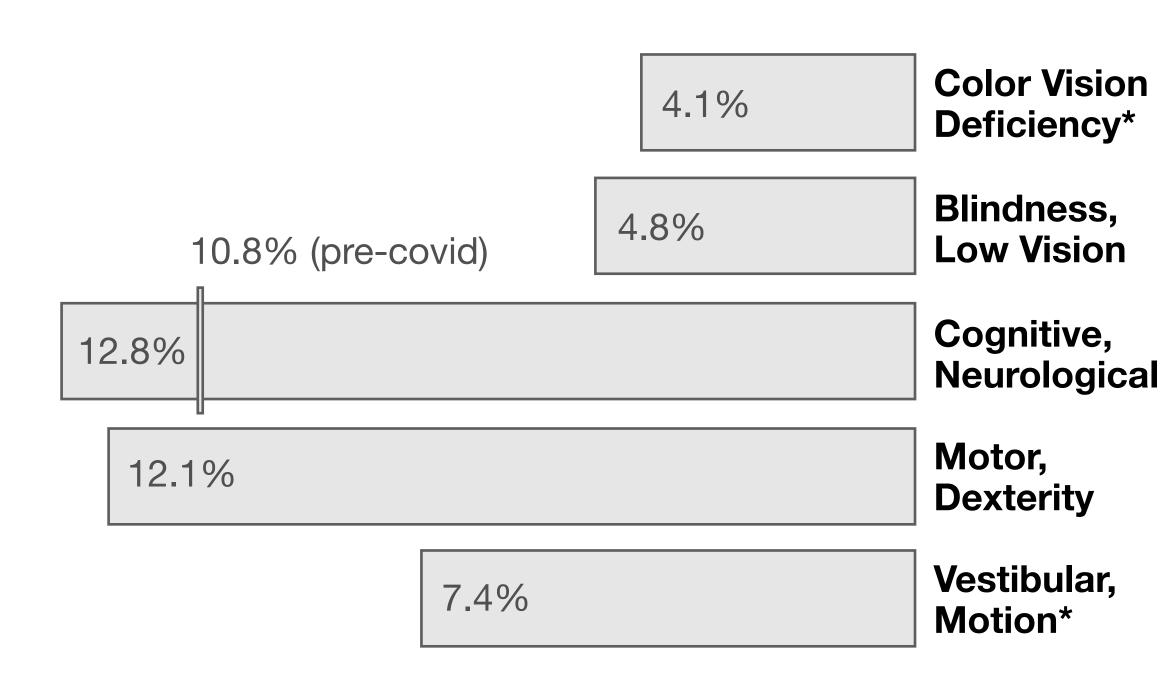
Source: Okoro et al. "Prevalence of Disabilities and Health Care Access by Disability Status and Type Among Adults"

~26% of people living in the United States self-report living with a disability that affects their daily life (2017)



Centers for Disease Control and Prevention. Disability and Health Data System (DHDS). 2023. Available from: http://dhds.cdc.gov
*No new data

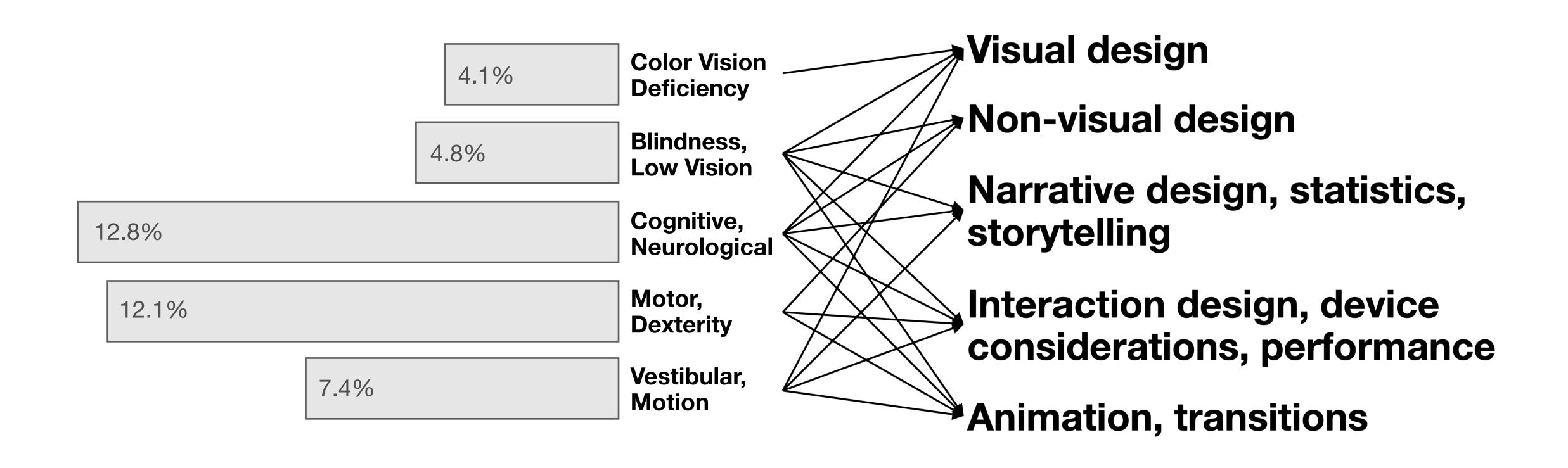
~27% of people living in the United States self-report living with a disability that affects their daily life (2023)



Cognitive disability is on the rise

Centers for Disease Control and Prevention. Disability and Health Data System (DHDS). 2023. Available from: http://dhds.cdc.gov
*No new data

Accessibility affects every aspect of visualization work

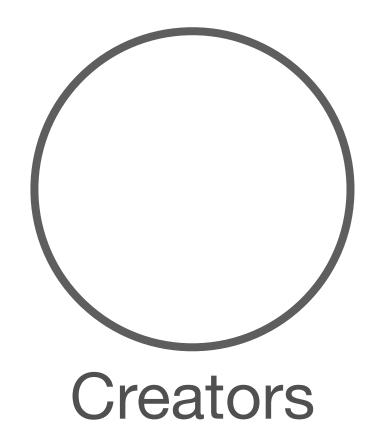


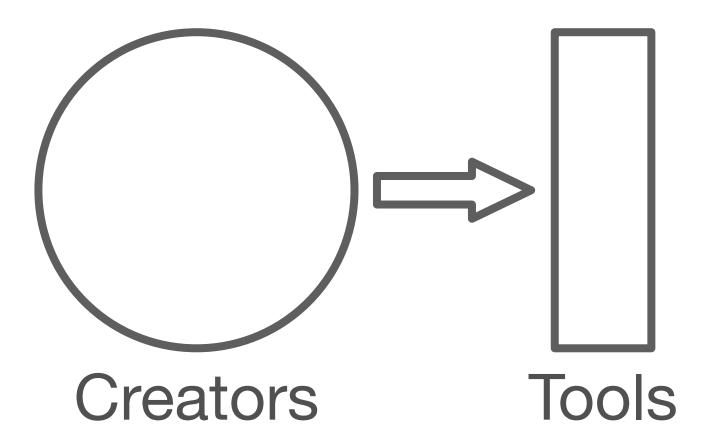
Even for profit-driven consequentialism: It is expensive to exclude accessibility

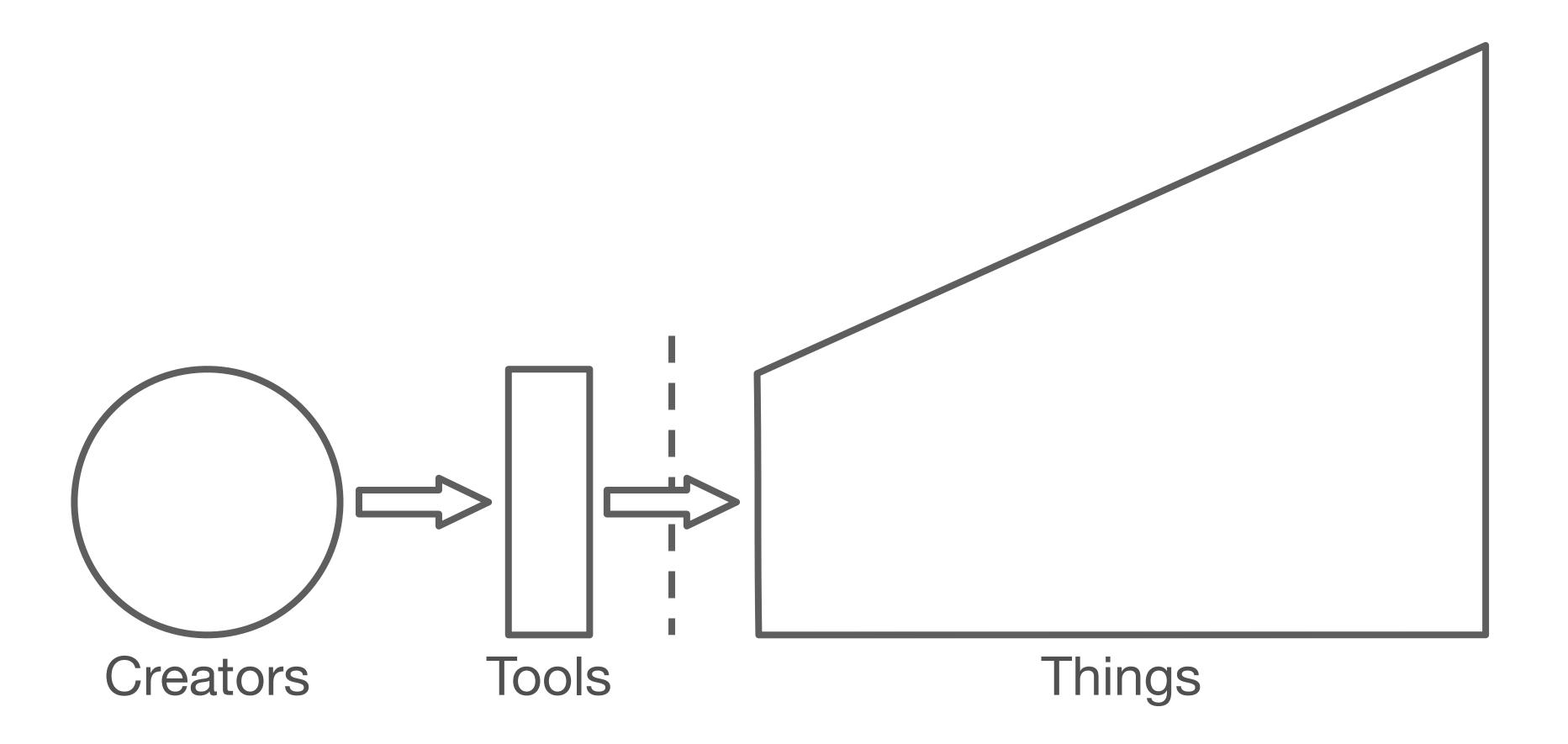
15% of time to include accessibility during a project

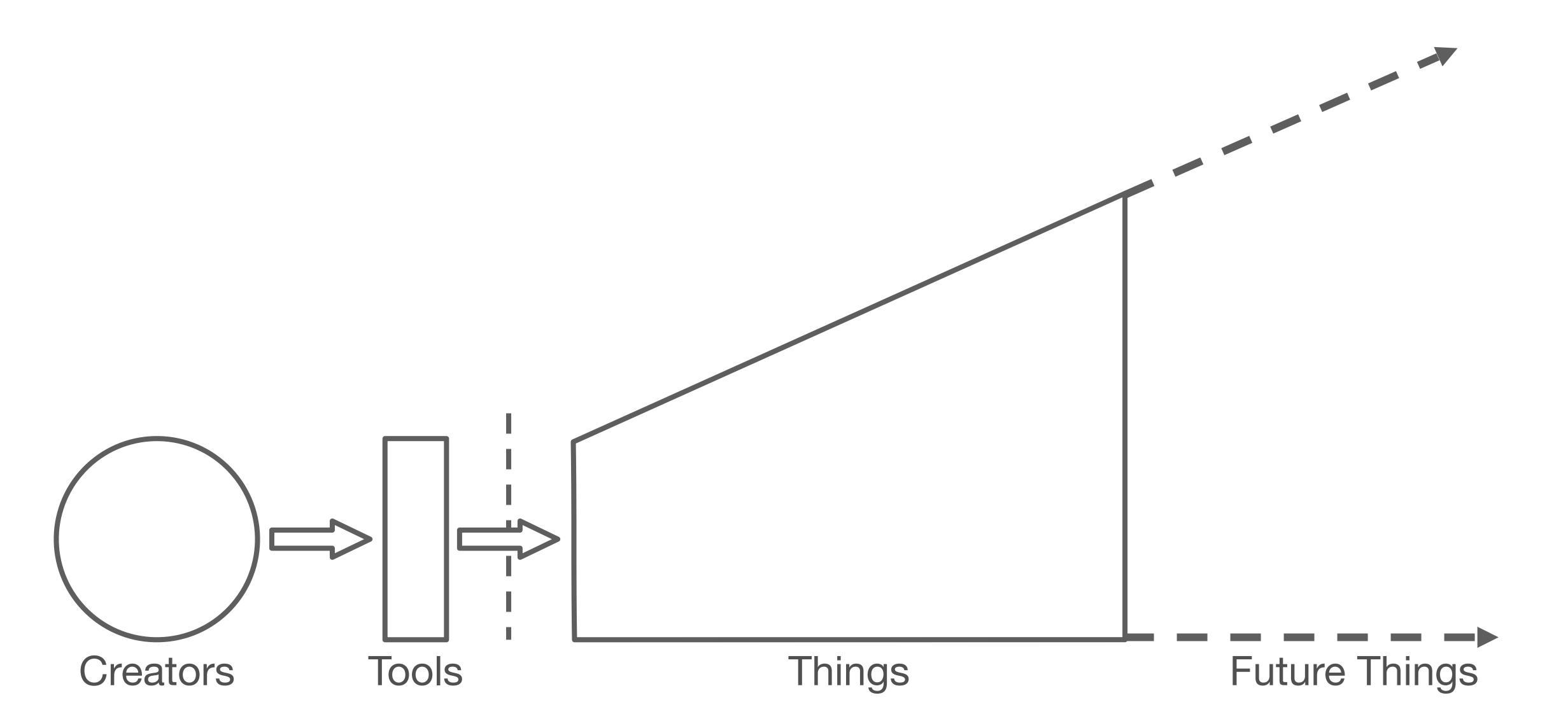
And this helps make sure ~27% of all people aren't excluded

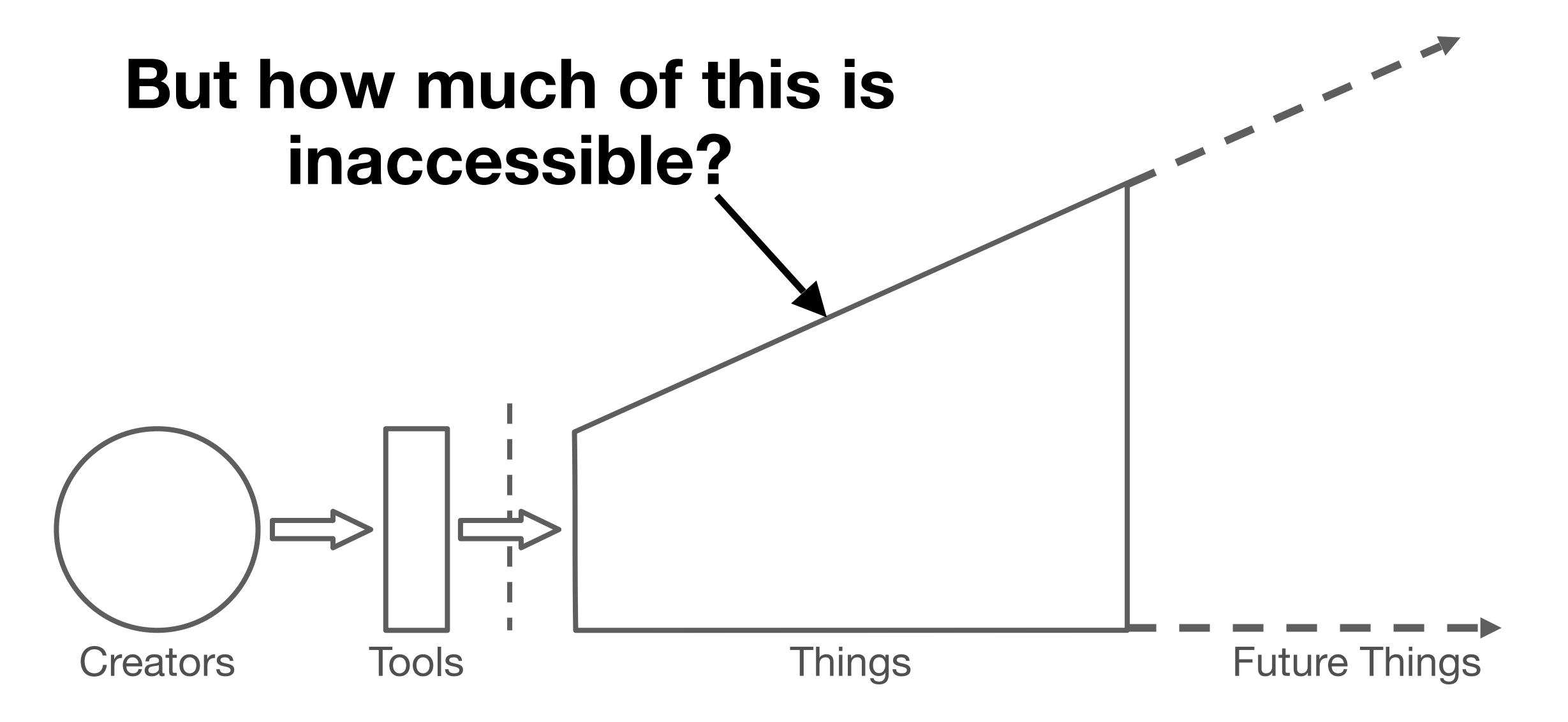
But excluding accessibility costs a project 1.5-10x more time later

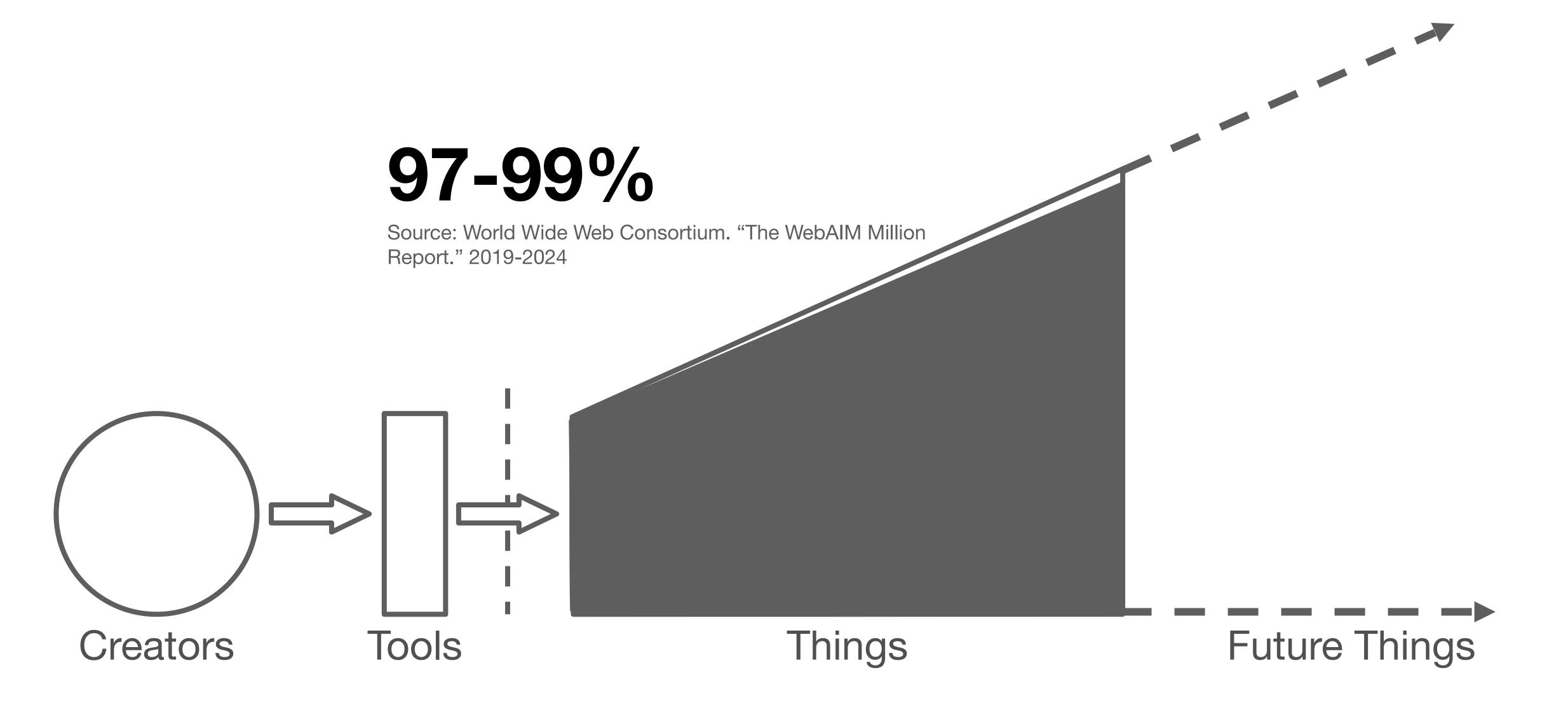












(Role ethics)

Who is responsible for making this accessible?

Concept: The social framing of disability

What about curbs in our cities?

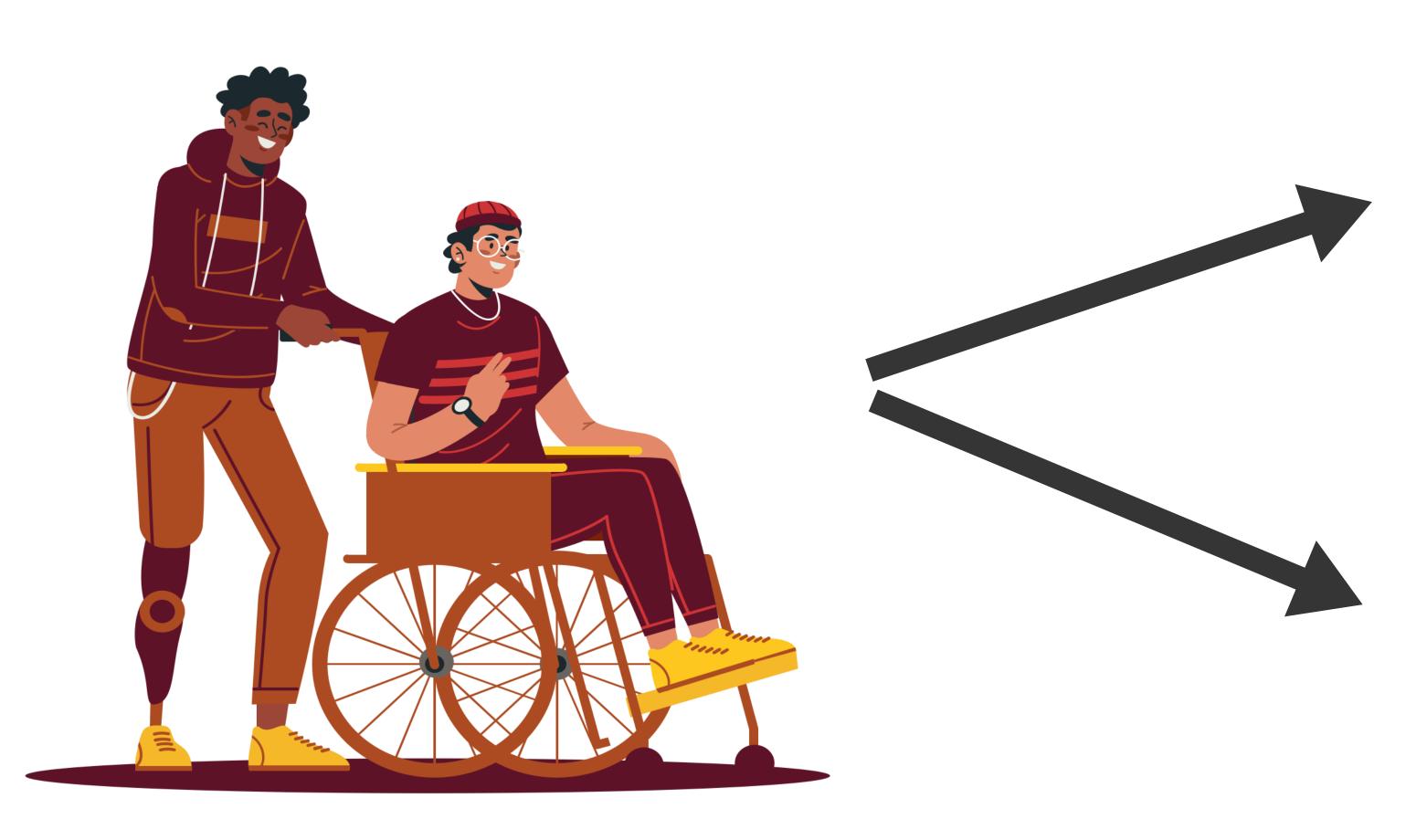




Medicalizing framing: the body is the cause/location of disability (according to normative standards).



Augment or "cure" the body, the person typically bears the cost of access.







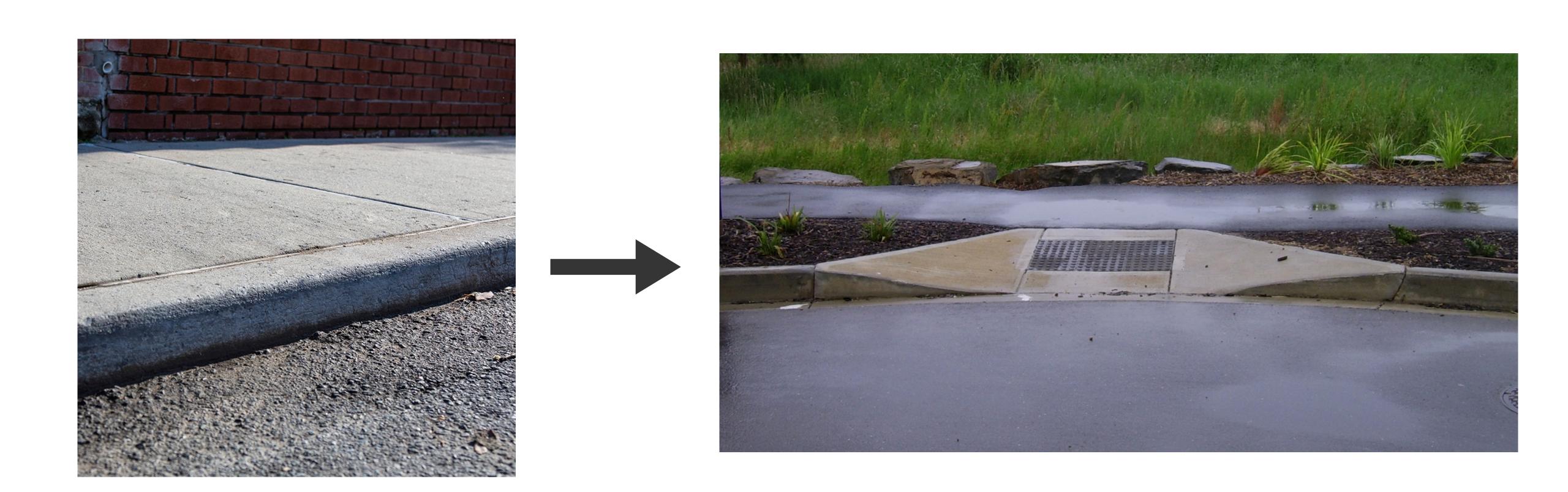
(Consequentialist ethics)

People with disabilities often bear the burden of technology and access, which produces bad outcomes.

Social framing: The *curb* is the source/location where disability is produced (as a "barrier" to access).



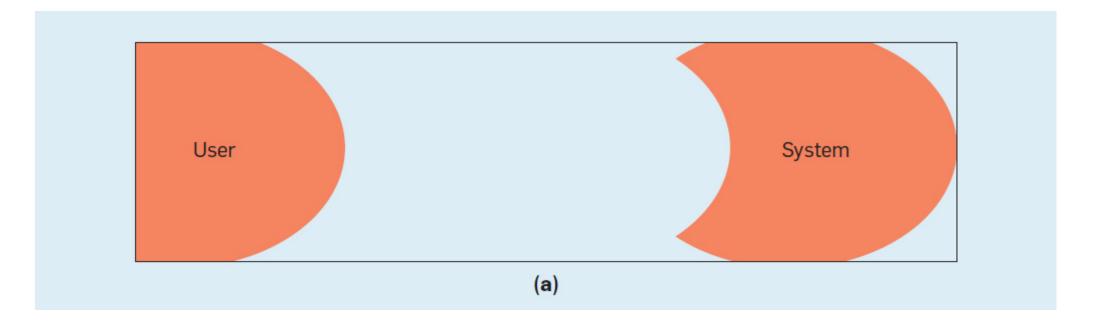
We built barriers, so now we need to fix them.



Concept: Ability Assumptions

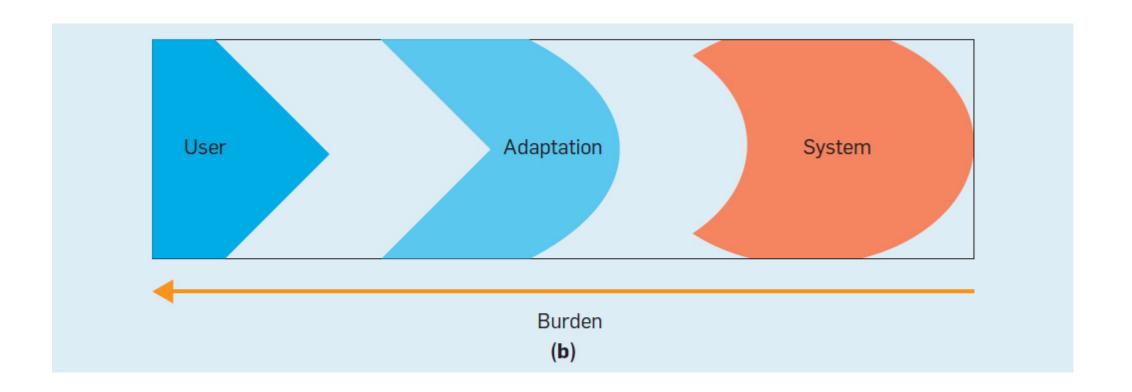
Ability Assumptions

(Wobbrock et al) https://cacm.acm.org/magazines/2018/6/228034-ability-based-design/fulltext



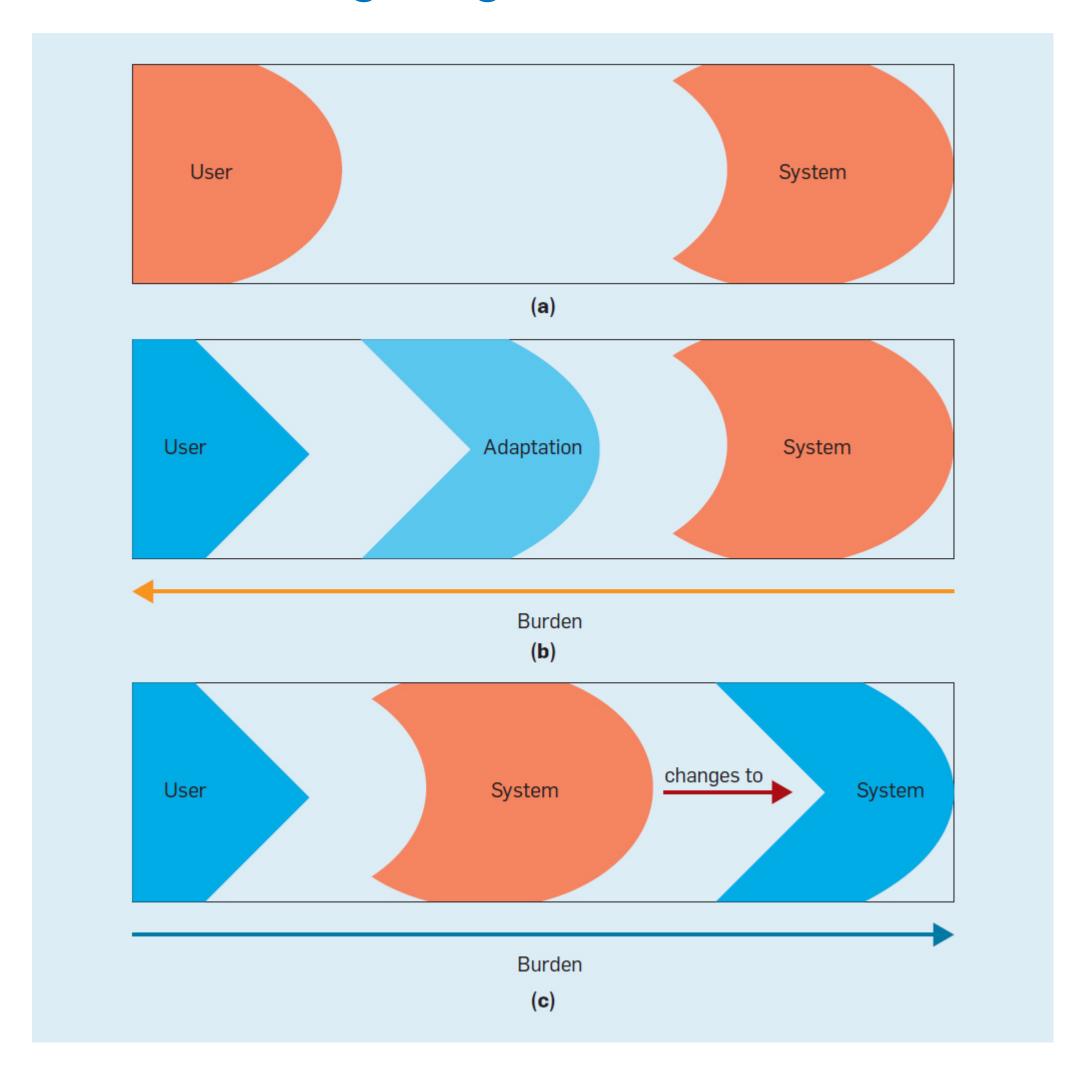
Ability Assumptions

(Wobbrock et al) https://cacm.acm.org/magazines/2018/6/228034-ability-based-design/fulltext



Ability Assumptions

(Wobbrock et al) https://cacm.acm.org/magazines/2018/6/228034-ability-based-design/fulltext



A curb exclusively assumes the ability to step up





A cut curb has fewer exclusive ability assumptions





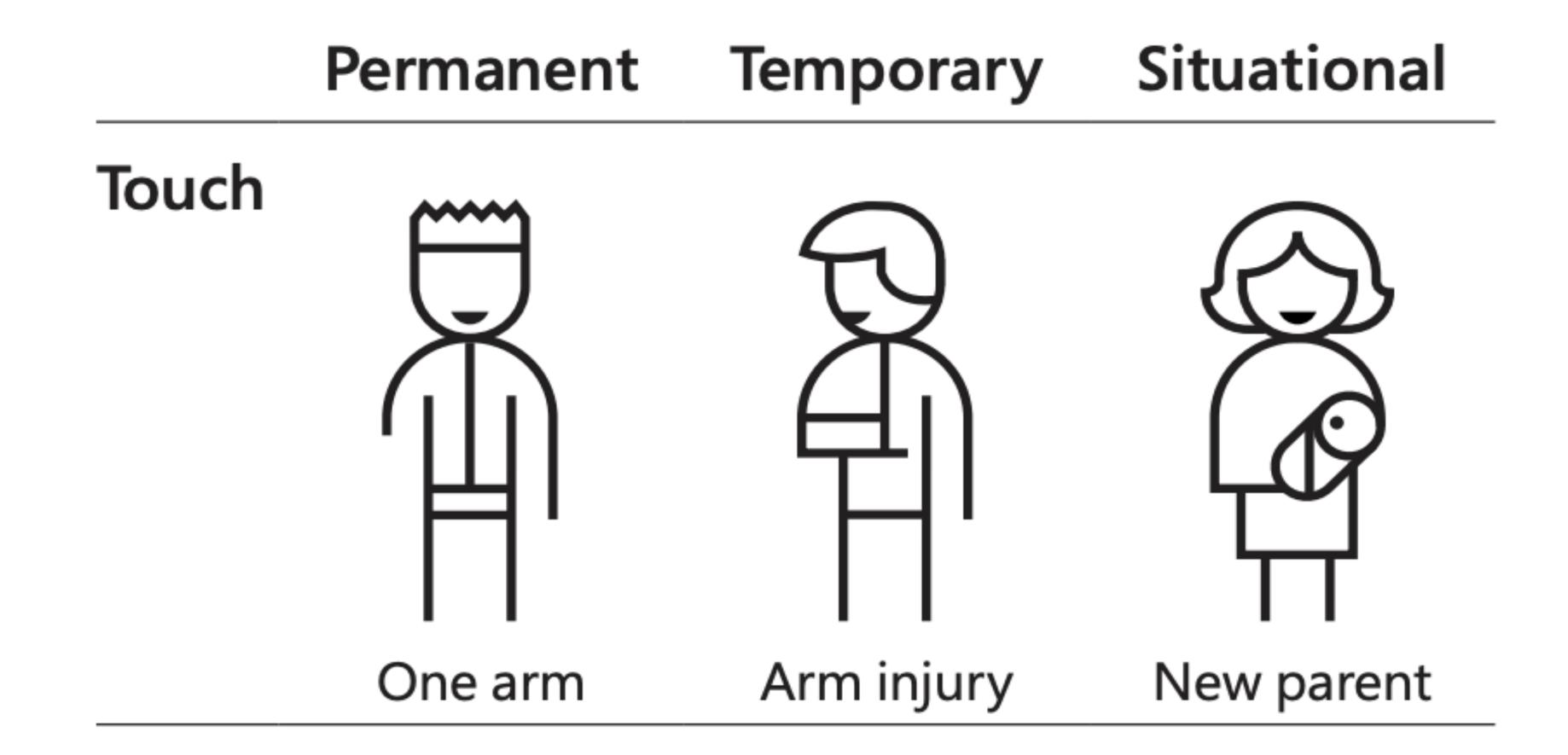
Concept: Situational Impairment

Permanent

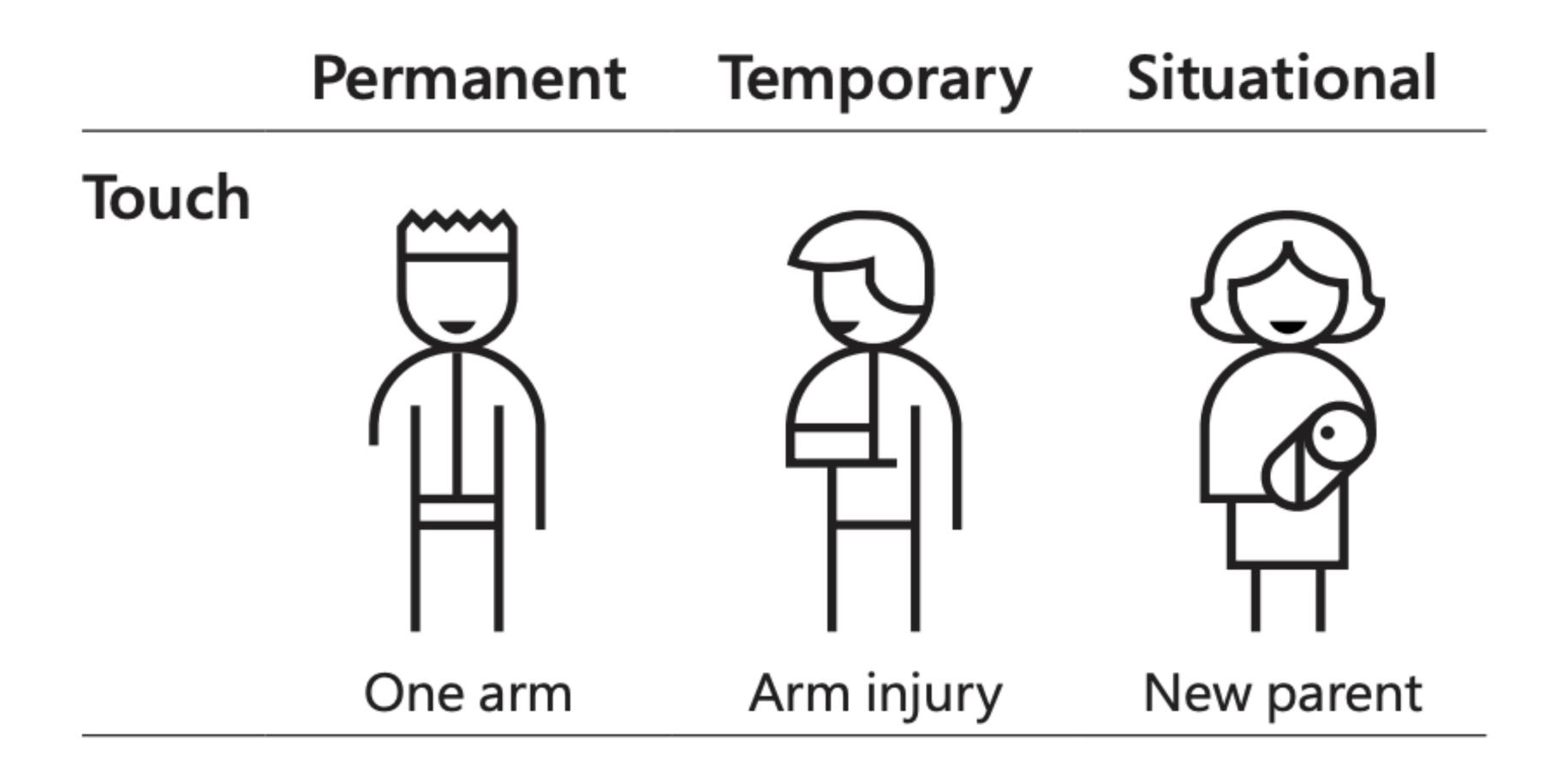
Touch



Permanent **Temporary** Touch Arm injury One arm



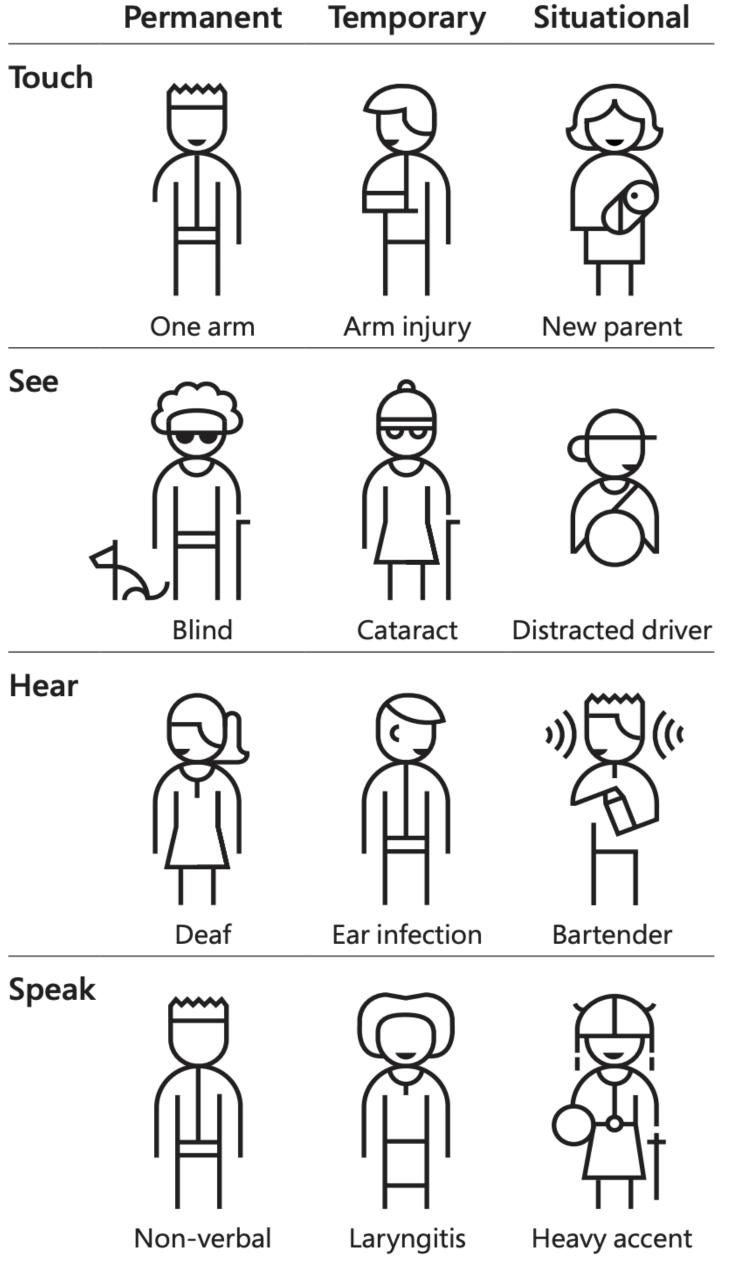
We all experience situational impairment in our daily lives. Accessibility benefits everyone!



"Design for One, Extend to All"

Speak

Microsoft's Inclusive Design 101 Toolkit: https://download.microsoft.com/download/b/0/d/b0d4bf87-09ce-4417-8f28-d60703d672ed/inclusive toolkit manual final.pdf



Does "design for one, extend to all" have limits? Problems?

Final Concept: Disability-Centered Design

"Nothing about us without us"

And the 1977 504 sit-in.



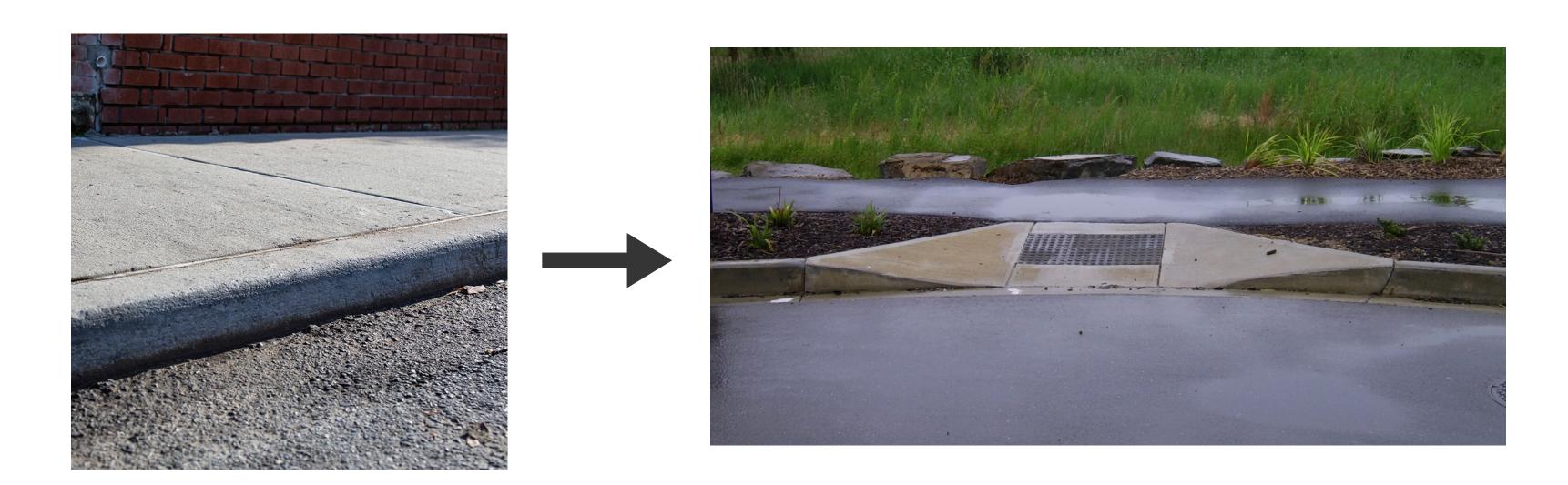
(Deontological + consequentialist ethics)

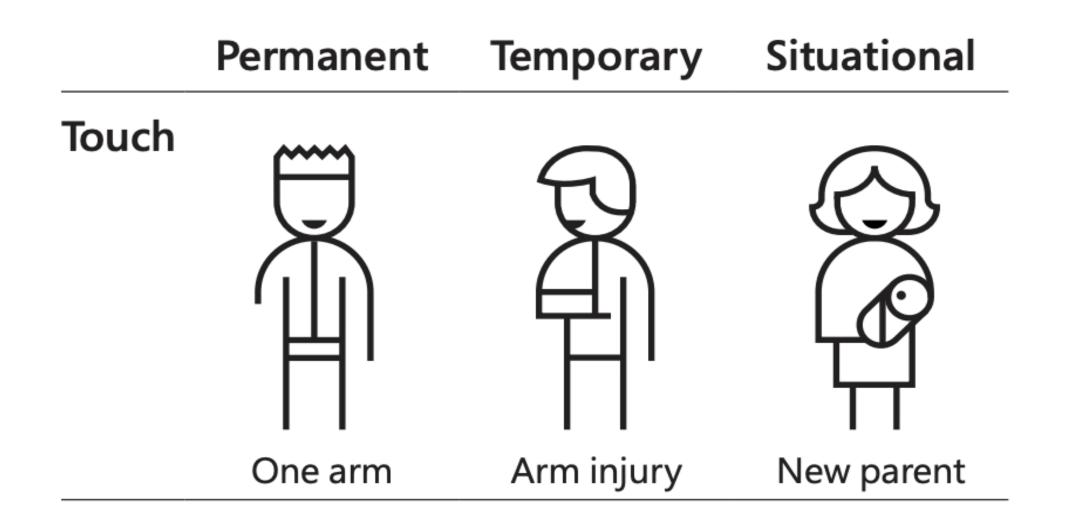
Having the ADA has actually been awesome for using litigation as a way to pressure change.

(Consequentialist ethics)

Observing the "curb cut effect" has also helped push adoption of accessibility, even in corporate/profit-driven contexts!

However, "curb cut" work has been prioritized





(Consequentialist ethics)
Unfortunately, work that doesn't have an obvious curb-cut effect is often not funded or de-prioritized.

ASL interpretation vs subtitles



A sign language interpreter at Pittsburgh Steelers Super Bowl Rally in 2011.

https://en.m.wikipedia.org/wiki/

File:American Sign Language Interpreter.jpg, wikipedia



Subtitles in Charade, 1963 https://en.wikipedia.org/wiki/Subtitles, wikipedia

The best work *centers* on people with disabilities, includes them, and has the best outcomes for their work and lives



Perkins School for the Blind Archives, with tactile maps dating back to the early 1800s