

Ongoing Threads in Crowdsourcing Research

1>threads<1>1>threads



Complexity

Hahn et al. (2016), Kim and Monroy-Hernández (2016),
Kittur et al. (2011), Nebeling et al. (2016), Suzuki et al.
(2016), Yu, Kittur, and Kraut (2016), and Yuan et al. (2016)

Workers

Gray et al. (2016), Irani and Silberman (2016, 2013), Lee et al.
(2015), McInnis et al. (2016), and Salehi et al. (2015)

Decomposition

Celis et al. (2016), Chang, Kittur, and Hahn (2016), Law et al.
(2016), Lykourentzou et al. (2016), and Newell and Ruths
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Ongoing Threads in Crowdsourcing Research

2>threads<2>



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... In some cases. Sometimes.

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⇒

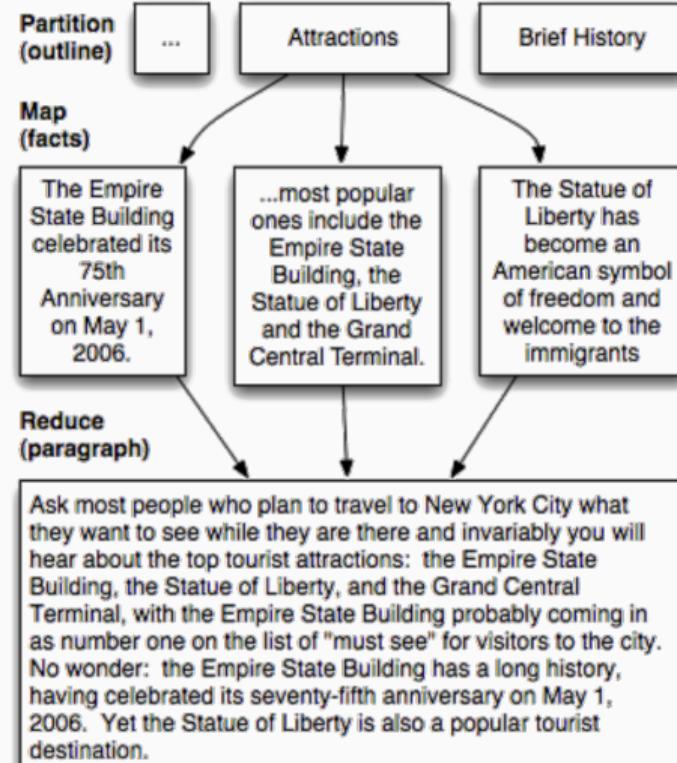
Within narrow specifications

What Does On-Demand Work Say?



Build complexity into the process

- Apply CS methods to people
Kittur et al. (2011)

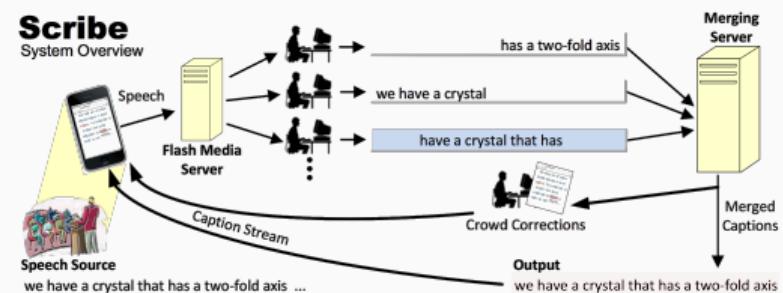


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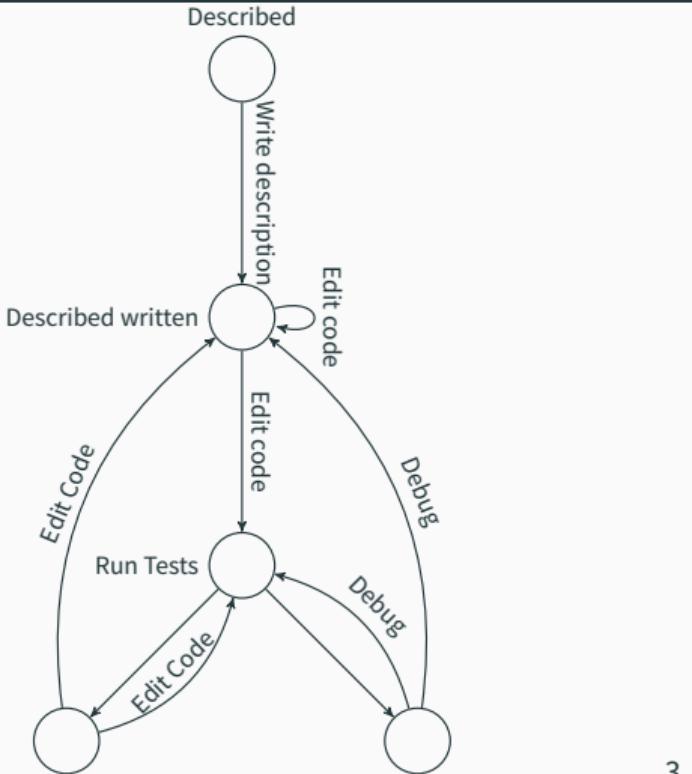


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Build complexity into the process

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- Humans as computational units
Lasecki, Kushalnagar, and Bigham (2014)
- Crowdsourcing workflows as function state machines
LaToza et al. (2014)



What Does Piecework Say?



What we'll find

- Building complexity *into* processes

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- Incremental advances until managers *tracked* and *standardized* workers and work
- Challenges with *flexibility*
- Insights into task *specialization*

What Does Piecework Say?



George Airy. Astronomer. Crowd work requester.

Grier (2013)



- Employed computers
- 13–20 years old
- no particularly strong background in mathematics
- A basic understanding of logarithms, algebra, etc...

George Airy



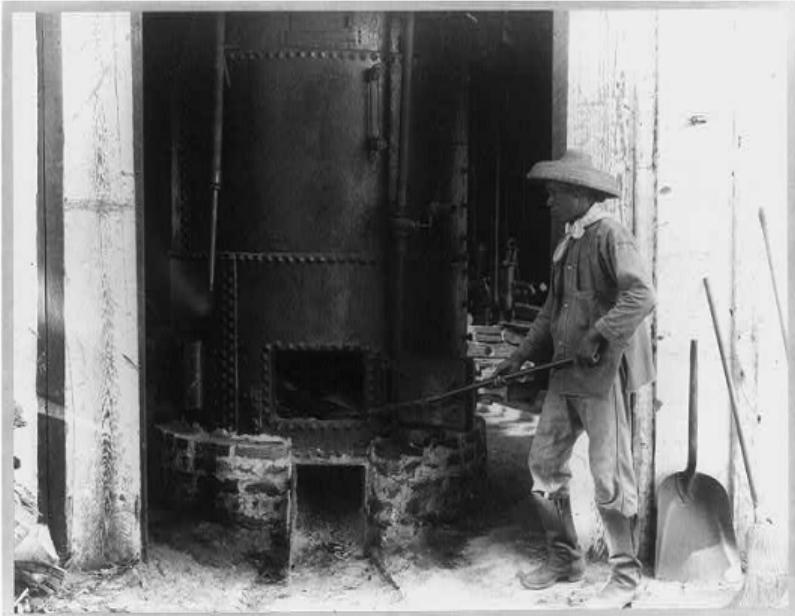
Airy built complexity into the process, assigning *human computers* to calculate astronomical movements.

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 Rate EARNSHAW / SHELTON
	Oct. h		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 46.629	1.0010686	0.00046384	0.00047194

Low Complexity



Farms



- Formalization of piecework:
payment for results
Chadwick ([1865](#))
- Dynamic piece rates

Low Complexity



Textiles



- Distributed workers

- Assuming common skills

Low Complexity

- Strict management
- Formalizing work methods



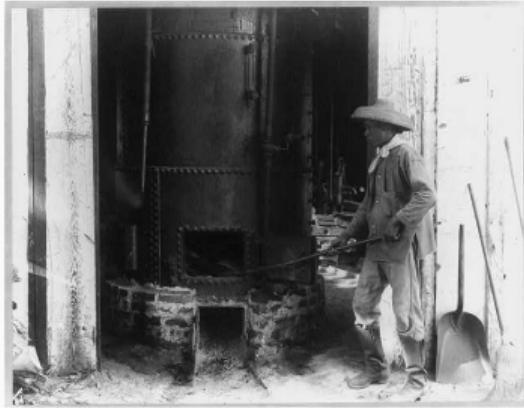
Matchstick Girls



Low Complexity



Farms



Textiles



Matchstick Girls



Planes, Trains, and Automobiles



Trains



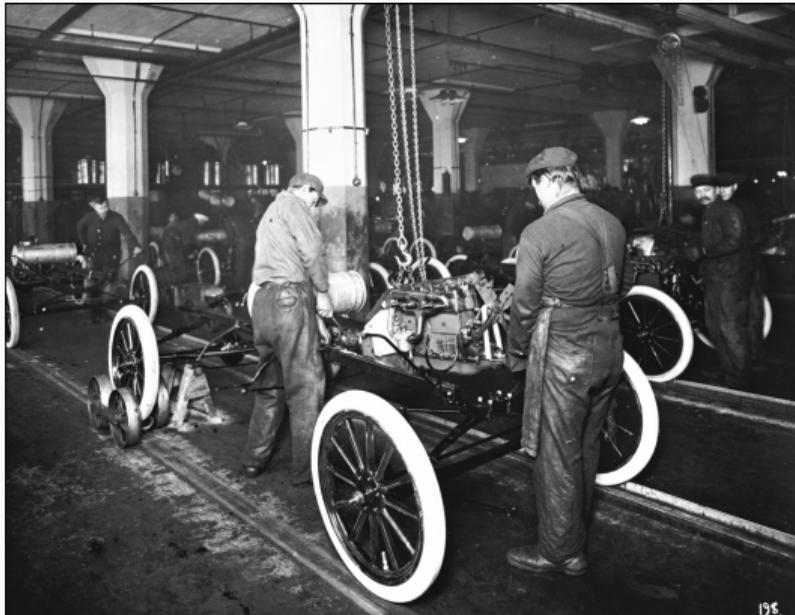
- “Efficiency experts” measured how long it would take to do various jobs
Cunningham ([1911](#))
- These measurements would be used to assign pay rates for each specific task
Jewell ([1921](#))

Planes, Trains, and Automobiles



Automobiles

- Consolidating and training workers
(Fordism)
Schoenberger (1988)
and Tolliday and
Zeitlin (1986)



- Measuring and evaluating workers by very carefully defined instructions
(Taylorism)
Taylor (1911)

Planes, Trains, and Automobiles



- Men drafted during World War II
- Factories turned to a new workforce who had neither conventional training nor experience
- **Specialized training and assignment**

Planes



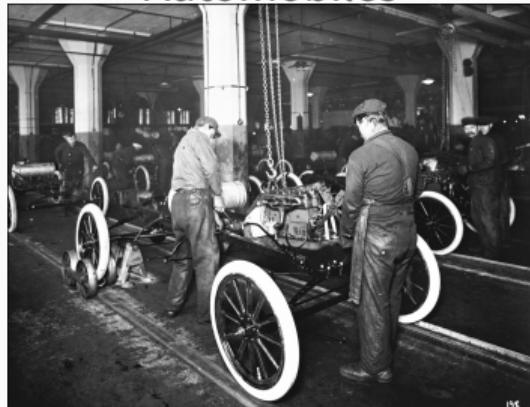
Planes, Trains, and Automobiles



Trains



Automobiles



Planes



Comparisons



- Building complexity into the processes
- Challenges dealing with flexibility
 - *Building planes versus fixing trains*

Implications for On-Demand Work



Has technology shifted on-demand work?

In some ways, yes

- Technology makes *some* complex tasks relatively trivial
- Measuring workers is easier than ever

In other ways, no — we still don't have good end-to-end processes for arbitrarily complex work

We can make a routine out of building planes, but not out of fixing trains

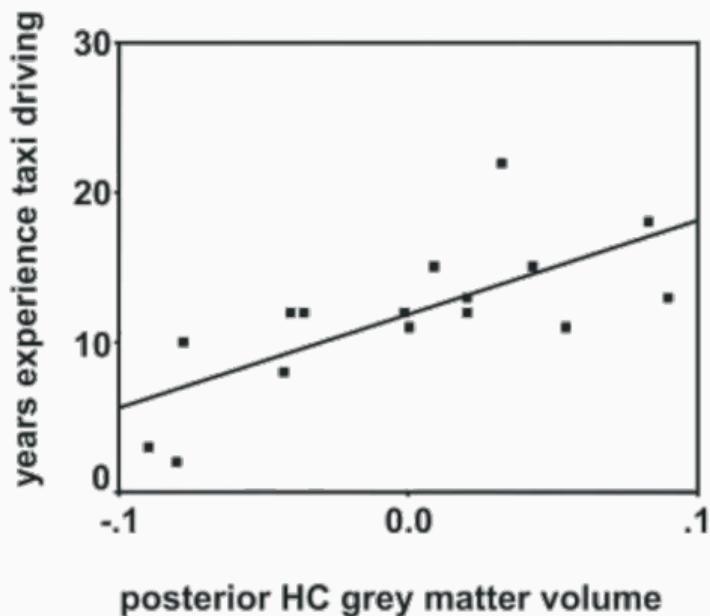
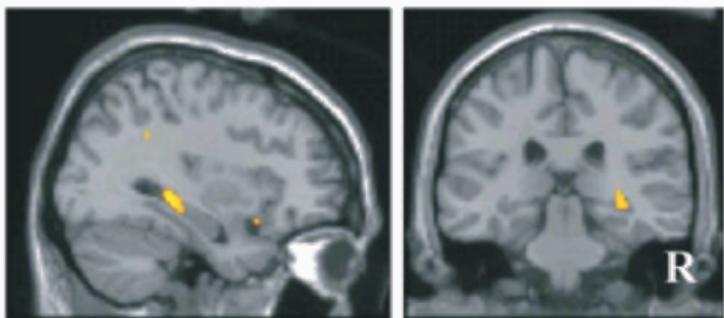
Enhanced Cognition



Enhanced Cognition



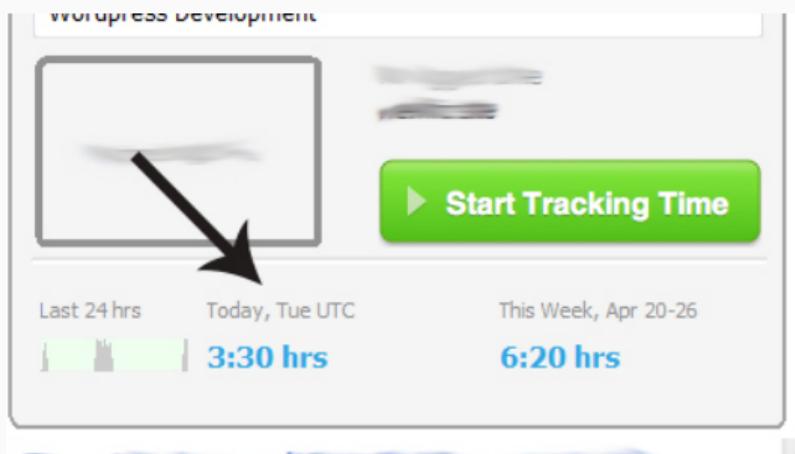
A



Enhanced Cognition



Tracking Work and Workers



Upwork has turned to logging workers' keystrokes and taking screenshots automatically every 10 minutes

Takeaways



- 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