

# 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)

## Decomposition

Celis et al. (2016), Chang, Kittur, and Hahn (2016), Law et al.  
(2016), Lykourentzou et al. (2016), and Newell and Ruths  
(2016)

## Workers

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

# Ongoing Threads in Crowdsourcing Research

2>threads<2>



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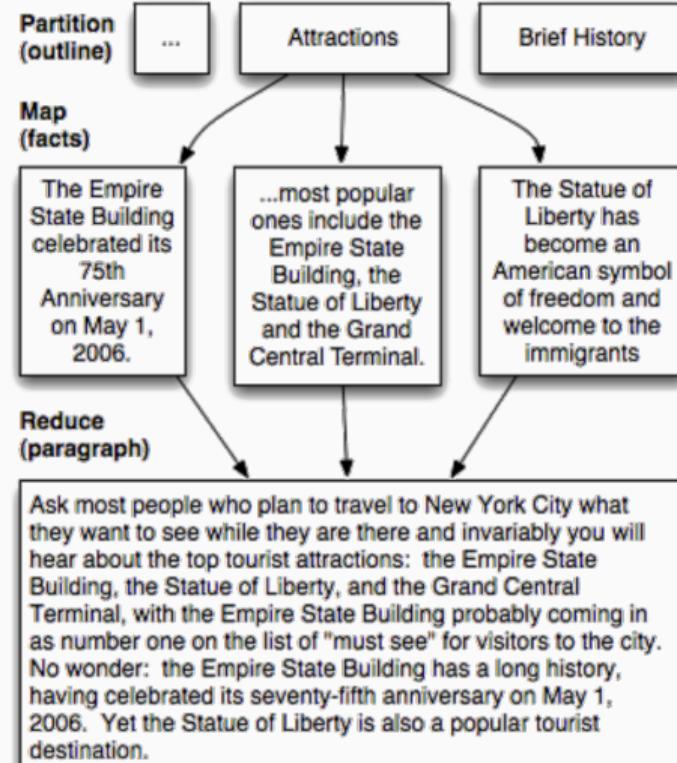
Within narrow specifications

# What Does On-Demand Work Say?



Build complexity into the process

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

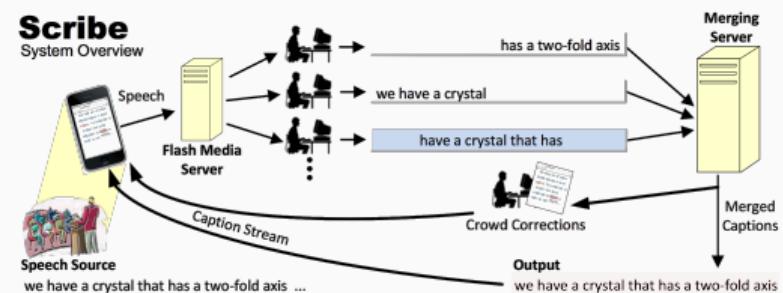


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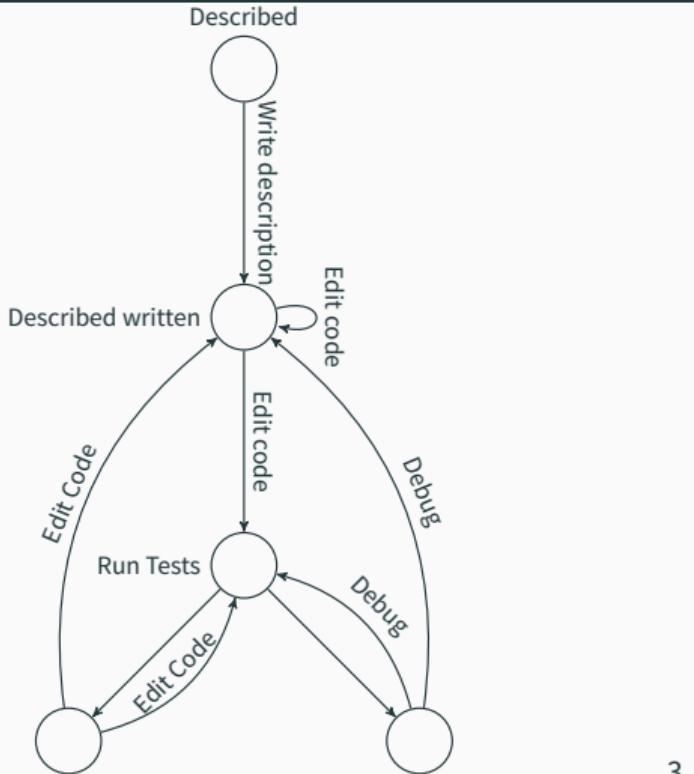


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Build complexity into the process

- Apply CS methods to people  
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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

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What we'll find

- Building complexity into the processes
- Incremental advances until managers *tracked* and *standardized* workers and work
- Insights into task specialization

# What Does Piecework Say?



George Airy (astronomer) used a very similar approach

Grier (2013)



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

# George Airy



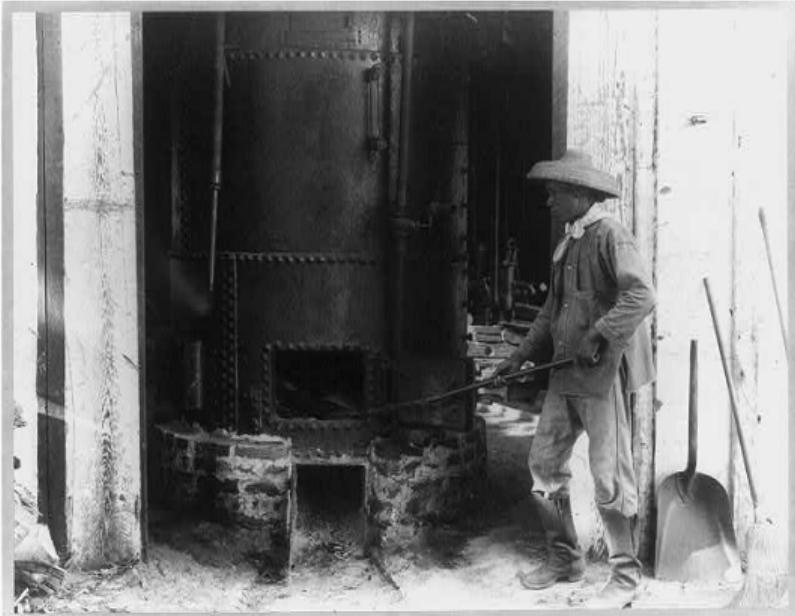
Airy built complexity into the process, assigning *human computers* to calculate astronomical movements.

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



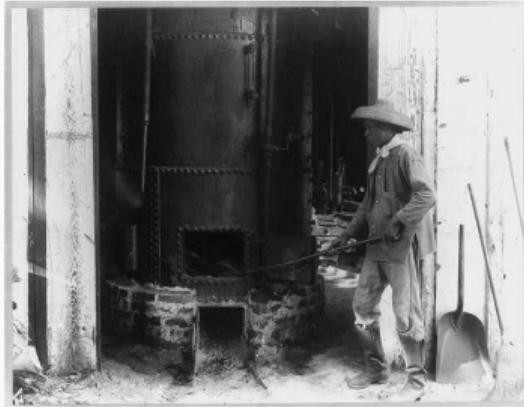
Matchstick Girls



# Low Complexity



Farms



Textiles



Matchstick Girls



# Planes, Trains, and Automobiles



## Trains



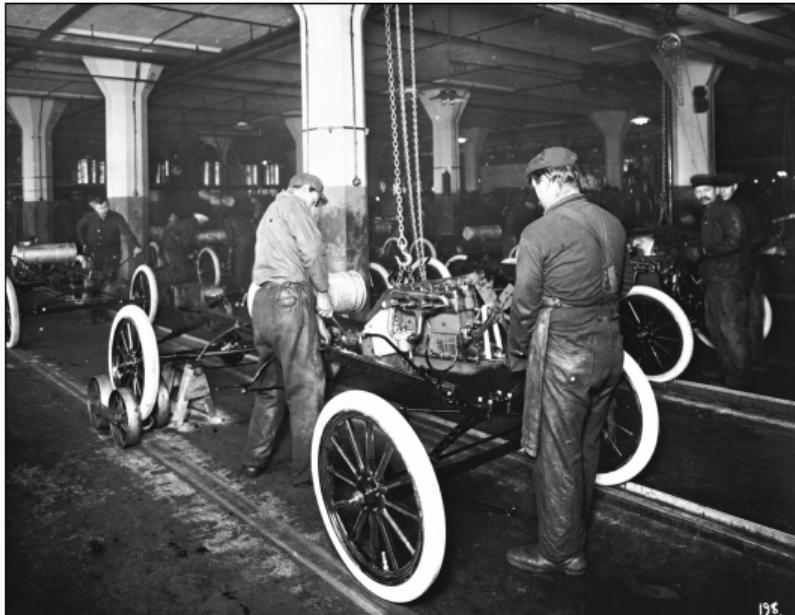
- “Efficiency experts” measured how long it would take to do various jobs  
Cunningham ([1911](#))
- These measurements would be used to assign pay rates for each specific task  
Jewell ([1921](#))

# 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



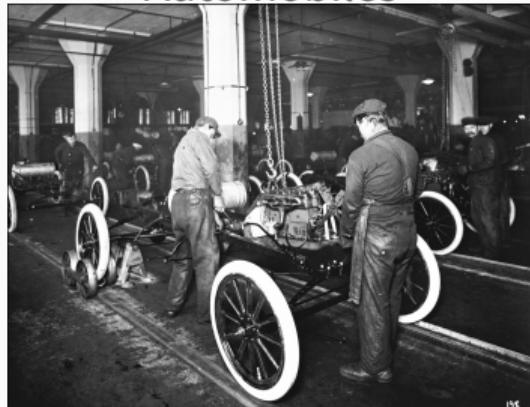
# Planes, Trains, and Automobiles



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

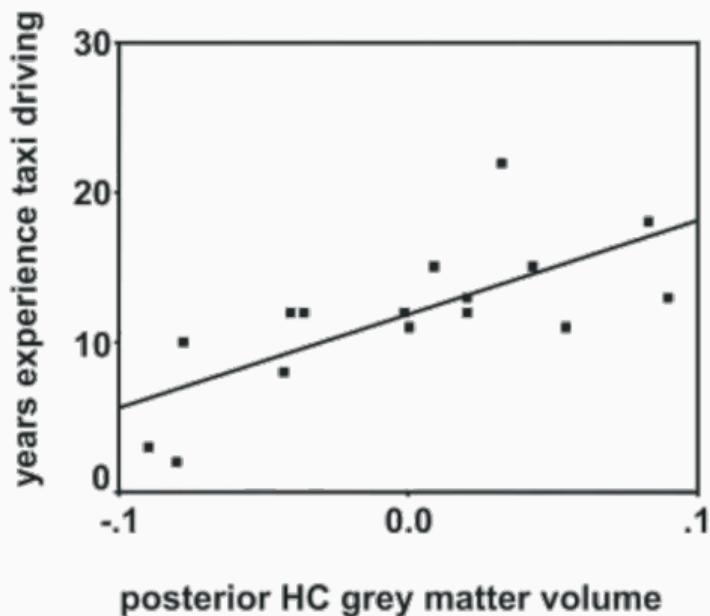
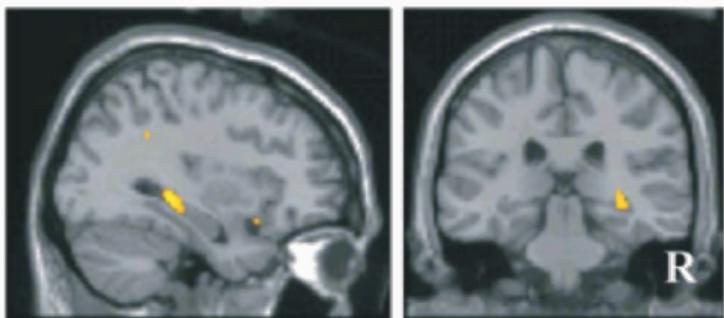
# Enhanced Cognition



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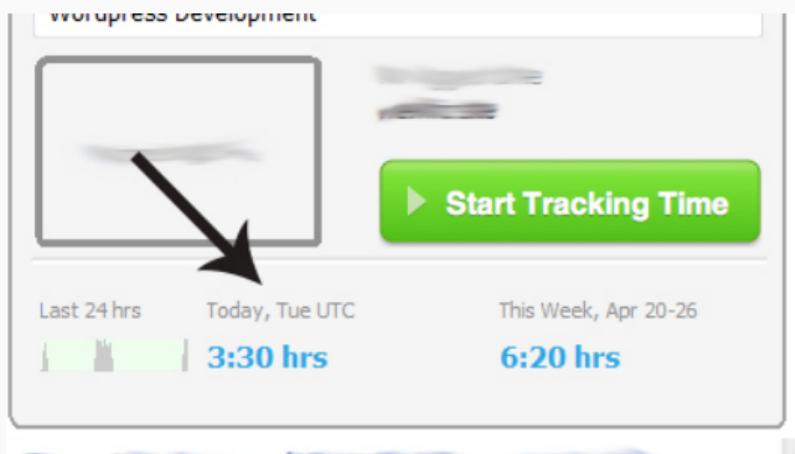
A



# 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