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### Title

Difference and Dependence among Digital Workers: The Case of Amazon Mechanical Turk

### Permalink

<https://escholarship.org/uc/item/6xk920pj>

### Journal

South Atlantic Quarterly, 114(1)

### ISSN

0038-2876

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### Publication Date

2015

### DOI

10.1215/00382876-2831665

Peer reviewed

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Difference and Dependence  
among Digital Workers:  
The Case of Amazon Mechanical Turk

In 2006, Jeff Bezos launched a new form of computer technology. Amazon.com, Inc. had used the technology as a form of “artificial artificial intelligence”—data processing that could classify images, sounds, and texts automatically while still seizing on cultural nuances like humor, sexuality, and linguistic dialects. The service was part of Amazon Web Services, marketed alongside S3 and EC2—just-in-time server space and computational cycles available to programmers through routine acts of coding. Bezos explained the new technology—the artificial artificial intelligence—as “humans-as-a-service.” That service was Amazon Mechanical Turk (AMT).

The secret of AMT was not a feat of computer engineering, statistics, or algorithms. In fact, AMT was born out of the failures of artificial intelligence to meet the needs of internet companies seeking to expand the domain of the data they could store, classify, and serve up online. Rather, AMT offered a virtual marketplace where workers with computers and internet connections all over the world could flexibly complete data-processing tasks around the clock. Employers seeking quick-turnaround data processing no longer had to hire more employees or even contract with an outsourcing firm; they would not even have to meet their employees, either online or face-to-face. They could simply place their data-processing tasks online, set a price for each task, and design algorithms to receive, validate, and integrate workers’ processed data into computer systems. The system allowed for a kind of massively mediated microlabor—large volumes of small, independent tasks distributed to large groups of workers.

*The South Atlantic Quarterly* 114:1, Winter 2015  
DOI 10.1215/00382876-2831665 © 2014 Duke University Press

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1       Despite Bezos' declaration of this technology's novelty, largescale  
2 microlabor is not itself new. For a long time, homeworkers have, for instance,  
3 translated documents through correspondence; a company called *DialAmerica*  
4 paid homeworkers for each phone number they verified. Poorly compen-  
5 sated data work has been the foundation of this information economy, from  
6 telegraph messenger boys to online chatroom moderators (Downey 2014;  
7 Scholz 2012; Schmidt 2011; Terranova 2000).

8       Compared to these prior modes of data work, however, IT microwork  
9 platforms allow for the distribution, collection, and processing of data work  
10 at high speeds and large scales. Instead of hiring hundreds of homeworkers  
11 for a few weeks, a single person can hire sixty thousand workers for two  
12 days. This shift in speed and scale produces a qualitative change in which  
13 human workers come to be understood as computation. Employers delegate  
14 the management of these workers to algorithms, pushing labor relations  
15 into the server and out of the manager's work day. AMT is part of a larger  
16 class of microlabor platforms (e.g., CloudFactory, MobileWorks, and Crowd-  
17 Flower); these platforms provide algorithms, payments transfer, and web-  
18 sites where employers can place tasks, set prices or collect bids and then elec-  
19 tronically receive the results of the work. These systems are sometimes  
20 glossed as "crowdsourcing." A whole subfield of computer science has  
21 sprung up around these forms of data microwork and emerging strategies of  
22 technologically mediated management. The field, human computation, inte-  
23 grates the capacities of human workers located all over the world under the  
24 rubric of computational resources and digitized labor relations.

25       This essay takes up the computational labor relations of AMT as a  
26 symptom of emerging forms and stakes of digital work. In these systems,  
27 some people are employers, entrepreneurs, and programmers, and others  
28 simulate computation for them. Following Donna Haraway's exchange with  
29 Lisa Nakamura, I investigate "which kinds of humanness and machineness  
30 are produced out of these sorts of material-semiotic relationships" (Naka-  
31 mura and Haraway 2003). I will show the technical means by which diverse  
32 workers are rendered into computational resources, directly feeding the algo-  
33 rithms of entrepreneurs and Fortune 500 companies alike. The transforma-  
34 tion of workers into a computational service, in turn, serves not only employ-  
35 ers' labor needs and financial interests but also their and desire to maintain  
36 preferred identities; that is, rather than understanding themselves as man-  
37 agers of information factories, employers can continue to see themselves as  
38 much-celebrated programmers, entrepreneurs, and innovators. Amazon's  
39 platform untethers these employers from the working "crowd," keeping

workers behind computer screens and lines of code. Employers imagine that  
 Turkers (as they are called colloquially) work by uncoerced choice; ignorance  
 is not only bliss, but has consequences for what microwork-employing enter-  
 prises are financially worth.

### Transforming People into “Human Computation”

Amazon operates AMT as an online marketplace infrastructure. Employers  
 can post tasks at a set price; workers can browse and select tasks; Amazon  
 also provides programming infrastructures and payment transfer to auto-  
 mate the transfer of money and bits between employers and workers. The  
 employer-defined tasks, called Human Information Tasks (HITs), are web-  
 based forms that specify an information task and allow workers to input  
 responses. Tasks include structuring unstructured data (e.g., entering the  
 information from a given webpage into an employer’s structured form fields),  
 transcribing snippets of audio, and labeling an image (e.g., as pornography or  
 violating given terms of service). Employers specify the range of data for pro-  
 cessing, define the structure of the form into which the data must be input,  
 create a set of instructions for workers, and assign the task a price. Workers  
 find and perform tasks on the AMT website. Amazon sends workers’ output  
 directly to employers’ IT systems without human intermediation.

The employer defines criteria that candidate workers must meet to  
 access the task. These criteria include the worker’s approval rating (the per-  
 centage of tasks the worker has performed that employers have approved and,  
 by consequence, paid for), the worker’s self-reported country, and whether the  
 worker has completed certain skill-specific qualification exams offered on the  
 platform. This filter approach to choosing workers, as compared to more indi-  
 vidualized evaluation and selection, allows employers to request work from  
 thousands of temporary workers in a matter of hours.

Once a worker submits completed work, the employer can choose  
 whether to pay for it. This discretion allows employers to reject work that  
 does not meet their needs, but also enables wage theft. Because AMT’s par-  
 ticipation agreement grants employers full intellectual property rights over  
 submissions regardless of rejection, workers have no legal recourse against  
 employers who reject work and then use it anyway.<sup>2</sup>

Today, it appears that Turkers hail largely from the United States,  
 though Indian workers also appear in online forums from time to time. In  
 the early days of the system, Turkers were a global workforce, though employ-  
 ers have always been restricted to the United States. Amazon paid in dollars,

1 rupees, and Amazon.com gift certificates. In recent years, however, Amazon  
2 appears to have cut off international workers, instead focusing on US work-  
3 ers, who are understood to generate less “spam” work. Though Amazon has  
4 not publicly announced this as policy, international worker forums appear to  
5 have been abandoned, stories of new international workers joining are rare  
6 (though not unheard of), and some US workers substantiate this observa-  
7 tion. US workers offer several advantages: they are likelier to be culturally  
8 fluent in the kinds of linguistic and categorization tasks employers delegate  
9 to AMT; they have also developed online forums where they regulate, train,  
10 and sanction one another to produce high-quality work. Though the crowd  
11 seems unstructured, AMT employers rely on invisible social work and cul-  
12 tural bonds to smooth and simplify their operations.

13 Hiring a thousand workers for a few hours of work is no small task.  
14 Employers develop algorithmic approaches to sorting “good” work and work-  
15 ers from “bad.” The work of management itself is semiautomated; labor rela-  
16 tions play out in large part through routine acts of programming. As a result,  
17 Turk employers are far more likely to identify as entrepreneurs, coders, and  
18 scientists rather than owners or managers.

19 There are a number of approaches to deciding algorithmically which  
20 workers are doing “good” work. A common approach to vetting workers is to  
21 include tests to which employers know the answer but that look like any  
22 other data processing task. Workers that answer correctly can be authorized  
23 for future work; employers often assume those who get the wrong answer  
24 are either inadequately skilled or “spammers” trying to generate income  
25 through bad-faith work. Another approach is to hire several workers to do  
26 the same information task: employers then count the workers who offer the  
27 most common result as correct, while workers with outlier results might be  
28 denied pay or even blocked from future work. This technique is called  
29 “majority rule” (Martin et al. 2014: 6)

30 Within this large-scale, fast-paced, and highly mediated workforce,  
31 dispute resolution between workers and employers becomes intractable.  
32 Workers dissatisfied with a requester’s work rejection can contact the  
33 requester through AMT’s web interface. Amazon does not require request-  
34 ers to respond and many do not; several requesters have noted that a thou-  
35 sand-to-one worker-to-requester ratio makes responding cost prohibitive. In  
36 the logic of massive crowd collaborations, dispute resolution does not scale.  
37 Dahn Tamir, a large-scale requester, explained a logic I heard from several  
38 Turk employers: “You cannot spend time exchanging email. The time you  
39 spent looking at the email costs more than what you paid them. This has to

function on autopilot as an algorithmic system . . . and integrated with your business processes” (pers. comm. October 6, 2011). Instead of eliciting a response, workers’ dispute messages become signals to the employer. Rick, a pseudonymous CEO of a crowdsourcing startup, explained to me that messages from workers signal the algorithm’s performance in managing workers and tasks. If a particular way of determining “correctness” for a task results in a large number of disputing messages, Rick’s team will look into revising the algorithm but will rarely retroactively revise decisions. Algorithmic management, here, precludes individually accountable relations (pers. comm. October 5, 2011).

### Purifying Innovation Work

The promise of the new media industries is expressive, creative work. Promises can never quite be fulfilled, but how people pursue them makes a difference. AMT employers cite the system as enabling them to innovate in new ways, first by outsourcing tedium, second, by speeding up their experiments in production, and, third, by enabling labor employers to perform as software companies.

Technology has captured the imaginations of robotics engineers and critical theorists alike as a potential liberator from tedious labor. AMT’s existence testifies, I argue, to the limits of automation and the persistence of tedium as a condition of human life. Within the internet industries, those who can outsource tedium and lower-value work can instead enjoy highly valued work and the promise of the creative, collaborative new-media workplace (Turner 2009).

Jeff Howe, author of the otherwise celebratory book *Crowdsourcing*, characterizes AMT clickwork as “any number of dull, brainless, low-paid tasks that keep the Internet economy, for better or for worse, firing on all pistons. . . . Mechanical Turk allows clients to farm out the kinds of menial clickwork that we all wish computers could do, but can’t” (2008). Howe explains how he used AMT to get rid of his tedious work quickly and cheaply, obtaining transcriptions of book research interviews at 10 percent of what professional transcriptionists would cost. Another engineer, Stig Hammond, explained the value of AMT through a story of a creative class workplace gone awry. Hammond (2005) tells the tale of an email autoresponder program ceasing to work and the guilt he felt assigning a fast-rising support staff member to perform the work of that algorithm: “It wasn’t worth it to recode the system, as we were about to migrate to a new email platform.

1 So we assigned Wamique to manually review the incoming mail, look at the  
2 request, and place the file in the appropriate directory. Mindless work, really,  
3 and I felt bad about giving it to him, but he did a great job with it. We started  
4 calling him the ‘Human API.’ APIs, in software engineering parlance, are  
5 “application program interfaces”—standardized protocols for invoking a  
6 bundle of code written and stored elsewhere, and ready for reuse. APIs, and  
7 AMT more broadly, fit a broader discipline by which computer scientists  
8 working on large-scale systems bracket off complexity by studiously ignor-  
9 ing how the functions they depend on are implemented (Blanchette 2011). By  
10 calling Wamique the “Human API,” the manager marks both his apprecia-  
11 tion and regret. Like a computer, Wamique performed the task tirelessly,  
12 quickly, and without the need for constant supervision or management. Like  
13 Howe, Hammond appreciates that such work must sometimes be done but  
14 it is beneath *his* coworkers. He assigns it to lower-ranking “support” staff,  
15 but he writes that AMT allows for this tedious work to be outsourced beyond  
16 the walls of the firm.

17 Through the redistribution of tedium, AMT requesters can reshape  
18 their roles to more closely align with the image of creative work. AMT, then,  
19 is not only a means of collaborating, sharing burdens, pooling cognitive sur-  
20 plus (see Benkler 2006), or even expropriating value. AMT also offers a  
21 means for new-media producers to do boundary work (see Gieryn 1983), pro-  
22 ducing the difference between innovators and non-innovators in high-tech.  
23 The boundary work is both organizational and rhetorical, manifested in  
24 both the actual division of labor that AMT enables and the symbolic conse-  
25 quences of those organizational acts of purification.

26 AMT not only enables employers to experiment quickly and identify as  
27 “innovators” rather than managers, but it also allows microwork companies  
28 to hide their labor force so they can attract capital as high-tech companies.  
29 AMT renders digital labor flexible and low-cost, but it does so to such an  
30 extent that it allows for more than the extraction of surplus value. It allows  
31 employers to experiment with the uses of human labor, exploring new busi-  
32 ness areas with little accountability or obligation to those employed in the  
33 experiments.

34 One large-scale requester I spoke with worked in a technology com-  
35 pany; he used AMT both to test prototypes of products under development  
36 and to explore new business areas. He argued that AMT allowed him to  
37 work in a new way. He tinkered with microlabor the way he might have  
38 otherwise tinkered in code: “You can work in a different way, you can work  
39 much faster, you can try things. To me, the try things thing is a wonderful

thing about crowdsourcing on Mechanical Turk. You don't have to get your questions perfect. . . . When I was wrong, it really didn't matter. I spent a few bucks. The loss was minimal. It inspires the willingness to try a lot of things" (pers. comm.). Microwork, then, enabled this engineer to tinker with human workers. The figure of the masculine tinker is central to American innovation myths, from Thomas Edison to Steve Jobs and his partner Steve Wozniak. AMT expands the capacity to tinker from the domain of things to the domain of people, with little expansion of consequence.

By hiding the labor and rendering it manageable through computing code, human computation platforms have generated an industry of startups claiming to be the future of data. Hiding the labor is key to how these startups are valued by investors, and thus key to the speculative but real winnings of entrepreneurs. Microwork companies attract more generous investment terms when investors perceive them as *technology companies* rather than labor companies. At one industry workshop I witnessed, a crowdsourcing startup CEO discussed the question, "Am I a labor business or a SaaS [software-as-a-service] business?" In response, a venture capital (VC) investor responded, "SaaS has a higher multiplier in the market. I was hoping it was a technology company and not a labor company when I invested!" Multipliers are rule-of-thumb quantities that appraisers of various sorts—VCs, banks, buyers—use to estimate the value of companies. Multipliers represent an attempt to guess at the relation between a company's current capital and future market value. To act as technology companies, microlabor companies must convince investors, first, that their labor force is of little risk and of little cost, and second, that their technology confers an advantage over other companies. Microlabor companies do this in part by foregrounding algorithmic techniques for managing Turkers and demonstrating a reliable flow of replaceable workers. As companies promise the ability to expand their operations quickly, so do they fuel scaling valuations.

The characterization of Turk work as menial and mindless serves the project of attributing innovation and agency to the software engineers and entrepreneurs that employ Turkers. For decades, feminist researchers of work have demonstrated that "rote" and "menial" work actually demand creativity and improvisation (Suchman and Bishop 2000: 331; Suchman 1995: 59). Turk work is no different. Workers I have met online include laid-off teachers, mobility-impaired professionals, military retirees, agoraphobic writers, undersupported college students, stay-at-home parents, and even Malaysian programmers-in-training. This variety of backgrounds, skills, and languages benefits employers running surveys, commissioning



1 web articles, virtualizing focus groups, getting translations, and sorting  
 2 permissible web 2.0 content from policy violations.<sup>3</sup> Beyond Amazon's  
 3 website and networks, workers participate in an ecology of forums, employer  
 4 review sites, and job-sharing platforms. Tens of thousands of workers con-  
 5 gregate on two major worker-run web forums in which workers share  
 6 advice with one another, negotiate the norms of work (Martin et al. 2014),  
 7 and struggle to establish more interactive and participatory relationships  
 8 with employers. These collectives are sites where workers manage one  
 9 another, help employers improve their tasks, and, sometimes, coordinate  
 10 work refusals.

11 The agency of workers—both as organizers and as workers—threatens  
 12 the valuation of microwork-based “software” companies in two primary  
 13 ways. First, the more visible the workers in human computation become, the  
 14 less the “software” companies look like software—there go the valuations.  
 15 Second, a skilled labor force is not an infinite labor force; the more skilled  
 16 Turkers appear, the more a microwork company may seem dependent on a  
 17 limited labor pool rather than on an infinitely replaceable pool of cheap labor.  
 18 Again, there goes the VC valuation.

## 19 20 **Conclusion**

21 I have shown three ways that AMT, like other human-computation and  
 22 microlabor platforms, allows employers to sustain their identities as cre-  
 23 ative, highly valued entrepreneurs. By outsourcing tedium, tinkering with  
 24 labor, and performing within “software companies,” entrepreneurs focus  
 25 their own labors on that which has higher exchange and speculative value.  
 26 AMT, then, becomes an infrastructure not only for data processing but  
 27 also for producing the difference between “innovators” and “menial” work-  
 28 ers.<sup>4</sup> While some command and explore new potential sources of value  
 29 production, microlaborers are treated as replaceable workers kept at dis-  
 30 tance that sustains the image of the innovative workplace. AMT, then, is  
 31 not only a way of distributing cognitive or immaterial labor, though it is  
 32 that, too. But it is also a system that organizes workers for the pleasure of  
 33 programmers, fitting workers into forms of late-industrial experimental  
 34 production and innovation. In aggregate, these workers produce surplus  
 35 value, but their invisibility also fuels the status of the companies that employ  
 36 them. This division of labor enables the capture of value or reduction in  
 37 cost while producing at the same time highly stratified labor subjectivities.  
 38 Programmers, innovators, lean startups, and IT managers reinforce their  
 39

claim as the celebrated actors of knowledge-economy projects—the brains that drain, circulate, and congregate in centers of capital (Saxenian 2005; Castells 2000: 233–36).

What kinds of solidarities will strengthen futures of labor in the shadow of a knowledge economy? Knowledge workers of the world are divided not only by the differences among them, but also by much the more difficult dependencies between them. The subjectivity of the entrepreneur is dependent on the Turker as mediated through AMT’s interfaces. Ethnic studies scholar Evelyn Nakano Glenn has shown how black and immigrant servants made possible “the woman belle ideal for white middle class women” who employed them (1985: 104). Similarly, in American late capitalism, the entrepreneurial information and communications technology ideal rests on the distanced work of Turkers who are kept variously close or at a distance, in rough accordance with the identity practices of their creative-class employers. The co-work space, the hacker space, and the startup office offer high-status knowledge workers forms of work-based community predicated on the appropriation and distancing of other kinds of labor. This segmentation and differentiation poses a challenge for theories of immaterial labor that point us toward the immanence of the communicative, collective revolutionary subject. Some immaterial laborers are programmers, and some are Turkers. Turkers need programmers to survive; programmers need Turkers to sustain the magic of their technologies and the fun of their work. Within these relations of exploitation, where among the multitudes is liberation to be found?

**Notes**

- 1 S3 stands for Simple Storage Service, and EC2 stands for Elastic Cloud 2. These are examples of cloud computing services—data storage and processing services maintained by Amazon in data centers across the world and available to programmers on an as-needed basis. Like AMT, these services allow programmers to use computational resources without committing to the upkeep or maintenance of those resources.
- 2 Turker forums (e.g., mTurkGrind) and activist projects (e.g., Turkopticon) have sprung up in part to help workers share information about bad employers. Amazon, however, does not intervene in cases of wage theft or include infrastructures in AMT to prevent it.
- 3 AMT allows employers to disaggregate the work of the focus group participant, the translator, the journalist, and the web “community manager” according to the Babage principle—high-cost work is subdivided so that some parts can be performed by lower-cost labor (Braverman 1998). Yet the tasks are not so much deskilled as they are performed by members of an enlarged and, hence, more competitive labor pool.
- 4 I expand elsewhere on the gendered dimensions of sinking labor into infrastructure (Irani forthcoming).

change to cite online first

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