Human Centered Data Science

DATA 512 — Jonathan T. Morgan & Os Keyes

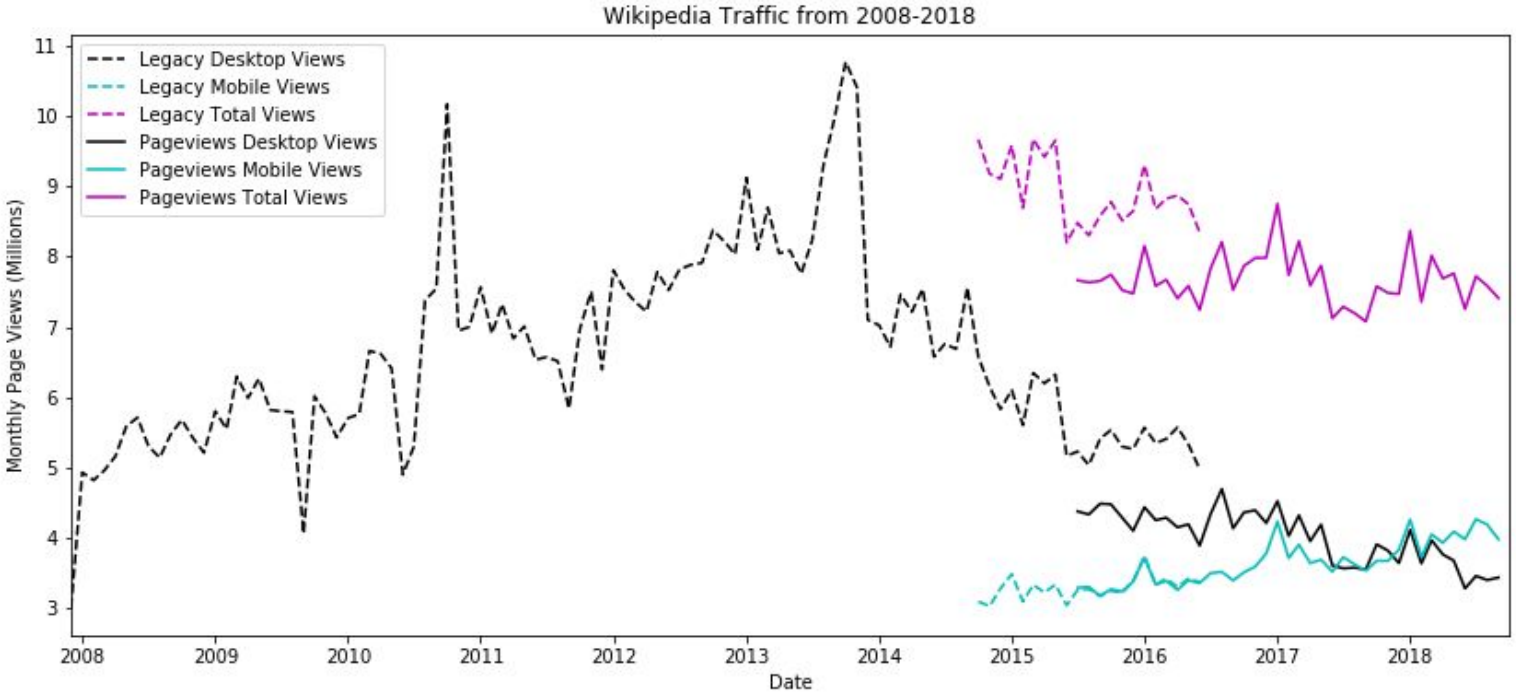
Mixed methods research | Week 5 | October 25, 2018

Overview of the day

- Assignment 1 review and reflection
- Reading reflections
- Survey of qualitative research methods
- Mixed-methods case study 1: examining the Wikipedia gender gap
- In-class activity: Automated Gender Recognition
- Mixed-methods case study 2: Automated Gender Recognition
- Introduction to crowdwork
- Introduction to ethnography
- Overview of assignment 3: Crowdwork ethnography

Assignment 1 review

Assignment 1 review



Assignment 1 review

- Lots of great answers!
- More documentation please
- Some issues with copying (assignment text, Wikimedia site, etc)
  - This is A1, it happens
  - It can’t happen again
  - You have to write your own documentation

Assignment 1 review

- Using without attribution: never acceptable
  - Academic malpractice
  - Obliged to report
- Using with attribution: acceptable
  - Note: don’t overdo
- Resources:
  - https://depts.washington.edu/grading/pdf/AcademicResponsibility.pdf
  - https://www.hcde.washington.edu/policies/plagiarism-and-academic-conduct
- Please reach out!
  - okeyes@uw.edu

Reading reflections

Wang, *Why Big Data Needs Thick Data*

Sen *et al.*, *Turkers, Scholars, "Arafat" and "Peace"*

Reading reflections

“As pointed out by the author, thick data relies on deeper insights drawn from a smaller sample of people. A well-collected large sample of data allows us to perform statistically significant results. How then can one ensure that the thick data they have collected is a good representative of the people under study, and not biased towards one group or the other?”

-Havan

Reading reflections

“My question for further thought regards privacy concerns in thick data. In class, we demonstrated different techniques used to anonymize datasets. Many of these techniques involve watering down the data with bucketing, removing columns, etc. so no unique individuals can be identified. This contradicts thick data which requires more depth in each observation. How would you address privacy concerns when collecting thick data?”

-Daniel

Reading reflections

“Don’t you think this article was a little too early for its own good? As the articles itself states based on Gartner Study, the adoption of Big Data was still around 8% when this article was published in 2015. Even today (2018), we see BigData is still a buzzword for most of the companies across the world.”

-Tejas

Reading reflections

(Paraphrased) *“Could we write an algorithm for thick data?”*

-Various

Reading reflections

"*Question: How does one start to enforce the idea “Thick Data” is just as important as “Big Data” when industry wants to utilize data driven decision making, but “data” is equated to “Big Data”?*"

-Hannah

Qualitative research methods

Qual research complements Data Science

"How do we preserve the richness associated with traditional qualitative techniques in data-driven research? How can we be sure not to lose the compelling and inspiring stories of individuals in a sea of aggregated data at scale?"

Source: Aragon, C. et al. (2016). *Developing a Research Agenda for Human-Centered Data Science.* Human Centered Data Science workshop, CSCW 2016.

Qualitative research is interpretivist

Positivism: *“this is the way the world is”*. Most natural science and some social sciences are strictly positivist.

Interpretivism: *“this is the way people understand the world”*, in other words...

- How do people perceive the world around them?
- What motivates people to act?
- What meaning do people ascribe to the actions of others?
- What are the contexts or environments in which people perceive and act?
- How do perceptions, contexts, **cultures,** values, meaning, and motivations influence how people perform, interpret, and respond to the world around them?

Quant research has qualitative aspects

People understand reality subjectively, and they act based on their subjective understanding of the world. Researchers are people.

Therefore any research involving*, created by*, or *created for* humans has a subjective component—whether or not it's acknowledged. And that's not an inherently bad thing.

Examples of qualitative aspects of quantitative research:

- Which research questions are asked
- Which data are collected
- Which variables are measured; which relationships matter
- How findings are interpreted

Qual research is scientific

Even small-*n,* non-randomly sampled, and/or naturalistic studies focused primarily on describing phenomena often draw on similar sources of rigor as quantitative research.

Examples of positivist aspects of qualitative research:

- **Empiricism:** e.g. recording, transcription, documentation
- **Methodology:** e.g. interview protocols
- **Abstraction:** e.g. thematic analysis
- **Generalization:** e.g. theory building
- **Describing limitations and assumptions**

Common qual research methods

- **Qualitative surveys**
  - ask people ‘why’ questions (motivations, beliefs, values experiences) rather than ‘what’ questions (activities, specific opinions, knowledge of the world). Mix of defined choice and ‘free text’ questions.
- **Semi-structured interviews**
  - talk to people about what the do, why/how they do it. Usually with some pre-defined research questions or goals.
- **Content analysis**
  - ‘code’, cluster, and/or label things people say, write or create.

Common qual research methods

- **Focus groups**
  - Using a pre-defined script or facilitation protocol, have a group discussion where people to talk about their opinions, experience, and ‘wants and needs’ related to your product/tech.
- **User testing**
  - Get people to use your product/tech in a particular way, often in a controlled setting. Observe, ask questions, ask them to think aloud.

Case study: user testing

Source: Luca Mascaro https://www.flickr.com/photos/lucamascaro/7993859829 CC-BY-SA 2.0

User testing process

1. Sit down with individuals who represent your target user base
2. Ask them questions about their use of some piece of technology
3. Ask them to perform specific tasks with some piece of technology
4. Observe their behavior
5. Ask them to think aloud
6. Ask them to provide feedback

Practical insights, subjective experience

Goal: understand how the affordances of a piece of technology interact with the background, skills, motivations, expectations, and perceptions of the people who use that technology.

Although user testing is sometimes framed as an *objective* evaluation of whether a piece of technology is ‘good’ or ‘bad’, it ultimately has a *subjective* goal:

> *how well can a particular kind of person (audience), who wants to perform a particular kind of task (purpose), accomplish their goal using this technology (context)?*

Small tests, multiple iterations

“Some people think that usability is very costly and complex and that user tests should be reserved for the rare web design project with a huge budget and a lavish time schedule. Not true. Elaborate usability tests are a waste of resources. **The best results come from testing no more than 5 users and running as many small tests as you can afford.**

The real goal of usability engineering is to improve the design and not just to document its weaknesses. After the first study with five participants has found 85% of the usability problems, you will want to fix these problems in a redesign.”

Source: https://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/

Rigor: System Usability Scale

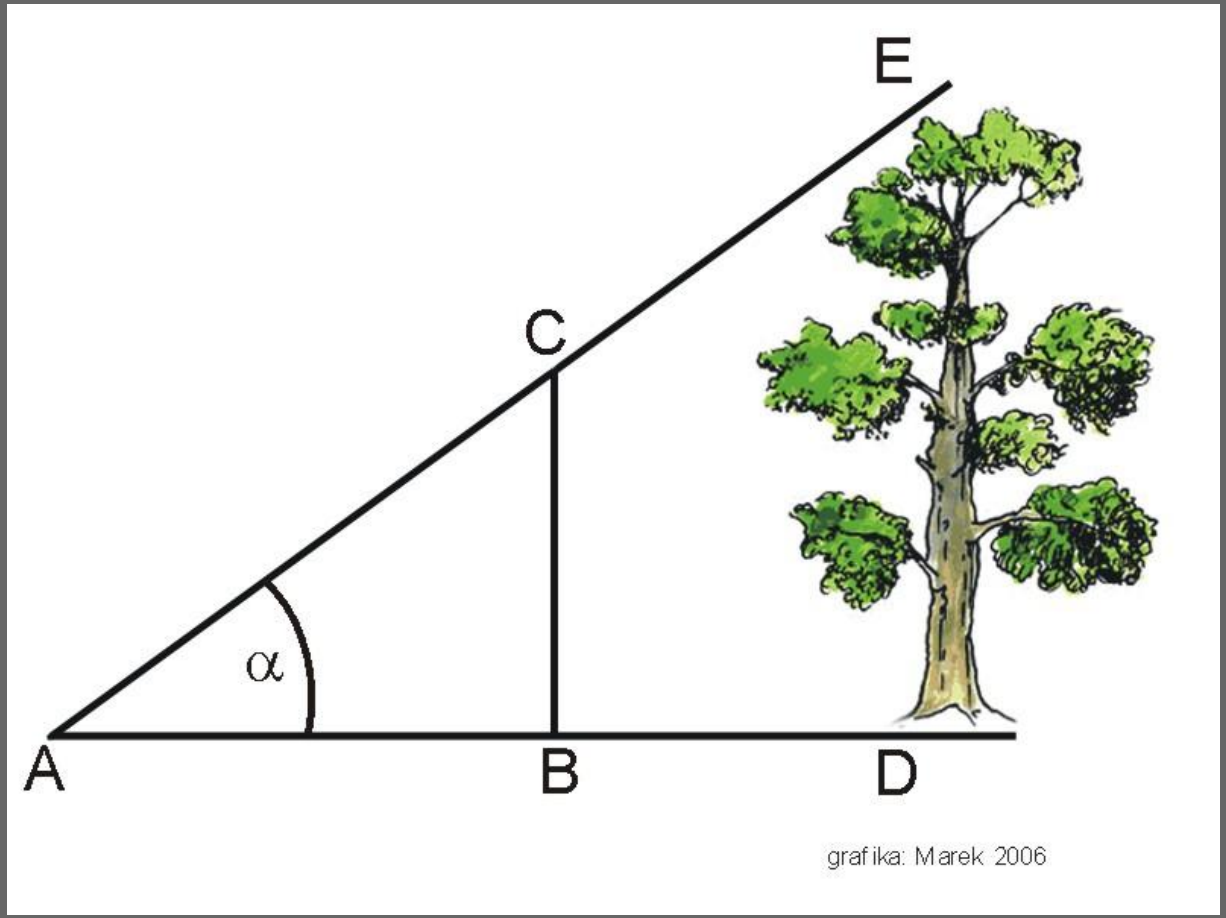
1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

Source: https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html

Mixed-Methods Case Study

Triangulating the causes and consequences of the Wikipedia gender gap

Triangulation



The Wikipedia Gender Gap

In a 2008 survey, ~16% of Wikipedia editors identified as female. We have no reason to believe that the proportion of non-male identified editors has changed substantially since then.

Task for research:

1. What are the causes of this gender gap?
2. What are the consequences?

Sources:
https://meta.wikimedia.org/wiki/Research:UNU-MERIT_Wikipedia_survey
Hill, B. M., & Shaw, A. (2013). The Wikipedia gender gap revisited: Characterizing survey response bias with propensity score estimation. *PloS one*, *8*(6), e65782.

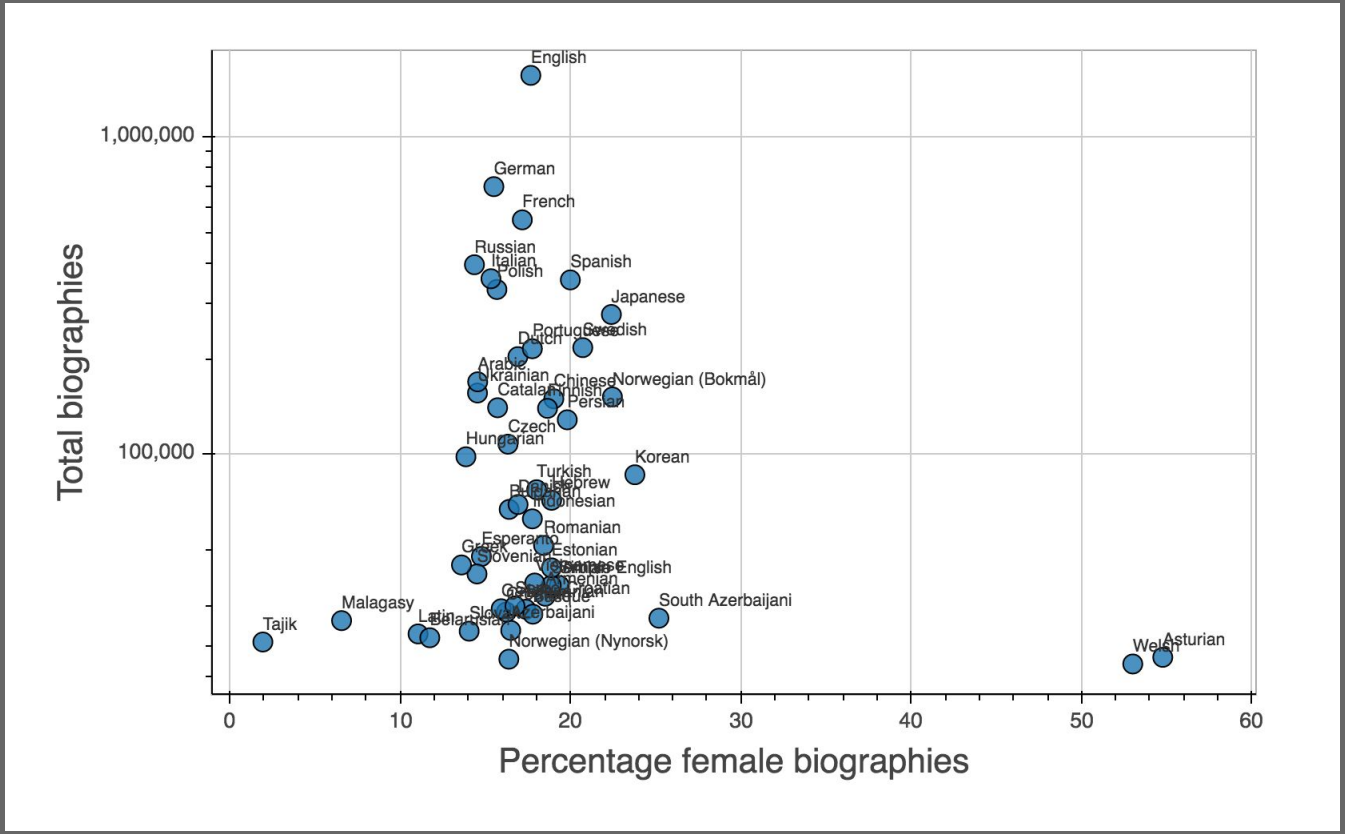
Consequences of the gender gap

Gendered editing patterns & content gaps

- Of the ~3% of editors who disclose gender, ~16% are female-identified (FI)
- FI editors tend to edit different articles than male-identified editors
- Articles that these FI editors are more likely to edit are shorter on average
- Articles about movies that female MovieLens users rate highly are shorter
- However… articles about female Nobel Prize and Academy Award winners are NOT shorter than their male counterparts'

Source: Shyong (Tony) K. Lam et al. 2011. *WP:clubhouse?: an exploration of Wikipedia's gender imbalance.* In Proceedings of the 7th International Symposium on Wikis and Open Collaboration (WikiSym '11).

Biography articles by gender



Source: Maximillian Klein, http://whgi.wmflabs.org/gender-by-language.html

Gendered language in articles

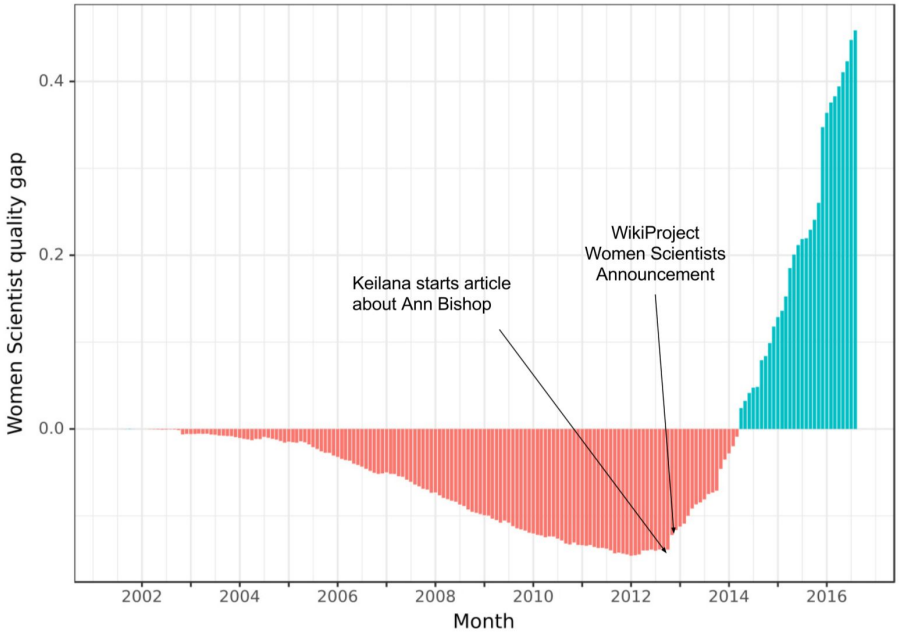
- Articles about women tend to emphasize the fact that they are about a women (i.e., they contain words like “woman”, “female” or “lady”), while articles about men don’t contain words like “man”, “masculine” or “gentleman”. The lower salience of male-related words in articles about men ... suggests that there is a social bias to assume male as the standard gender in certain social situations.

- Words like “married”, “divorced”, “children” or “family” are much more frequently used in articles about women.

This gender inequality cannot simply be explained by the imbalance in the coverage or in the pure existence of notable men and women, but shows that men and women are indeed presented differently on Wikipedia.

Source: Wagner, C., Garcia, D., Jadidi, M., & Strohmaier, M. (2015, April). It's a Man's Wikipedia? Assessing Gender Inequality in an Online Encyclopedia. In *ICWSM* (pp. 454-463).

Quality Dynamics of the Gender Gap



(a) The difference in *mean weighted sum* quality predictions for all wiki and articles about Women Scientists is plotted over time. Note the transition from red to blue represents the switch from a gap to a surplus. Important dates for User:Keilana's initiatives are annotated with arrows.

Source: Aaron Halfaker. 2017. Interpolating Quality Dynamics in Wikipedia and Demonstrating the Keilana Effect. In *Proceedings of the 13th International Symposium on Open Collaboration* (OpenSym '17).

Overall findings: Consequences

- Gender gap affects quality of articles of greater interest to women
- Gender gap affects the number of articles about women
- Gender gap affects the way women are presented in articles
- Gender gap affects article quality
- Gender gaps can be closed by focused effort

Causes
of the gender gap

Why women don’t more women edit Wikipedia?

Why women don’t edit

The researchers re-analyzed existing Wikipedia survey data. They drew on theories from social psychology, and gender studies to develop four hypotheses to explain the gender gap. They found that:

- Women are less likely to contribute because of the potential for conflict
- Women are less likely to contribute because of lower confidence in their expertise
- Women are less likely to contribute because they prefer to work in a more collaborative/cooperative way
- Interestingly, they did *not* find support for the fourth hypothesis: that women are more likely than men to list “less discretionary time” as a reason for not contributing

Source: Benjamin Collier and Julia Bear. Conflict, criticism, or confidence: an empirical examination of the gender gap in wikipedia contributions. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work* (CSCW '12). DOI: https://doi.org/10.1145/2145204.2145265

Wikipedia editing and internet skills

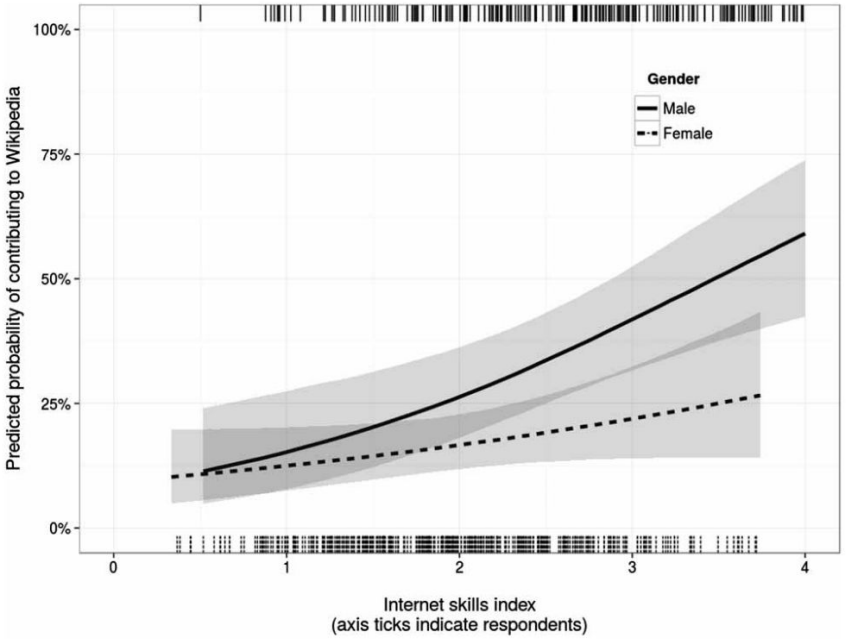


Figure 1. Marginal effects plot: predicted probability of contribution to Wikipedia by gender.

Source: Hargittai, E., & Shaw, A. (2015). Mind the skills gap: the role of Internet know-how and gender in differentiated contributions to Wikipedia. *Information, Communication & Society*, *18*(4), 424-442.

Wikipedia editing and internet skills

“Why is it that women with high levels of Internet skills are so much less likely to contribute to Wikipedia than comparably skilled men? While research has shown that one of the reasons women use the Internet differently from men concerns their parental responsibilities due to less available time, given that only 3% of the sample reported having a child, this factor cannot explain the gender differences for this group.

Self-selection into a project like Wikipedia also plays a critical role, but specific reasons why women might find encyclopedia writing (or the practice of doing so in Wikipedia) disproportionately unappealing requires further research.”

Source: Hargittai, E., & Shaw, A. (2015). Mind the skills gap: the role of Internet know-how and gender in differentiated contributions to Wikipedia. *Information, Communication & Society*, *18*(4), 424-442.

Gendered editing experiments

The researchers asked a mixed-gender group of college students to perform a collaborative editing task under controlled conditions. They found:

- Women edit more overall, but less under conditions that mimic Wikipedia: few or no visible women peers; edit feedback is ‘neutral’ instead of ‘constructive’
- Women and men both perceived anonymous peers as male, but women were more likely than men to perceive feedback from anonymous peers as critical

Implications

- more visible women, use of constructive feedback may alleviate the gender gap
- Possible tradeoffs: supporting anonymity and supporting female participation

Source: Christina Shane-Simpson, Kristen Gillespie-Lynch, Examining potential mechanisms underlying the Wikipedia gender gap through a collaborative editing task, In Computers in Human Behavior, Volume 66, 2017, https://doi.org/10.1016/j.chb.2016.09.043.

How are women who edit Wikipedia different from those who don’t?

Research has identified many plausible reasons why more women don’t participate in Wikipedia. What might the existing research lead us to assume about the women who do participate?

Emotional labor and Wikipedia editing

The researchers interviewed 20 current women editors to learn about "the possible causes of the Wikipedia gender gap by looking more closely at the experiences of women actively engaged in the community."

- Avoids framing the gender gap as a “woman problem”: rather than asking ‘why don’t more women participate’, asks ‘how do the women who participate persevere?’
- This shifts the focus to the *lived experience* of woman Wikipedians.

Source: Amanda Menking and Ingrid Erickson. 2015. The Heart Work of Wikipedia: Gendered, Emotional Labor in the World's Largest Online Encyclopedia. CHI 2015

Emotional labor and Wikipedia editing

Women Wikipedians are not immune to the negative aspects of Wikipedia culture. They must change both how they work and *how they feel about their work*. They must perform extra *emotional labor* in order to participate as ‘equals’.

- To avoid signaling "weakness" and becoming targets of gender-based harassment, they avoided publicly discussing harassment or gender.
- They changed the language they used in order to fit in and avoid drawing attention.
- Wikipedia’s rules around civil interaction place greater responsibility on the *recipient* of toxic behavior than the *source*, which disproportionately impacts women editors.

Emotional labor and Wikipedia editing

Bottom line: These women were able to continue to participate in Wikipedia because they believed so deeply in Wikipedia's mission that they could justify the emotional toll of working in an environment that exposed them to constant conflict and toxicity, made them regular targets of harassment, and expected them to proactively make it all okay.

How does knowing this change the way we understand the Wikipedia Gender Gap?

How does it change the way we might attempt to address the Gender Gap?

In-Class Activity

Graded, 25 minutes, groups of 4-5

Automated Gender Recognition

Notes on Computer Science

1. Historically a “feminine” profession
2. What happened? It became “important” and so professionalised and remunerative
3. structural misogyny

Further reading

1. Hicks, Mar. *Programmed inequality: How Britain discarded women technologists and lost its edge in computing*. MIT Press, 2017.
2. Morley & McDonnell. 2015. “The Gendering of the Computing Field in Finland, France and the United Kingdom Between 1960 and 1990”. In *Connecting Women: Women, Gender and ICT in Europe in the Nineteenth and Twentieth Century*

In-Class Activity

You will be randomly assigned one of 3 vignettes

1. Read the vignette
2. Discuss the questions it poses
3. Report back after 20 minutes

Deliverables (post in the “Week 5 in-class activity” Canvas thread):

1. A document providing your answers to the questions

Choose one person from your team to submit your group deliverables to Canvas

Mixed-Methods Case Study

Automated Gender Recognition

Automated Gender Recognition

“The automatic, computational identification of a person’s gender from photographs or videos. Implementations first isolate the person within a photograph: some use geometric structure,while others rely on skin texture, and yet others depend on 3D modelling. The resulting image can then be subject to "gender recognition" which...is usually based on the person’s face”

- Access control to gendered spaces
- Advertising/demographic analytics
- Gendered UI design

Automated Gender Recognition

- Buolamwini & Gebru, *Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification*
- Algorithmic audit
- Dataset of Parliamentarians coded for skin tone
- “We found that all classifiers performed best for lighter individuals and males overall. The classifiers performed worst for darker females.”
- Tells you that there is a bias

Automated Gender Recognition

- Hamidi, Scheuerman & Branham & Gebru, *Gender Recognition or Gender Reductionism? The Social Implications of Embedded Gender Recognition Systems*
- Qualitative interviews of trans technologists and non-technologists
- “We found that participants had overwhelmingly negative attitudes towards AGR and questioned if it can offer any beneficial applications to end users. They also expressed doubt about whether AGR can accurately identify gender and described the harm of being misgendered by it. Finally, participants expressed serious concerns about threats that it can pose to their autonomy and privacy.”

Automated Gender Recognition

- Me: 2018, *The Misgendering Machines: Trans/HCI Implications of Automated Gender Recognition*
- Content analysis of AGR

	Analysis results		
Paper type	*Binary*	*Immutable*	*Physiological*
Focused on gender	92.9%	71.4%	82.1%
No gender focus	96.7%	73.3%	40%
Overall	94.8%	72.4%	60.3%

Table 3. The results of my content analysis of 58 AGR papers. Each column contains the percentage of papers that explicitly or implicitly relied on one particular component of the traditional view of gender. Papers are also divided by whether they were focused particularly on gender, or simply used AGR as a test scenario for a more general facial recognition contribution.

- "There is, *ipso facto*, no way to make a technology premised on external inference of gender compatible with trans lives."

Automated Gender Recognition

- Quantitative audit: “what is this system doing?”
- Qualitative interview: “what are the consequences of what the system is doing? How might it change human comfort and dignity?”
- Content analysis: “What model of the world is influencing what it’s doing?”

An irresponsibly brief introduction to ethnography

Ethnography: studying users in the wild

Ethnography is the study of human experience and human culture. It involves observing and interacting with people as they go through their daily lives in their natural environment—their *social situation.*

Ethnographers try to understand *how and why* people do what they do and think what they think in particular social situations. Not just *what* they do or *when, where,* and *with whom* they do it.

Ethnography is about meaning

The goal of an ethnography is to provide an ***emic*** description of a social situation—the way the people involved describe their motivations and actions—rather than an ***etic*** description, which is what an outsider would assume or interpret about that situation based on the outsider's own preconceptions.

Although ethnography uses similar methods to many natural sciences, you can't do an ethnography of fish. But you *could* do an ethnography of people who study fish, catch fish, cook fish, or breed fish.

Ethnography is empirical

Systematic collection of data, through...

- **Observation:** watching and listening
- **Direct elicitation:** asking questions
- **Participation:** doing things people do, with them

Systematic analysis of data, through…

- Identification of patterns or themes in language, actions, or explanations
- Iterative refinement/re-assessment of themes as more data is collected
- Ongoing reflection on the influence of the researcher's own biases

Systematic presentation of findings ("thick description"), through…

- Research notes, quotes, recordings, case studies, stories, sometimes even statistics

Common ethnographic methods

Semi-structured interviews: talk to people about what they do, why/how they do it, how they experience the world, in their own words. May have some pre-defined questions or research goals, or be completely open-ended.

Participant observation: watch people performing their normal activities in their natural environment. Take notes about their actions, interactions, and the artifacts they create and use to understand their context and what it means to them. Sometimes, you might even join them in their activities.

Document analysis: study the artifacts that people create and use in their daily life/work, or the (physical, digital) traces they leave when moving through the world

Sampling

- Generally smaller *N* than quantitative research
- *Sampling is usually purposeful:* focused on diversity rather than representativeness, or a case study of a single social situation over an extended period of time
- Sampling can be an ongoing activity
    - keep talking/observing/participating until you stop learning new things (“data saturation”)
    - Ask each participant who to talk to next, or what questions to ask (“snowball sampling”)
- However, *stratified sampling* and *critical case sampling* can an be used to provide a kind of rigor similar to hypothesis-driven quantitative research

Rigor and validity

In ethnography, the researcher *is* the analytical instrument. But it uses many of the same strategies for rigor and de-biasing that data science does.

- **Motivate your study clearly** based on previous research and theory
- **Reflect on, articulate, and monitor** how your own biases and assumptions may affect what you notice (and don't), and how you interpret your observations.
- **Describe and justify your methods** for sampling, data processing, and analysis
- **Take detailed notes** and show your work
- **Involve multiple people** in analysis and interpretation--including subject matter experts, such as people who belong to the group you're studying

The role of ethnography in HCDS

- Helps you figure out questions to ask, hypotheses to pose, important variables
- Helps you understand the context surrounding your data
- Helps you identify important phenomena that you can’t (easily) quantify
- Helps you interpret what your quantitative findings mean
- Helps you communicate the nature and importance of your findings
- Helps you foster empathy for the people behind your data and the users of your technology

Ethnography in industry

People do ethnographic work in industry all the time. It can be a very useful complement to data science work.

Just like data science, ethnography is often done with less rigor and a more specific focus in industry than in academia.

Just like data science, there is a lot of debate about what *is* and *isn't* 'real' ethnography.

Crowdsourcing & data science

Surprise survey!

- Spend 15 minutes filling out the survey that I posted to canvas.
- Read the instructions and then attempt to capture everything you (think you) know about crowdsourcing, crowd workers, and Amazon Mechanical Turk.
- Your response to this survey is a required part of A3: Crowdwork ethnography and will be included in your report for that assignment.
- For now, just write down everything you have heard about, assume, or hypothesize to be true about the nature of working on Amazon Mechanical Turk and the motivations, backgrounds, priorities, and experiences of people who perform turk work. You can edit and fix grammar later.

Defining crowdsourcing

AKA ‘clickwork’, ‘crowdwork’, ‘human computation’

Always involves:

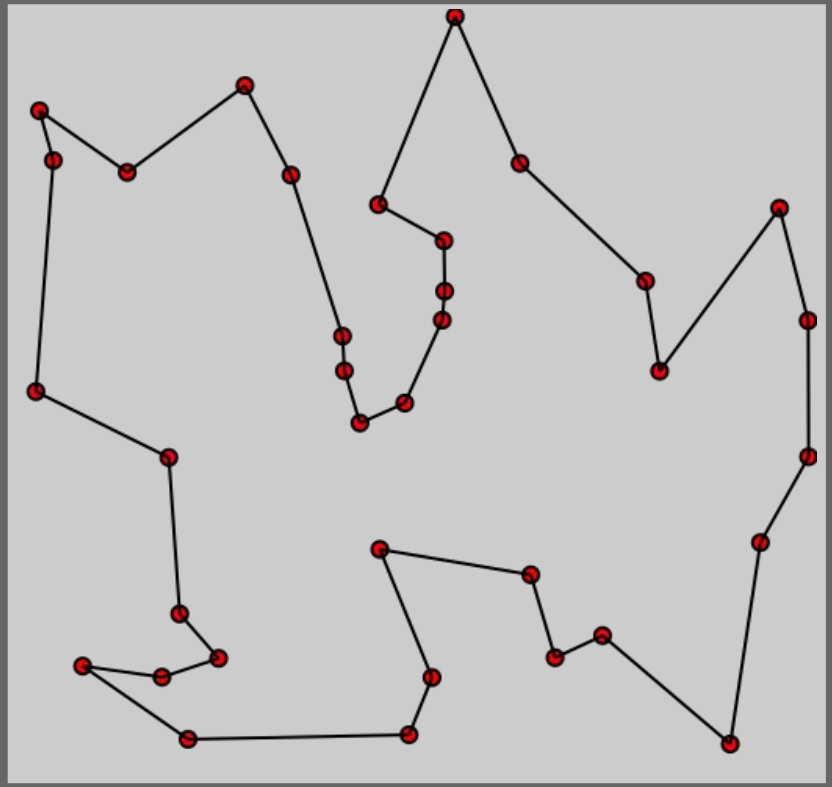
- Open participation/self-selection
- Aggregating individual contributions or judgements

Sometimes involves:

- Pre-defined ‘microtasks’

Uses in data science

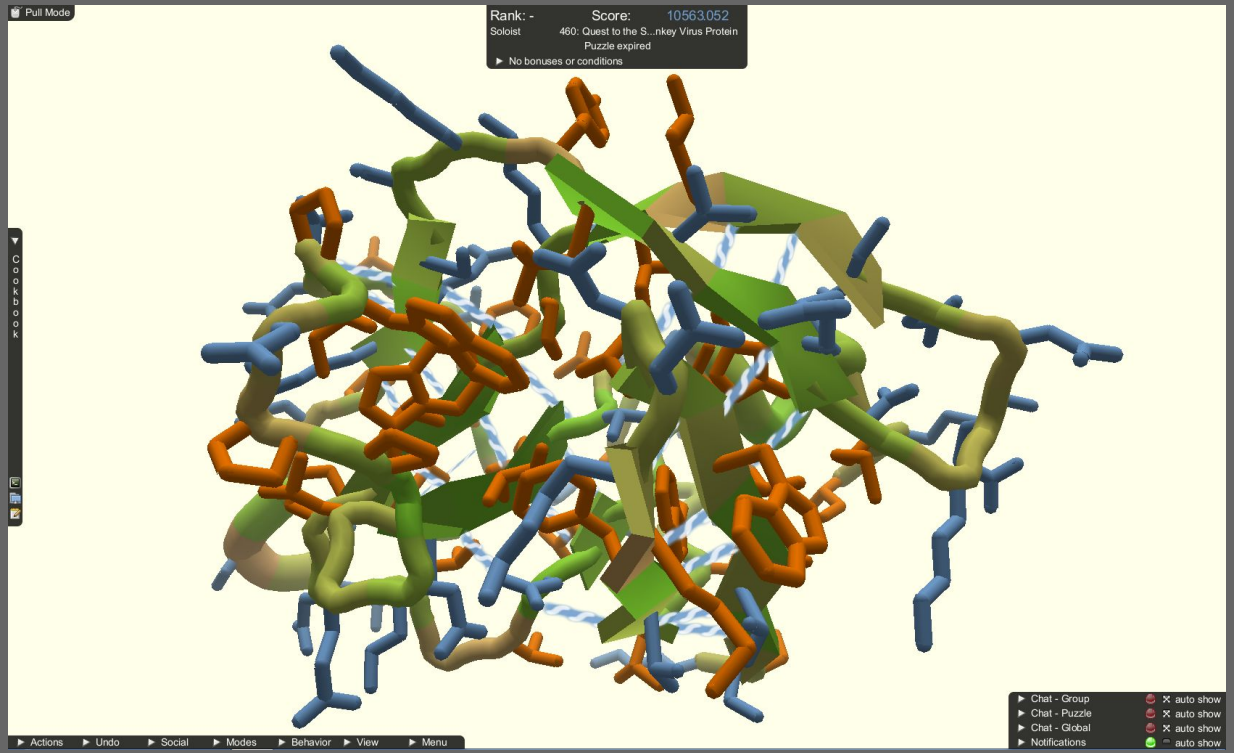
- Problem-solving
- Collecting data
- Labeling data
- Transforming data
- Error checking
- Ranking/voting
- Evaluating model output
- A/B testing



Crowdwork marketplaces

amazon mechanical turk™
Artificial Artificial Intelligence

Games with a purpose



foldit

Solve Puzzles for Science

Citizen science projects

ZOONIVERSE
REAL SCIENCE ONLINE

Take part in Science Projects

Experiment in Laboratory

All | Space | Climate | Humanities | Nature | Biology

Space

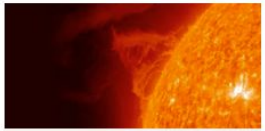
Sort by Category

How do galaxies form?
NASA's Hubble Space Telescope archive provides hundreds of thousands of galaxy images.

GALAXY ZOO

Explore the surface of the Moon
We hope to study the lunar surface in unprecedented detail.

MOON ZOO

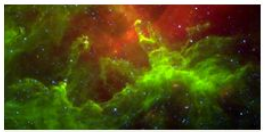


Study explosions on the Sun
Explore interactive diagrams to learn about the Sun and the spacecraft monitoring it.

SOLAR STORMWATCH

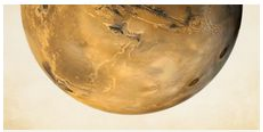
Find planets around stars
Lightcurve changes from the Kepler spacecraft can indicate transiting planets.

planethunters.org



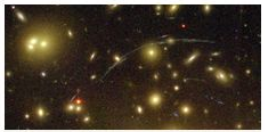
How do stars form?
We're asking you to help us find and draw circles on infrared image data from the Spitzer Space Telescope.

THE MILKY WAY PROJECT



Explore the Red Planet
Planetary scientists need your help to discover what the weather is like on Mars.

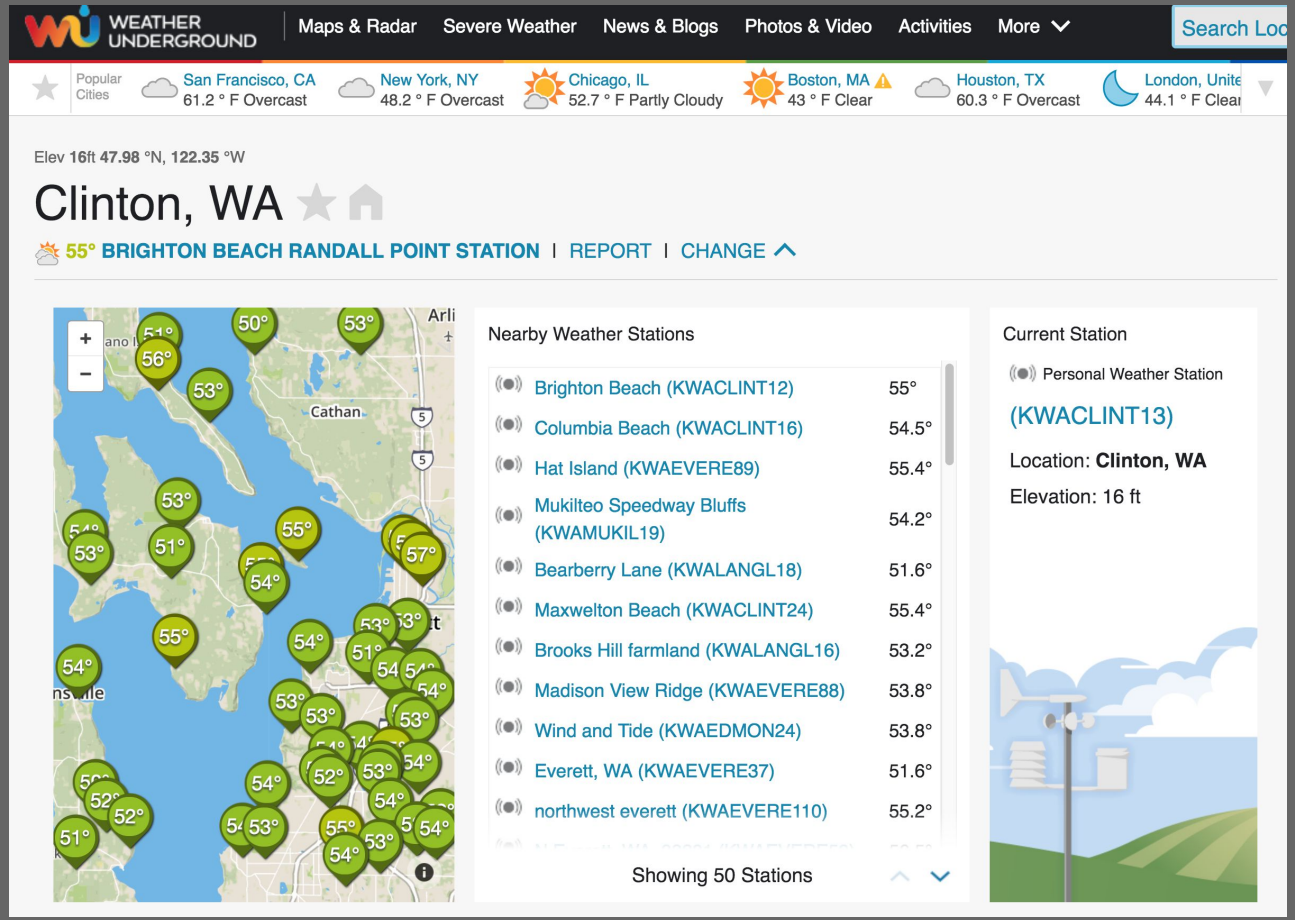
PLANET FOUR



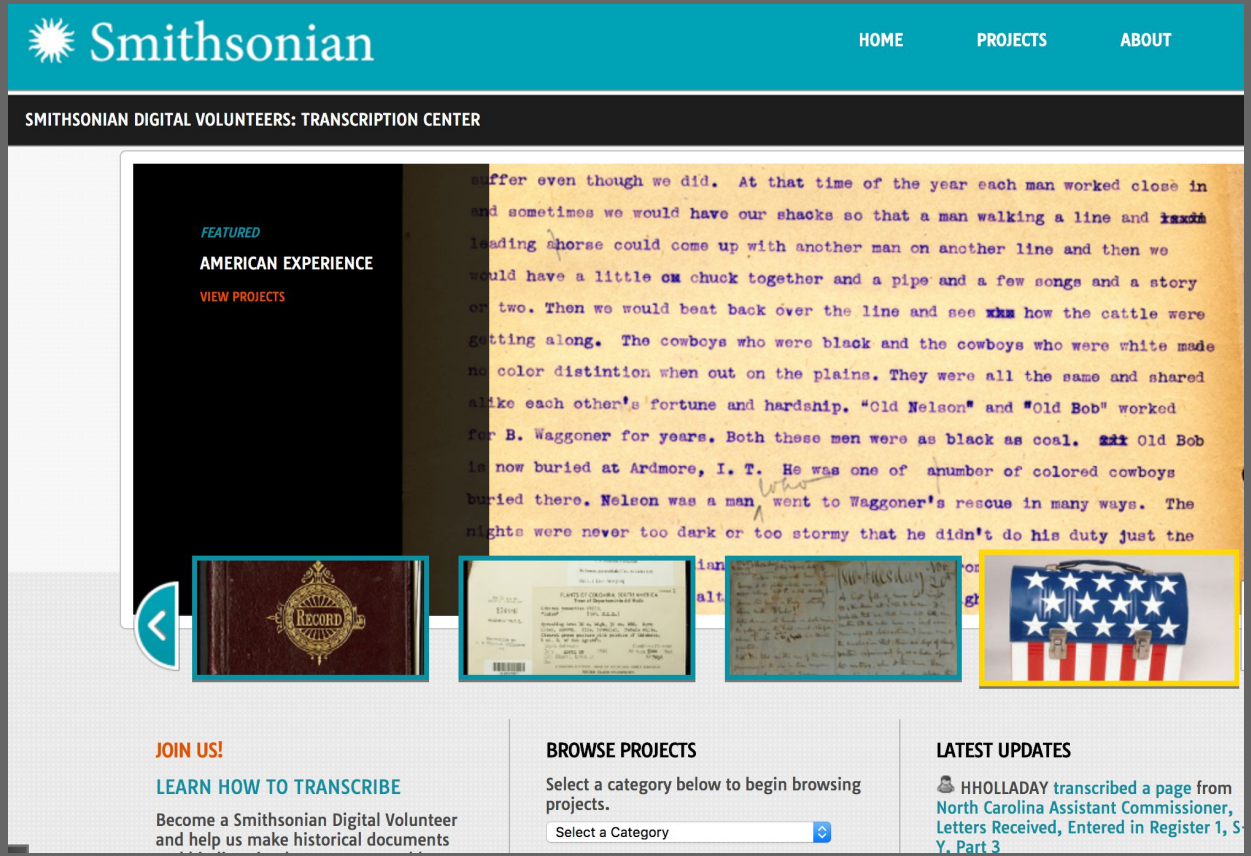
Help us find gravitational lenses
Imagine a galaxy, behind another galaxy. Think you won't see it? Think again.

SPACEWARPS

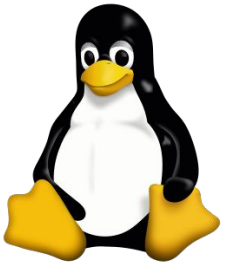
Citizen sensor projects



Volunteer transcription



Open collaboration



StackExchange

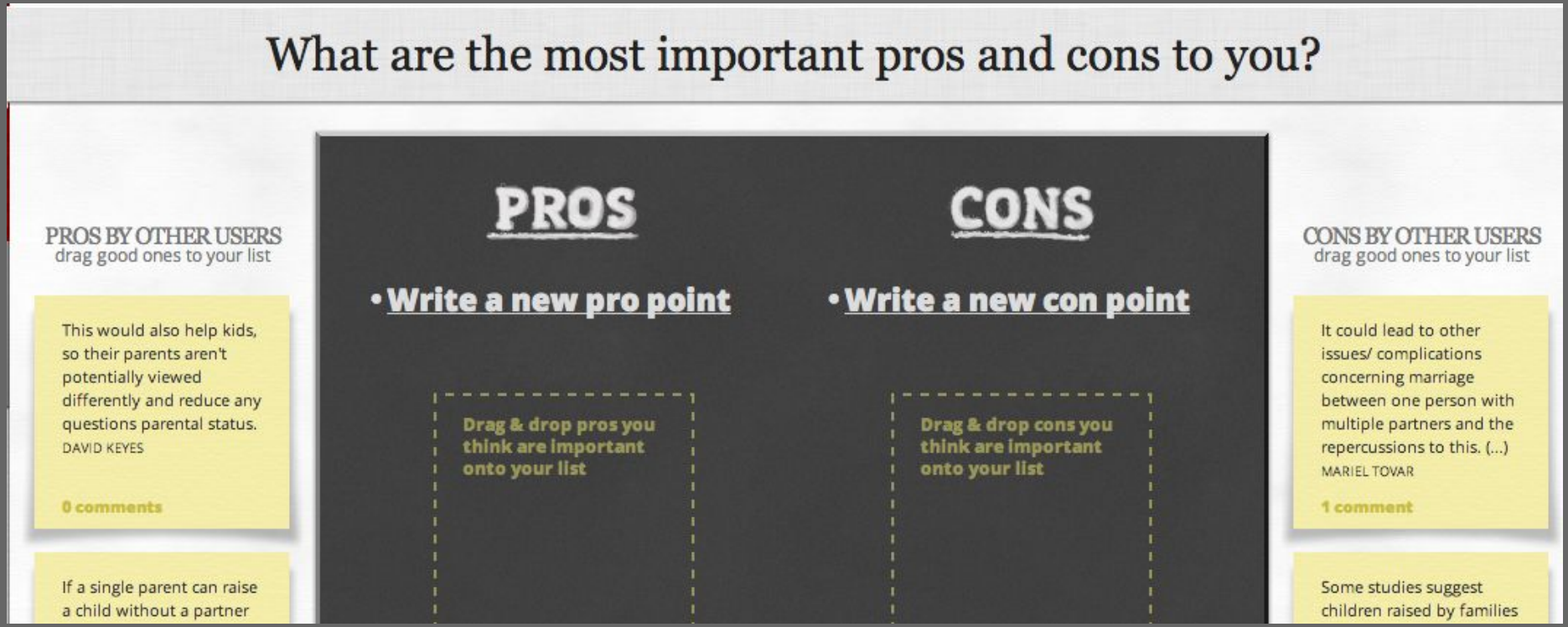
GitHub

WIKIPEDIA
The Free Encyclopedia

reddit

Crowdfunding

Crowdvoting/Fact checking/Ideation



Source: https://www.geekwire.com/2012/living-voters-guide/

Assignment 3: Crowdwork Ethnography

10 points, due 11/8

A3: Goal

This assignment involves writing an ethnographic account of the culture of ‘turk work’ based on participant observation and document analysis.

It’s typical in many ethnographies to focus on a theme or concept, rather than a specific research question or hypothesis. In this ethnography, you will be focusing on the concept of *fairness*.

The goal is to learn what Turkers mean by fairness, as it applies to their work. NOT what you think is ‘fair’ or ‘unfair’ about it.

A3: Steps

1. **Document your assumptions and preconceptions:** Write down everything you know now about Mechanical Turk (already done!)
2. **Participant observation:** Create an mturk account and preview HITs (“human intelligence tasks”), *take notes*
3. **Document analysis:** Read background documents related to turk work, *take notes*
4. **Conversation analysis:** Lurk in Turker forums, read conversations, *take notes*
5. **Synthesis and reflection:** Write up your overall findings and reflections on how this activity changed your understanding of Mechanical Turk, crowdsourcing in general, or the concept of fairness.

A3: Tips

1. **Take notes as you go, not after the fact.** Write down things that surprise you, things you don't understand, things that seem important even if you can't say why.
2. **Save links and screenshots.** Use these in your final write up to provide evidence and context for your findings.
3. **Read the assignment sheet carefully.** There are a lot of detailed instructions, and your assignment will be best if you follow them.
4. **Refer back to your "assumptions" regularly.** Reflect on how these assumptions are biasing your observations or your interpretations. If you believe they are, describe that in your write up.
5. For your final write-up, pick through your notes and select particular scenarios, examples, etc. and talk about what they mean. Don't just deliver a bullet list of things you say/read/did.

Homework due next week

Reading (read and reflect)

- Donovan, J. et al. (2018). *Algorithmic accountability: A primer*.

Assignment 2: Measuring bias in data

- 10 points, due next Thursday before class
- Post a link to GitHub repo to designated Canvas submission form
- Refer to the wiki for full assignment description. Make sure to take advantage of Slack and Oliver's office hours if you need help!

See:
https://wiki.communitydata.cc/Human_Centered_Data_Science_(Fall_2018)/Assignments#A2:_Bias_in_data

Homework due in two weeks

Assignment 3: Mechanical Turk Ethnography

- **Length:** at least 2000 words
- **Format**: Google Doc, shared with Jonathan and Os, link submitted to Canvas
- **Due date:** November 8, by 5pm

The assignment sheet for A3 has been emailed to you, and is also linked from https://wiki.communitydata.cc/Human_Centered_Data_Science_(Fall_2018)/Assignments#A3:_Crowdwork_ethnography

Questions?