

# 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)

## Relationships

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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Fuge et al. (2014) and Yuan et al. (2016)

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⇒

Within narrow specifications

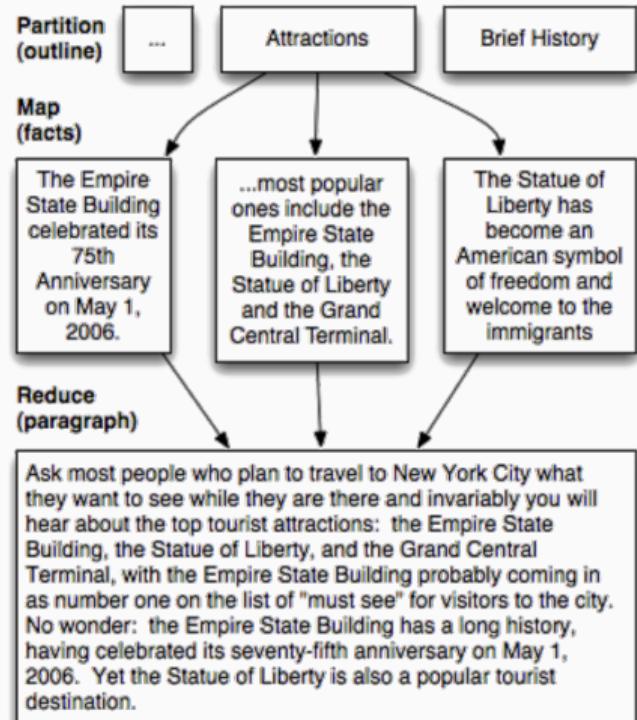
# What Does On-Demand Work Say?



Build complexity into the process

- Apply CS methods to people

Kittur et al. (2011)

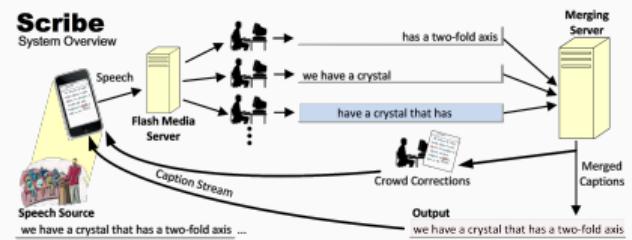


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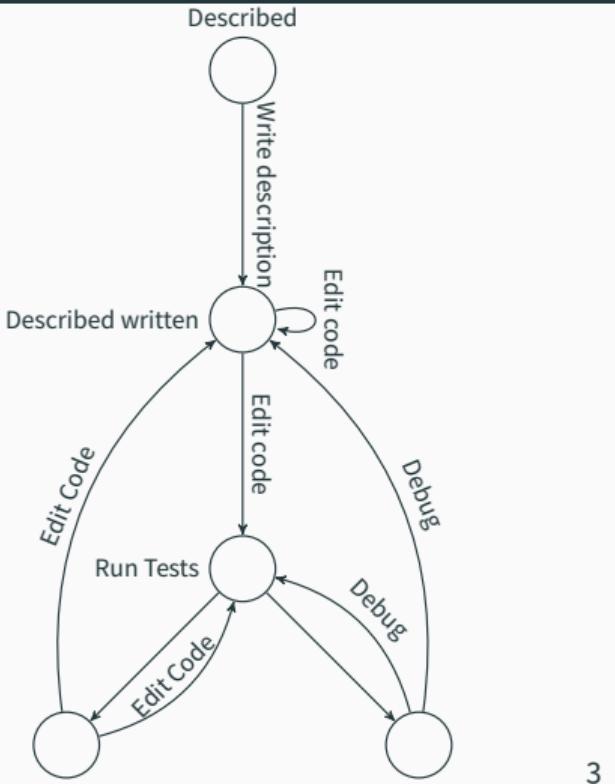


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Build complexity into the process

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

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- Incremental advances until managers *tracked* and *standardized* workers and work

# What Does Piecework Say?



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



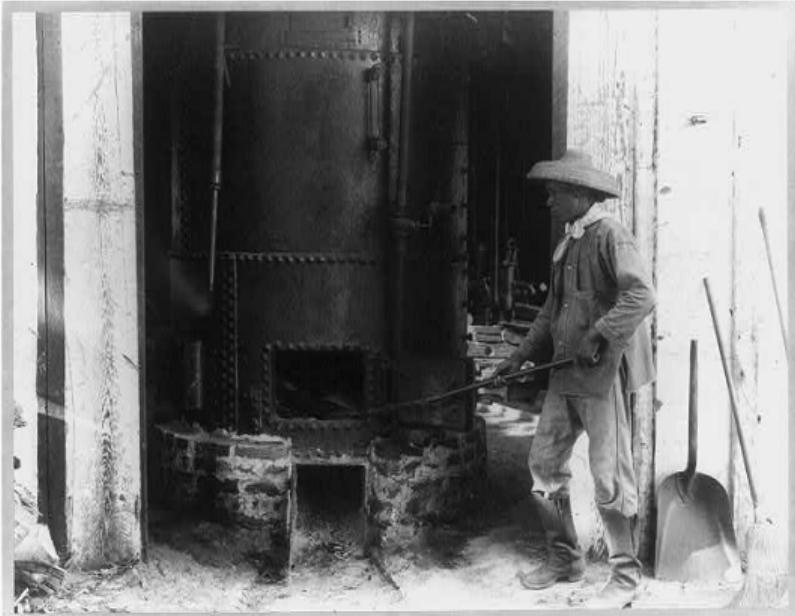
Airy built complexity into the process, assigning *human computers* to calculate & verify the *right ascension* and *declination* of stars.

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	
	Oct.	h	h	m	s	h	m	s	Rate	
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



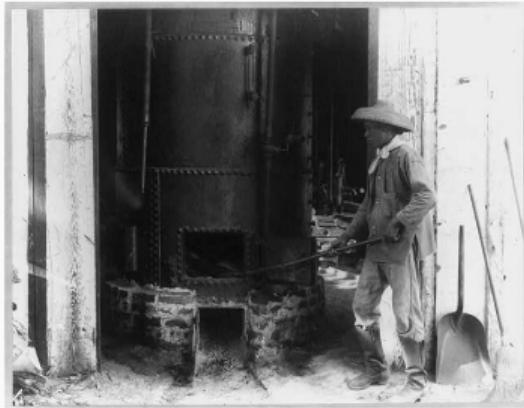
Matchstick Girls



# Low Complexity



Farms



Textiles



Matchstick Girls



# Planes, Trains, and Automobiles



## Trains



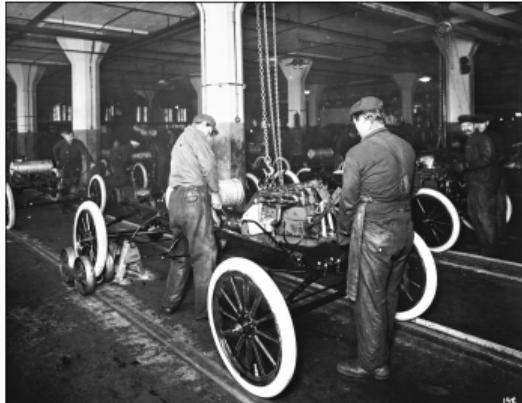
- “Efficiency experts” measured how long it would take to do various jobs  
Cunningham ([1911](#))
- These measurements would be used to assign values for each specific task  
Jewell ([1921](#))

# 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



Planes

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



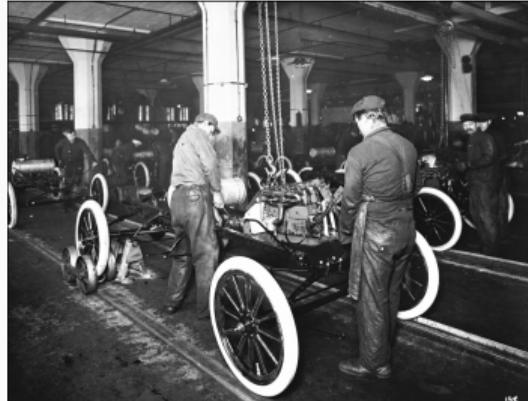
# Planes, Trains, and Automobiles



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?

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

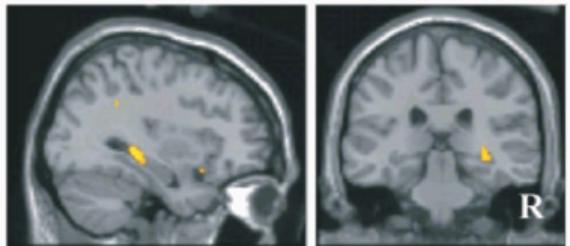
# Enhanced Cognition



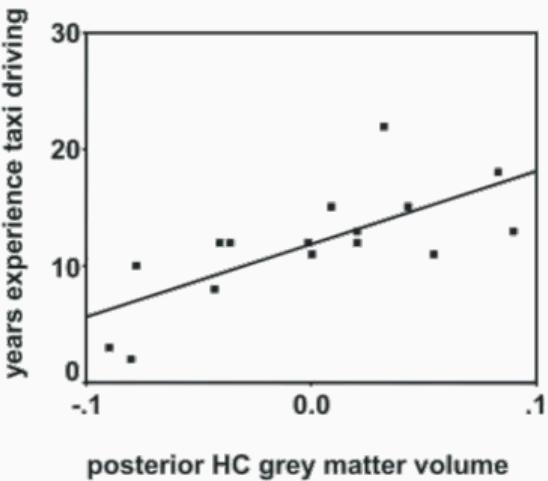
# Enhanced Cognition



A



B



# Enhanced Cognition



## Tracking Work and Workers



[al2: Upwork's screen recording tool as a way to measure workers]

## 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