

THE DUALITY OF EMPOWERMENT AND MARGINALIZATION IN MICROTASK CROWDSOURCING: GIVING VOICE TO THE LESS POWERFUL THROUGH VALUE SENSITIVE DESIGN

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Appendix A

Crowdsourcing Literature Review

Crowdsourcing (CS) emerges in a variety of forms (e.g., compensation-based, contest-based) and contexts (e.g., innovation, problem solving, and microtask). Not surprisingly, there exist a variety of definitions for CS, depending on the viewpoint adopted. One of the most frequently cited definitions is by Howe (2008, p. 1), who defines CS as “the act of taking a task traditionally performed by a designated agent (usually an employee or a contractor) and outsourcing it by making an open call to an undefined but generally large group of people.” Recent literature in CS has posited taxonomies for classifying diverse forms of CS (e.g., Estellés-Arolas and González-Ladrón-de-Guevara 2012; Osella 2014; Tarrell et al. 2013; Zhao and Zhu 2014). These studies use attributes such as the compensation received, the nature of the sourcing process, and the types of tasks in creating CS classifications. In this study, we view microtask CS as having followed three general characteristics (Estellés-Arolas and González-Ladrón-de-Guevara 2012): an undefined, generally large group of individuals (the crowd) who answer the open call made by job requesters (the initiator) and take on microtasks for micropayment (the process).

Research on microtask CS can be summarized around its four structures, namely governance, compensation, microtask, and technology. The *governance structure* refers to CS work practices, standards and policies. The *compensation structure* refers to payment arrangements. The *microtask structure* refers to the properties of CS jobs. The *technology structure* refers to the IT infrastructure used to build the CS work environment. Table A1 summarizes the relevant studies on microtask CS between 2010 and September 2014¹ under the four headings.

¹While we included literature in our search from January 2006, most refereed conference and journal publications on the topic appeared from 2010 onward.

Table A1. Summary of Reviewed Studies on Microtask Crowdsourcing		
Reference	Publication Outlet	Findings
CS Governance Structure		
Greengard (2011)	<i>Communications of the ACM</i>	CS is powerful because virtually anyone has the potential to plug in valuable information. CS offers businesses and developers access to an on-demand, scalable work force. CS continues to grow—and involves increasingly complex issues.
Schenk and Guittard (2011)	<i>Journal of Innovation Economics & Management</i>	Compares CS with established theories (open innovation, user innovation). Proposes and illustrates a typology of CS practices based on two criteria: the integrative or selective nature of the process and the type of tasks (routine, complex and creative) that are crowd sourced. Concludes that relying on the crowd is an appropriate method for organizations to use.
Kaganer et al. (2013)	<i>MIT Sloan Management Review</i>	Companies face two major obstacles when sourcing work to the on-demand CS work force: perceived risk and limited capacity to handle large scale projects. Four models of human cloud platforms are proposed—aggregator; arbitrator; facilitator, and governor—based on two dimensions: who (buyer or platform) provides project governance and where (the supplier or the platform) to place the buyers' trust.
Vakharia and Lease (2013)	arXiv preprint arXiv:1310.1672.	Conducts cross-platform content analysis of seven crowd work platforms. Formulates key criteria for characterizing and differentiating crowd work platforms.
Saxton et al. (2013)	<i>Information Systems Management</i>	Analyzes 103 well-known CS web sites. Develops a “taxonomic theory” of CS, resulting in nine distinct forms of CS model.
Nakatsu et al. (2014)	<i>Journal of Information Science</i>	Follows an iterative approach and considers over 100 well-known examples of CS. Develops taxonomy of CS tasks with three dimensions of task complexity: (1) structure, (2) interdependence, and (3) commitment. Concludes with seven CS types.
Zogai et al. (2014)	<i>Journal of Business Economics</i>	A case study of a German start-up CS intermediary that connects CS companies and the crowd. Challenges for CS intermediaries include managing the (1) process, (2) crowd, and (3) technology.
CS Compensation Structure		
Finnerty et al. (2013)	<i>Proceedings of the Biannual Conference of the Italian Chapter of SIGCHI, ACM.</i>	CS is emerging as an effective method for performing tasks that require human skills (e.g., tagging photos, transcribing handwriting and categorizing data). Two experiments: (1) task design and reward scheme may affect work performance on CS platform and (2) guidelines for designing tasks with the aim to maximize worker performance.
Kittur et al. (2013)	<i>Proceedings of the 16th ACM Conference on Computer Supported Cooperative Work</i>	The crowd is a geographically distributed workforce to complete complex tasks on demand and at scale. Outlines a framework that will enable crowd work that is complex, collaborative and sustainable. Identifies research challenges in 12 major areas: workflow, task assignment, hierarchy, real-time response, synchronous collaboration, quality control, crowds guiding artificial intelligences (AIs), AIs guiding crowds, platforms, job design, reputation, and motivation.
CS Task Structure		
Finnerty et al. (2013)	<i>Proceedings of the Biannual Conference of the Italian Chapter of SIGCHI, ACM.</i>	CS is emerging as an effective method for performing tasks that require human skills (e.g., tagging photos, transcribing handwriting and categorizing data). Two experiments: (1) task design and reward scheme may affect work performance on CS platform and (2) guidelines for designing tasks with the aim to maximize worker performance.

Table A1. Summary of Reviewed Studies on Microtask Crowdsourcing (Continued)

Reference	Publication Outlet	Findings
Chandler et al. (2013)	<i>Handbook of Human Computation</i> . Springer New York.	Investigates the role of microtask labor marketplaces in managing human and hybrid human machine computing. Distinct challenges in human computation (crowd): increased unsystematic error (e.g., mistakes) and systematic error (e.g., cognitive biases), both of which can be exacerbated when motivation is low, incentives are misaligned, and task requirements are poorly communicated.
Hassan and Curry (2013)	<i>Proceedings of the 9th International Conference on Collaborative Computing: Networking, Applications and Worksharing</i>	Current CS task assignment primarily focuses on content-based approaches, qualifications, or work history. Proposes an alternative and complementary approach that focuses on capabilities workers employ to perform tasks to predict worker performance. Three different tasks: fact verification, image comparison and information extraction.
Sarasua and Thimm (2013)	<i>Third International Conference on Cloud and Green Computing</i>	Focuses on knowledge-intensive micro tasks in human computation scenarios. Profiles workers and proposes the introduction of a crowd worker CV as a comprehensive means to describe a worker's expertise and interests.
CS Technology Structure		
Kajino et al. (2014)	<i>Data Mining and Knowledge Discovery</i>	Focuses on the privacy problems of CS workers. Proposes a protocol where a requester can estimate results while preserving worker privacy.
Geiger and Schader (2014)	<i>Decision Support Systems</i>	Considers CS IS as sociotechnical systems that provide informational products or services. Introduces personalized task recommendation mechanisms so that the CS task and workers' individual interests and capabilities are better matched.
Saito et al. (2014)	<i>Universal Access in Human-Computer Interaction: Universal Access to Information and Knowledge</i> (Volume 6, Part II)	Proposes a framework of microtasking that intrinsically supports the development of workers' skills with three core modules: tutorial producer, task dispatcher, and feedback visualizer, all supported by a back-end skill assessment engine.

References

- Chandler, J., Paolacci, G., and Mueller, P. 2013. "Risks and Rewards of Crowdsourcing Marketplaces," in *Handbook of Human Computation*, New York: Springer, pp. 377-392.
- Estellés-Arolas, E., and González-Ladrón-de-Guevara, F. 2012. "Towards an Integrated Crowdsourcing Definition," *Journal of Information Science* (38:2), pp. 189-200.
- Finnerty, A., Kucherbaev, P., Tranquillini, S., and Convertino, G. 2013. "Keep it Simple: Reward and Task Design in Crowdsourcing," in *Proceedings of the Biannual Conference of the Italian Chapter of SIGCHI*, New York: Association for Computing Machinery, Article 14.
- Geiger, D., and Schader, M. 2014. "Personalized Task Recommendation in Crowdsourcing Information Systems—Current State of the Art," *Decision Support Systems* (65), pp. 3-16.
- Greengard, S. 2011. "Following the Crowd," *Communications of the ACM* (54:2), pp. 20-22.
- Hassan, U., and Curry, E. 2013. "A Capability Requirements Approach for Predicting Worker Performance in Crowdsourcing," in *Proceedings of the 9th IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing*, October 20-23, Austin, TX, pp. 429-437.
- Howe, J. 2008. "Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business," The International Achievement Institute.
- Kaganer, E., Carmel, E., Hirschheim, R., and Olsen, T. 2013. "Managing the Human Cloud," *MIT Sloan Management Review* (54:2), pp. 22-32.
- Kajino, H., Arai, H., and Kashima, H. 2014. "Preserving Worker Privacy in Crowdsourcing," *Data Mining and Knowledge Discovery* (28:5-6), pp. 1214-1335.

- Kittur, A., Nickerson, J. V., Bernstein, M. S., Gerber, E. M., Shaw, A., Zimmerman, J., Lease, M., and Horton, J. J. 2013. "The Future of Crowd Work," in *Proceedings of the 16th ACM Conference on Computer Supported Cooperative Work*, January 2013, San Antonio, Texas.
- Nakatsu, R. T., Grossman, E. B., and Lacovou, C. L. 2014. "A Taxonomy of Crowdsourcing Based on Task Complexity," *Journal of Information Science* (40:6), pp. 823-834.
- Osella, M. 2014. *A Multi-Dimensional Approach for Framing Crowdsourcing Archetypes*, unpublished Ph.D. Dissertation, Politecnico di Torino.
- Saito, S., Watanabe, T., Kobayashi, M., and Takagi, H. 2014. "Skill Development Framework for Micro-Tasking," in *Universal Access in Human-Computer Interaction: Universal Access to Information and Knowledge* (Volume 6, Part II), C. Stephanidis and M. Antona (eds.), New York: Springer International Publishing, pp. 400-409.
- Sarusua, C., and Thimm, M. 2013. "Microtask Available, Send Us Your CV!," in *2013 IEEE Third International Conference on Cloud and Green Computing*, pp. 521-524.
- Saxton, G. D., Oh, O., and Kishore, R. 2013. "Rules of Crowdsourcing: Models, Issues, and Systems of Control," *Information Systems Management* (30:1), pp. 2-20.
- Schenk, E., and Guittard, C. 2011. "Towards a Characterization of Crowdsourcing Practices," *Journal of Innovation Economics and Management* (1), pp. 93-107.
- Tarrell, A., Tahmasbi, N., Kocsis, D., Tripathi, A., Pedersen, J., Xiong, J., Oh, O., and de Vreede, G. J. 2013. "Crowdsourcing: A Snapshot of Published Research," in *Proceedings of the 19th Americas Conference on Information Systems*, Chicago.
- Vakharia, D., and Lease, M. 2013. "Beyond AMT: An Analysis of Crowd Work Platforms," *arXiv preprint* (arXiv:1310.1672).
- Zhao, Y., and Zhu, Q. 2014. "Evaluation on Crowdsourcing Research: Current Status and Future Direction," *Information Systems Frontiers* (16), pp. 417-434.
- Zogai, S., Bretschneider, U., and Leimeister, J. 2014. "Managing Crowdsourced Software Testing: A Case Study Based Insight on the Challenges of a Crowdsourcing Intermediary," *Journal of Business Economics* (84:3), pp. 375-405.

Appendix B

Research Methods

Survey Instrument

Survey on Crowdsourcing Work and Crowd Workers' Experience

Dear Crowd Workers – Thank you for taking the time to complete the survey. We value your input and the important roles you play in helping us understand crowdsourcing work and crowd workers.

Are you a Mechanical Turk Master? No Yes

1. What types of HITs do you usually take? The following lists the seven categories of HITS on Mechanical Turk. Please indicate the extent to which you work on them (Scales: Quite a lot; Somewhat; Very few; Not at all).
(1) Data Processing HITs; (2) Categorization HITs; (3) Sentiment HITs; (4) Tagging HITs; (5) Content HITs; (6) Business Feedback HITs; (7) Academic Survey HITs.
2. What skills are required to perform the jobs you have identified above on Mechanical Turk? Please describe.
3. What do you like about doing crowdsourcing jobs on Mechanical Turk? And why? Please illustrate with examples.
4. What would you like to change about doing crowdsourcing jobs on Mechanical Turk? And why? Please provide examples.
8. Does doing crowd sourcing jobs on the Mechanical Turk allow you to attain the work values that are important to you in your career? Why or why not?
9. What are your career goals? Describe the career pathway that is most attractive to you and most suitable to your work-life needs.
10. Does doing crowd sourcing jobs on Mechanical Turk allow you to meet your career goals? Why or why not? (If not, then please tell us why you are still working as a crowd worker.)
11. Overall, how satisfied are you with your crowdsourcing jobs on Mechanical Turk? Please explain.
12. What is your gender? Male Female
13. What is your age?
14. Which of the following best describes your highest achieved education level? (Select one)
() Some High School; () High School Graduate; () Some college, no degree
() Associates degree; () Bachelors degree; () Graduate degree (Master's, Ph.D., etc.)
For your highest education degree identified above, what is your Field of Study?
15. What is the total income of your household? (Select one)
() Less than \$25,000; () 25,000 - \$49,999; () \$50,000 - \$74,999;
() \$75,000 - \$99,999; () \$100,000 or More
16. What is your current employment status?
() Employed Full-Time; () Employed Part-Time; () Un-employed; () Other
17. How long (in months) have you been working as a crowd worker on Mechanical Turk?
18. On average, how many HITs do you usually take in a week on Mechanical Turk?
19. When do you usually schedule to work on the crowdsourcing jobs? And why?
20. On average, how many hours in a week do you spend on doing crowdsourcing work on Mechanical Turk?
21. Would you consider doing crowdsourcing work as your full-time job? Why or why not?
22. We welcome your feedback. Please use the space below if you have any additional comments or suggestions.

Table B1. Examples of Coding Discrepancies and Resolution

Examples	Initial Coding and Resolution of Coding Discrepancies
<p>“doing MTurk HITs indirectly helps in honing necessary skills I could later utilize to attain my goals”</p>	<p>During the initial coding, the two coders <i>disagreed</i> on their coding type: coder 1 considered it as “<i>empowerment – competence</i>” while coder 2 regarded it as “<i>value – Access</i>.”</p> <p>To resolve the issue, the two coders first discussed their rationale for the coding, and agreed the experience and feeling of empowerment is a product of presence of a value. In this case, the presence of the value “having access” led to the feeling of being empowered through gaining competence (e.g., “<i>honing necessary skills</i>”). Based on the discussion, the two coders reconciled the coding by agreeing that having access to opportunity is a necessary condition to empower the workers. They concluded that both the codes “access” value and “competence” empowerment should be included.</p>
<p>“I’m very satisfied with crowd sourcing jobs on MTurk. MTurk <u>allows me to choose the jobs I want to complete.</u> I only work on jobs that <u>offer an excellent wage and allow me to work on a job that encourages me to think about the subject matter</u> before responding to the questions asked.”</p>	<p>During the initial coding, the two coders both coded the statements “empowerment” but <i>disagreed</i> on their coding of the dimension of empowerment: coder 1 considered it “empowerment via <i>self-determination</i>” while coder 2 regarded it as “empowerment via <i>meaning</i>.”</p> <p>To resolve the coding on “empowerment via self-determination,” the coders reviewed the code definition and agreed that because the individual had a “choice,” there is thus empowerment via self-determination.</p> <p>To resolve the coding on “empowerment via meaning,” the two coders first discussed the code definition: “The job activities are personally meaningful to me” (e.g., important work for an individual; work that makes a person feel productive). However, the two coders read through the lines of the quote and decided that work choices enjoyed by a worker related directly to the nature of the work (e.g., “<i>encourage me to think about the subject matter</i>”) and compensation for the job (e.g., “<i>offers an excellent wage</i>”). Then the two coders realized that there exist multiple dimensions (subcategories) of “meaningful,” viz.: <i>economically meaningful</i>, <i>cognitively meaningful</i>, in addition to the previous single dimension of meaningful. As a result, the two coders agree to add the two new sub-categories to the meaningful dimension under empowerment and modified the coding scheme accordingly.</p>

Table B2. Worker Values and Distribution by Demographic Factors

Panel A. Crowd Worker Values by Employment Status											
Value	Employed FT (n = 76)		Employed PT (n = 55)		Other (n = 27)		Unemployed (n = 52)		Total (n = 210)		
	Count	%	Count	%	Count	%	Count	%	Count	%	
Access	74	97%	53	96%	27	100%	50	96%	204	97%	
Autonomy	70	92%	44	80%	22	81%	42	81%	178	85%	
Fairness	45	59%	32	58%	15	56%	35	67%	127	60%	
Transparency	25	33%	18	33%	5	19%	16	31%	64	30%	
Communication	19	25%	14	25%	8	30%	14	27%	55	26%	
Security	17	22%	10	18%	5	19%	11	21%	43	20%	
Accountability	12	16%	10	18%	6	22%	14	27%	42	20%	
Making an impact	13	17%	11	20%	3	11%	7	13%	34	16%	
Dignity	10	13%	3	5%	2	7%	9	17%	24	11%	

Panel B. Crowd Worker Values by Worker Gender						
Value	Female (n = 110)		Male (n = 100)		Total (n = 210)	
	Count	%	Count	%	Count	%
Access	109	99%	95	95%	204	97%
Autonomy	91	83%	87	87%	178	85%
Fairness	72	65%	55	55%	127	60%
Transparency	30	27%	34	34%	64	30%
Communication	27	25%	28	28%	55	26%
Security	23	21%	20	20%	43	20%
Accountability	19	17%	23	23%	42	20%
Making an impact	19	17%	15	15%	34	16%
Dignity	12	11%	12	12%	24	11%

Panel C. Crowd Worker Values by Worker Education Level												
Value	High School (n = 27)		Some college (n = 62)		Associate degree (n = 25)		Bachelor's degree (n = 73)		Graduate degree (n = 23)		Grand Total (n = 210)	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Access	27	100%	59	95%	25	100%	70	96%	23	100%	204	97%
Autonomy	26	96%	53	85%	20	80%	58	79%	21	91%	178	85%
Fairness	17	63%	39	63%	17	68%	45	62%	9	39%	127	60%
Transparency	4	15%	20	32%	8	32%	24	33%	8	35%	64	30%
Communication	1	4%	18	29%	3	12%	25	34%	8	35%	55	26%
Security	6	22%	11	18%	5	20%	14	19%	7	30%	43	20%
Accountability	2	7%	13	21%	3	12%	21	29%	3	13%	42	20%
Making an impact	4	15%	7	11%	6	24%	13	18%	4	17%	34	16%
Dignity	1	4%	7	11%	5	20%	9	12%	2	9%	24	11%

Table B2. Worker Values and Distribution by Demographic Factors (Continued)												
Panel D. Crowd Worker Values by Worker Household Income												
	Less than \$25,000 (n = 40)		\$25,000– \$49,999 (n = 82)		\$50,000– \$74,999 (n = 48)		\$75,000– \$99,999 (n = 23)		\$100,000 or More (n = 17)		Total (n = 210)	
Value	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Access	37	93%	81	99%	47	98%	22	96%	17	100%	204	97%
Autonomy	32	80%	71	87%	44	92%	16	70%	15	88%	178	85%
Fairness	23	58%	51	62%	30	63%	15	65%	8	47%	127	60%
Transparency	12	30%	23	28%	21	44%	6	26%	2	12%	64	30%
Communication	12	30%	24	29%	13	27%	4	17%	2	12%	55	26%
Security	11	28%	11	13%	12	25%	6	26%	3	18%	43	20%
Accountability	10	25%	14	17%	13	27%	3	13%	2	12%	42	20%
Making an impact	7	18%	15	18%	4	8%	4	17%	4	24%	34	16%
Dignity	6	15%	10	12%	5	10%	3	13%	0	0%	24	11%
Panel E. Crowd Worker Values by Worker Age Group												
	Age 18–24 (n = 45)		Age 25–30 (n = 51)		Age 31–40 (n = 46)		Age 41–50 (n = 45)		Age 51+ (n = 23)		Total (n = 210)	
Value	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Access	42	93%	51	100%	46	100%	42	93%	23	100%	204	97%
Autonomy	38	84%	41	80%	40	87%	40	89%	20	87%	178	85%
Fairness	22	49%	36	71%	28	61%	28	62%	13	57%	127	60%
Transparency	13	29%	15	29%	13	28%	16	36%	7	30%	64	30%
Communication	10	22%	12	24%	12	26%	15	33%	6	26%	55	26%
Security	7	16%	12	24%	8	17%	13	29%	3	13%	43	20%
Accountability	8	18%	11	22%	13	28%	7	16%	3	13%	42	20%
Making an impact	3	7%	12	24%	8	17%	9	20%	2	9%	34	16%
Dignity	3	7%	6	12%	4	9%	9	20%	2	9%	24	11%

Appendix C

The Nine Crowd Worker Values

The crowd workers surveyed shared a common set of key values in the CS work environment. Our data revealed a set of nine values that they shared, namely, *access*, *autonomy*, *fairness*, *transparency*, *communication*, *security*, *accountability*, *making an impact*, and *dignity*. These values are associated with the work-related expectations of the crowd workers, as they interacted with, and engaged in, CS work on MTurk.

Access

Crowd workers in our sample valued access to various jobs opportunities available on MTurk; the opportunity to earn extra income was the most frequently cited benefit of microtask CS. Yet, the value of access is multifaceted; it conveys different meanings to different workers. It provides a means of making income for those who are unable to conform to traditional workplace expectations due to certain life circumstances (e.g., stay-at-home parents, individuals with health problems):

I'm not able to be hired for a job outside the home due to my health condition. I must work from home. If I am too sick to work [on MTurk] a certain day, I don't have to worry about being fired for not working. If I can work extra [hours on

MTurk] another day, I do it when the work is available. (Male, 49 years; Some college education; Household income < \$25,000; Employment-Other: Disabled)

For some, CS was their only job option for making ends meet during periods of unemployment, creating an important, financial cushion for them and their families:

[CS] work is providing me money to pay monthly bills and helping me to dig out of the hole I was in from being out of work for so long. [MTurk] helps me to pay bills and buy groceries. It's necessary until I get another job that pays more. (Female, 45 years; Bachelor's degree; Household income \$25,000–\$49,999; Unemployed)

Autonomy

Crowd workers appreciated that MTurk provided them with flexibility and freedom in making job-related decision (e.g., deciding what tasks to take on, and how, where, and when to perform the tasks). While some enjoyed the total control over their work schedule on MTurk (e.g., scheduling HITs at their own pace instead of constrained by the 9 to 5 time frame), others appreciated the freedom in their choices of tasks. As one worker put it:

I enjoy being able to choose what I'll work on. I have chosen assignments based purely on pay and profitability and... because the subject matter was interesting to me or for a good cause. (Female, 45 years; Bachelor's degree; Household income \$25,000–\$49,999; Employed full-time)

Fairness

Crowd workers also valued fairness in being compensated and treated in conducting microtask CS. Our data analysis revealed a perception of a *lack* of fairness in microtask compensation, however. While most of the respondents appreciated the fact that they could obtain monetary compensation (“The best thing about doing [CS] jobs on [MTurk] is getting paid”) the same individuals felt they were unfairly compensated and sometimes unfairly treated by job requesters.

I think all requesters should put HITs at a minimum of [a] \$6/hr rate or more. For example, a survey that takes 10 minutes but only pays 20 cents is ridiculous! (Male, 18 years; Some college education; Household income \$75,000–\$99,999; Unemployed)

In addition to the unfair pay rates, some crowd workers also perceived unfairness in MTurk's evaluation of workers (i.e., MTurk's Master Qualification program). Moreover, some crowd workers felt that they were being unfairly treated by job requesters who rejected their work without clear reasons.

Transparency

Open and transparent work standards and protocols in microtask CS are appreciated by the crowd workers in our sample. To some extent, the value of transparency is embedded in the open sourcing form of work because each HIT published on MTurk includes a brief job description, instructions, time requirements, and payment amount. However, sometimes, workers felt they were blind to the process and their job performance, for example:

I would change how requesters are reviewed and rated so that Turkers like myself can avoid bad requesters and do quality work for the ones that are worth it. For example, as of now, we can't see ratings of [requesters] on the site, and last month I was rejected unfairly by a requester [who] just wanted to keep the work and not pay...so we're "blind" and can't know that a requester can potentially reject our content. Having a rating platform (like Turkopticon) benefits everyone working for the site. (Male, 25 years; Bachelor's degree, Household income \$25,000–\$49,999; Employed full-time)

Because this lack of transparency was related to MTurk's management of the CS process, there was a call for MTurk to establish governance structures to enforce standards that are clear and understandable by both workers and job requesters. For example, to improve transparency and job feedback in the CS marketplace, some crowd workers urged MTurk to establish a requester screening/evaluation system. Because of the lack of a systematic reputation mechanism for requesters on MTurk, workers relied on off-site, third party reputation systems. Turkopticon (www.turkopticon.com) mentioned above is one such site that allows workers to rate job requesters on four aspects (communicativity,

generosity, fairness, and promptness), thus enabling workers to learn about the reputations of job requesters before deciding to work for them. Building such a reputation system on the MTurk site itself would be greatly appreciated by the workers.

Communication

Crowd workers expressed their desire for direct and open communication with job requesters so as to be informed about their job outcomes and to reduce the risk of potential disputes. Their desire to receive job feedback grew stronger when their payments were rejected without reason because each rejection received negatively impacts efforts to attain Master status. As one worker urged:

I'd like to see better communication between requesters and workers. Amazon doesn't get involved in disputes or misunderstandings between workers and requesters. For the most part, the requesters who I have needed to contact have been polite and have made a point to respond to me, which I appreciate. (Female, 28 years; Some college education; Household income \$50,000–\$74,999; Unemployed)

However, most workers found the existing communication tools on MTurk insufficient because the tools did not facilitate their interaction with job requesters in order to clarify a HIT or check a job outcome. In such cases, crowd workers worked around MTurk's communication tools by directly e-mailing a job requester to clarify a HIT and to avoid a potential rejection, as a stay-at-home mom has done in her urgent email to a job requester:

My daughter just hit the enter key on me early! I was in the middle of answering question number [xx]. Please! Please! Please! Is there a way I can get back into the survey?? I really need to complete it and earn the money. (Female, 23 years; Associate degree; Household income \$25,000–\$49,999; Employment-Other: Stay-at-home Mom)

Security

A CS work environment that provides assurance, safety, and reduces work disruptions is highly desirable. Some crowd workers perceived the CS job on MTurk a secure one as they perceived MTurk less likely of “going bankrupt.” Nevertheless, lack of job security is one of the most prevalent feelings shared by crowd workers. This is often due to task scamming, which causes disruption in pay and a potential threat in undermining the crowd workers' efforts and reputation:

I would like MTurk to be more protective of workers—we get scammed a lot. Say you spend 30 minutes filling out a survey, but after you submit your answers, you get no completion code to get paid. They have their data and you get nothing. (Female, 43 years; High school graduate; Household income \$75,000–\$99,999; Employment-Other: Stay-at-home mom)

Accountability

Crowd workers hope that the actions of people or institutions be traced uniquely to individual workers and job requesters so that crowd workers and job requesters be held responsible for their work and behavior. As indicated by some respondents, the current design of the MTurk platform rarely held job requesters accountable for their behavior; for example:

The pay should be adjusted to at least minimum wage levels for all jobs because often requesters lie about pay in order to get you invested in their HITs. Requesters should be held accountable for their shortcomings/unethical behavior because too often they abuse a system that does not care. (Male, 24 years; Bachelor's degree; Household income \$75,000–\$99,999; Employed part-time)

Making an Impact

The desire to contribute to the community and to have a positive impact on other people's lives is shared by crowd workers. In such a large online labor marketplace, as is the case with CS, individual workers become part of a community where they have opportunities to influence others via their work. The fulfillment of this social need is enabled by the MTurk platform. In particular, the value of making an impact can be supported by performing certain types of micro tasks, such as research-related, survey HITs. As one worker explained:

[Working on academic surveys] gives me a sense of pride knowing that I'm helping the research community by assisting them with data collection. For example, I really enjoy surveys that are noted as being for Master's or Doctoral research, because I know that someone is working to not only provide new, insightful research to the world, but to also better themselves. (Male, 30 years; Bachelor's degree; Household income \$75,000–\$99,999; Employed part-time)

Dignity

Crowd workers value a sense of pride in self. This desire for dignity (pride and respect) is illustrated in the following two remarks. Whereas the first worker felt that his work was valued and respected by his job requester, the second worker held a different view:

Some requesters actually value our input highly, and they compensate accordingly. Some actually "get it" that there are many of us who are doing this to keep the lights on. (Male, 49 years; Some college education; Household income < \$25,000; Unemployed)

I don't feel like there is enough respect for workers. For example, someone might offer \$0.50 for an hour's worth of work. Requesters can often be ignorant of the ins and outs of MTurk and this can lead to unwarranted rejects. (Male, 34 years; Bachelor's degree; Household income \$50,000–\$74,999; Employed full-time)

In sum, the CS platform on MTurk mostly fulfills workers' values in relation to access, autonomy, and making an impact. This is so because the platform offers people from all walks of life free access to micro tasks and provides them with control over their CS job decisions. The remaining value categories were found to be partially supported, or in some cases, rarely supported.

Appendix D

The Four Cognitions of Empowerment

Table D1. The Four Cognitions of Empowerment Experienced by Crowd Workers

Employment Status						
Empowerment	Employed Full-time (n = 76)	Employed Part-time (n = 55)	Employment Other (n = 27)	Unemployed (n = 52)	Total (n = 210)	
Meaning	97%	96%	96%	94%	96%	
Self-Determination	93%	80%	81%	81%	85%	
Impact	16%	20%	11%	13%	16%	
Competence	14%	15%	22%	12%	15%	
Educational Level Attained						
Empowerment	High School Graduate (n = 26)	Some College Education (n = 62)	Associate Degree (n = 25)	Bachelor's Degree (n = 73)	Graduate Degree (Master's; Doctorate) (n = 23)	Total (n = 210)
Meaning	100%	95%	100%	96%	96%	96%
Self-Determination	100%	87%	80%	79%	91%	85%
Impact	15%	11%	24%	16%	17%	16%
Competence	19%	11%	4%	18%	22%	15%

Note: Percentages relate to the proportion of the total number of workers (listed as n in the column heading) in each category.

Table D2. Associations Between Worker Values and Forms of Empowerment

Value\Empowerment	Self-Determination	Meaning	Impact	Competence	Total Workers Who Expressed the Value
Access	166 (81.4%)	202 (99.3%)	44 (21.4%)	34 (16.6%)	204
Autonomy	178 (100%)	117 (65.7%)	21 (11.8%)	25 (14.0%)	178
Fairness	109 (85.8%)	91 (71.7%)	25 (19.7%)	23 (18.1%)	127
Transparency	56 (87.5%)	47 (73.4%)	10 (15.6%)	7 (10.9%)	64
Communication	49 (89.1%)	35 (63.6%)	8 (14.5%)	6 (10.9%)	55
Security	37 (86.0%)	31 (72.1%)	10 (23.3%)	12 (27.9%)	43
Accountability	34 (81.0%)	31 (73.8%)	8 (19.0%)	8 (19.0%)	42
Making an Impact	22 (64.7%)	32 (94.1%)	33 (97.1%)	7 (20.6%)	34
Dignity	18 (75.0%)	17 (70.8%)	2 (8.3%)	1 (4.2%)	24

Note: The % in the brackets are the percentage of the row total; it represents the percentage of all workers sharing the same value that experienced a certain form of empowerment.

Appendix E

The Four Types of Marginalization

Table E1. The Four Types of Marginalization Experienced by Crowd Workers

Employment Status						
Marginalization	Employed Full-time (n = 76)	Employed Part-time (n = 55)	Employment Other (n = 27)	Unemployed (n = 52)	Total (n = 210)	
(1) Economic	59%	58%	56%	67%	60%	
(2) Institutional policies and practices	33%	40%	37%	42%	38%	
(3) Institutional technical features	16%	22%	37%	27%	23%	
(4) Competence	12%	4%	27%	10%	9%	
Educational Level Attained						
Marginalization	High School Graduate (n = 26)	Some College Education (n = 62)	Associate Degree (n = 25)	Bachelor's Degree (n = 73)	Graduate Degree (Master's, Ph.D.) (n = 23)	Total (n = 210)
(1) Economic	65%	63%	68%	62%	39%	60%
(2) Institutional policies and practices	31%	42%	36%	34%	48%	38%
(3) Institutional technical features	31%	23%	20%	21%	26%	23%
(4) Competence	8%	10%	8%	4%	22%	9%

Note: Percentages relate to the proportion of the total number of workers (listed as n in the column heading) in each category.

Table E2. Associations Between Worker Values and Forms of Marginalization

Value/Marginalization	Economical	Institutional Governance	Technical Artifact	Competence	Total Workers Who Expressed the Value
Access	103 (50.3%)	79 (38.6%)	52 (25.5%)	14 (6.9%)	204
Autonomy	83 (46.1%)	69 (38.8%)	39 (21.9%)	17 (9.6%)	178
Fairness	98 (77.2%)	58 (45.7%)	36 (28.3%)	7 (5.5%)	127
Transparency	27 (42.2%)	49 (76.6%)	26 (40.6%)	6 (9.4%)	64
Communication	20 (36.4%)	41 (74.5%)	20 (36.4%)	7 (10.9%)	55
Security	23 (53.5%)	31 (72.1%)	20 (46.5%)	7 (16.3%)	43
Accountability	22 (52.4%)	40 (95.2%)	21 (50.0%)	4 (9.5%)	42
Making an Impact	21 (61.8%)	15 (44.1%)	12 (35.3%)	1 (2.9%)	34
Dignity	17 (70.8%)	10 (41.7%)	4 (16.7%)	2 (8.3%)	24

Note: The percentages in the brackets are the percentage of the row total; it represents the percentage of all workers sharing the same value that experienced a certain form of marginalization.

Appendix F

Distribution of Crowd Workers Experiencing the Duality of Empowerment and Marginalization

Those CS workers who attained a sense of self-fulfillment from their work tended to feel empowered, while those experiencing unfair compensation had a strong sense of economic marginalization. Among all of the 210 respondents, 58 percent of them simultaneously felt empowered because of doing meaningful CS work and felt that the rates of pay were low (*economic marginalization*), as shown in Table F1.

Table F1. Duality: Four Types of Empowerment Versus Four Types of Marginalization

Empowerment	Marginalization				Total
	Economic	Institutional Technical Features	Institutional Policies and Practices	Competence	
Meaning	121 (58%)	46 (22%)	75 (36%)	14 (7%)	202 (96%)
Self-Determination	109 (52%)	39 (19%)	69 (33%)	17 (8%)	179 (85%)
Impact	25 (12%)	12 (6%)	15 (7%)	1 (0.5%)	33 (16%)
Competence	23 (11%)	14 (7%)	15 (7%)	3 (1%)	31 (15%)
Total	127 (60%)	48 (23%)	79 (38%)	18 (9%)	210 (100%)

Note: The percentages in the brackets are the percentage of the total 210 respondents.

The duality experienced by the majority of the crowd workers we surveyed is distributed relatively evenly across the demographic factors we measured. For the most part, duality is experienced reasonably uniformly between workers of different gender (Women: 72%; Men: 68%); among workers with varying levels of education (High school graduate: 77%; Some college education: 77%; Associate degree: 80%; Bachelor's degree: 66%; graduate degree: 48%); workers with different employment statuses (Full-time: 71%; Part-time: 65%; Other: 63%; Unemployed: 77%); workers from different age groups (Aged 18–24: 62%; 25–30: 84%; 31–40: 65%; 41–50: 69%; 51+: 65%), and workers with diverse household income levels (<\$25,000: 75%; \$25,000–\$49,999: 72%; \$50,000–\$74,999: 73%; \$75,000–\$99,999: 70%; \$100,000+: 41%).

Table F2. Distribution of Crowd Workers with Duality (n = 147)						
Gender	Female	Male	Total			
Employees w/duality	79	68	147			
Total Employees	110	100	210			
% of Duality Cases	72%	68%	70%			
Employment Status	Employed Full-Time	Employed Part-Time	Other	Unemployed	Total	
Employees w/duality	54	36	17	40	147	
Total Employees	76	55	27	52	210	
% of Duality Cases	71%	65%	63%	77%	70%	
Education Level	High School Graduate	Some college	Associate degree	Bachelor's degree	Graduate degree (Master's, Ph.D.)	Total
Employees w/duality	20	48	20	48	11	147
Total Employees	26	62	25	73	23	210
% of Duality Cases	77%	77%	80%	66%	48%	70%
Age Group	Age 18–24	Age 25–30	Age 31–40	Age 41–50	Age 51+	Total
Employees w/duality	28	43	30	31	15	147
Total Employees	45	51	46	45	23	210
% of Duality Cases	62%	84%	65%	69%	65%	70%
Household Income	Less than \$25,000	\$25,000–\$49,999	\$50,000–\$74,999	\$75,000–\$99,999	\$100,000 or More	Total
Employees w/duality	30	59	35	16	7	147
Total Employees	40	82	48	23	17	210
% of Duality Cases	75%	72%	73%	70%	41%	70%

We also examined those respondents who only expressed feelings of empowerment and found that those cases were almost uniformly distributed across each of the demographic categories with the exception of household income greater than \$100,000 and education background with graduate degree. This is reflected in Table F3.

Table F3. Distribution of Crowd Workers with Empowerment Only (n = 61)

Gender	Female	Male				
Empowerment Only	30	31	61			
Total Respondents	110	100	210			
% of Empower-Only	27%	31%	29%			
Employment Status	Employed Full-Time	Employed Part-Time	Other	Unemployed	Total	
Empowerment Only	22	18	10	11	61	
Total Respondents	76	55	27	52	210	
% of Empower-Only	29%	33%	37%	21%	29%	
Education Level	High School Graduate	Some college education	Associate degree	Bachelor's degree	Graduate degree (Master's, Ph.D.)	Total
Empowerment Only	7	14	5	24	11	61
Total Respondents	26	62	25	73	23	210
% of Empower-Only	27%	23%	20%	33%	48%	29%
Age Group	Age 18–24	Age 25–30	Age 31–40	Age 41–50	Age 51+	Total
Empowerment Only	16	8	15	14	8	61
Total Respondents	45	51	46	45	23	210
% of Empower-Only	36%	16%	33%	31%	35%	29%
Household Income	Less than \$25,000	\$25,000–\$49,999	\$50,000–\$74,999	\$75,000–\$99,999	\$100,000 or More	Total
Empowerment Only	10	23	13	6	9	61
Total Respondents	40	82	48	23	17	210
% of Empower-Only	25%	28%	27%	26%	53%	29%

Appendix G

Ethical Considerations and the Design of Microtask CS: A Research Agenda

Gregor and Hevner (2013), in their recent paper, state that useful knowledge of design science research can be divided into two distinct types: *descriptive* and *prescriptive* knowledge. The descriptive is the *what* knowledge about phenomena, whereas prescriptive knowledge is the *how* knowledge of building artifacts. They argue that both types of knowledge are required to build a comprehensive knowledge base for a particular design science research domain. We contribute to design science research by extending the descriptive body of knowledge about the ethical design and use of microtask CS. This knowledge can be applied in the conduct of future studies that can help develop prescriptive knowledge about building new (and/or refining the existing) microtask CS artifacts.

In addition, the worker values and CS platform structures uncovered in this study lay the groundwork for future research. Specifically, this work could help advance ethical considerations in the design of microtask CS platforms. We propose two kinds of analysis that can be conducted to further this work, based on the practical suggestions provided in the VSD literature (Friedman et al. 2008). First, future research can conduct value-driven investigations on microtask crowdsourcing platforms where a more detailed and nuanced tripartite analysis is done on each value. Second, a similar, structure-driven analysis can be undertaken by focusing on one of the four structures where the values are implicated. We should point out that VSD also suggests a third kind of analysis, which is tool-driven, where the focus is on investigating a tool using the three-part analysis (such as a software application for batch processing of micro tasks on MTurk). However, we believe that such an analysis overlaps with the technical investigations of value- and/or structure-driven analysis. In addition, VSD instructs the use of direct stakeholders (in our case, crowd workers, requestors, MTurk) and indirect stakeholders (people whose jobs are being crowd sourced or who are excluded from this environment because of the digital divide) while conducting design investigations. Given our study's focus on crowd workers' views, we propose future research that is based on this perspective. The aforementioned two research approaches, together with some potential broad research questions, are discussed below.

Value-Driven Analysis: The process of value-driven analysis through a series of iterative studies is well-articulated in the VSD literature. For instance, Friedman’s studies on informed consent in online transactions (Friedman, Felten, Millett 2000; Friedman, Howe, and Felten 2002; Friedman, Kahn, and Howe 2000; Friedman and Millett 1995; Millett et al. 2001) provide good guidance on how research through value driven investigations can unfold. Table G1 presents some of the key macro-level research problems, providing a template for future work. The conceptual value-driven investigations entail a review of relevant literature. In particular, “the philosophical ontological literature can help provide criteria for what a value is, and thereby how to assess it empirically” (Freidman et al. 2008, p. 89). The empirical investigations test the human response to value conceptualizations by eliciting the perspectives of the key stakeholders using methodologies prescribed by the social sciences. The technical investigations assess how a value is implicated (through retrospective analysis) or can be implicated (through prospective designs) in technological properties and underlying mechanisms.

Structure-Driven Analysis: As illustrated in Table G2, the structure-driven investigations can begin at one of the four structures (microtask, governance, compensation, technology) where the values are embodied. For each of these structures, a conceptual, empirical, and technical analysis can be conducted to propose designs that empower workers with minimum marginalization. While value-driven analysis is well articulated in the VSD literature, the guidance on structure-driven analysis is less clear. Here, we detail how future research can build on the empirical investigation conducted in this study.

Table G1. Future Potential Value-Driven Investigations of Microtask Crowdsourcing Platforms			
Values	Conceptual Investigations	Empirical Investigations	Technical Investigations
	Unit of Analysis: Value Concept Objective: Entails philosophical and theoretical investigation of a value through the lenses of ethical philosophies and past theories/literature relevant to microtask CS.	Unit of Analysis: Humans Objective: Entails examining the human response to a value in the context of microtask CS platforms through social science research methodologies such as surveys, interviews, observations.	Unit of Analysis: Technology Objective: Entails retrospective analysis of current microtask CS technologies to assess the nature of value implications and/or building new prospective designs to implicate a value in these platforms.
Access	Provide more detailed and nuanced working conceptualizations derived from the literature for each of the values revealed by the crowd workers.	Examine the comprehensiveness and completeness of these derived values. Are there additional values that were not revealed in this research?	Examine how existing technological properties and underlying mechanisms and tools support or hinder a human value.
Accountability			
Autonomy			
Communication	Clarify fundamental issues underpinning in the values revealed by the crowd workers in a manner that provides a basis for comparing results across research studies.	Study how workers prioritize competing values while engaging in crowd work.	Conduct retrospective analyses of current tools and technologies to examine the extent to which the values uncovered in this work are implicated in various microtask CS platforms.
Dignity			
Fairness			
Making an impact			
Security	Provide guidelines to resolve value conflicts (empowerment and marginalization) to arrive at trade-offs among competing values.		Proactively design proof of concept for systems to support values identified in our investigation.
Transparency			

Table G2. Future Potential Structure-Driven Investigations of Microtask Crowdsourcing Platforms

Values	Conceptual Investigations	Empirical Investigations	Technical Investigations
	Unit of Analysis: Structure Objective: Entails philosophical and theoretical investigation of values through the lenses of ethical philosophies and past theories/literature relevant to a particular structure.	Unit of Analysis: Humans Objective: Entails examining the human response to values embodied in the structure through social science research methodologies such as surveys, interviews, observations.	Unit of Analysis: Technology Objective: Entails examining how existing technological properties & underlying mechanisms used to build a certain structure support or hinder human values.
Microtask Structure	Use work/job design, job crafting; motivation, batch design and processing theories to conceptualize design components for this structure that help in realizing the values important to the crowd workers.	Examine how the posited conceptual microtask designs, once implicated in supporting technologies, are received by the crowd workers.	Proposes new tools and technologies to apprehend crowd worker values relevant to the microtask structure.
Governance Structure	Use procedural justice theories, agency theories; dispute resolution literature to conceptualize design components for this structure that help in realizing the values important to the crowd workers.	Examine how the posited conceptual designs for governance, once implicated in supporting technologies, are received by the crowd workers.	Proposes new tools and technologies to apprehend crowd worker values relevant to the governance structure.
Compensation Structure	Use distributive justice theories, equity theories to conceptualize design components for this structure that help in realizing the values important to the crowd workers.	Examine how the posited conceptual designs for compensation, once implicated in supporting technologies, are received by the crowd workers.	Proposes new tools and technologies to apprehend crowd worker values relevant to the compensation structure.
Technology Structure	Use work pattern literature, such as preference theory, boundary-less careers, computer-mediated work literature to conceptualize platform designs that could adapt to a variety of work pattern preferences.	Examine how the posited conceptual designs for technology, once implicated in supporting technologies, are received by the crowd workers.	Conduct value suitability analysis to evaluate the limits of IT in empowering and managing marginalization; identifying those values that can realistically be implicated in the technology.

Our empirical assessment suggests that the microtask structure provides work pattern flexibility by affording workers with the freedom to choose *where*, *how* and *when* they work, whereas task design focuses on *what* they work on. Our results also show that crowd workers' task preferences differ. Some look for tasks that meet their prosocial needs, which make them feel that they are having a positive impact on society, whereas others look for tasks that fulfill their growth needs (skill variety); for example, while they are in midst of career transitions (through job loss, career changes, elderly or child care responsibilities, etc.) or desire to qualify for MTurk's Master program. Future work needs to focus on conceptual investigations of this structure by leaning on current theoretical perspectives in this area, such as job enrichment (Oldman and Hackman 2010); job crafting (Berg et al. 2010); batch design and processing (Laguna and Marklund 2013). The job enrichment literature shows that certain task characteristics, such as task variety, task identity, and task significance, can help empower workers by fulfilling their values (Hackman and Oldham 1975, 1976). Therefore, future technical investigations could build on job enrichment theories by generating ways of crafting CS tasks (Wrzesniewski and Dutton 2001) that empower workers and prevent requesters from following a Taylorist-style doctrine (Taylor 1911), slicing and dicing jobs into micro tasks with the sole goal of gaining efficiencies and control.

The findings arising from this study illustrate that crowd worker responses to MTurk's governance structure were less favorable and thus account for a considerable portion of feelings of marginalization. While crowd workers appreciate control over their work patterns and the nature of tasks they perform, they are less appreciative of the lack of sensitivity toward fair and transparent governance processes and policies.

embodied in the CS platform. This displeasure is often a result of not having an avenue to voice complaints and resolve disputes with the requesters. The crowd workers who responded to our survey expressed the need for design features in the CS platform that would allow them to protect themselves from requesters that have a bad reputation (task scams, missed payments, low pay). In addition, they also desired on the CS platform digitized mechanisms that would not only allow them to communicate directly and openly with the requesters, but also support fair dispute resolution. Future design investigations should be sensitive to the issues that help reduce uncertainty and provide greater predictability as to how crowd workers' performance is evaluated. Future conceptual investigations could derive conceptualizations from justice theory (Rawls 1971) and related organizational justice theories (Gilliland et al. 2001) that focus on procedural justice to inform prospective future technical investigations whose aim is to design governance structures for microtask CS platforms that mitigate the marginalization of crowd workers. Future work could also conduct retrospective technical investigations of tools and applications currently built into microtask CS platforms.

Similar to the governance structure, the compensation structure was salient to crowd workers' perceptions of marginalization. In addition to fair and transparent processes, crowd workers are also sensitive about equitable, transactional practices that ensure just allocation of compensation for task completion. Our respondents voiced concerns regarding payments and compensation that did not dignify their work efforts. Many tasks did not even meet the minimum wage rate. Moreover, there were no payment guarantees upon task completion in certain instances. Future investigations could help conceptualize compensation and payment procedures and regulations that ensure a fair distribution of wealth generated within the crowdsourcing markets that would collectively benefit the workers, the requesters, and the platform owners. These conceptualizations can then be used to conduct future empirical and technical investigations. In the absence of such procedural and regulatory design options, these marketplaces will likely provision a race to the bottom where governments, in the name of a free market economy, could well cut back on regulation and enforcement of decent working conditions in order to lower labor costs. Future conceptual investigations could derive design specifications from equity theory (Adams 1965) and related organizational justice theories (Cowherd and Levine 1992) that focus on distributive justice, and not just focus research on common labor economic issues of reservation wage; in other words, the smallest wage a worker is willing to accept for a task (e.g., Horton and Chilton 2010).

Unlike governance and compensation structures, the technology structure was viewed favorably by the crowd workers in our study. One of the principle features germane to this kind of CS work environment is the free and open access to online jobs. This technological feature broadens labor force participation by allowing nontraditional labor (such as stay-at-home parents, the unemployed, the physically impaired, retirees) to remain actively engaged in the labor market. This nontraditional labor force is turned away from traditional labor markets not because they are unwilling or unable to work, but rather because traditional forms of work are incongruent, and therefore in conflict, with their life circumstances or choices (Muffels 2005; Muffels and Luijkx 2005). Although the current CS platform mostly empowers crowd workers by fulfilling the values of autonomy and access, there is still room for improvement. It seems there is a greater amount of flexibility in workers choosing *where* they work (at home, in transit, in a café), and *how* they work (no dress code, how they sequence their tasks), but there are still constraints on *when* they work. For instance, one stay-at-home parent wished to have greater flexibility in task scheduling, noting that the short times allotted on HITs prevented her from accepting those tasks that she would like to conduct because they conflict with her child care responsibilities. Thus, conceptual investigations could help in formulating empirical investigations and testing technical designs that further adapt to work patterns congruent with this diverse workforce. Future design research could achieve this by building on the work pattern literature, such as preference theory (Hakim 2000) and boundaryless careers (Arthur and Rousseau 1996) to develop such conceptualizations. This structure would also benefit from literature on computer-mediated work, which could help in deriving value suitability analysis of CS platforms to recognize what value can be implicated in the technology and, more importantly, what cannot be implicated as this would limit the platform's ability to empower and manage marginalization.

References

- Adams, J. S. 1965. "Inequity in Social Exchange," in *Advances in Experimental Psychology*, L. Berkowitz (ed.), New York: Academic Press, pp. 267-299.
- Arthur, M. B., and Rousseau, D. M. (eds.). 1996. *The Boundaryless Career: A New Employment Principle for a New Organizational Era*, Oxford, UK: Oxford University Press.
- Berg, J. M., Wrzesniewski, A., and Dutton, J. E. 2010. "Perceiving and Responding to Challenges in Job Crafting at Different Ranks: When Proactivity Requires Adaptivity," *Journal of Organizational Behavior* (31:2-3), pp. 158-186.
- Cowherd, D. M., and Levine, D. I. 1992. "Product Quality and Pay Equity Between Lower-Level Employees and Top Management: An Investigation of Distributive Justice Theory," *Administrative Science Quarterly* (37:2), pp. 302-320.
- Friedman, B., Felten, E., and Millett, L. I. 2000. "Informed Consent Online: A Conceptual Model and Design Principles," CSE Technical Report 2000-12-2, University of Washington.
- Friedman, B., Howe, D. C., and Felten, E. 2002. "Informed Consent in the Mozilla Browser: Implementing Value-Sensitive Design," in *Proceedings of the 35th Annual Hawaii International Conference on System Science*, Los Alamitos, CA: IEEE Computer Society.

- Friedman, B., Kahn Jr., P. H., and Borning, A. 2008. "Value Sensitive Design and Information Systems," in *The Handbook of Information and Computer Ethics*, K. Himma and H. Tavani (eds.), Hoboken, NJ: Wiley, pp. 69-102.
- Friedman, B., Kahn, Jr., P. H., and Howe, D. C. 2000. "Trust Online," *Communications of the ACM* (43:12), pp. 34-40.
- Friedman, B., and Millett, L. 1995. "It's the Computer's Fault—Reasoning About Computers as Moral Agents," in *Conference Companion of the Conference on Human Factors in Computing Systems*, New York: Association for Computing Machinery Press, pp. 226-227.
- Gilliland, S., Steiner, D. D., and Skarlicki, D. (eds.). 2001. *Theoretical and Cultural Perspectives on Organizational Justice*, Charlotte, NC: Information Age Publishing.
- Gregor, S., and Hevner, A. R. 2013. "Positioning and Presenting Design Science Research for Maximum Impact," *MIS Quarterly* (37:2), pp. 337-356.
- Hackman, J. R., and Oldham, G. R. 1975. "Development of the Job Diagnostic Survey," *Journal of Applied Psychology* (60:2), pp. 159-170.
- Hackman, J. R., and Oldham, G. R. 1976. "Motivation Through the Design of Work: Test of a Theory," *Organizational Behavior and Human Performance* (16:2), pp. 250-279.
- Hakim, C. 2000. *Work-Lifestyle Choices in the 21st Century: Preference Theory*, Oxford, UK: Oxford University Press.
- Horton, J. J., and Chilton, L. B. 2010. "The Labor Economics of Paid Crowdsourcing," in *Proceedings of the 11th ACM Conference on Electronic Commerce*, Boston, June 7-11, pp. 209-218.
- Laguna, M., and Marklund, J. 2013. *Business Process Modeling: Simulation and Design*, Boca Raton, FL: CRC Press.
- Millett, L. I., Friedman, B., and Felten, E. 2001. "Cookies and Web Browser Design: Toward Realizing Informed Consent Online," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, New York: ACM.
- Muffels, R. 2005. "Labour Market Mobility and Empowerment Patterns," Position Paper Workpackage 3: Researching Labour Market Transitions in European Welfare Regimes, Amsterdam: SISWO/Social Policy Research.
- Muffels, R. J. A., and Luijkx, R. 2005. "Job Mobility and Employment Patterns across European Welfare States: Is There a 'Trade-Off' or a 'Double Bind' Between Flexibility and Security?," TLM.NET 2005 Working Paper No. 2005-13, SISWO/Social Policy Research, Amsterdam.
- Oldham, G. R., and Hackman, J. R. 2010. "Not What it Was and Not What it Will Be: The Future of Job Design Research," *Journal of Organizational Behavior* (31:2-3), pp. 453-479.
- Rawls, J. 1971. *A Theory of Justice*, Cambridge, MA: The Belknap Press.
- Taylor, F. W. 1911. *Principles of Scientific Management*, New York: Harper
- Wrzesniewski, A., and Dutton, J. E. 2001. "Crafting a Job: Revisioning Employees as Active Crafters of Their Work," *The Academy of Management Review* (26:2), pp. 179-201.