CS 5306
INFO 5306:
Crowdsourcing and Human Computation

Lecture 5

9/5/17

Haym Hirsh

Upcoming

- Thursday, Sep 7, 4:15 (after class)
  Henry Kautz, Mining Social Media to Improve Public Health
  (extra credit)
- Tuesday, Sep 12 (in class)
  Serge Belongie
- Tuesday, Sep 12 (evening, details TBA)
  Team forming event
- Thursday, Sep 28, 4:15 (after class)
  Michael Bernstein
  (extra credit)

Cornell Tech/Law Colloquium
Tuesdays 7:30pm Gates G01
infosci.cornell.edu/techlaw-colloquium

- September 5 – Arvind Narayanan (Princeton CS) – “Uncovering Commercial Surveillance on the Web”
- September 12 – Elizabeth Joh (UC Davis Law) – “The Undue Influence of Surveillance Technology Companies on Policing”
- September 19 – Woodrow Hartzog (Northeastern Law) – “Privacy’s Blueprint: The Battle to Control the Design of New Technologies”
- September 26 – Jennifer Doleac (UVA Public Policy/Economics) – "The Deterrent Effects of DNA Databases: Evidence from the US and Denmark"
- October 3 – Solon Barocas (Cornell IS)– “Regulating Inscrutable Systems”
- October 24 – James Grimmelmann (Cornell Law) – “The Structure and Interpretation of Legal Programs”
- October 31 – Fred Schneider (Cornell CS) – “A Doctrine of Public Cybersecurity”
- November 7 – Ifeoma Ajunwa (Cornell IRL) – “Hiring by Algorithm”
- November 14 – Deirdre Mulligan (UC Berkeley IS/Law), "Procurement as Policymaking: Policing Administration in an Era of Intelligent Systems"
- November 28 – Mark Latonero (USC Data & Society Research Institute/Communication) – “Technological Interventions in the Refugee/Migration Crisis”

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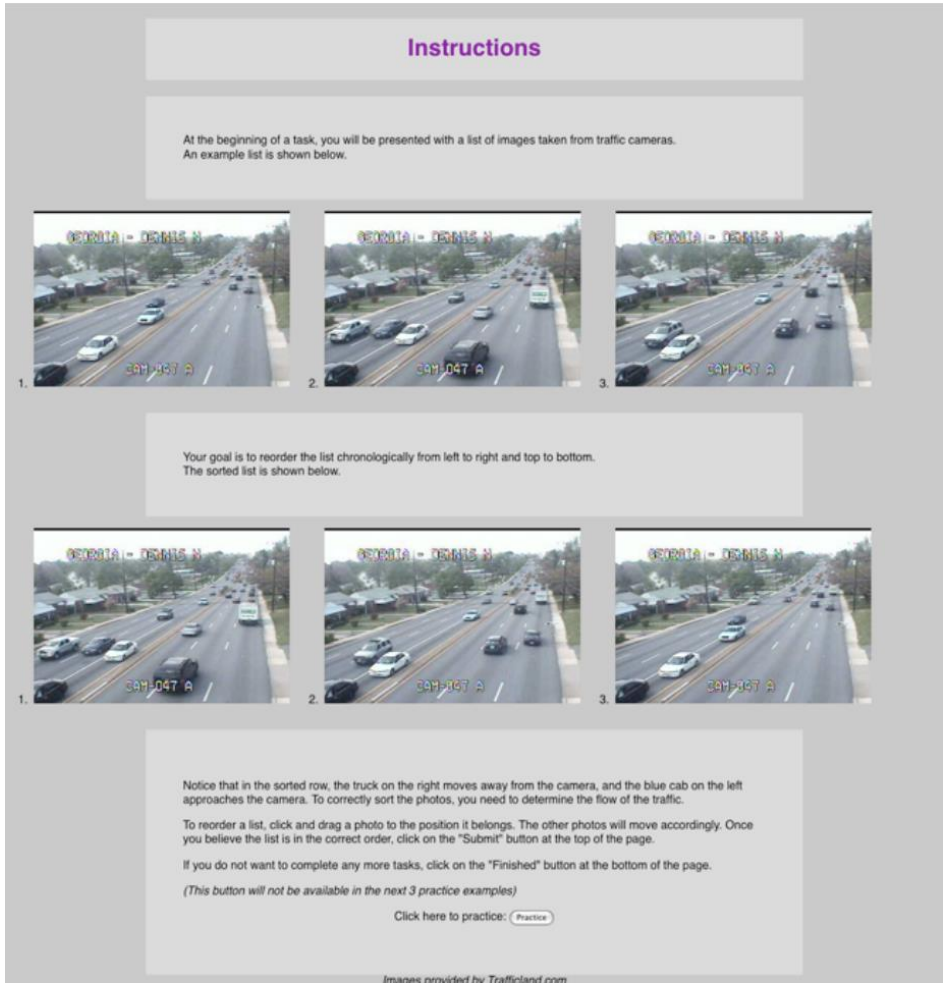
"Financial incentives and the performance of crowds“, Winter Mason and Duncan J. Watts,
In *Proceedings of the 2009 Human Computation Workshop*



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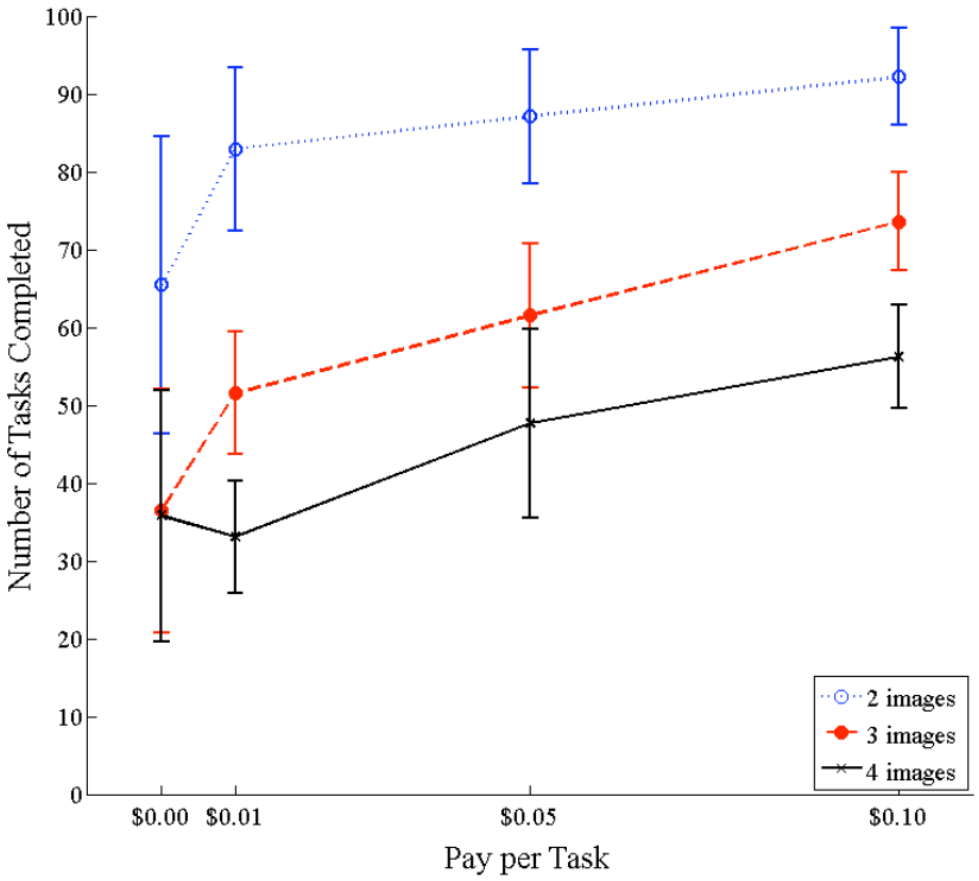

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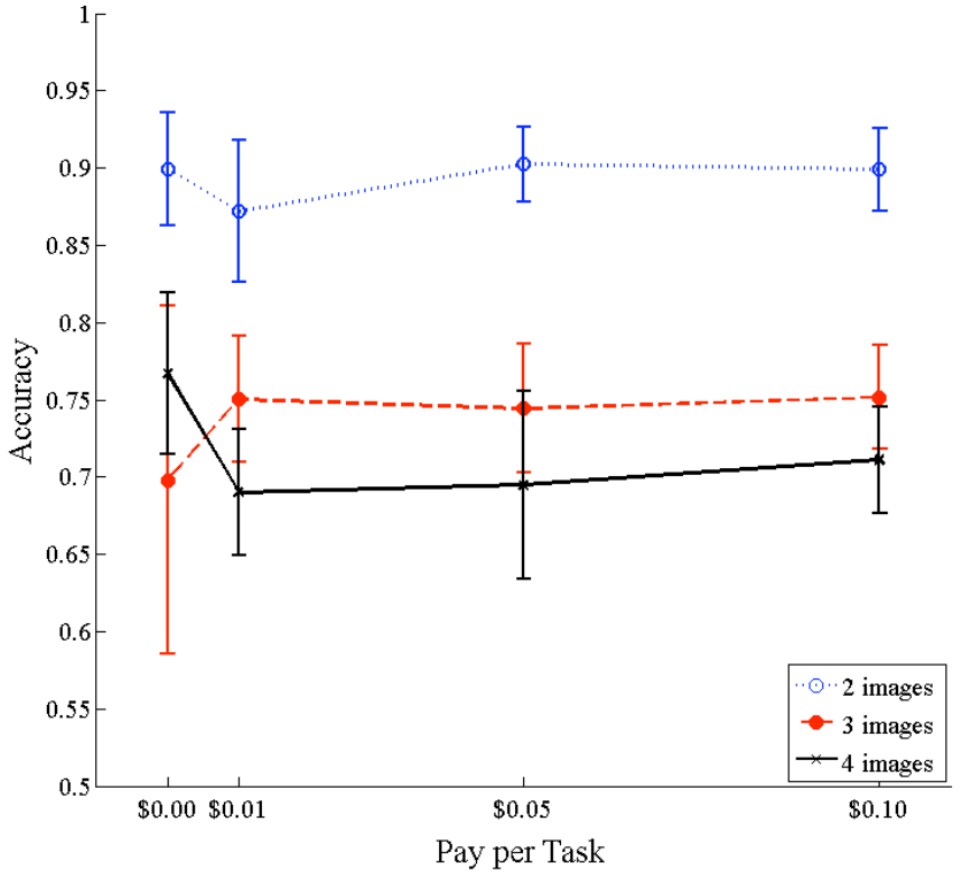

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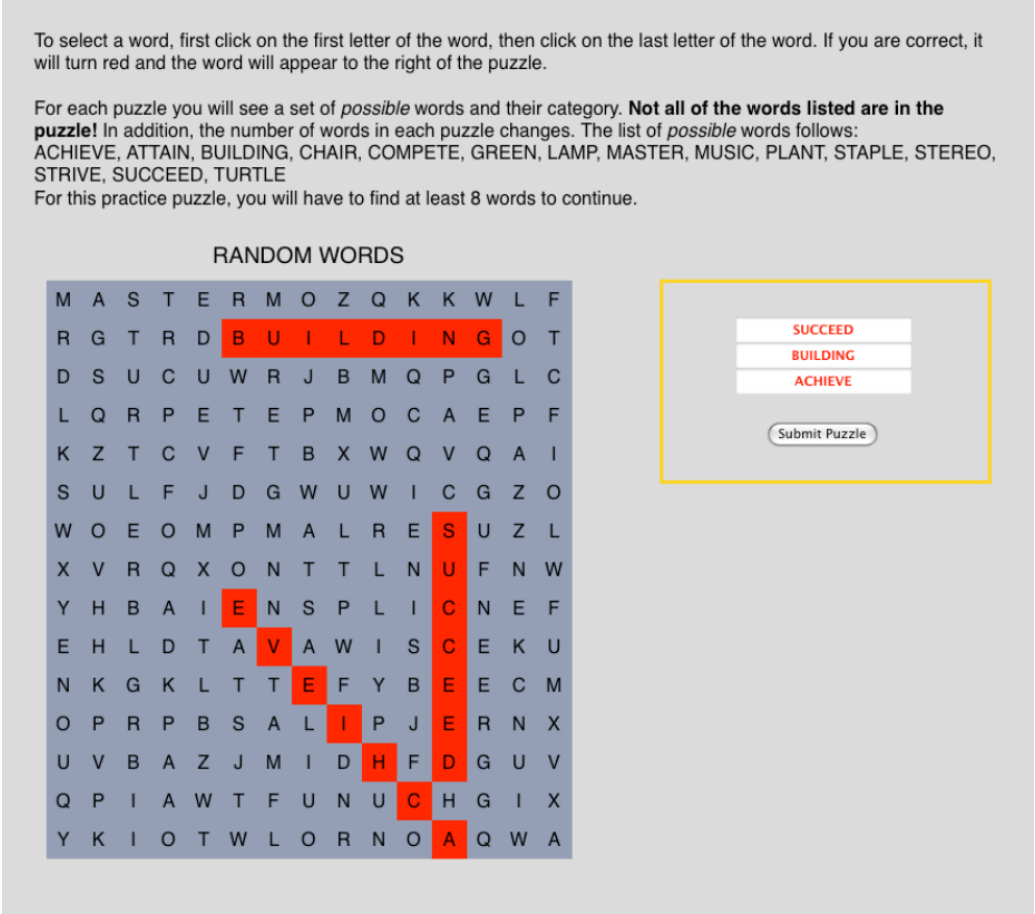

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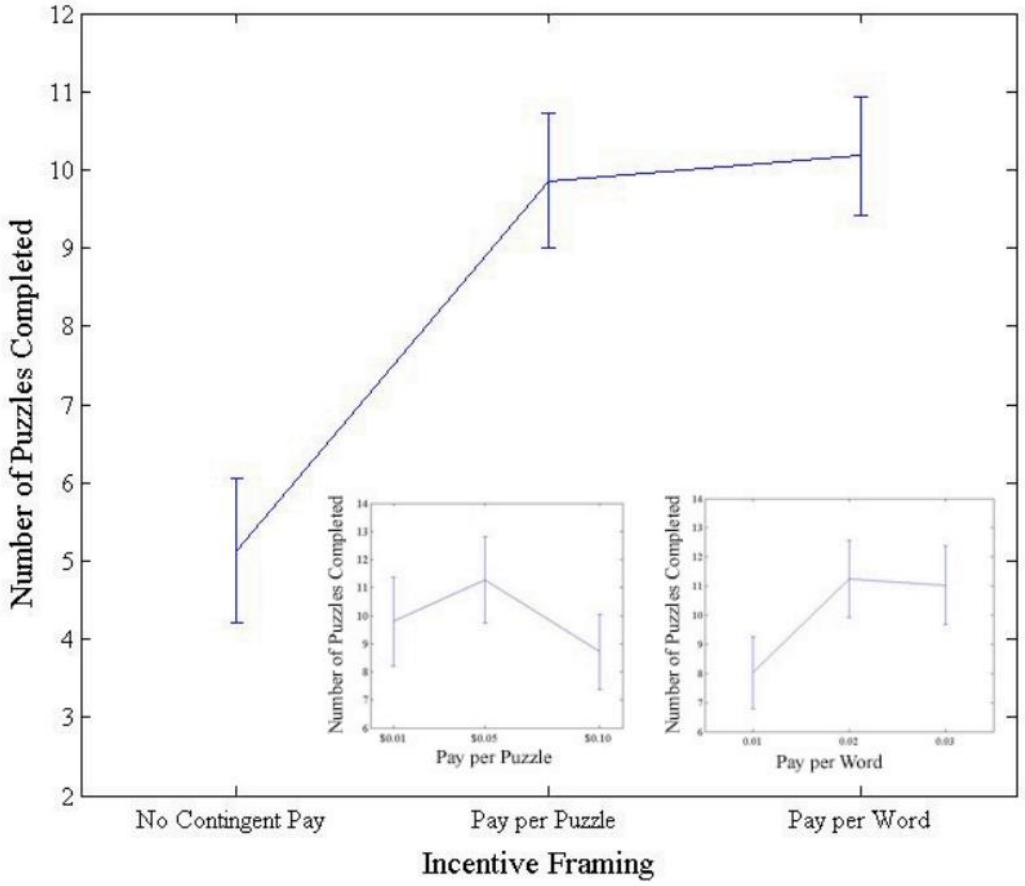

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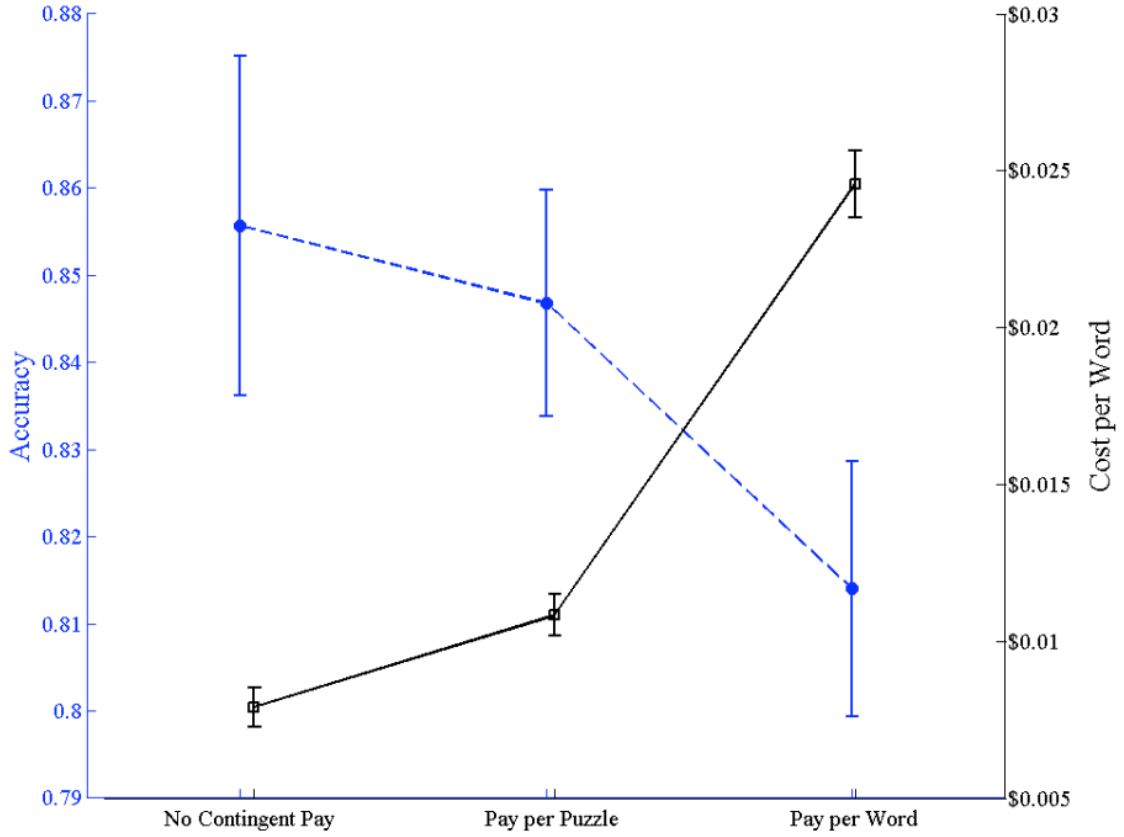

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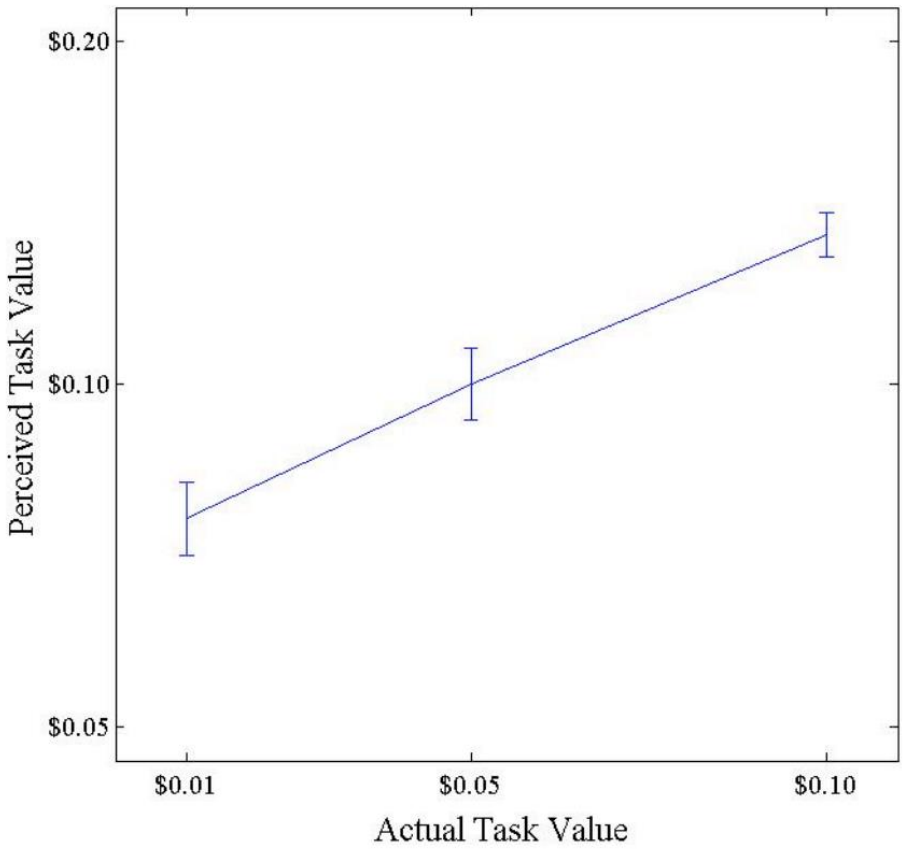

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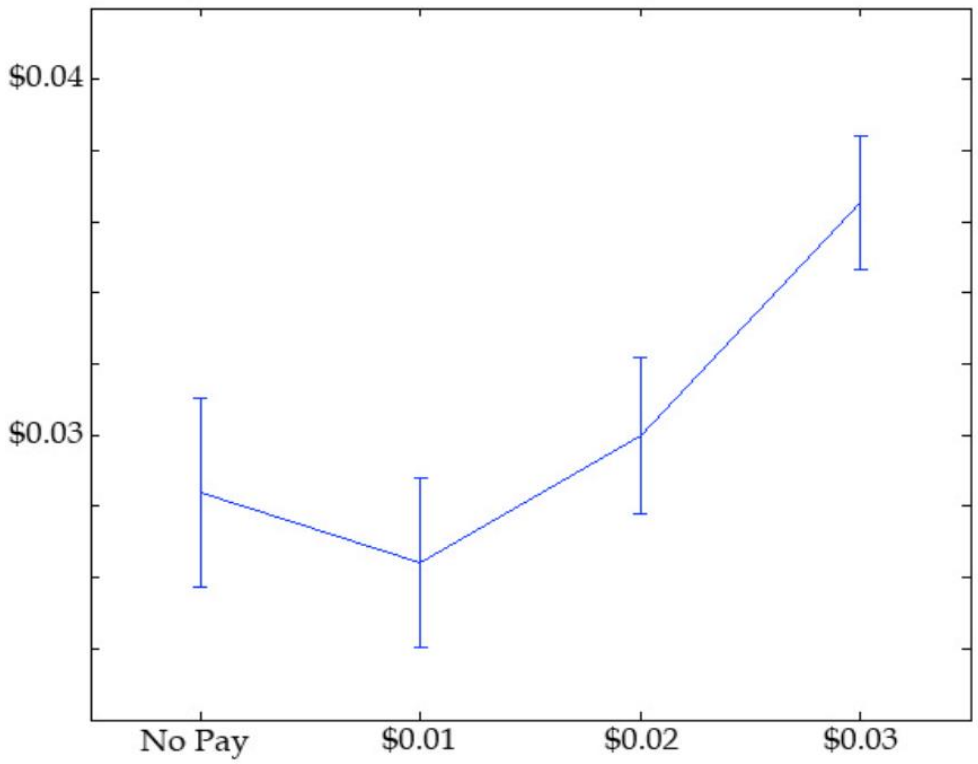

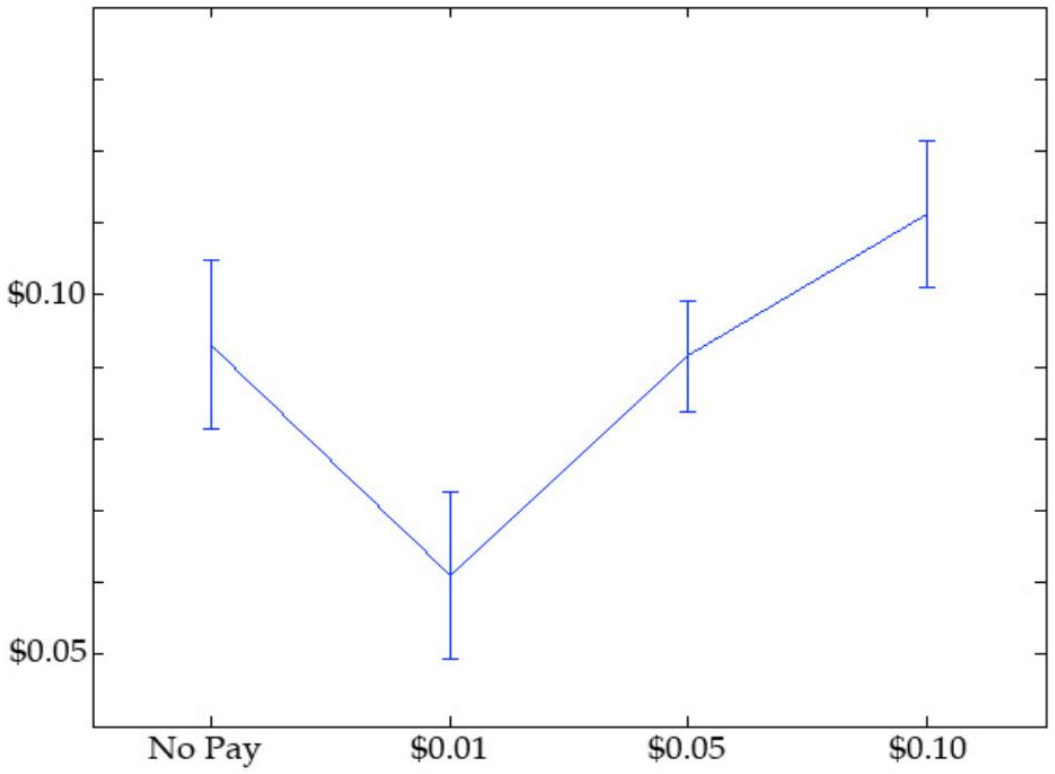

“A comparison of social, learning, and financial strategies on crowd engagement and output quality”, L. Yu, P. André, A. Kittur, R. and Kraut
In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing (pp. 967- 978),* 2014

A Comparison of Social, Learning, and Financial Strategies on Crowd Engagement and Output Quality

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ABSTRACT
A significant challenge for crowdsourcing has been increasing worker engagement and output quality. We explore the effects of social, learning, and financial strategies, and their combinations, on increasing worker retention across tasks and change in the quality of worker output. Through three experiments, we show that 1) using these strategies together increased workers' engagement and the quality of their work; 2) a social strategy was most effective for increasing engagement; 3) a learning strategy was most effective in improving quality. The findings of this paper provide strategies for harnessing the crowd to perform complex tasks, as well as insight into crowd workers' motivation.

Author Keywords
Crowds; incentives; strategies; motivations

ACM Classification Keywords
H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces – Collaborative computing, Computer-supported cooperative work, Web-based interaction

INTRODUCTION
A major research challenge in crowdsourcing has been increasing crowd worker engagement and output quality [4,8,16,19,20,21,26,33,37]. One significant issue has been that crowd platform features aimed at lowering market transaction costs – such as simplified work histories, de-identification of worker names, and lack of long-term contracts – can, on the one hand, enable employers to hire workers without the significant vetting and handshake costs prevalent in other markets, leading to high-speed, scalable transactions. On the other hand, they do not promote a particularly fulfilling or engaging environment for workers, who can feel like “just another cog in the machine” [12], with corresponding negative implications for motivation, effort, and output quality [4,17,20,34].

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As a result, large crowd employers (such as CrowdFlower or MobileWorks) have begun to build up and train their own trusted workforces of crowd workers, and researchers have investigated “retainer” models to keep workers around [22]. However, such approaches may not work for many crowd employers, who do not have the volume of work to continuously feed a dedicated workforce. In this paper we compare combinations of three task design strategies – social, learning, and financial – to determine what kinds of features can be incorporated into marketplaces to create rewarding or fulfilling experiences for crowd workers, and thereby increase crowd worker engagement and output quality. Specifically, we examine the effects of these strategies on attracting workers to come back to take additional tasks from the employer (engagement) as well as changes in the quality of their work (output quality). Furthermore, we go beyond investigating individual strategies to look at interactions between strategies.

Job Design Strategies
In traditional organizations, a variety of strategies are designed to encourage employees' engagement and productivity. Theories on job design and motivation theory in conventional work organizations indicate that job design should focus on human needs and workers' motivations [24]. Job design researchers stress the importance of performance feedback, learning, and interaction with other people in determining the attitudes and behavior of employees in organizations [35]. Literature on human resource management suggests that individual performance appraisal (and the rewards associated with the appraisal), training, and team building are the main activities that motivate workers [3]. In brief, the strategies that are effective for improving engagement and output quality mainly include a social, learning or training, and financial component, and these strategies are very often implemented together.

While the effects of job design are well established in conventional work organizations, the features of crowdsourcing markets, including their reliance on one-off impersonal transactions, crowd workers' demographics, and lack of effective punishment mechanisms [20, 34], make it unclear how crowd workers will respond to these strategies. In traditional organizations, employees are situated in a hierarchical and long-term situation, and their behaviors are influenced by such an environment. For example, employees are motivated by a social strategy because maintaining a good rela-

Building Successful Online Communities

Evidence-Based Social Design

Robert E. Kraut
and Paul Resnick

with Sara Kiesler,
Moira Burke,
Yan Chen,
Niki Kittur,
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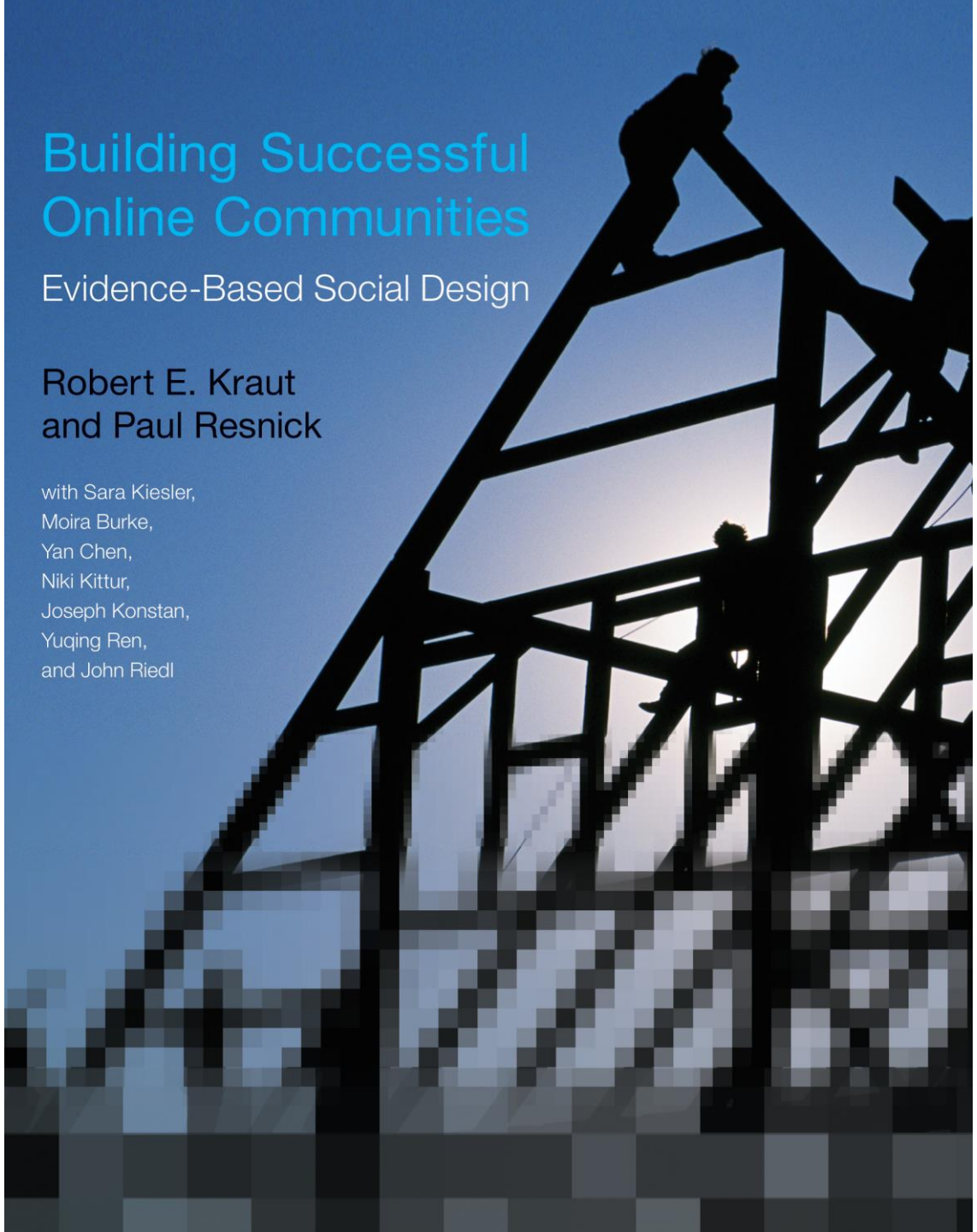
and John Riedl



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MobileWorks?

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- H-S1: A social strategy will improve workers’ engagement.
- H-S2: A social strategy will improve the quality of crowd work.
- H-L1: A learning strategy in the form of providing feedback will improve the quality of crowd work.
- H-L2: A learning strategy will not improve workers’ engagement.
- H-F1: The financial strategy will improve workers’ engagement.
- H-F2: The financial strategy will improve the quality of crowd work.

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“We averaged these assessments using the geometric mean to normalize differences among the variance in the judgments”

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Geometric mean?

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Geometric mean?

$$e^{\frac{\sum_{n}^{1} \ln(a_i)}{n}}$$

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- To control the quality of the rating, verification questions were embedded in the task: two questions were about the content of the original text and the raters were also asked to provide feedback for the summaries.

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- Experiment details:
  - Education level, native English speaker, etc.: Self reported
  - Two judges
  - Quality = geometric mean of accuracy, conciseness and coverage
  - Engagement = return rate
  - Experiment 1: No hypotheses explicitly tested
  - “Due to the large number of summaries, only a sample of summaries (50 summaries) were selected and rated by two judges. The inter-rater agreement score on the overall quality was good (ICC=.81). One judge rated the remainder of summaries.”
  - “Two judges rated the summaries on 7-point Likert scales of coverage, accuracy and conciseness.” / “Each summary was rated by three workers on its accuracy, conciseness and coverage on 7- point scales.”

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- Social:
  - “found powerful positive effects on workers’ engagement across tasks”
  - “Regarding the social strategy’s effect on quality, it had a positive effect when there was only an imaginary team and self-disclosure of workers’ information, and the effect disappeared when real interaction between workers was provided. “
- Learning
  - “A learning strategy was shown to be most effective in improving quality.”
- Combined
  - “However, when we tried to combine strategies, we found that the effects were not additive on either engagement or task quality. Indeed, some combinations, especially the learning and financial combinations even undercut the positive effect from the single strategy. Except for the negative interaction between the financial and learning strategy, we are not aware of theories to explain such complex interaction among the other strategies.”

Next Time

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- Little, G., Chilton, L.B., Goldman, M. and Miller, R.C., 2010, October. Turkit: human computation algorithms on mechanical turk. In *Proceedings of the 23nd annual ACM symposium on User interface software and technology*(pp. 57-66). ACM. https://dspace.mit.edu/openaccess-disseminate/1721.1/60950