

# EXAMINING CROWD WORK AND GIG WORK THROUGH THE HISTORICAL LENS OF PIECEWORK

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Stanford University

# OPEN PROBLEMS IN CROWDSOURCING



Tasks

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## - Complexity

Suzuki et al. [38], Kim and Monroy-Hernández [15], Yuan et al. [43], Yu, Kittur, and Kraut [42], Nebeling et al. [28], and Hahn et al. [10]



Complexity



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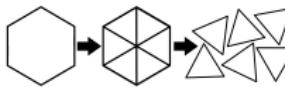
Complexity

## - Decomposition

Celis et al. [3], Lykourentzou et al. [26], Law et al. [23], Chang, Kittur, and Hahn [4], and Newell and Ruths [29]



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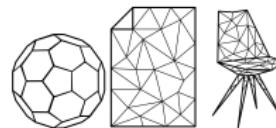


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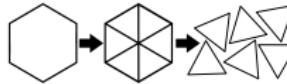
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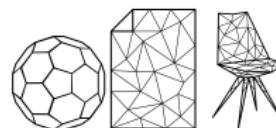


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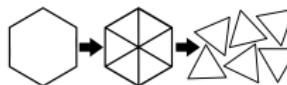
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Decomposition

## - Relationships

Irani and Silberman [13, 12], Gray et al. [8], McInnis et al. [27], Salehi et al. [34], and Lee et al. [24]



# **WHAT IS THE FUTURE OF WORK?**

## WHAT IS THE FUTURE OF WORK?

How will **technology** affect the **complexity** of the work that on-demand workers do?

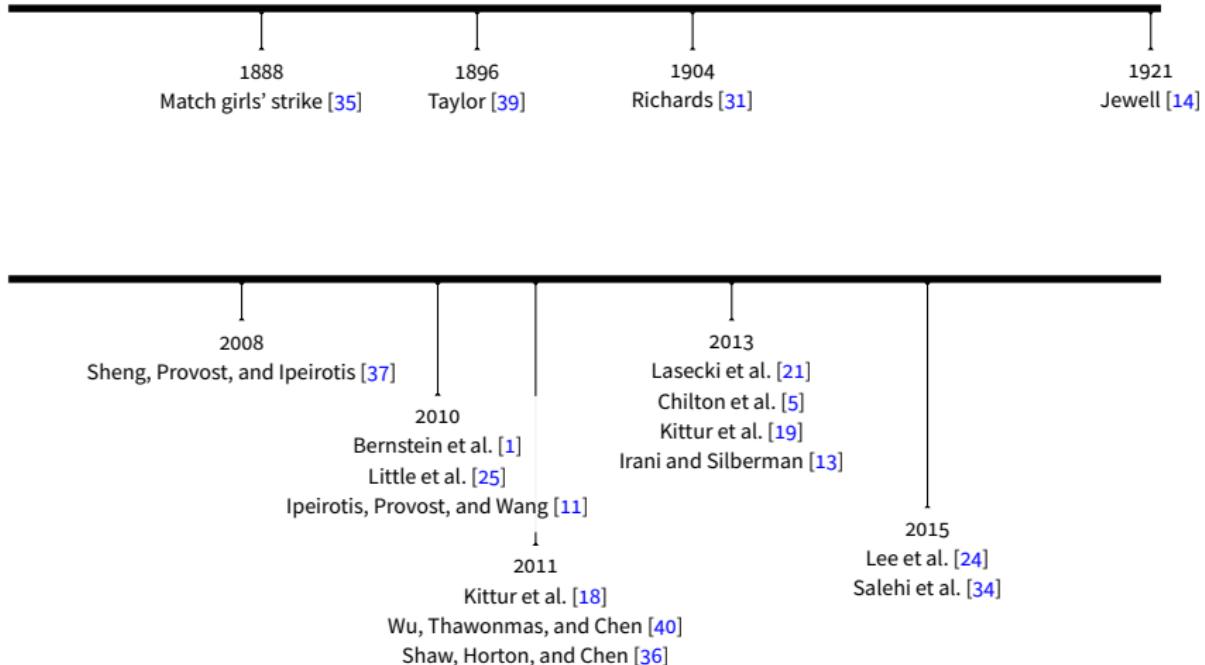
What are the **limits** of complexity in on-demand work?

How can we **reach** those limits?

# A TIMELINE OF PIECEWORK



# A TIMELINE OF ~~PIECEWORK~~ ON-DEMAND WORK



## INTRODUCTION

We hope to provide:

- A useful ontological lens for making sense of crowdsourcing and gig work (which we collectively call “*on-demand work*”) as a resurgence of *piecework*.
- A method for making sense of contemporary phenomena through *historical analysis*.

# A CASE FOR COMPARATIVE HISTORICAL ANALYSIS

- Historical analysis isn't new
  - In general  
Rosenberg [32, 33]
  - In HCI  
Wyche, Sengers, and Grinter [41] and Bødker [2]

## A BRIEF GLOSSARY

- Crowd work: digitally mediated **information work** — for example, work done on Amazon Mechanical Turk [19]
- Gig work: digitally mediated — but often **physically embodied** — one-off jobs, such as *driving, courier services, and administrative support* [6, 30]

## **COMPLEXITY**

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## COMPLEXITY

What kinds of problems do we mean when we talk about complexity?

- Can crowds help you write something?  
Bernstein et al. [1], Kim et al. [17], and Nebeling et al. [28]

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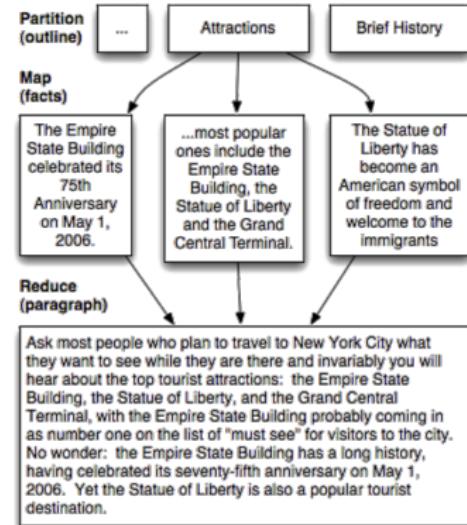
- Can crowds create things from whole cloth?

Kim and Monroy-Hernández [15], Kim et al. [16], Hahn et al. [10], and Lasecki, Kushalnagar, and Bigham [20]

# WHAT DOES THE CROWDSOURCING LITERATURE SAY?

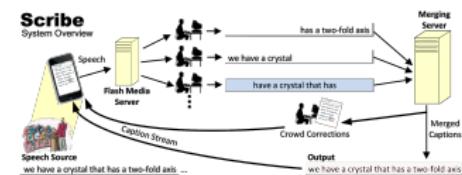
- Build complexity into the process
  - Apply CS methods to people

Kittur et al. [18]



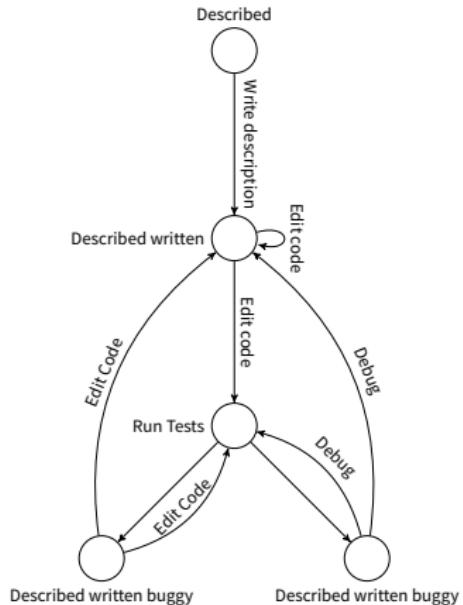
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  - Humans as computational units  
Lasecki, Kushalnagar, and Bigham [20]
  - Crowdsourcing workflows as function state machines  
LaToza et al. [22]



## WHAT DOES THE PIECEWORK LITERATURE SAY?

George Airy (astronomer) used a very similar approach [9]



- Employed computers
- 13–20 years old
- Overworked
- Underpaid
- Could be fired at will

# GEORGE AIRY — WHIZ KID

Airy built complexity into the process, assigning *human computers* to compute, verify, and correct the right ascension and declination of stars.

No. of Swings.	Approximate Time (Astronomical Reckoning).	Number of Signals.	Mean of Times by SHELTON.	Mean of Times by EARNSHAW.	Interval by SHELTON.	Interval by EARNSHAW.	Rate EARNSHAW / SHELTON	Logarithm of EARNSHAW / SHELTON	Corrected Logarithm of EARNSHAW / SHELTON
1	Oct. h 1. 23	22	3 19 36-505	21 23 28-764	h m s ...4 0 23-100	h m s 4 0 38-722	1·0010831	0·00047012	
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3	2. 7	21	11 18 21-257	5 22 44-886	...4 45 27-829	4 45 46-421	1·0010855	0·00047117	0·00047387
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5	2. 16	17	20 20 55-618	14 25 54-541	...3 13 21-898	3 13 34-795	1·0011116	0·00048249	
6	2. 19	25	23 34 17-516	17 39 29-336	...3 49 42-503	3 49 57-654	1·0010994	0·00047720	0·00047990
7	2. 23	31	3 24 0-019	21 29 26-990	...3 55 2-071	3 55 17-433	1·0010893	0·00047282	
8	3. 3	21	7 19 2-090	1 24 44-423	...4 2 41-510	4 2 57-445	1·0010944	0·00047503	
9	3. 7	25	11 21 43-600	5 27 41-868	...4 31 5-786	4 31 23-591	1·0010947	0·00047516	0·00046316
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11	3. 15	24	19 20 39-133	13 27 8-783	...3 59 47-292	4 0 3-188	1·0011049	0·00047959	
12	3. 19	24	23 20 26-425	17 27 11-971	...4 3 30-416	4 3 46-620	1·0010686	0·00046384	0·00047194

# COTTAGE INDUSTRY

# COTTAGE INDUSTRY

Farms



# COTTAGE INDUSTRY

Farms



Textiles



# COTTAGE INDUSTRY

Farms



Textiles



Matchsticks



# PLANES, TRAINS, AND AUTOMOBILES

... NOT IN THAT ORDER

## Trains



- “Efficiency experts” measured how long it would take to do various jobs
- These measurements would be used to assign values for each specific task
- Train engineers performed work more slowly when inspectors were around

# PLANES, TRAINS, AND AUTOMOBILES

... NOT IN THAT ORDER

## Automobiles

- Fordism,  
Taylorism, and  
Scientific  
Management in  
full force



- *Manufacturing* proved amenable to assembly line processes.

**PLANES, TRAINS, AND AUTOMOBILES**

**... NOT IN THAT ORDER**

Planes



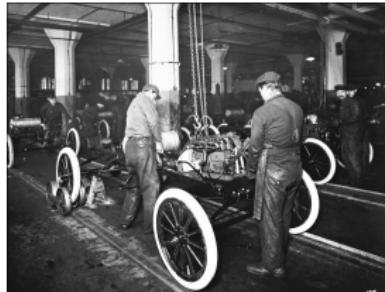
# PLANES, TRAINS, AND AUTOMOBILES

... NOT IN THAT ORDER

Trains



Automobiles



Planes



## COMPARISONS

- Limited range of tasks > arbitrary changes (building planes is easier than fixing trains)
- Has technology changed this? Yes
  - Technology makes complex tasks relatively trivial
  - Measuring workers is easier than ever

# COMPLEXITY CAB DRIVERS



# COMPLEXITY CAB DRIVERS



# COMPLEXITY

## ALGORITHMIC MEASUREMENT

notes

- I'm thinking of pointing to UpWork's screen recording tool as a way to measure workers
- also maybe google analytics and other ways of tracking web-based workers

## IMPLICATIONS

- We make stronger assumptions about workers' abilities thanks to technology
- Evaluation remains difficult, but we're trying to find stopgap solutions through decomposition
- We're still not solving the problems of inherently subjectively judged work

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