AGAINST the DAY

Lilly Irani

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

In 2006, Jeff Bezos announced a new labor service masquerading as computer technology. The Amazon.com Inc. CEO explained the technology as a form of "artificial intelligence"—human workers that could be integrated directly into computer code. These human workers were marketed as part of Amazon Web Services, alongside S3 and EC2[1]—just-in-time server space and computational cycles available to programmers through routine acts of coding. Like these "software-as-a-service" systems, Bezos explained the new technology 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. Artificial intelligence, it turned out, failed to classify the cultural nuances of the images, sounds, and texts that filled web 2.0. Rather, AMT offered a virtual marketplace where programmers could ask people, rather than algorithms, to fill the gap. 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 mas-

The South Atlantic Quarterly 114:1, January 2015
DOI 10.1215/00382876-2831665

sively mediated microlabor—large volumes of small, independent tasks distributed to large groups of workers.

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

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

This essay takes up the computational labor relations of AMT as a symptom of emerging forms and stakes of digital work. In these systems, some people are employers, entrepreneurs, and programmers (Castells 2000: 233–36), and others simulate computation for them. Following Donna Haraway's exchange with Lisa Nakamura, I investigate "which kinds of humanness and machineness are produced out of these sorts of material-semiotic relationships" (Nakamura and Haraway 2003). I will show the technical means by which diverse workers are rendered into computational resources, directly feeding the algorithms of entrepreneurs and Fortune 500 companies alike. The transformation of workers into a computational service, in turn, serves not only employers' labor needs and financial interests but also their desire to maintain preferred identities; that is, rather than understanding themselves as managers of information factories, employers can continue to see themselves as much-celebrated programmers, entrepre-

neurs, and innovators. Amazon's 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 enterprises 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 automate 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 web page 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 processing, 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 percentage 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 individualized 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 participation 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.[2]

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 employers have always been restricted to the United States. Amazon paid in dollars,

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

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

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

Within this large-scale, fast-paced, and highly mediated workforce, dispute resolution between workers and employers becomes intractable. Workers dissatisfied with a requester's work rejection can contact the requester through AMT's web interface. Amazon does not require requesters to respond and many do not; several requesters have noted that a thousand-to-one worker-to-requester ratio makes responding cost prohibitive. In the logic of massive crowd collaborations, dispute resolution does not scale. Dahn Tamir, a large-scale requester, explained a logic I heard from several Turk employers: "You cannot spend time exchanging e-mail. The time you spent looking at the e-mail 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 e-mail auto-responder 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 e-mail platform.

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

Through the redistribution of tedium, AMT requesters can reshape their roles to more closely align with the image of creative work. AMT, then, is more than a means of collaborating, sharing burdens, pooling cognitive surplus (see Benkler 2006), and expropriating value. AMT also offers a means for new-media producers to do boundary work (see Gieryn 1983), producing the difference between innovators and non-innovators in high-tech. The boundary work is both organizational and rhetorical, manifested in both the actual division of labor that AMT enables and the symbolic consequences of those organizational acts of purification.

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

One large-scale requester I spoke with worked in a technology company; he used AMT both to test prototypes of products under development and to explore new business areas. He argued that AMT allowed him to work in a new way. He tinkered with microlabor the way he might have otherwise tinkered in code: "You can work in a different way, you can work

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

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

Conclusion

I have shown three ways that AMT, like other human-computation and microlabor platforms, allows employers to sustain their identities as creative, highly valued entrepreneurs. By outsourcing tedium, tinkering with labor, and casting their work as high-tech, entrepreneurs focus their own labors on that which has higher exchange and speculative value. AMT, then, becomes an infrastructure not only for data processing but also for producing the difference between "innovators" and "menial" symbolic workers.[4] Programmers who manage thousands remain flexible tinkerers with few accountabilities. AMT organizes workers for the pleasure of programmers, fitting workers into forms of late-industrial experimental production and innovation. Workers' invisibility also fuels the status of the companies that employ them. AMT, then, innovates more than cheap labor. It enables high-tech workers to manage accountabilities and maintain their high-tech image—they sustain their identities and enhance their valuations. Programmers, innovators, lean startups, and IT managers reinforce their 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 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 cowork 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 Babbage 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 2013).

References

Benkler, Yochai. 2006. *The Wealth of Networks*. New Haven, CT: Yale University Press.

Blanchette, Jean François. 2011. "A Material History of Bits." *Journal of the American Society for Information Science and Technology* 62, no. 6: 1042–57.

Braverman, John. 1998. *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York: Monthly Review.

Castells, Manuel. 2000. *The Rise of the Network Society*. Sussex: Wiley-Blackwell.

Downey, Greg. 2014. "Making Media Work: Time, Space, Identity, and Labor in Analysis of Information and Communication Infrastructures." In *Media Technologies: Essays on Communication, Materiality, and Society*, edited by Tarleton Gillespie, Pablo Boczkowski, and Kristen Foot, 141–66. Cambridge, MA: MIT Press.

Gieryn, Thomas. 1983. "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists." *American Sociological Review* 48: 781–95.

Hammond, Stig. 2005. "Amazon's Mechanical Turk Is the Human API." *Watson, come here, I need you* (blog), November 5. www.stighammond.com/watson/webtech/.

Howe, Jeff. 2008. "Mechanical Turk Targets Small Business." *Crowdsourcing.com*, August 1. www.crowdsourcing.com/cs/2008/08/index.html.

Irani, Lilly. 2013. "The Cultural Work of Microwork." *New Media and Society*. nms.sagepub.com/content/early/2013/11/19/1461444813511926.abstract.

Martin, David, et al. 2014. "Being a Turker." In *CSCW '14: Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work and Social Computing, Baltimore, February 15–19*. New York: ACM.

Nakamura, Lisa, and Donna Haraway. 2003. "Prospects for a Materialist Informatics: An Interview with Donna Haraway." *Electronic Book Review*. www.electronicbookreview.com/thread/technocapitalism/interview.

Nakano Glenn, Evelyn. 1985. "Racial Ethnic Women's Labor: The Intersection of Race, Gender, and Class Oppression." *Review of Radical Political Economics* 17, no. 3: 86–108.

Saxenian, AnnaLee. 2005. "From Brain Drain to Brain Circulation: Transnational Communities and Regional Upgrading in India and China." *Studies in Comparative International Development* 40, no. 2: 35–61.

Schmidt, Kjeld. 2011. *Cooperative Work and Coordinative Practices*. London: Springer.

Scholz, Trebor. 2012. *Digital Labor: The Internet as Playground and Factory*. New York: Routledge.

Suchman, Lucy. 1995. "Making Work Visible." *Communications of the ACM* 38, no. 9: 56–64.

Suchman, Lucy, and Libby Bishop. 2000. "Problematizing Innovation as a Critical Project." *Technology Analysis and Strategic Management* 12, no. 3: 327–33.

Terranova, Tiziana. 2000. "Free Labor: Producing Culture for the Digital Economy." *Social Text* 18, no. 2: 33–58.

Turner, Fred. 2009. "Burning Man at Google: A Cultural Infrastructure for New Media." *New Media and Society* 11, no. 1–2: 73–94.