

# Lecture 3: Knowing the Crowd Workers

Instructor: Chien-Ju (CJ) Ho

# Logistics

- Paper Reviews
  - You are not expected to understand every details in the papers that we cover.
    - Presenters do need to understand the details...
  - However, you should be able to answer the following questions:
    - Summary the paper in 2~3 sentences.
      - What's the research question the paper is solving?
      - What's the proposed approach?
      - What are the results?
    - List 1~3 points you like about the paper.
    - Coming up with potential future directions based on this paper.
      - It might be hard in the beginning. Try to think about what assumptions they make, and whether you can relax some of those? Can you apply the method/approach of the paper in different domains/applications, etc?
  - I'm estimating an 2-hour effort for each review
    - Could be longer for hard papers or if it's your first time reading research papers

# Logistics

- Paper Reviews
  - I had enjoyed reading the answers to the reading questions.
  - Consider this as a crowdsourcing idea generation.
    - The shared answers will be anonymized.

Do you agree to share your answers to the class (the answers will be anonymized)? I'll explain more on this in the lecture on Jan 22. \*

Yes

No

# Logistics

- Presentations
  - Form a team and submit your bids for presentations.
    - Team size: 2~3 students (Default size is 2. More work is expected from 3-person teams)
    - Bid 3 to 5 topics from Feb 7 to Apr 9 lectures
    - Submit the Bids by **midnight, Jan 24 (Thursday)**
    - Will announce the schedule by the end of this Friday
    - I'll try to accommodate your interests but no guarantee on that. Will resolve conflicts using random draws.

Feb 7	Incentive Design: Financial Incentives  [Student Presentations]	<p><b>Required</b> <a href="#">Incentivizing High Quality Crowdwork</a>. Ho et al. WWW 2015.</p> <p><b>Optional</b> <a href="#">Financial Incentives and the "Performance of Crowds"</a>. Mason and Watts. HCOMP 2009. <a href="#">Adaptive Contract Design for Crowdsourcing Markets: Bandit Algorithms for Repeated Principal-Agent Problems</a>. Ho, Slivkins, and Vaughan. JAIR 2016. <a href="#">The Effects of Performance-Contingent Financial Incentives in Online Labor Markets</a>. Yin et al. AAAI 2013. <a href="#">The Effects of Pay-to-Quit Incentives on Crowdworker Task Quality</a>. Harris. CSCW 2015.</p>
-------	---	---

# Logistics

- Presentation Requirements
  - Read the required paper and at least one optional paper for the assigned class
    - For **3-person teams**, read at least **two** optional papers
  - Discuss with me one week before your presentations
    - Finish your readings
    - Come up with reading questions
  - Give a presentation and lead the discussion in class
    - You can use slides, blackboards, or a mix of them
    - Prepare enough content for around 70 minutes
    - Preparing discussion questions is encouraged!
    - Everyone in the team should contribute!

# Logistics

- Projects
  - Team size: 2~3
  - Any topic that's related to human computation and crowdsourcing.
    - Apply crowdsourcing in applications.
    - Develop human behavior models using existing datasets or by running behavioral experiments.
    - Design and implement algorithms for aggregating noisy data from humans.
    - Design incentive mechanisms to motivate high-quality work.
    - Think of methods to improve human collaborations.
    - Recommender systems for crowdsourcing
    - Reputation systems
    - ...
  - Ideally, you should work on projects that "spark joy"

2 Weeks	Jan 29: Deciding the team members
3 Weeks	Feb 12: Project proposal Brief description of the proposed project (1~2 paragraph) Citing at least one paper that's relevant to your proposal
5 Weeks	Mar 5: Milestone 1 A brief literature review and the description of your plan (one page) Last chance to change the topic of the project
2 Weeks	Apr 9: Milestone 2 Summary of your current progress (2 pages) Last chance to convert the research project to (a more extensive) literature review
	Apr 23/25: In-class project presentations Apr 28: Project report due (up to 6 pages)

# Logistics

- Assignment 1
  - Due date is extended to Jan 29 (due to my typo in the PDF file)
  - Visa issues...

# Crowdsourcing (Requester's Perspective)



Input



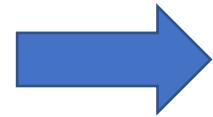
Black Box



Flower  
Dog  
Cute  
...

Output

# The Crowd is Made of People



Flower  
Dog  
Cute

...

Who are these people?

# Why should we care?

- So we know how to better utilize and interact with the crowd
  - CS tools let us reason about programs run on machines (runtime, scalability, correctness, ...)
  - Need to develop **models of human behavior** when humans are in the loop
  - Most studies so far make strong assumptions about human behavior
- Remind us crowd workers are humans like us (sounds obvious, but...)
  - Human-centered research has been receiving great attention recently
  - Ethical-related issues (fairness, transparency, and privacy) are important
- **Relatively under-explored.** Potential interesting topics for your projects...
  - They might be quite challenging though

# Who are these workers?

- Demographic information
- Are workers working independently?
- How many workers are there?

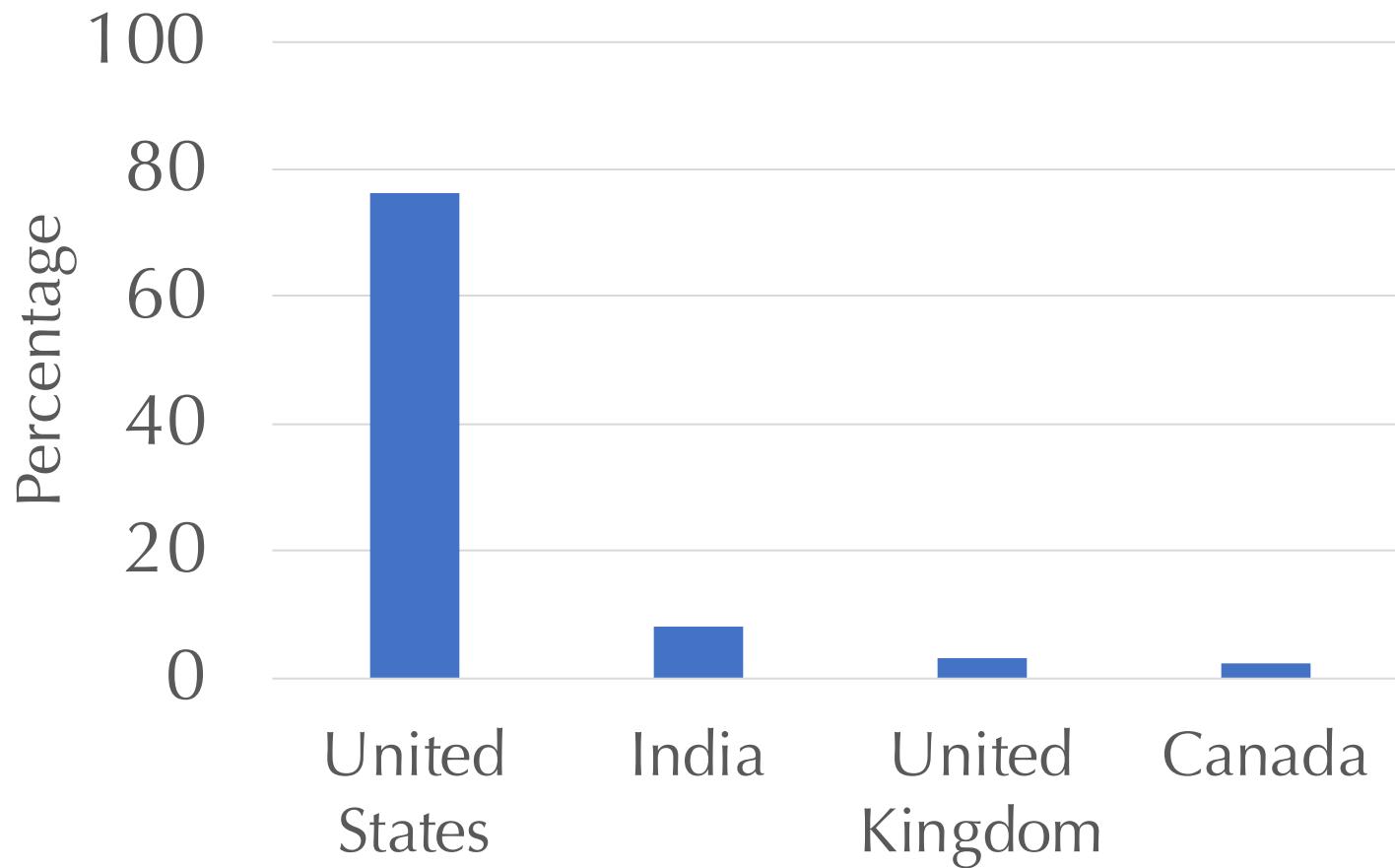
# The information is not trivial to get

- There is no official census data about crowd workers are available
- Potential solutions:
  - Conducting surveys
  - ethnographic analysis of digital trace
  - What else?

# The Demographic of MTurk

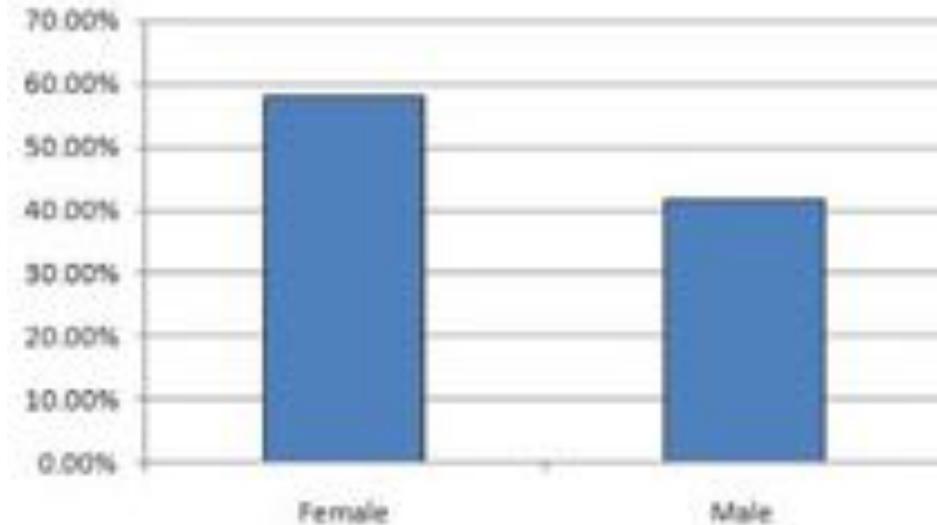
- Survey on 1,000 Turkers
  - Conduct the survey twice (Dec. 2008 and Oct. 2008)
  - Consistent statistics
  - Blog Post:
    - [A Computer Scientist in a Business School](#)
- One of the early attempts to understand the MTurk demographics

# MTurk Worker Demographics (2008): Country

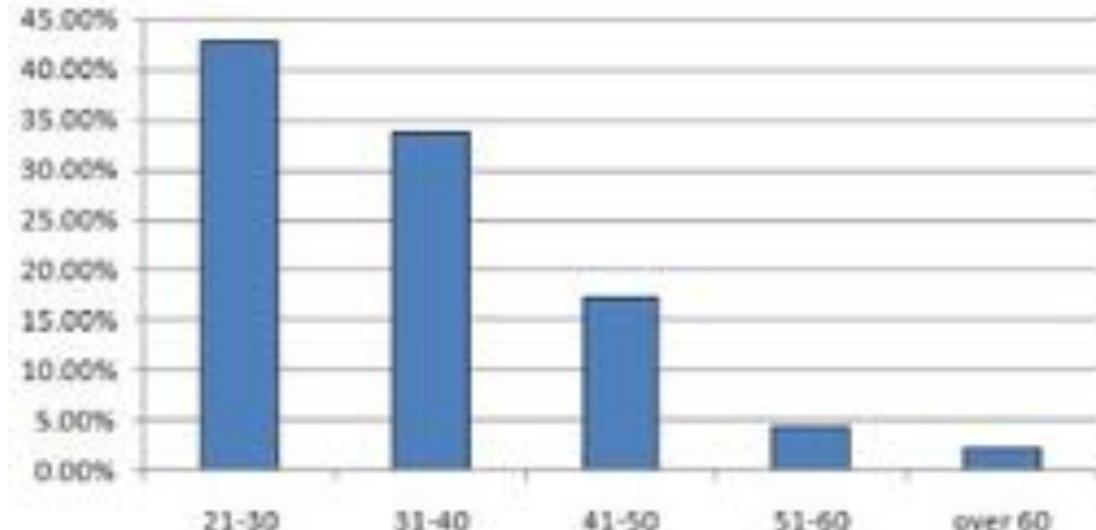


The majority of crowd workers on MTurk come from US!

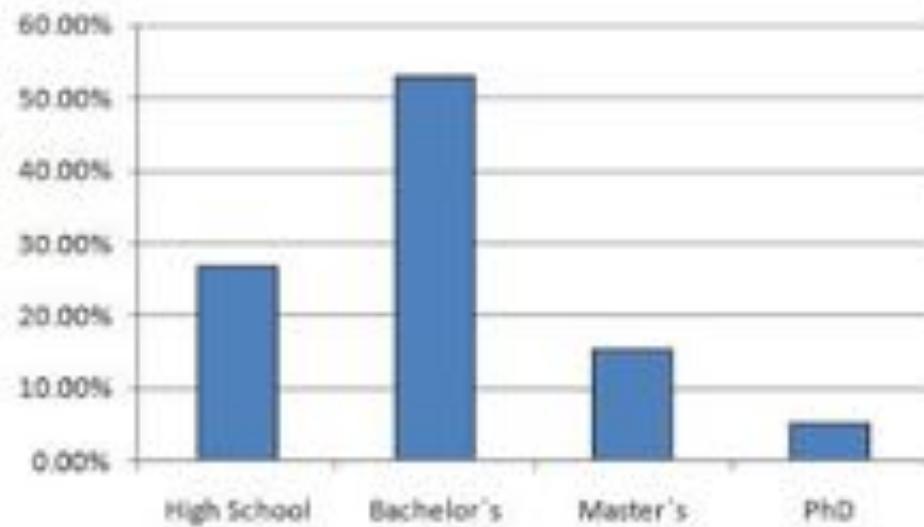
## Gender



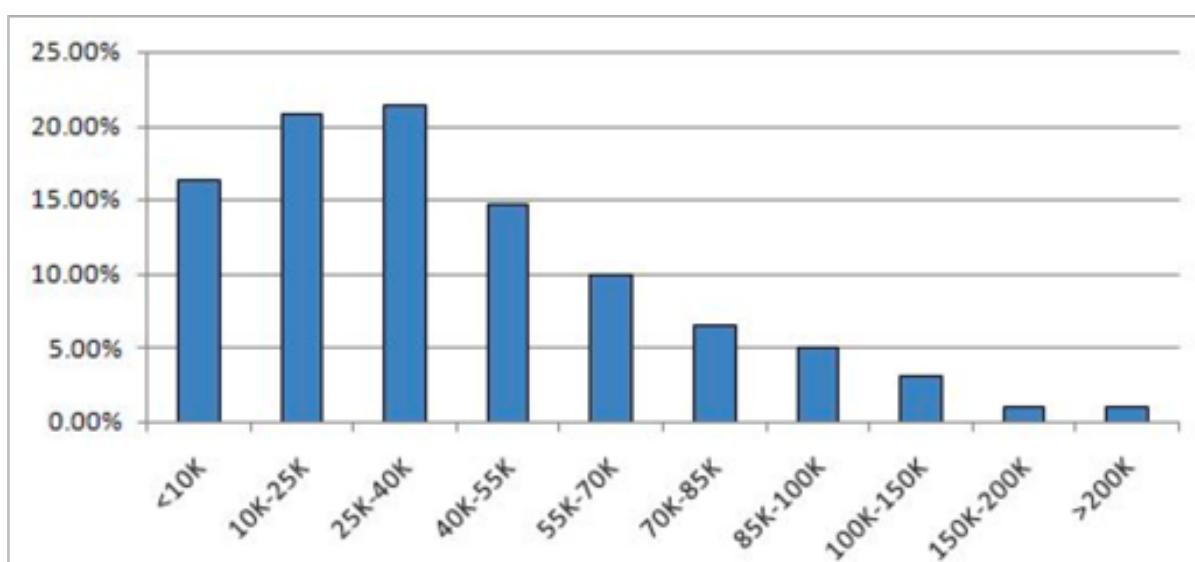
## Age



## Education



## Income



# MTurk Worker



**Younger** 54%

**More Female** 70%

**Lower Income** 65%

**Smaller Family** 45%

# Internet Users (2008, US)



**Age: 21-35** 22%

**Female** 50%

**Household income < 60K** 45%

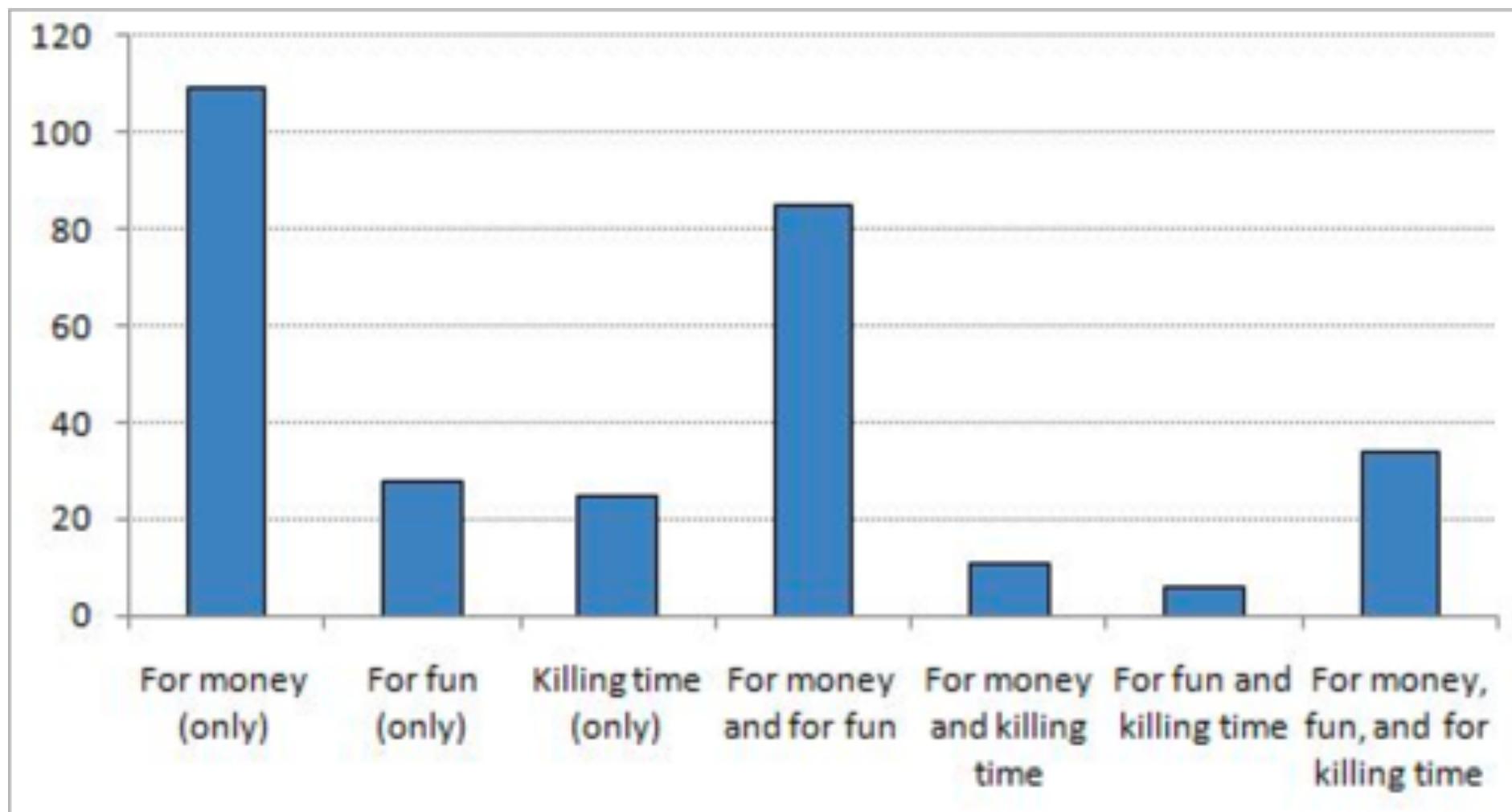
**Household <= 2 people** 28%

# MTurk Worker Demographics (2008): Payment received



<http://www.behind-the-enemy-lines.com/2008/09/how-much-turking-pays.html>

# MTurk Worker Demographics (2008): Purpose

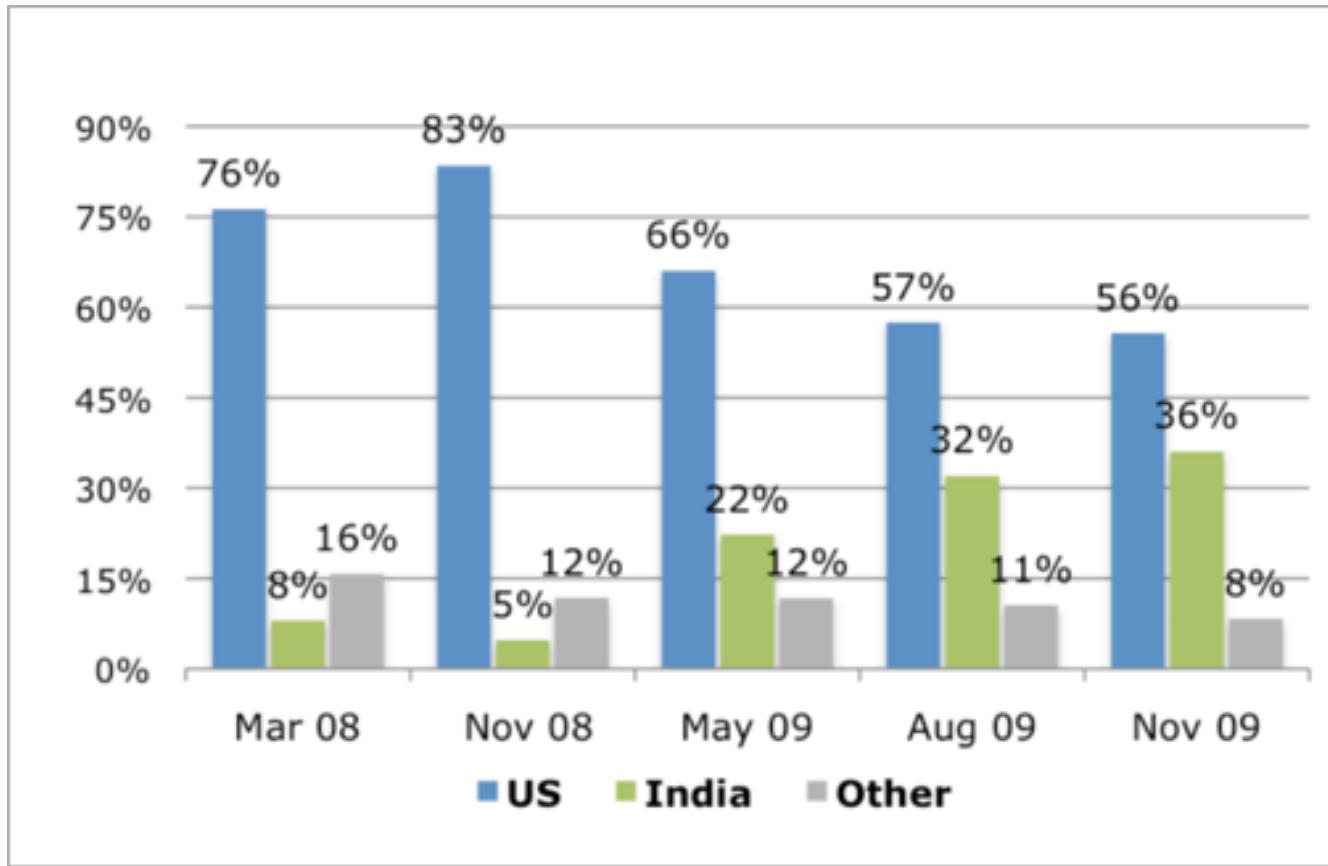


# Faces of MTurk workers



[https://waxy.org/2008/11/the\\_faces\\_of\\_mechanical\\_turk/](https://waxy.org/2008/11/the_faces_of_mechanical_turk/)

# But Demographics Also Changes Over Time...



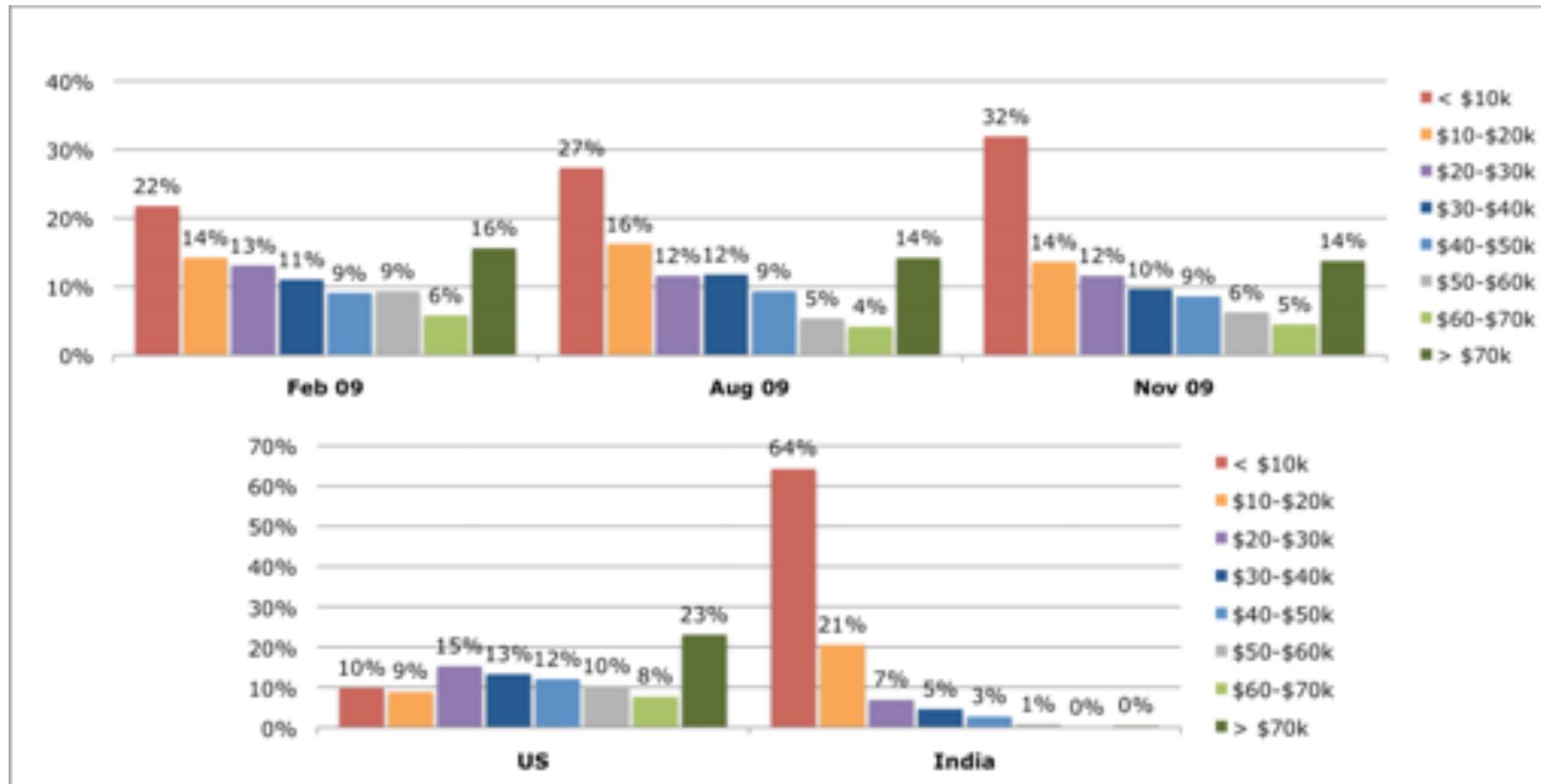
From a primary US-based workforce to an increasingly international group of workers.

# But Demographics Also Changes Over Time...

		<b>Nov 08</b>	<b>May 09</b>	<b>Aug 09</b>	<b>Nov 09</b>
<b>Average Age</b>	<i>US</i>	33.6	34.3	33.2	35.4
	<i>India</i>	28.5	28.8	27.6	26.4
<b>Gender</b>	<i>US</i>	28% male, 72% female	34% male, 66% female	31% male, 69% female	37% male, 63% female
	<i>India</i>	75% male, 25% female	61% male, 39% female	69% male, 31% female	66% male, 34% female
<b>Education</b>	<i>US</i>	32% Bachelors, 11% Graduate	34% Bachelors, 14% Graduate	34% Bachelors, 19% Graduate	38% Bachelors, 17% Graduate
	<i>India</i>	69% Bachelors, 29% Graduate	56% Bachelors, 18% Graduate	56% Bachelors, 13% Graduate	45% Bachelors, 21% Graduate

Ross, Joel, et al. "Who are the crowdworkers?: shifting demographics in mechanical turk." *CHI'10 EA*

# But Demographics Also Changes Over Time...



Ross, Joel, et al. "Who are the crowdworkers?: shifting demographics in mechanical turk." *CHI'10 EA*

# MTurk-Tracker: A Long-Term Demographic Survey



Each worker can take at most one survey in 30 days

# Warm-up Discussion

Does the demographic information collected from self-reported survey responses suffer from any problems?

Can you come up with potential fixes for the problems?

- Sampling bias
- Untruthful self-reports

# Sampling Bias

Ideally, we want to select participants from the population “uniformly at random”.

However, it's not always that easy...

# 1948 US Presidential Election

- Truman vs. Dewey
  - Chicago Daily Tribune decided to run a phone poll of how people voted



Truman



# What happened?

One explanation: we cannot claim anything for certain.

However, there are bigger issues here...

- Phones are expensive in 1948...
- Dewey was more favored in rich populations
- Imagine you are polling from people in DC/Texas/NY to predict who will win the presidential election...

# Sampling Bias

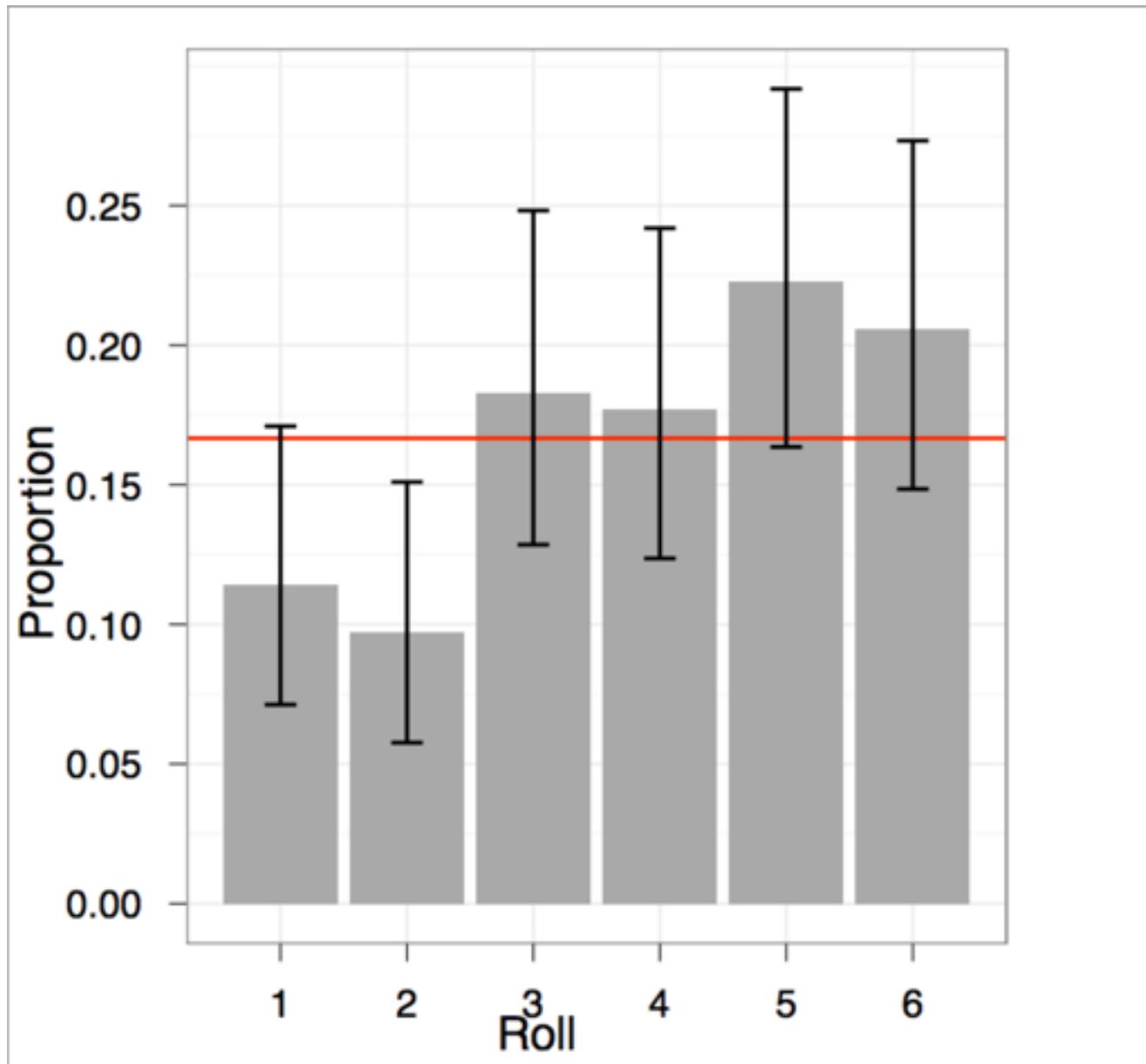
- Be aware of the issue and think about how much impacts it might bring in your work.
- You might be able to “correct” the bias if you have extra knowledge of the population.
  - Importance sampling
  - Potentially interesting/relevant paper
    - [Conducting Truthful Surveys, Cheaply](#). Roth and Schoenebeck. EC 2012.

# Are workers honest?

- Workers are asked to answer demographics questions [Suri et al. 2011]
  - – Sex, Age, Location, Income, Education
- Ask workers to privately roll a die and report the outcome.

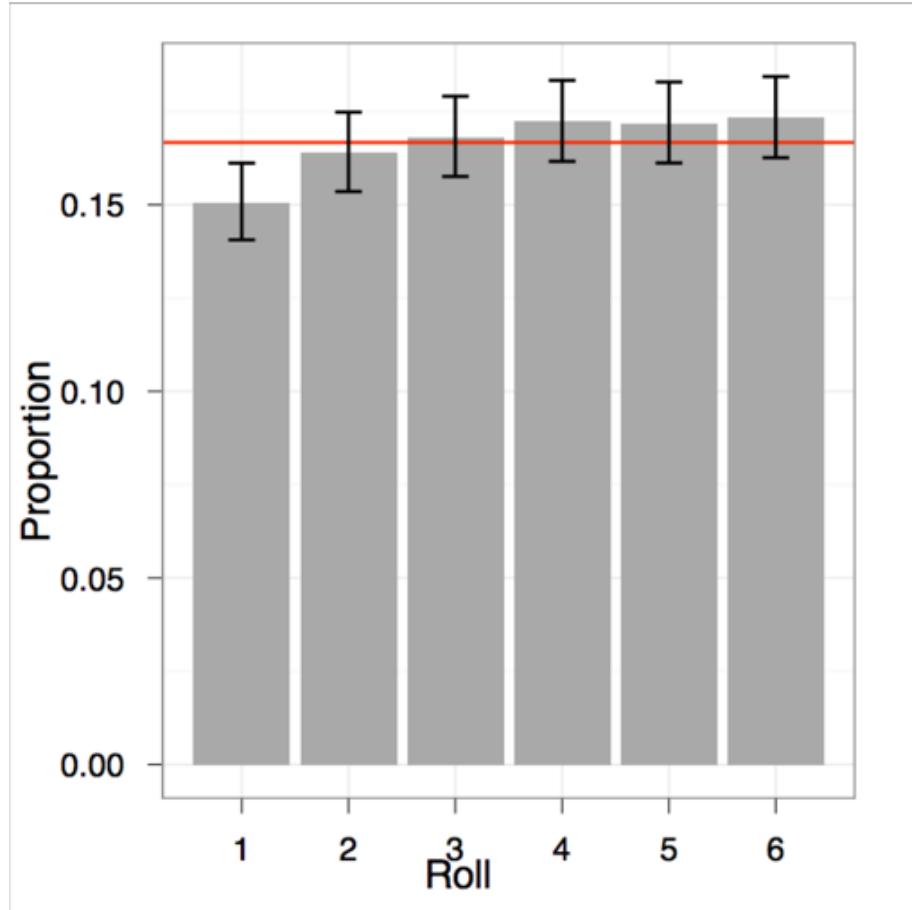
$$\text{Payment} = \$0.25 + \$0.25 * \text{roll}$$

- If all workers are honest, mean report: 3.5
- What do you think the mean was?



Mean: 3.91

# Ask workers to report 30 rolls



- Not conclusive evidence, but workers are more honest than we think.
- However, some workers are not. We should be careful to avoid attacks.
  - E.g., designing consistency check questions

# Focus of the lecture: Methods for Information Collection

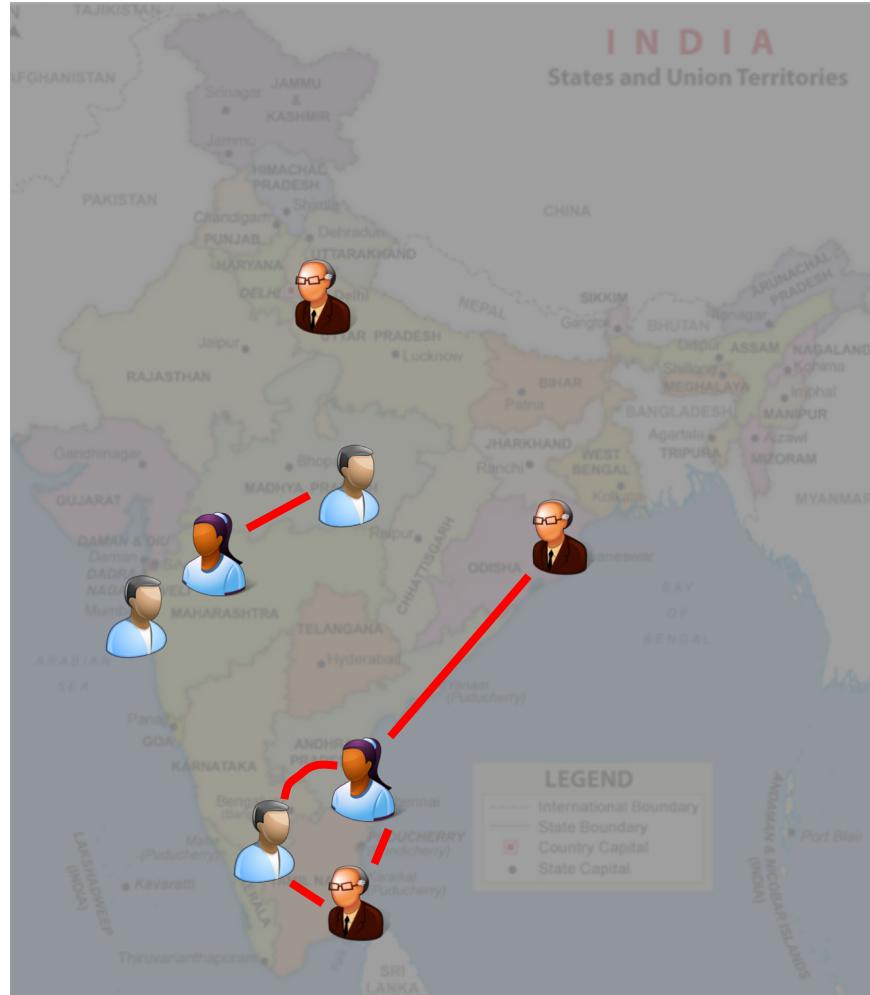
- Direct surveys
- Ethnographic analysis (as in the required reading)
- More intricate methods
  - Example 1: How to measure the communication network of the crowd
  - Example 2: How to measure the size of the crowd

# Common Assumption: Workers are Independent



[Yin et al., 2016]

# Some Evidence From the Field



Workers talk to each other to...  
(based on ~100 interviews)



Help with  
administrative  
overhead

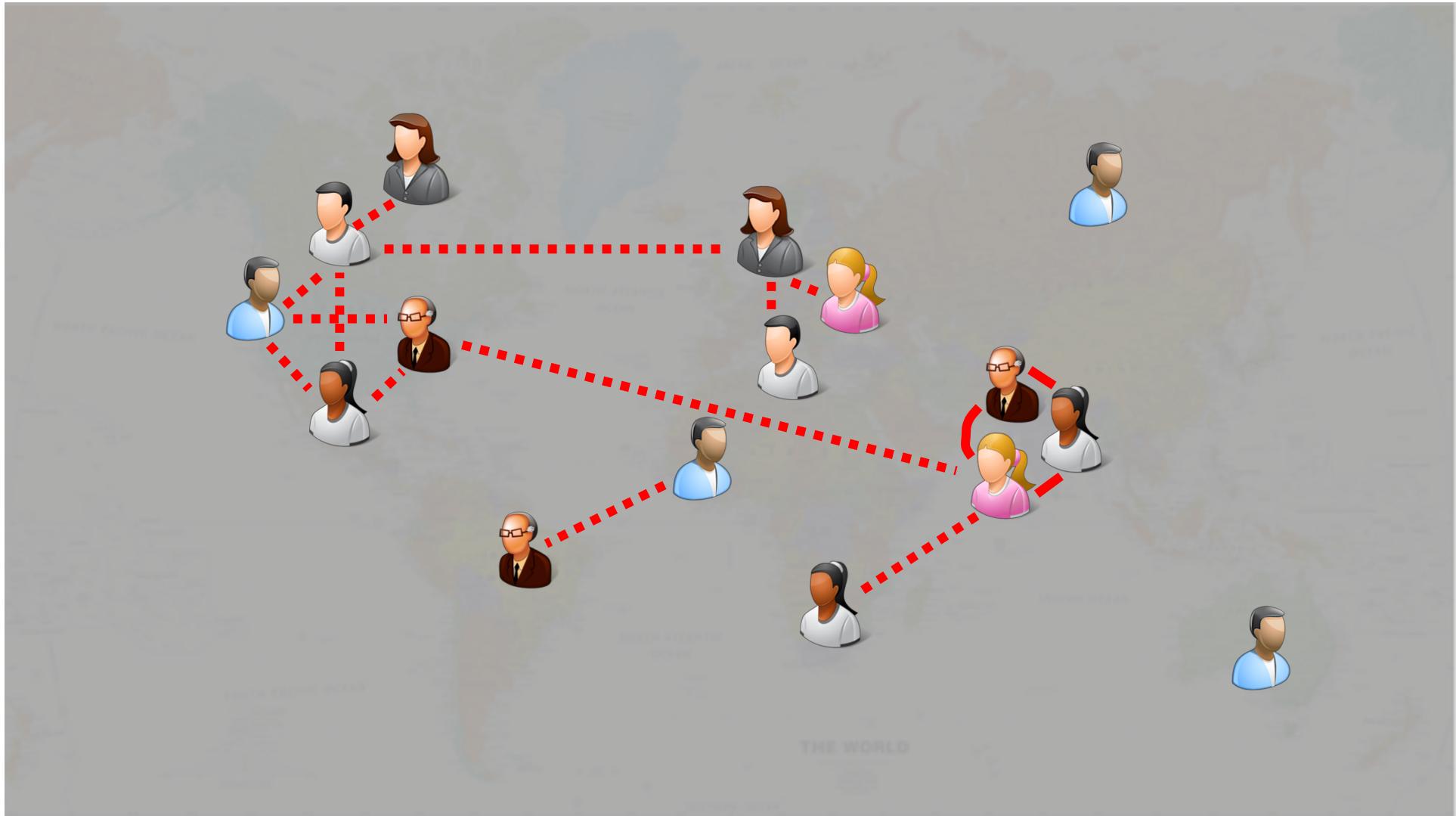


Share useful  
information



Recreate social  
connections

# Can we Map the Network?



*What is the scale?*

*What is the structure?*

*How is it used?*

[Yin et al., 2016]

# Why is it Challenging?



Not accessible  
through API



Not on the  
MTurk platform



Nowhere to  
download



Can't just crawl  
from the web

## The goal...

- ◆ Elicit “true” connections only
- ◆ Elicit as many true connections as possible
- ◆ Preserve workers’ privacy

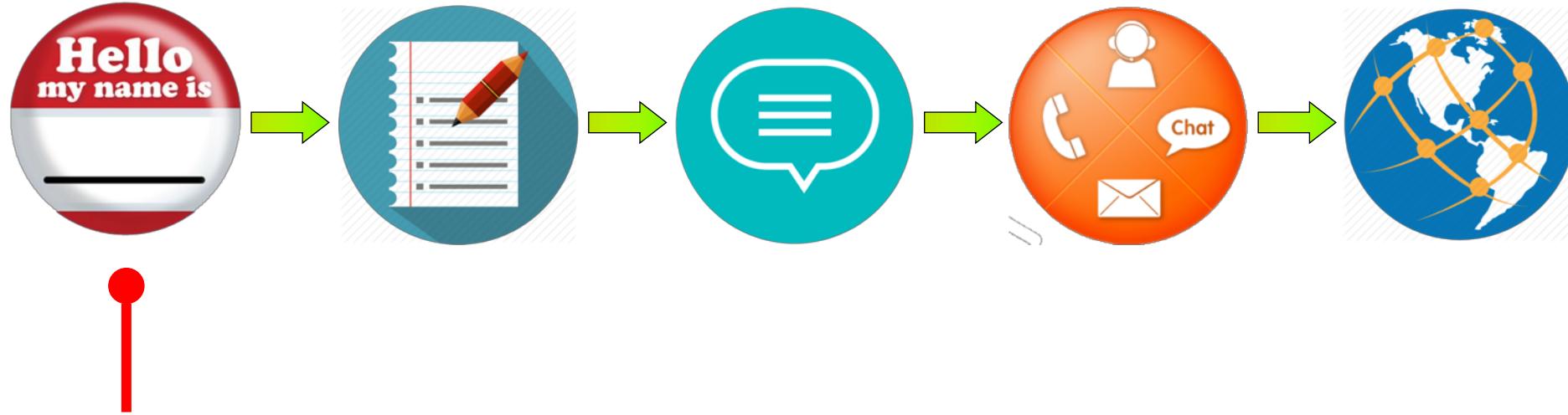
**Can't directly ask for names!**

**Can't pay by connections!**

# A Web App

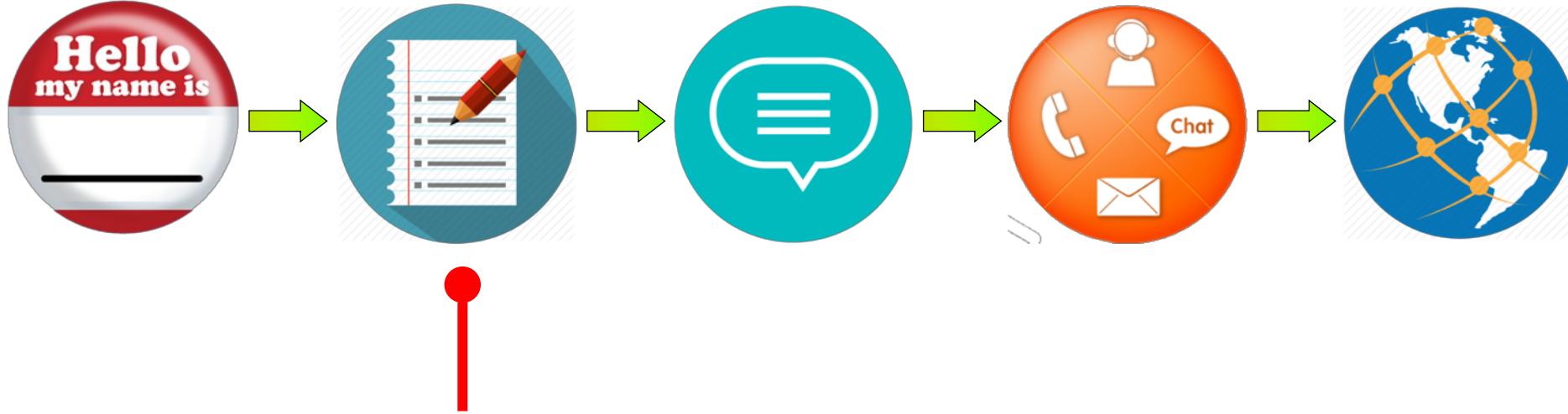
- Workers **self-report** their connections
- Provides some **value back** to the workers so it's their best interest to report as many true connections as possible

# The Network Mapping App



**Step 1:** Create a nickname for yourself

# The Network Mapping App



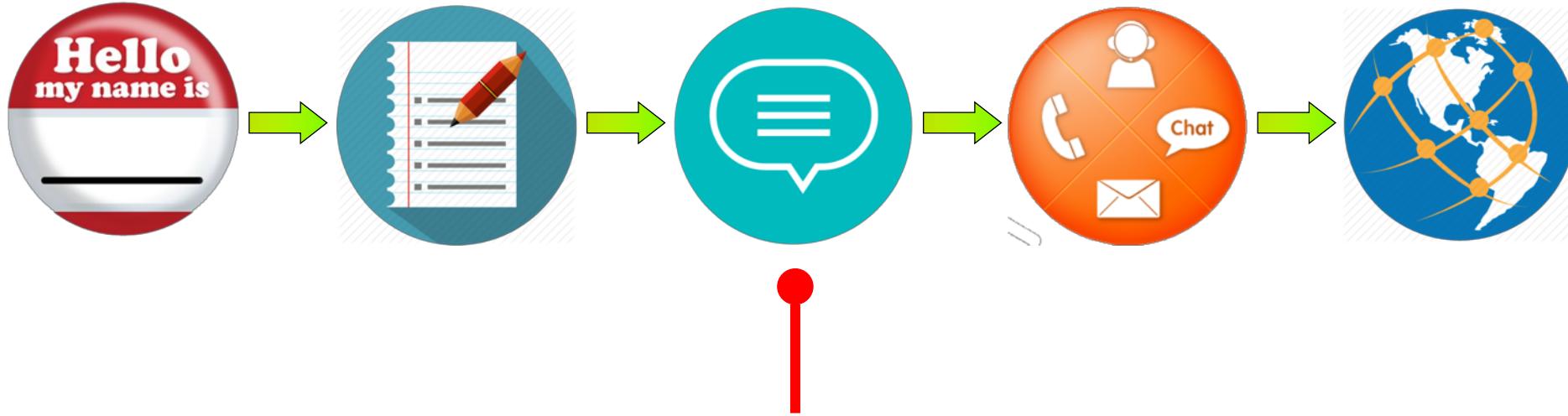
**Step 2:** Complete a brief demographic survey

Age  
Gender  
Country  
Approval rate  
...

- Share with all other workers
- Share with workers connected to me
- Not share with anyone

**Value back: Who are the other workers?**

# The Network Mapping App



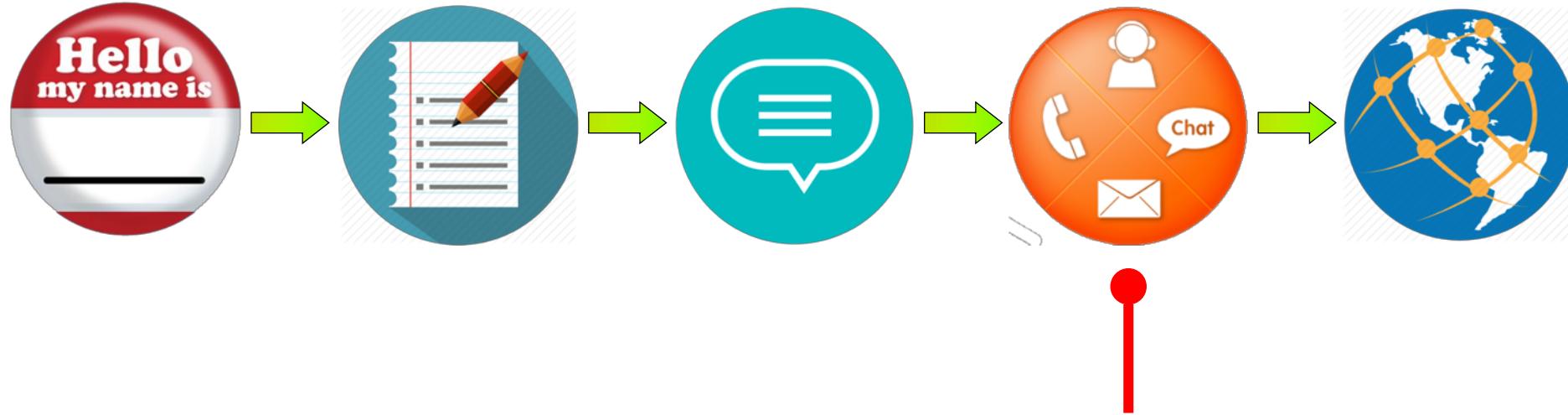
**Step 3:** Tell us about your personal experience with MTurk

Why did you start Turkling?  
What motivates you to keep Turkling?

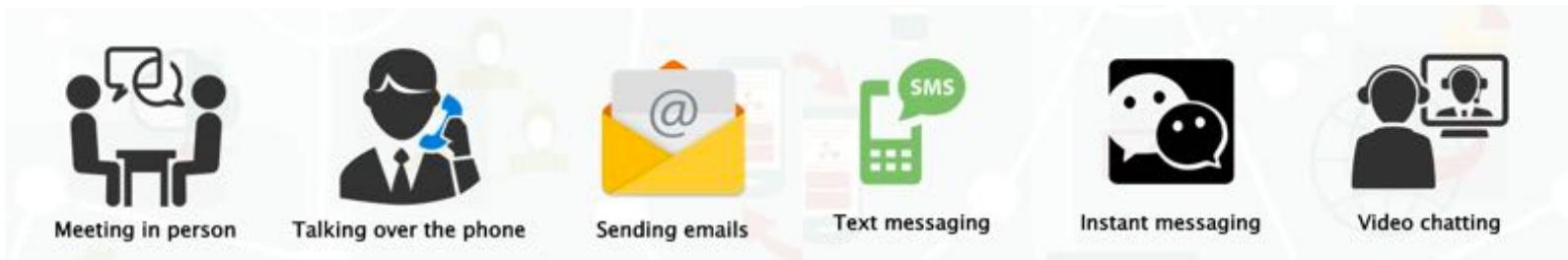
**(Selected based on a pilot study!)**

**Value back: What are other workers' Turkling stories?**

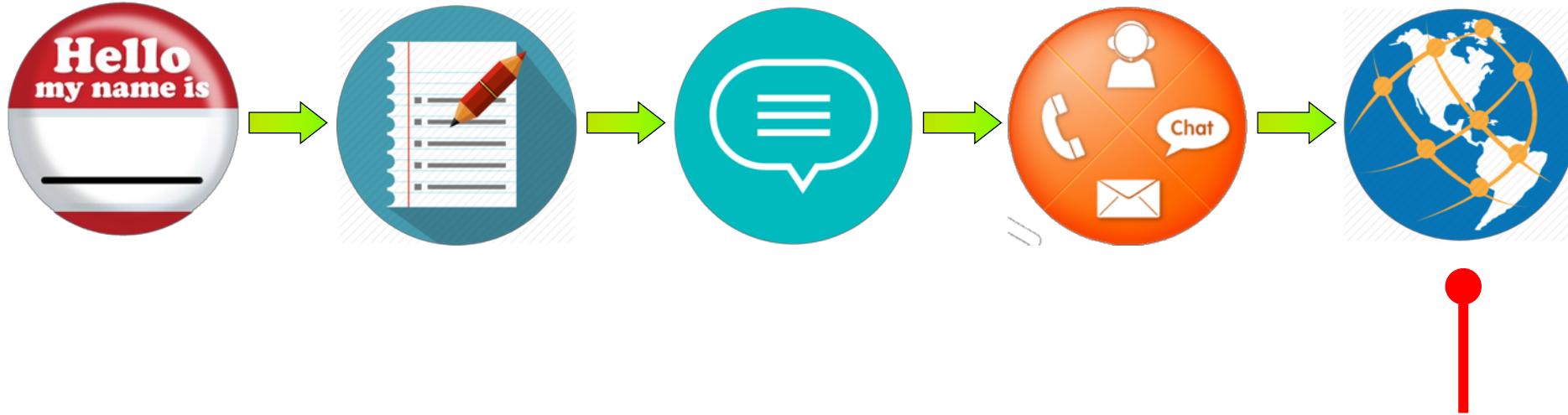
# The Network Mapping App



**Step 4:** Swap nicknames with Turkers you know

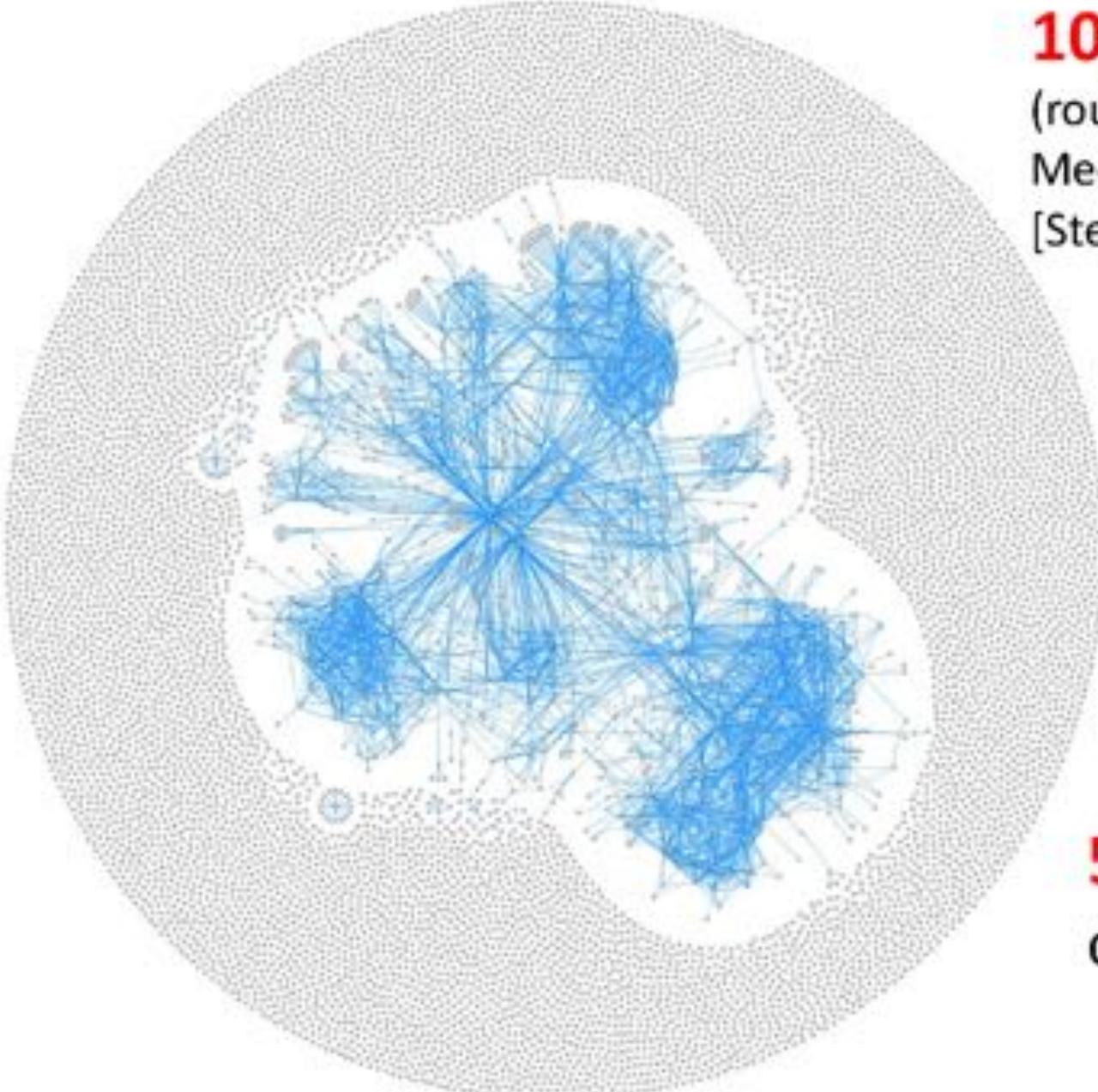


# The Network Mapping App



**Step 5:** Explore the Turker network

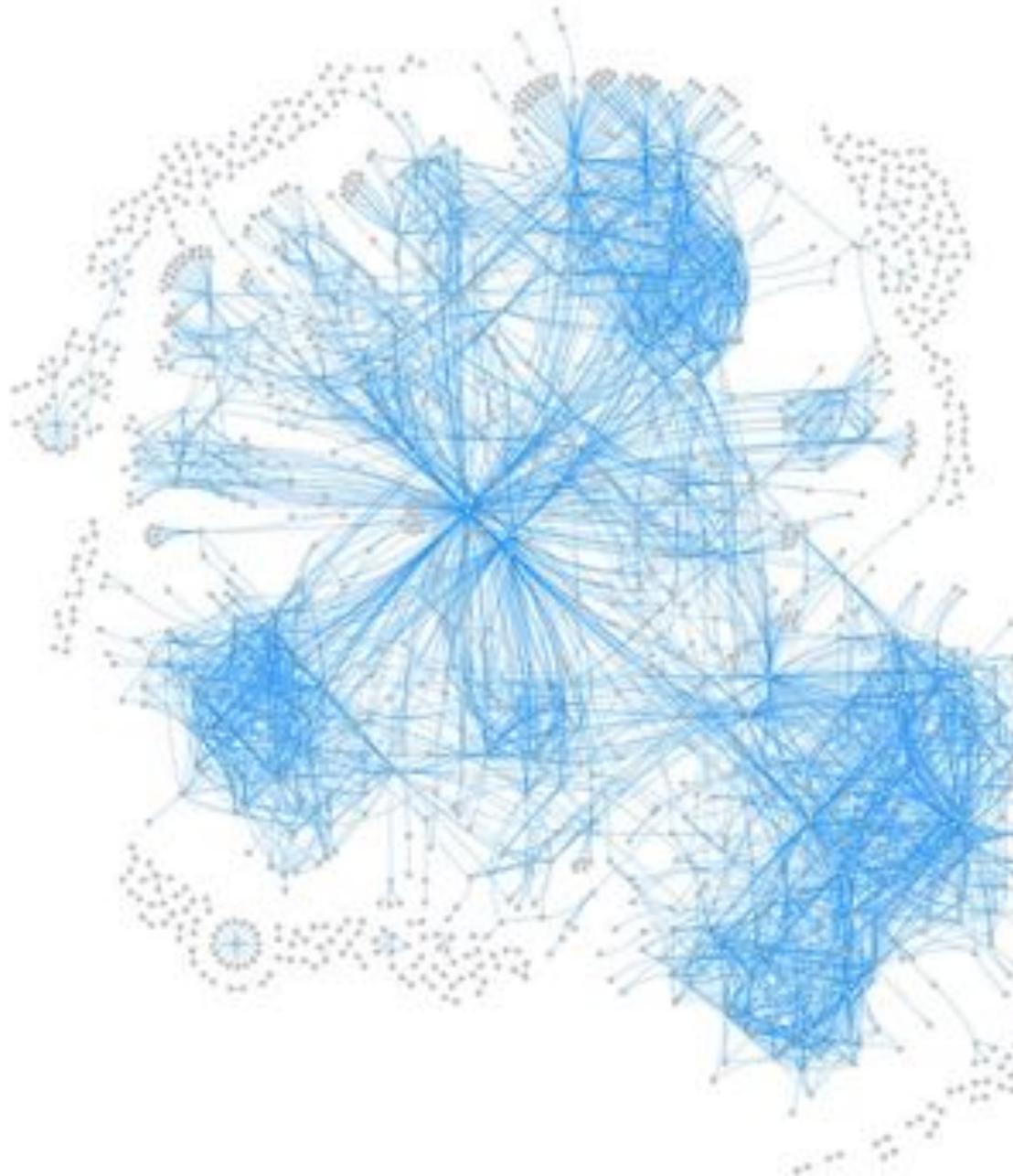




**10,354** workers  
(roughly a census of  
Mechanical Turk  
[Stewart et al. 2015])

**5268**  
connections

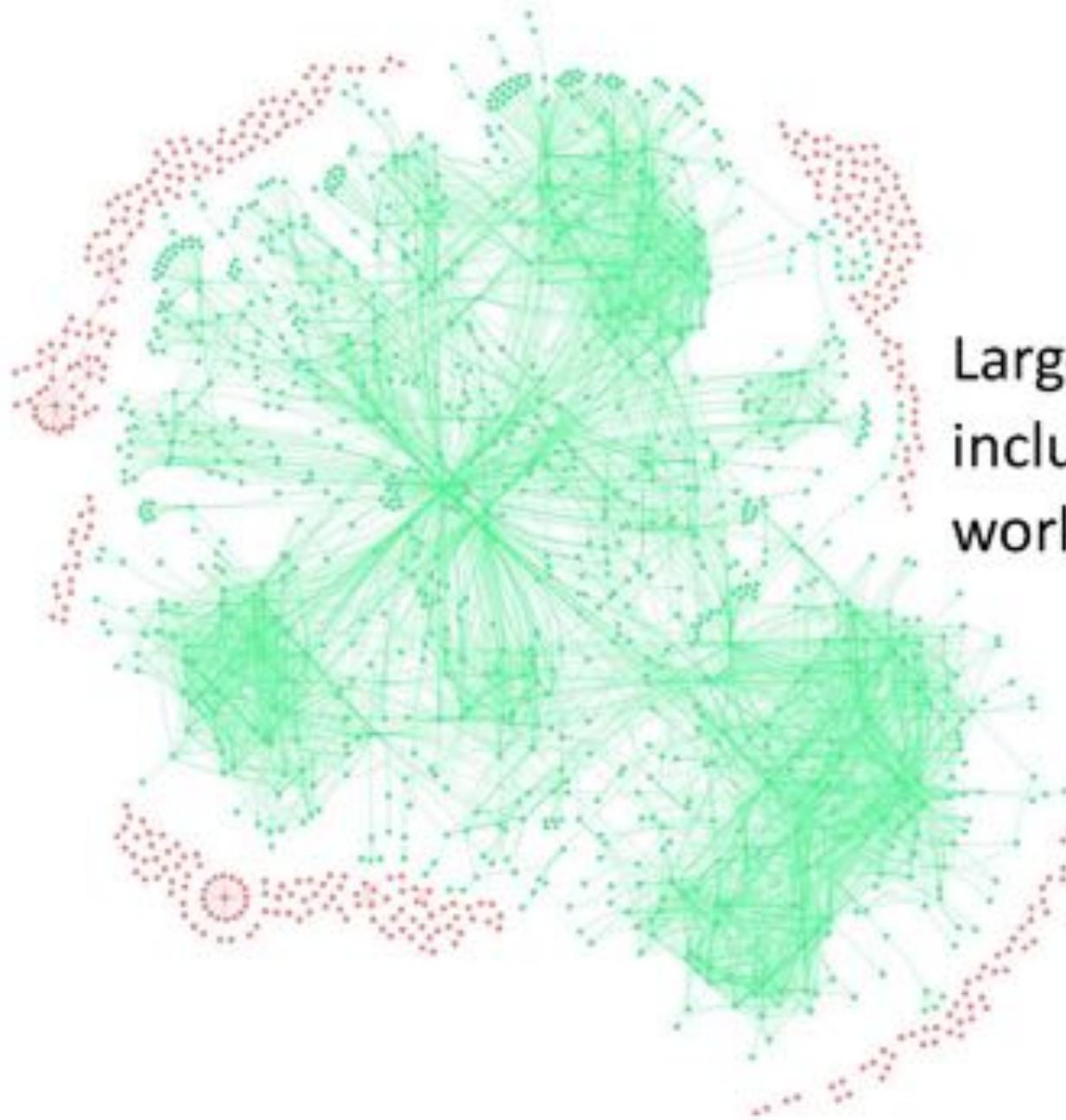
[Yin et al., 2016]



**1,389 (13%)**  
connected  
workers

On average,  
workers  
communicate  
with **7.6** others

Max degree  
is **321**  
[Yin et al., 2016]



Largest component  
includes **994 (72%)**  
workers

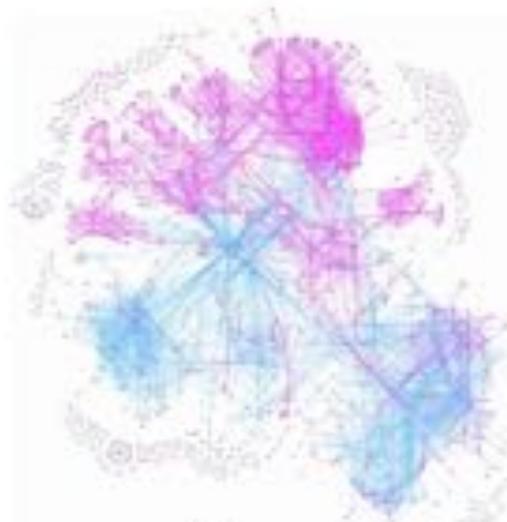
[Yin et al., 2016]

## A Network Enabled By Forums

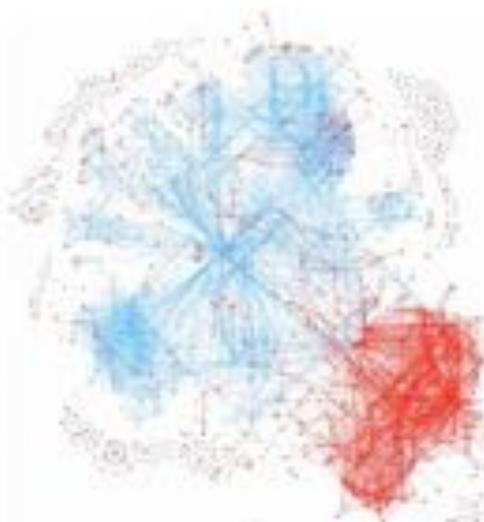
- 59% of all workers and 83% of connected workers reported using at least one forum.
- 90% of all edges are between pairs of workers who communicate via forums, and 86% are between pairs who communicate *exclusively* through forums.

[Yin et al., 2016]

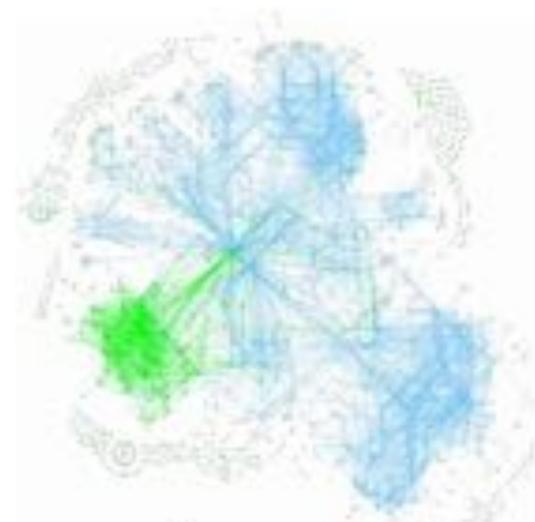
# Forums Create Subcommunities



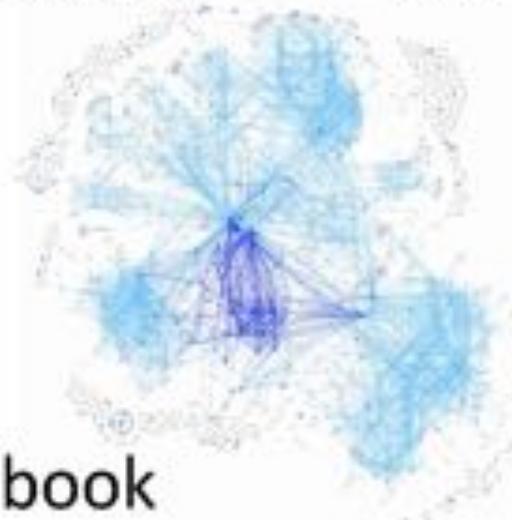
Reddit HWTF



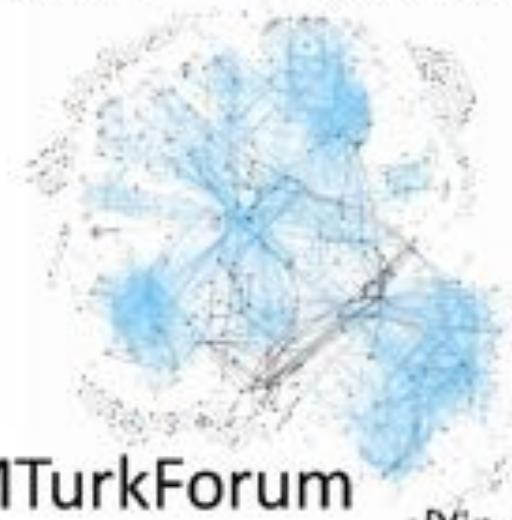
MTurkGrind



TurkerNation



Facebook



MTurkForum

[Yin et al., 2016]

# Subcommunities Are Different



**Topological Structure:** How tightly connected is each subcommunity?



**Temporal Dynamics:** Do relationships endure over time?



**Communication Content:** Is communication social or strictly business?

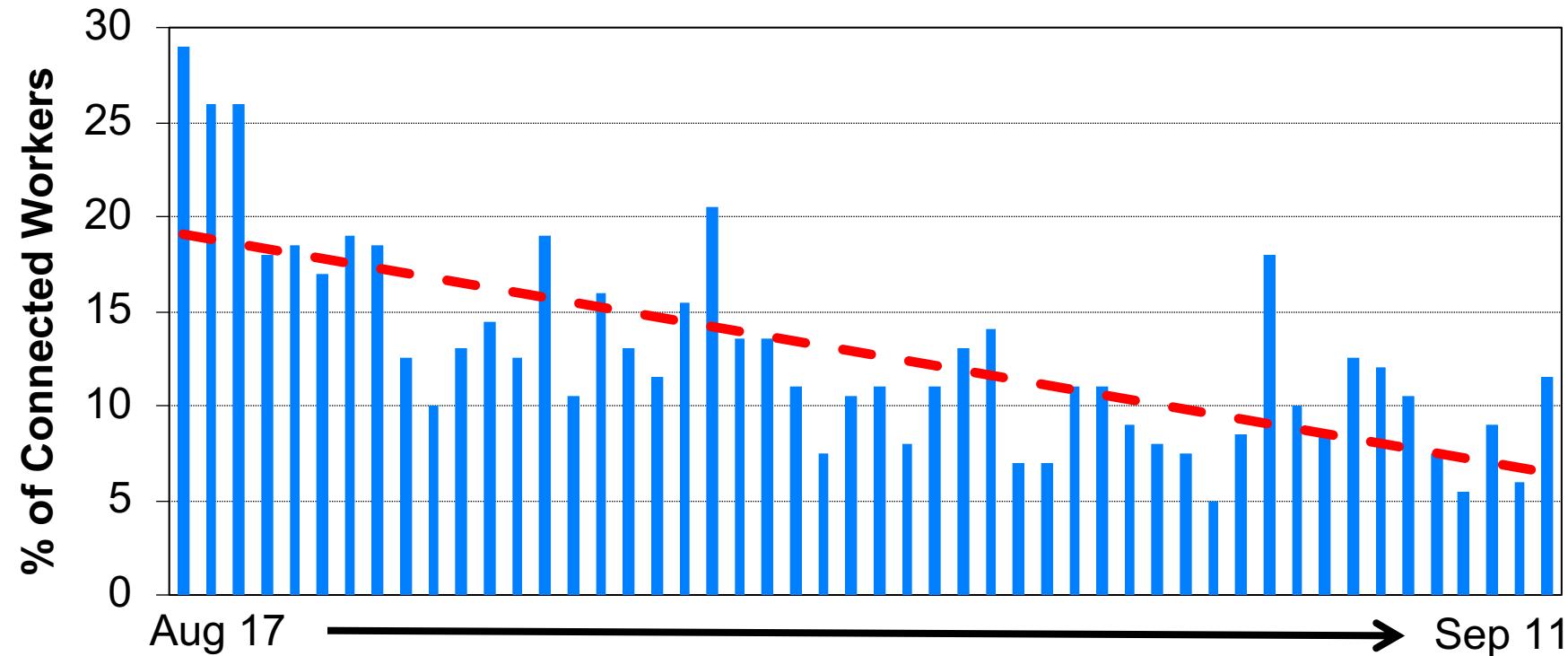
[Yin et al., 2016]

## Measures of Success

Property	Connected	Unconnected
Be active > 1 year	55%	46%
Use forums	83%	56%
Master	11%	7%
Approval rate	98.6%	97.4%

Connected workers were also **more likely** than unconnected workers to find our task **early**.

# Connected Workers Find HITs Earlier



# Discussion

- What are the implications of this study?
- What do you think the fact that there are communication networks would affect the way we think of crowdsourcing?