

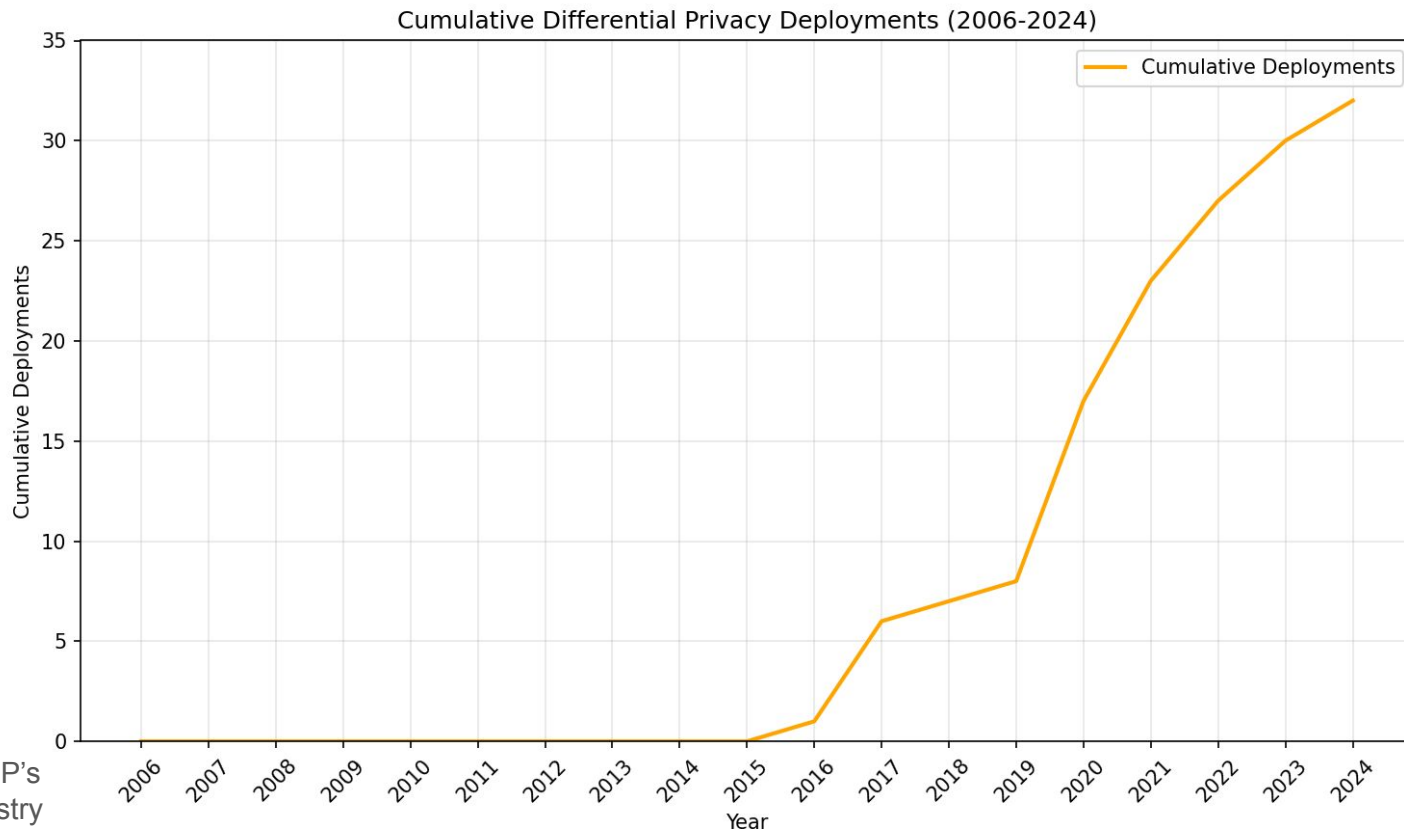
# “Having Confidence In My Confidence Intervals”

How Data Users Engage with Privacy-Protected Wikipedia Data

**Harold Triedman**, Jayshree Sarathy, Priyanka Nanayakkara, Rachel Cummings, Gabriel Kaptchuk, Sean Kross, and Elissa Redmiles

9 February 2026 • PPC

# DP is increasingly being deployed in the real world!



Data from OpenDP's  
Deployment Registry

**UNITED STATES DISTRICT COURT FOR THE  
MIDDLE DISTRICT OF ALABAMA  
EASTERN DIVISION**

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MAR 10 P 12:38  
THE STATE OF ALABAMA; ROBERT  
ADERHOLT, Representative for Alabama's  
4th Congressional District, in his official and  
individual capacities; WILLIAM GREEN;  
and CAMARAN WILLIAMS,

Plaintiffs,

v.

UNITED STATES DEPARTMENT OF  
COMMERCE; GINA RAIMONDO, in her  
official capacity as Secretary of Commerce;  
UNITED STATES BUREAU OF THE  
CENSUS, an agency within the United States  
Department of Commerce; and RON  
JARMIN, in his official capacity as Acting  
Director of the U.S. Census Bureau,

Defendants.

CIVIL ACTION NO. 3:21-cv-211-RAH

COMPLAINT FOR DECLARATORY AND  
INJUNCTIVE RELIEF

**THREE-JUDGE COURT REQUESTED  
PURSUANT TO 28 U.S.C. § 2284**

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## *The 2020 Census Suggests That People Live Underwater. There's a Reason.*

Technology advances forced the Census Bureau to use sweeping measures to ensure privacy for respondents. The ensuing debate goes to the heart of what a census is.

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U.S. NEWS

# Young Republicans challenge 2020 census results as part of wider GOP attack on head count



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**TheUpshot**

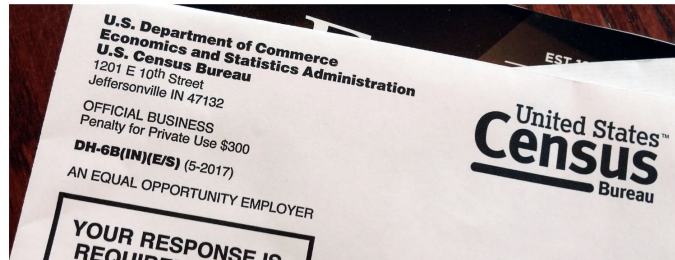
### *To Reduce Privacy Risks, the Census Plans to Report Less Accurate Data*

Guaranteeing people's confidentiality has become more of a challenge, but some scholars worry that the new system will impede research.

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37



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Enumeration or Estimation: Why Inaccurate Census Results Hurt American Citizens



House Judiciary GOP  
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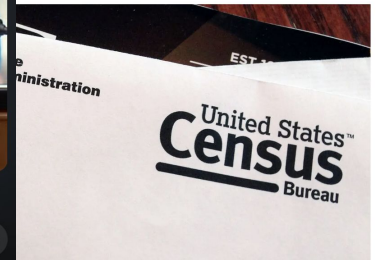
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### Risks, the Census Accurate Data

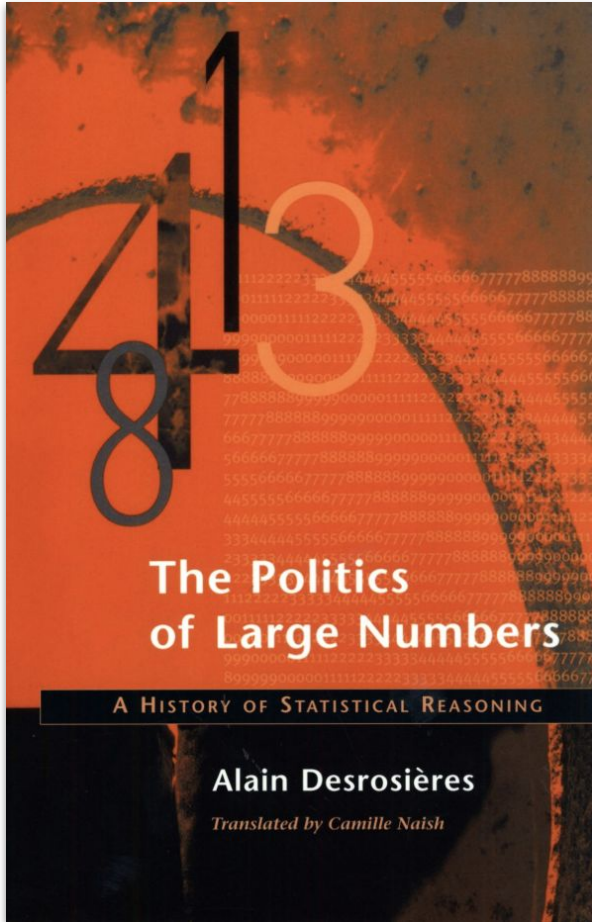
...tiality has become more of a  
...orry that the new system will



Deploying DP means intervening in a  
sociotechnical system...

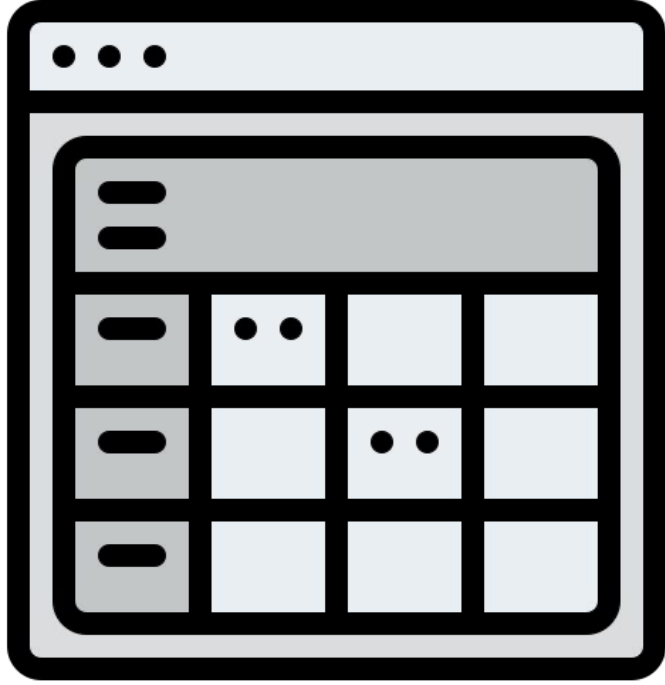
Deploying DP means intervening in a  
sociotechnical system...

...which changes system users' *statistical imaginaries*.

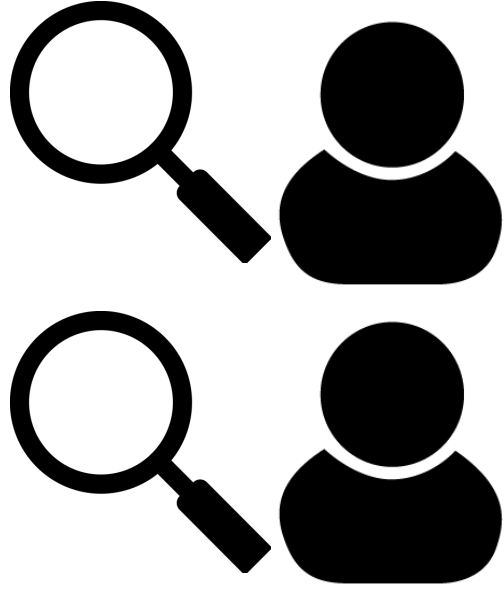


P means intervening in a technical system...

...system users' *statistical imaginaries*.



Privacy-enhancing noise ✨



This is not just a question of politics...

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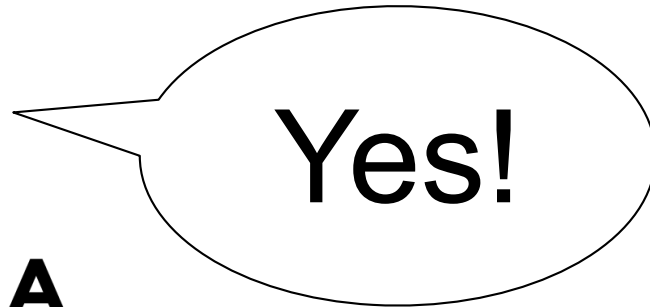
...it's also a question about how *changing the noise mechanism changes the data user experience.*

If we change the context, can we study the broader phenomenon?

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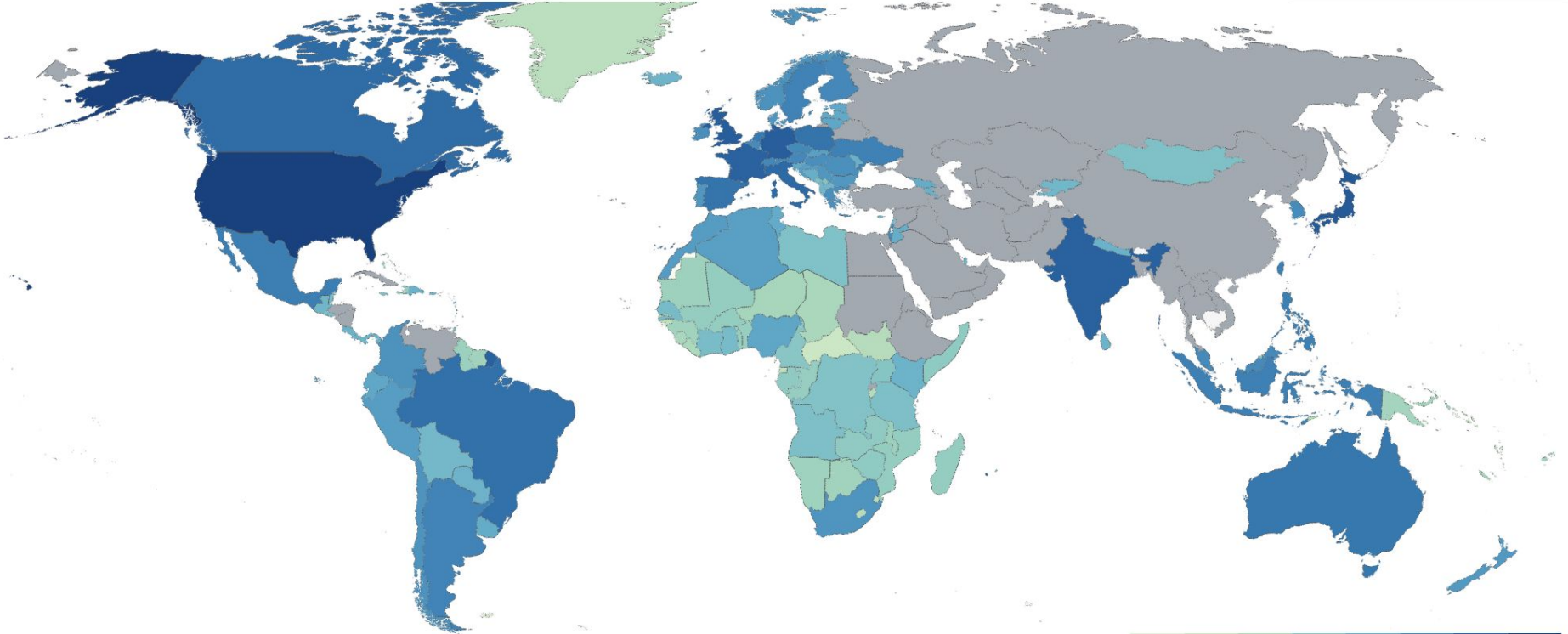


**WIKIMEDIA**  
FOUNDATION



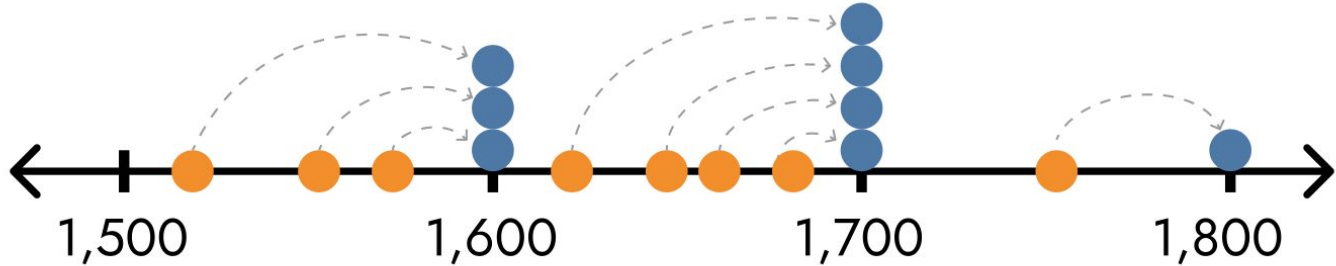
# Page views by country

Download, Link, Globe, and Dropdown menu icons.



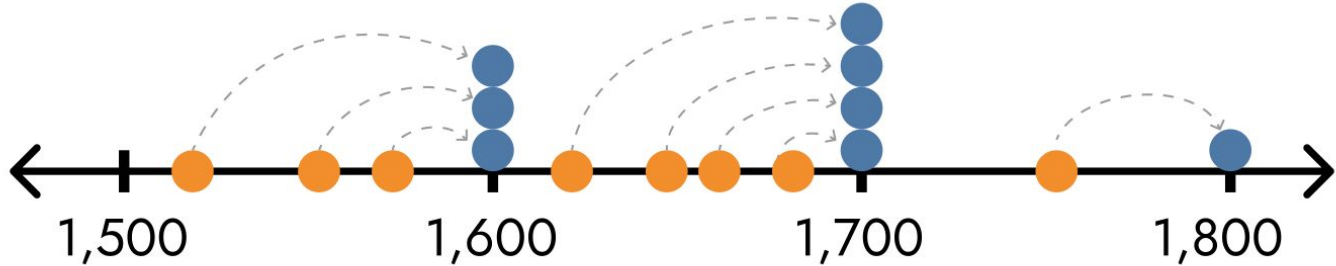
# Pageviews by country

Rounded

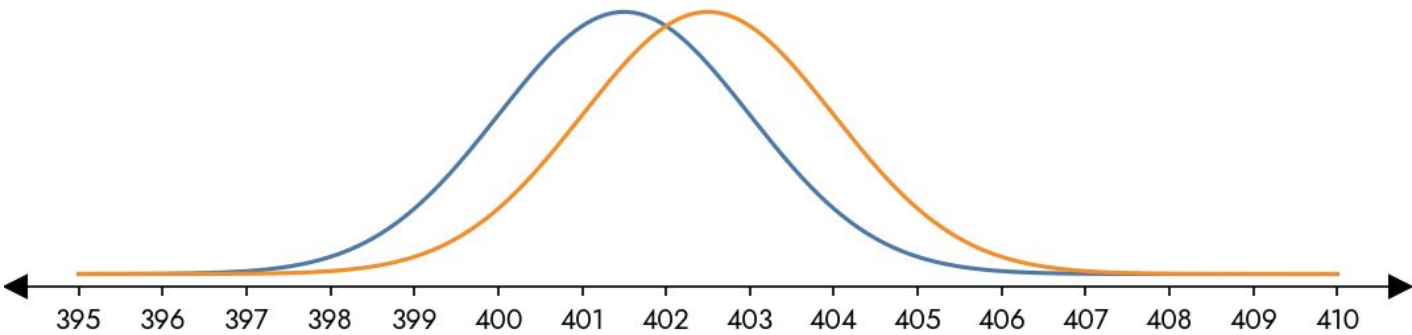


# Pageviews by country

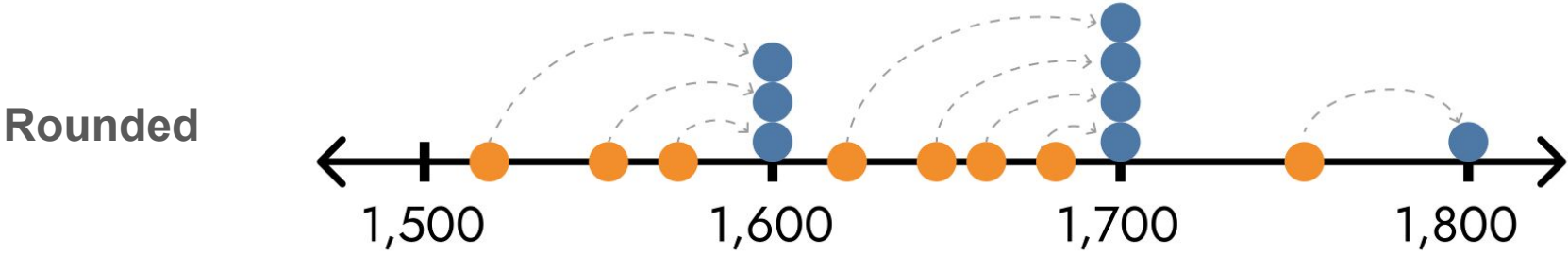
Rounded



DP

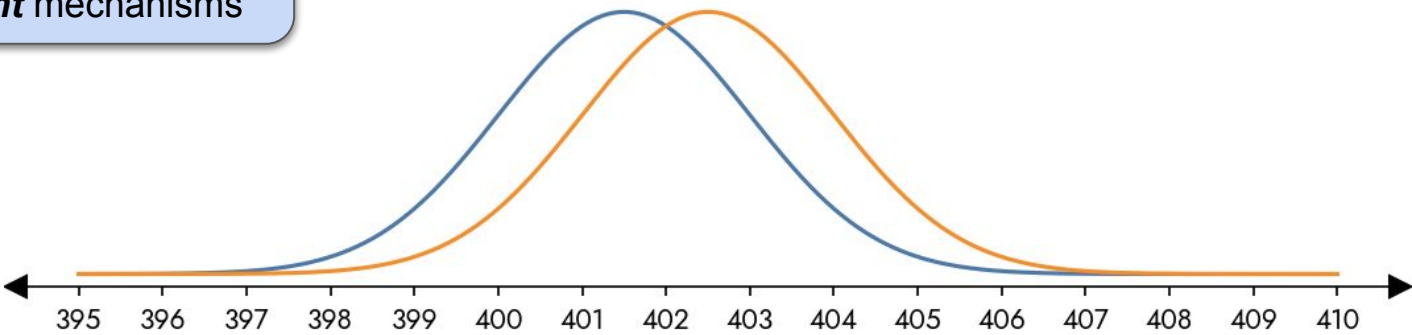


# Pageviews by country



Same underlying data  
Same time range  
*Different* mechanisms

DP



# Our methodology

- With DP expert guidance, design ***data user-focused*** DP documentation
  - N = 5
  - Iteration on documentation design throughout

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# Our methodology

- With DP expert guidance, design ***data user-focused*** DP documentation
  - N = 5
  - Iteration on documentation design throughout
- Create a set of basic data analysis activities about pageview trends
  - Maxima, sums, means, equality checks
- Conduct structured interviews with non-DP expert data users on ***both noise mechanism datasets***
  - N = 15
  - Explicitly probe interviewee understandings of how the noise mechanism affects their perceptions of error, reliability, privacy guarantees, and more

# Documentation

- Introduction
- Dataset schema
- How were the data pre-processed?
- How was privacy protection applied?
- How does privacy protection affect the accuracy of the published data?
- How can you use the published data?

Study materials



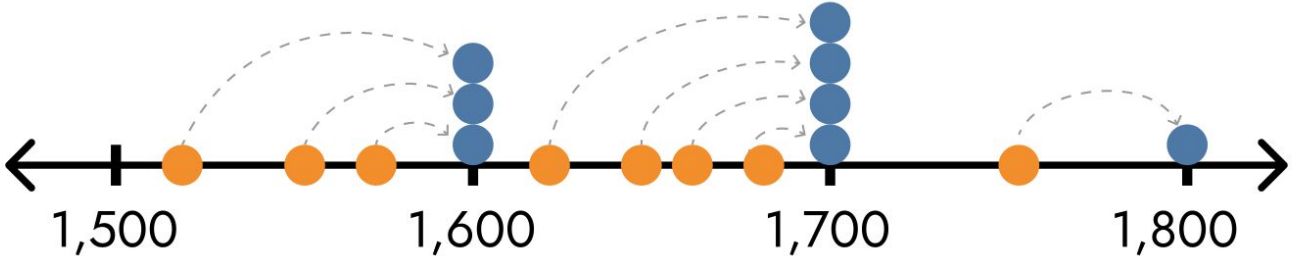
# Documentation: Privacy Mechanism

These counts are NOT included in the dataset for privacy reasons.

These counts ARE included in the dataset.

**original pageviews** rounded up to the next greatest multiple of 100

= **privacy-protected pageviews\***



\*only records with **privacy-protected pageviews**  $\geq 1,100$  are reported

# Documentation: Privacy Mechanism

This variable is NOT included in the dataset for privacy reasons.

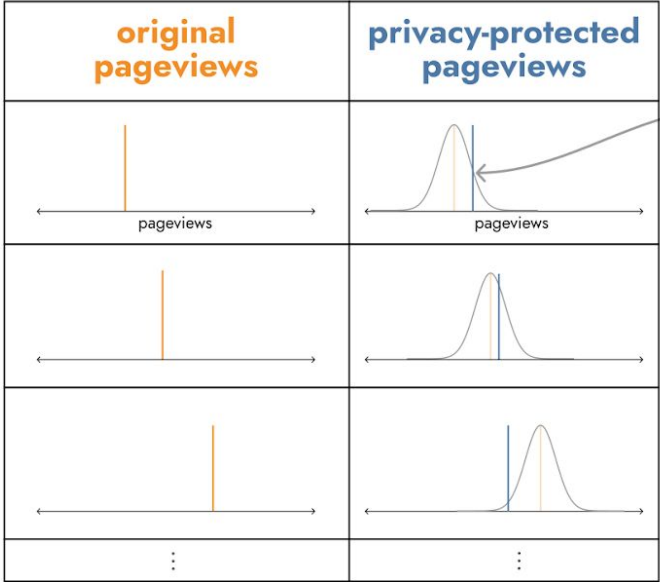
This variable IS included in the dataset.

Each record is unique across the following variables:

page\_title: Taylor\_Swift  
country\_id: US  
project: en.wikipedia  
year: 2024  
month: 5  
day: 9

page\_title: Grace\_Hopper  
country\_id: FR  
project: en.wikipedia  
year: 2024  
month: 5  
day: 9

page\_title: Invisibility  
country\_id: MX  
project: en.wikipedia  
year: 2024  
month: 5  
day: 9

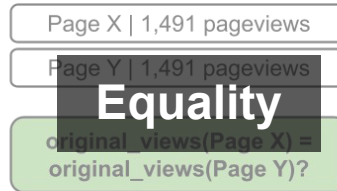
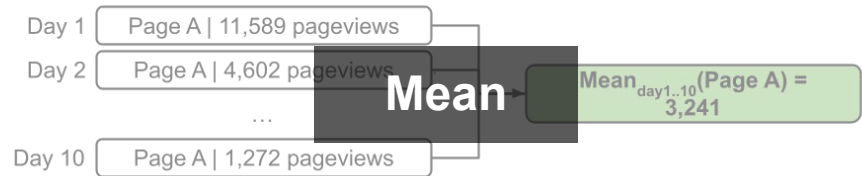


We generate a **privacy-protected count** for each **original count** using a differentially private algorithm.

*The algorithm draws a random value from a normal distribution centered around the corresponding original count with  $\sigma = 18.2$ . This randomly drawn value is published as the **privacy-protected count**.*

\*only records with **privacy-protected pageviews**  $\geq 90$  are reported

# Tasks



Study materials



# Interview Questions

- For each task:
  - Provide a range that you would be 95% sure the *non-noised* value falls within.

# Interview Questions

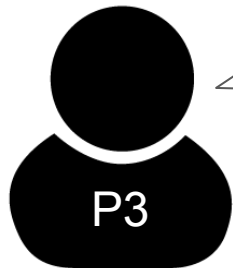
- For each task:
  - Provide a range that you would be 95% sure the *non-noised* value falls within.
- At the end:
  - Which analyses would you want to conduct with each dataset?
  - Does one dataset seem more privacy preserving to you?
  - Do you feel more comfortable analyzing one dataset?
  - Do you feel more comfortable communicating an analysis for one dataset?

# Findings

Baseline understanding of (non-privacy) sources of noise = better reasoning about the impact of additional privacy noise

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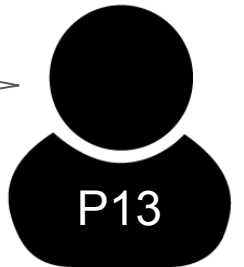


If you ever get me as a reviewer, that's going to be, like, the first words out of my mouth... “**Did you correct for redirects?**” Because it can make a difference up to 25% in terms of the data. I kick papers out of review all the time for this problem.

# Findings

Baseline understanding of (non-privacy) sources of noise = better reasoning about the impact of additional privacy noise

**Internet data is super messy** to begin with...  
**messifying it more for privacy** would not take away from the kind of work that people are already doing

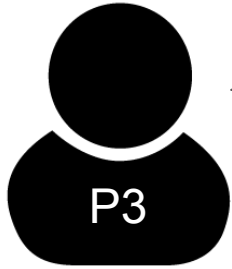


# Findings

Rounding = easier to understand the process, DP = easier to reason with/about

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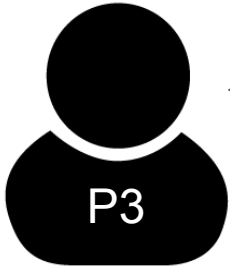
Rounding = easier to understand the process, DP = easier to reason with/about



The **rounding is mathematically easier**. It's, like, high school versus college math.

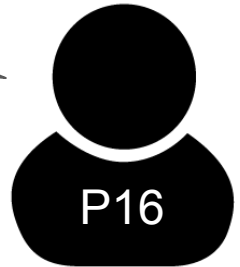
# Findings

Rounding = easier to understand the process, DP = easier to reason with/about



The **rounding is mathematically easier**. It's, like, high school versus college math.

**Rounding is a lot easier to explain**, but it feels more... **statistically fraught** somehow

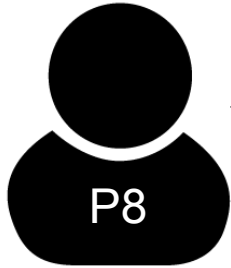


# Findings

Multiple perturbed data points = struggle to compute confidence intervals

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Multiple perturbed data points = struggle to compute confidence intervals



There was one point where I was like, “Oh no, it feels like **I came to 10th grade stats but I didn’t study for the test!**”

# Findings

Multiple perturbed data points = struggle to compute confidence intervals

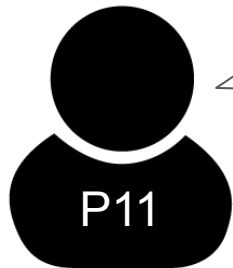
- Only **3 of 15** (20%) of participants do so successfully
  - And 2 of 3 had recently *taught* statistics courses

# Findings

Mixed understandings of different methods' effectiveness at protecting privacy

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Mixed understandings of different methods' effectiveness at protecting privacy



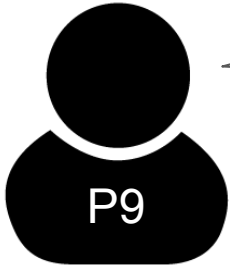
I found the **differential privacy more useful, more accessible** in terms of making various conclusions. **Does that mean that it is less private, though?** I'm not sure.

# Findings

Preferences for which dataset to use when communicating their results are contextually-dependent

# Findings

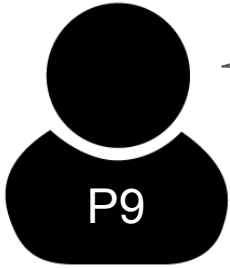
Preferences for which dataset to use when communicating their results are contextually-dependent



I think **DP** sounds sexier... you sound a little smarter if you're using **DP** instead of rounding.

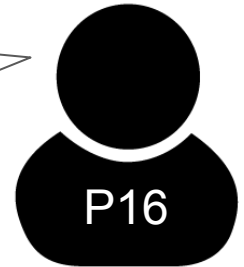
# Findings

Preferences for which dataset to use when communicating their results are contextually-dependent



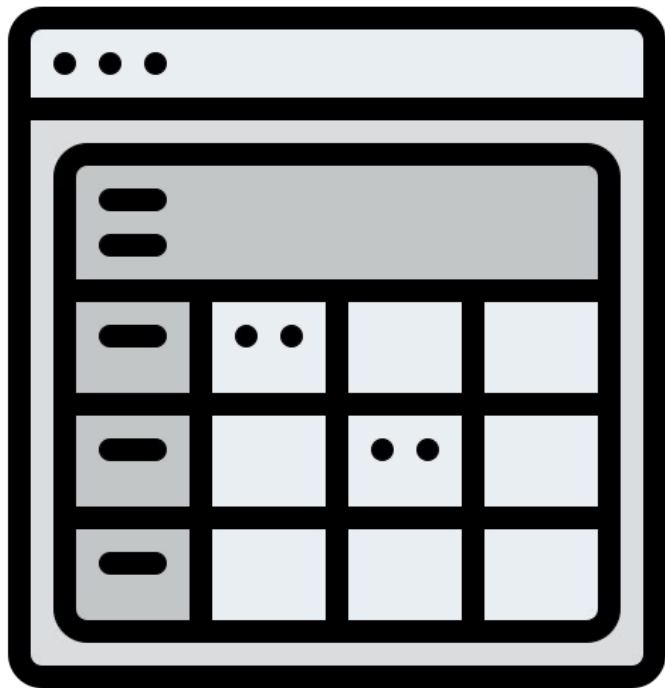
I think **DP sounds sexier... you sound a little smarter if you're using DP** instead of rounding.

**What you lose with easy explainability you gain with the ability to cite, like, hundreds of papers that ostensibly say that DP is a reasonable thing to do.**

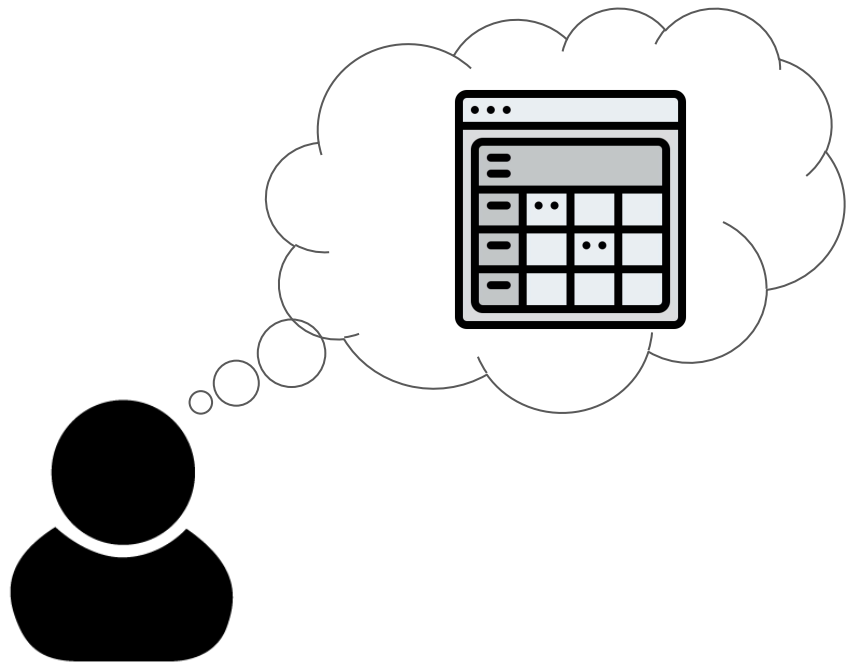


So... what does all of this mean?

**Actual statistics**

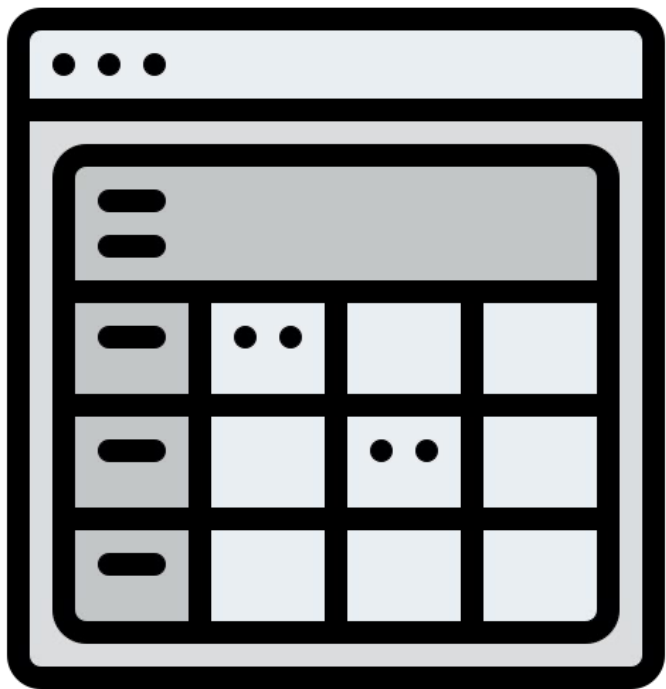


**The data user's  
~statistical imaginary~**



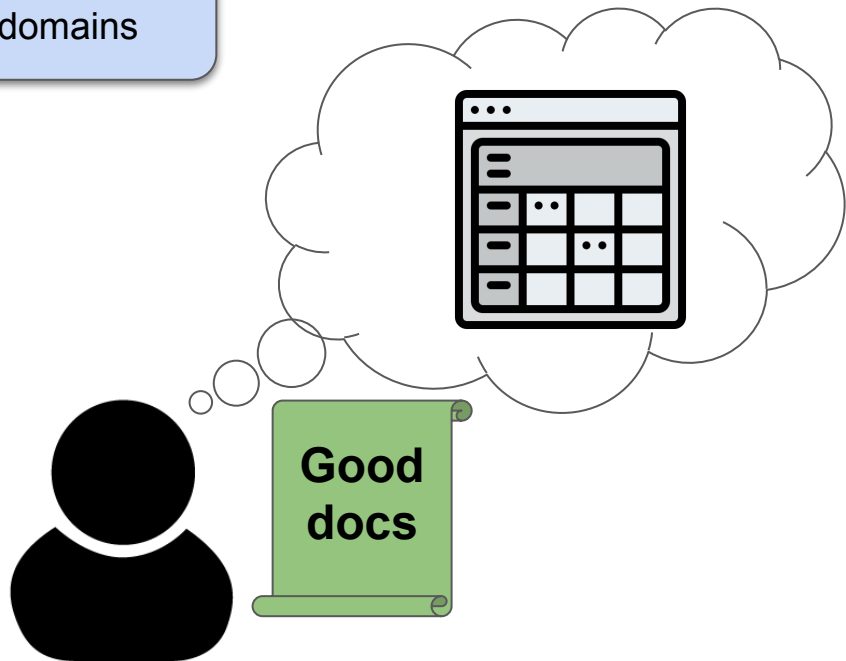
Actual statistics

✨ Privacy-enhancing noise ✨



The data user's  
~statistical imaginary~

Effective interventions  
span both domains



# What seems to work?

- Context-aware documentation
- Present privacy harms and accuracy metrics *together*
- Examples that clearly illustrate what analysts can and cannot deduce from noisy data
- Consider perceptions of “face privacy”

Thank you! Questions?

Paper (arxiv)



Study materials

