

Complexity



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Yuan et al. [15] and Fuge et al. [3]



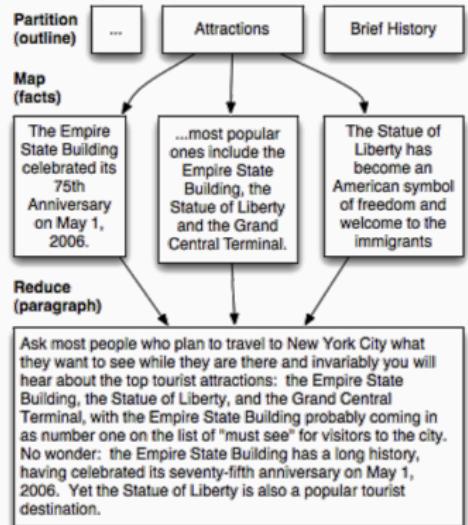
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- Can crowds create things from whole cloth?
Kim and Monroy-Hernández [7], Kim et al. [8], Hahn et al. [5], and Lasecki, Kushalnagar, and Bigham [11]

What Does Crowdsourcing Say?



- Build complexity into the process
 - Apply CS methods to people
Kittur et al. [10]





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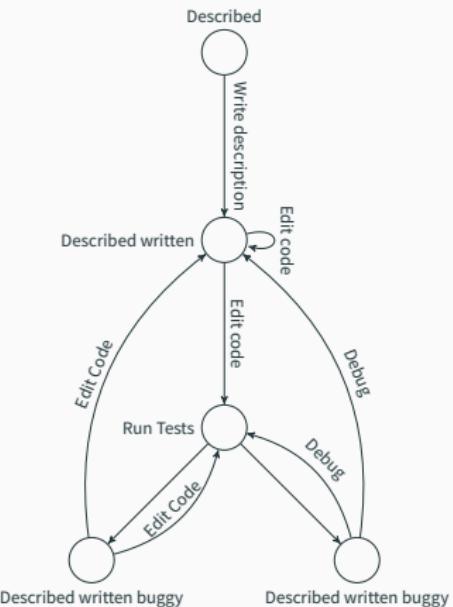
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 - **Crowdsourcing workflows as function state machines**
LaToza et al. [12]





What Does Piecework Say?

George Airy (astronomer) used a very similar approach [4]



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

George Airy



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 Rate	Corrected Logarithm of EARNSHAW / SHELTON Rate
1...	Oct. 1	23	22 3 19 36-505	21 23 28-764	h m s h m s h m s	h m s h m s h m s	1·0010831	0·00047012	
2...	2.	3	21 7 19 59-605	1 24 7-486	...4 0 23-100	4 0 38-722	1·0011011	0·00047793	
3...	2.	7	21 11 18 21-257	5 22 44-886	...3 58 21-652	3 58 37-400	1·0010855	0·00047117	0·00047387
4...	2.	11	29 16 3 49-086	10 8 31-307	...4 45 27-829	4 45 46-421	1·0010827	0·00046995	
5...	2.	16	17 20 20 55-618	14 25 54-541	...4 17 6-532	4 17 23-234	1·0011116	0·00048249	
6...	2.	19	25 23 34 17-516	17 39 29-336	...3 13 21-898	3 13 34-795	1·0010994	0·00047720	0·00047990
7...	2.	23	31 3 24 0-019	21 29 26-990	...3 49 42-503	3 49 57-654	1·0010893	0·00047282	
8...	3.	3	21 7 19 2-090	1 24 44-423	...3 55 2-071	3 55 17-433	1·0010944	0·00047503	
9...	3.	7	25 11 21 43-600	5 27 41-868	...4 2 41-510	4 2 57-445	1·0010947	0·00047516	0·00046316
10...	3.	11	22 15 52 49-386	9 59 5-459	...4 31 5-786	4 31 23-591	1·0010888	0·00047260	
11...	3.	15	24 19 20 39-133	13 27 8-783	...3 27 49-747	3 28 3-324	1·0011049	0·00047959	
12...	3.	19	24 23 20 26-425	17 27 11-971	...3 59 47-292	4 0 3-188	1·0010686	0·00046384	0·00047194

Cottage Industry



Farms



Cottage Industry



Farms

Textiles



Cottage Industry



Farms



Textiles



Matchsticks





Trains

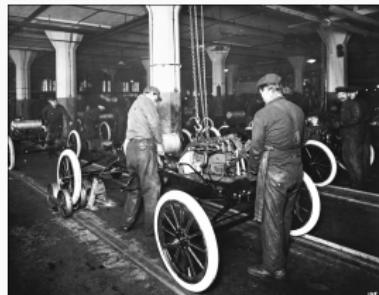


- “Efficiency experts” measured how long it would take to do various jobs [2]
- These measurements would be used to assign values for each specific task [6]
- Train engineers instituted “The Fix” to correct perceived unfairness [14]



Automobiles

- Fordism,
Taylorism, and
Scientific
Management in
full force



- *Manufacturing* proved amenable to assembly line processes.

Planes, Trains, and Automobiles



Planes

- Men drafted during World War II
- Factories turned to a new workforce who had neither conventional training nor experience
- Training for individual tasks and correspondingly assigning workers



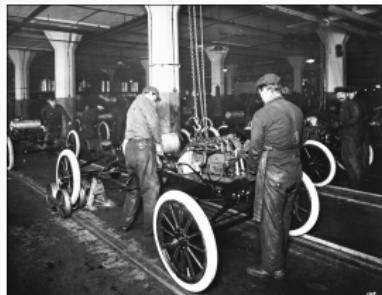
Planes, Trains, and Automobiles



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



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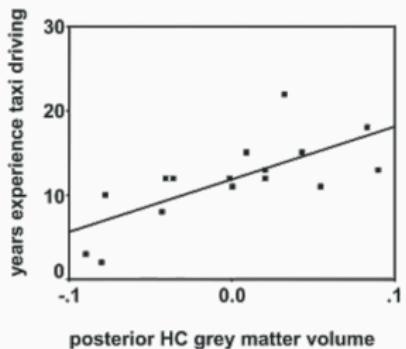
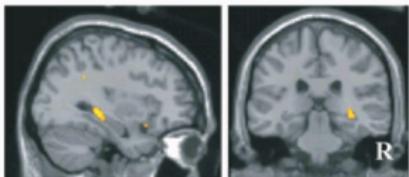




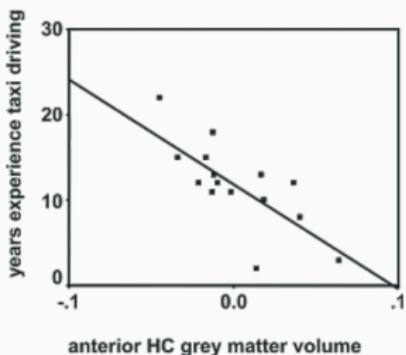
Complexity



A



B





Complexity





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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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