

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

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OPEN PROBLEMS IN ON-DEMAND WORK



Tasks

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- Complexity

Suzuki et al. [40], Kim and Monroy-Hernández [16], Yuan et al. [45], Yu, Kittur, and Kraut [44], Nebeling et al. [29], and Hahn et al. [11]



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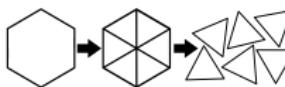
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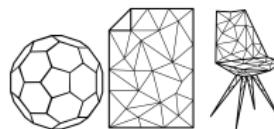


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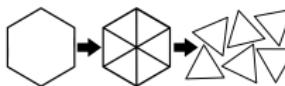
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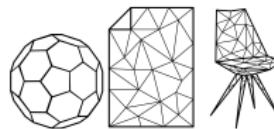


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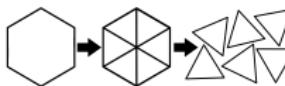
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Tasks



Decomposition

- Relationships

Irani and Silberman [14, 13], Gray et al. [9], McInnis et al. [28], Salehi et al. [36], and Lee et al. [25]



WHAT IS THE FUTURE OF WORK?

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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?

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- *Piecework*: Payment for *output* rather than for *time*

A TIMELINE OF PIECEWORK



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

1888 Match girls' strike [37] 1896 Taylor [41] 1904 Richards [32] 1921 Jewell [15]

2008 Sheng, Provost, and Ipeirotis [39] 2010 Bernstein et al. [1]
Little et al. [26] Ipeirotis, Provost, and Wang [12]
2011 Kittur et al. [19] Wu, Thawonmas, and Chen [42]
Shaw, Horton, and Chen [38] 2013 Lasecki et al. [22]
Chilton et al. [5]
Kittur et al. [20]
Irani and Silberman [14]
2015 Lee et al. [25]
Salehi et al. [36]

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 [33, 34]
 - In HCI
Wyche, Sengers, and Grinter [43] and Bødker [2]
- Still, it's an underutilized method
 - Provide some basic framing for ostensibly new phenomena
 - Theoretically ground ourselves
 - Flesh out *differences* and their implications

COMPLEXITY

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

- Can crowds help you write something?
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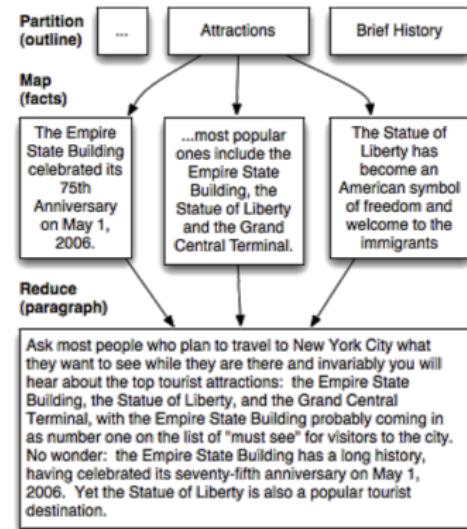
- Can crowds create things from whole cloth?

Kim and Monroy-Hernández [16], Kim et al. [17], Hahn et al. [11], and Lasecki, Kushalnagar, and Bigham [21]

WHAT DOES THE CROWDSOURCING LITERATURE SAY?

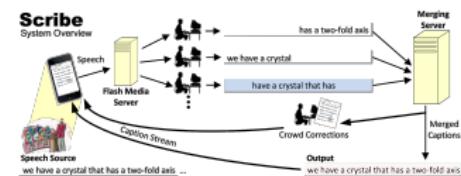
- Build complexity into the process
 - Apply CS methods to people

Kittur et al. [19]



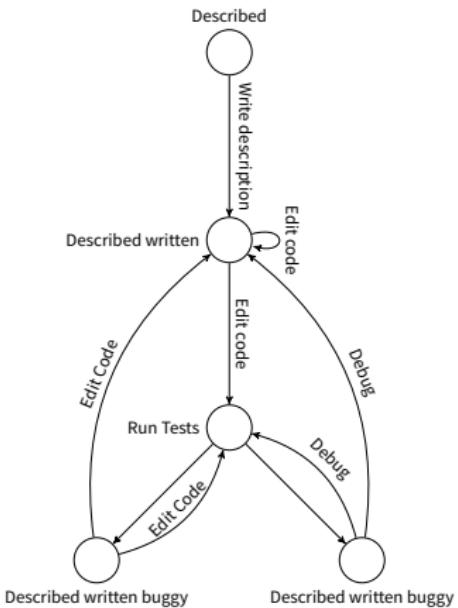
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 - Crowdsourcing workflows as function state machines
LaToza et al. [23]



WHAT DOES THE PIECEWORK LITERATURE SAY?

George Airy (astronomer) used a very similar approach [10]



- 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 $\frac{\text{EARNSHAW}}{\text{SHELTON}}$	Logarithm of $\frac{\text{EARNSHAW}}{\text{SHELTON}}$ Rate	Corrected Logarithm of $\frac{\text{EARNSHAW}}{\text{SHELTON}}$ Rate
Oct.	h	h m s	h m s	h m s	h m s	h m s			
1...	1.	23 22	3 19 36.505	21 23 28.764	4 0 23.100	4 0 38.722	1.0010831	0.00047012	
2...	2.	3 21	7 19 59.605	1 24 7.486	3 58 21.652	3 58 37.400	1.0011011	0.00047793	
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
4...	2.	11 29	16 3 49.086	10 8 31.307	4 17 6.532	4 17 23.234	1.0010827	0.00046995	
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
10...	3.	11 22	15 52 49.386	9 59 5.459	3 27 49.747	3 28 3.324	1.0010888	0.00047260	
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

Farms



COTTAGE INDUSTRY

Farms



Textiles



COTTAGE INDUSTRY

Farms



Textiles



Matchsticks



PLANES, TRAINS, AND AUTOMOBILES

... NOT IN THAT ORDER

Trains



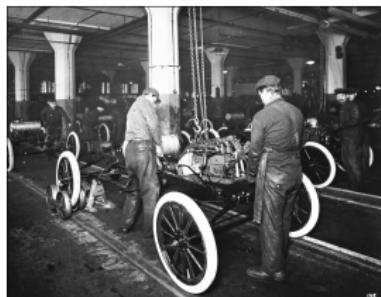
- “Efficiency experts” measured how long it would take to do various jobs [6]
- These measurements would be used to assign values for each specific task [15]
- Train engineers instituted “The Fix” to correct perceived unfairness [35]

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

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Planes



PLANES, TRAINS, AND AUTOMOBILES

... NOT IN THAT ORDER

Trains



Automobiles



Planes



COMPARISONS

- Limited array of tasks versus arbitrarily complex work
 - *Building* planes versus *fixing* trains
- Has technology changed this?
 - Technology makes complex tasks relatively trivial
 - Measuring workers is easier than ever

COMPLEXITY

CAB DRIVERS



COMPLEXITY CAB DRIVERS



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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