Title

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Stories We Tell About Labor: Turkopticon and the Trouble with "Design"

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ABSTRACT
This paper argues that designers committed to advancing justice and other non-market values must attend not only to the design of objects, processes, and situations, but also to the wider economic and cultural imaginaries of design as a social role. The paper illustrates the argument through the case of Turkopticon, originally an activist tool for workers in Amazon Mechanical Turk (AMT), built by the authors and maintained since 2009. The paper analyzes public depictions of Turkopticon which cast designers as creative innovators and AMT workers as without agency or capacity to change their situation. We argue that designers' elevated status as workers in knowledge economies can have practical consequences for the politics of their design work. We explain the consequences of this status for Turkopticon and how we adapted our approach in response over the long term. We argue for analyses of power in design work that account for and develop counters to hegemonic beliefs and practices about design as high-status labor.

Author Keywords
Activism; design, ethics, economics, social theory, critical design, human computation; Amazon Mechanical Turk

INTRODUCTION: THE POLITICS OF DESIGN IN KNOWLEDGE ECONOMIES

HCI works at the gap between technological possibility and human desires, conflicts, and labor. Some work to make things that make new kinds of relating possible. Others advocate for the making of things as a way of bringing people together to provoke and sustain democracies [9, 10, 23]. Environmental sustainability, socio-economic development, and pro-social reorganization of technological life animate international HCI communities. But what if the problem is not how we design in a highly unequal world, but the very fact that we are read as designers at all?

Designers are more than those who seek to move from current states to preferred ones. Designers also occupy a relatively high rung in hierarchies of "knowledge economy" projects. The World Bank, for example, cites design as an engine of "new value chains" in the face of global competition that drives existing commodity profit margins to zero [16]. Design is core to economic growth policies in Britain [21], China [49], and India [68]. American economic policy looks to hacking, 3-D printing, and STEAM (Science, Technology, Engineering, Arts, and Math) education to transform workers into citizens who can both generate new sources of financial value and improve material conditions for living.

Within such a milieu, designers and HCI practitioners have a privileged place as a research community that self-consciously attempts to generate both the futures of pervasive technologies and methods for generating those futures. We are not simply Herbert Simon's designers in pursuit of preferred states [77:111], but privileged economic actors. These stories of economic and social progress sustain us institutionally, but they also become complicities and liabilities for those who wish to redistribute power through design practice. We encountered these problems as designers of Turkopticon, an activist intervention into Amazon Mechanical Turk (see [45]). In this paper, we explain how cultural and economic understandings of design shaped how broader publics interpreted our intervention, with problematic consequences for the workers the project sought to support. We describe the conflict between "design" as a cultural position to speak from and the projects' labor politics. We then describe how we expanded our tactics beyond design itself to sustain the projects' goals to improve digital microwork.

This paper contributes to HCI scholarship on critical design, systems development, and relationships between technology and policy by describing the role that stories of innovation play in shaping the politics of a design project.

A BRIEF HISTORY OF TURKOPTICON

Amazon Mechanical Turk is a website and service operated by Amazon as a meeting place for requesters with large volumes of microtasks and workers who want to do those tasks, usually for money [41]. Amazon legally defines the workers as independent contractors; this means they are not entitled to minimum wage or other employment benefits.

Turkopticon came out of engagements with "Turkers" in 2008, when we asked them—through Mechanical Turk itself—to articulate a hypothetical Bill of Rights. This elicitation invited workers to imagine what "better"

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crowdwork might mean. Responses to the survey were diverse and even conflicting. But eight themes recurred: uncertainty about payment; unaccountable and seemingly arbitrary rejections (i.e., non-payment); fraudulent tasks; prohibitive time limits; pay delays; uncommunicative requesters and administrators; costs of employer errors borne by workers; and low pay. Over the years, Turkers have grounded our understandings of microwork's benefits and drawbacks. For example, AMT brings stopgap, short-term jobs to those with limited employment options because of geography, mobility limitations, or economic conditions. Yet many workers still find themselves working in a system with limited recourse when faced with wage theft or disciplining by requesters or Amazon.

In response to our interactions with Turkers, we designed and built Turkopticon, a web application and browser add-on that augments the AMT interface with reviews written by Turkers. Turkopticon, works alongside crucial worker forums to bridge the worlds of workers and employers. These are worlds that Amazon's interface design keeps at a distance convenient for employers. AMT allows employers to automate requests for Turker data processing work. Turkopticon interrupts this dynamic of "human computation on-demand" by offering workers support for evaluating and possibly refusing work requests.

Our entrée into questions of innovation came through concerns about the ethics of crowdsourcing. News stories and papers on crowdsourcing often oscillate between jubilant speculation and "sweatshop" exposés, while those invested in the long-term future of crowdsourcing work to formulate agendas for meaningful, pleasant, and even just futures of work. We entered the debate critical, but open-minded – we were not Turkers, but we were computing workers concerned about the futures of work being built in our field. We saw Turking as part of a long history of computing that valorizes abstractions and planning and denigrates those who appear to be implementing those abstractions, a chain of continuity leading from designer-managers and assembly line workers [64, 95] to World War 2 mathematicians and the women who implemented their equations by programming early computers [42].

Following philosopher Donna Haraway, we chose to stay with the trouble. And trouble came. Over the past six years, Turkopticon has had a public life beyond the relationships among us, Turkers, and employers that gather around it. The system – and the questions we raise with it – has attracted coverage in *The Nation*, *O'Reilly Radar*, *The Sacramento Bee*, *AlterNet*, and *Communications of the ACM* – among other venues. Over these years of coverage, we learned – by listening to Turkers' incisive critiques – that these articles painted a bifurcated world of digital labor. Designers, programmers, and creatives appeared to have all the agency – innovators designed AMT, creating this potential or this mess depending on one's perspective. And other innovators could come along with a tool to disrupt these designs. Across all these stories, Turkers and other kinds of workers who powered these platforms appeared as exploited cogs in other people's plans, toiling in digital sweatshops with little creativity or agency.

METHOD AND STANCE

This paper draws on six years of participant-observation as design activists within AMT worker and technologist communities. Our main engagement has been through Turkopticon, though the lessons learned through Turkopticon spurred each of us to work on other systems [68], public scholarship with Turkers [55], and design proposals [75]. We return to these projects later; we focus here on how stumbles in Turkopticon's trajectory revealed our complicities and privilege in the economies of innovation we critique.

Turkopticon grew out of a tactical media art project intended to raise questions about the ethics of human computation. Tactical media, one tradition within activist art, emphasizes developing urgent, culturally provocative interruptions and resistance through the design of media [20, 33, 38]. In addition to the interviews, observation, and casual conversation that feature in many HCI ethnographies, our encounters with Turk workers began through highly mediated "Human Intelligence Tasks" and feedback around Turkopticon.

We wrote about the process of designing and deploying Turkopticon in a paper presented at CHI 2013 [45]. We have maintained Turkopticon since 2009. It has become a staple worker tool, with over 55,000 registered users, 287,000 reviews of 42,000 employers, and a steady flow of 20,000 unique visitors per month. It is an often-taken-for-granted part of the livelihood strategies of workers who use their "Turking" income to meet basic needs. In short, it is part of the "ecology of infrastructure" [78] around AMT.

This paper focuses less on the software and instead on the stories people – journalists, academics, policymakers, and we as designers – told about the software, and how those stories supported or worked against the very goals of valorizing Turk workers our software was meant to achieve.

Over the course of this research, each of our stances developed as a result of our involvement with the workers through the project, and through our evolving understandings of the broader crowdsourcing community. As we intervened in the system, we became part of the public story of what crowdsourcing means, what innovation can do, and how futures of digital work ought to be shaped. Turkers are keen observers of culture and compilers of data. For example, one Turker has compiled and cross-tabulated data published about Turker demographics and maintains this collection on the forum MTurk Grind [18]. The forum TurkerNation maintains a thread called "mTurk in the Media" where community members post and discuss papers and news stories published about mTurk, Turkers, and Turk work. Through reading and participating in such forums,

and meeting with workers in person, we came to learn about the impact the stories people tell about Turkopticon have on Turkers themselves.

This reflection on the impact of stories *about* design and innovation through the case of Turkopticon draws together longstanding traditions in feminist and queer scholarship that attend to how research and theory impacts activism and the lived conditions of those the research concerns itself with. Judith Butler [13] highlights how decades of debates on whether sexuality was nature or nurture made painful experiments out of the lives of particular people whose gender reassignment therapies became public spectacle and allegories. Feminist research attends not only to how it makes knowledge about entities in the world, but how researchers relate to, help constitute, or are complicit in the oppression of others through life and research.

We also continue debates within HCI about how to carry out feminist [2, 3], postcolonial [46, 66], and emancipatory design practices, and value sensitivity in design [11, 31, 58]. We take up two calls most specifically: first, Taylor's call for HCI to recognize "how it is we are configuring the world out there" [88]; second, Harmon and Mazmanian draw on everyday anxieties about smartphone use to argue for attention to how HCI discourses about the impacts of technology themselves matter in practical sites of technological activity [37]. This paper pays attention to how our design activities intervening in Turk work became complicit in larger cultural narratives of labor (and Turker) disempowerment, and what we did about it.

DESIGNERS AS MEDIATORS OF CHANGE

This argument extends HCI's concerns with understanding its impact, from influencing technologies people use in everyday life to opening up political possibilities of life.

Advocating for Users

Designers in HCI have long argued that they represent, stand up for, and advocate for "the user." These practices of advocating for the user drew on disciplines spanning from psychology to anthropology [7, 34, 70], but shared in common that a researcher or designer represented the user out there in the world and advocated for them or attempted to engineer them from within sites of technological design and production [19, 80, 83, 85, 93]. User advocacy approaches can be explicitly concerned with values, ethics, and politics. Value Sensitive Design, for example, identifies stakeholders affected by a technology project, locates benefits and harms to stakeholders, maps those tradeoffs to fundamental values (e.g. privacy or freedom), and designs across the gap between user values and technological possibility [31].

Advocacy approaches have been critiqued for framing designers as neutral, expert mediators of user voice [11: 1125, 1130-31]. Researchers function as modest witnesses [36:24] and conduits of the truth of users, whether that truth is physical, psychological, cultural, or politically charged.

Making Democracies around Things

A range of design approaches demonstrate ways that designers have seen themselves as political agents rather than facilitators and translators.

The Scandinavian participatory design (PD) tradition explicitly located designers as advocates and partners for workers negotiating the computerization of the labor. The movement developed long-term projects in partnership with worker groups and trade unions to enhanced rather than eroded worker power and skill [17]. PD called for worker empowerment at three levels: computer systems design, organizational processes, and the law [8, 51]. By articulating systems design work with organizational and political systems, PD made explicit the ways design practice exists within – aligning or in tension with – broader ideologies, economies, and forms of social order.

Successors to this tradition have posed designers participants in democratic politics. Designers can cast technological values into high relief through making (e.g. [4, 25]), generate controversies around issues [9, 10, 23, 56], strengthen adversarial positions in public debates [22], or create infrastructures to support the formation of publics around shared issues [57].

In prior work, we argued that Turkopticon learned from and was compatible with this explicitly political approach to design. Existing scholarship did not prepare us, however, to recognize how we had already been positioned within broader stories of progress.

Accounting for the Social Histories of Design

User advocacy and democratic approaches to design have expanded the range and purposes of creation, making, and action that designers undertake. Less attention has been paid to the formation of design as a social role, and how that shapes designers abilities to imagine, make, and manage collective futures. These are questions of subject formation, central to works following Karl Marx and Michel Foucault. Marx offered a history of the emergence of capitalism and, with it, an investigation of how diverse people, including artisans and peasants, become *workers* as industrial capitalism sucks people into factories as wage labor [61:784-787]. Foucault argued that projects of power and rule translated people into objects of expertise, such as populations, criminals, or patients [30].

Economic organization shapes how we understand the value of design as a practice, as a form of labor, as a form of expertise, and as a relationship with other people.

Historians have argued that designers cannot design for the masses without mechanization and alienated labor to reproduce those designs at scale. Historian Adrian Forty, argues that the design profession emerged with the industrial revolution as companies sought to differentiate a glut of mass produced wares. Varying artisanal crafts gave way to mass produced, designed goods made in factories [29:42-61]. Forty locates the birth of design, then, in

English industrialization, mechanization, and the alienation of artisanal workers as wage labor on the assembly line [29:42-61). Arindam Dutta extends this analysis to colonial India; British designers also relied on Indian artisans to reproduce designs en masse [26:191-234].

The historical and social formation of the designer has also subtly structured HCI scholarship. We build on scholars of design who have called for attention to how social and historical forces — relations of production and ideologies, for example — shape the practice of design [52, 85, 86]. Across a range of studies, Suchman, Trigg, and Blomberg showed how corporate research labs dedicated to "innovation" constrained the kinds of progressive transformation design teams could undertake with information workers. They could not, for example, simply configure "off the shelf" technologies; they had to make new things that their corporation could sell to large markets [86]. Suchman argues that Valley imaginaries of innovation position designers as producers of the new for a world positioned as already behind. This is the arrangement signified by "Designed by Apple in California. Assembled in China" [59]. These "neocolonial geographies of center and periphery" builds on older geographies of modernity and modernization, developing and developed [85], extracting and extracted [24, 46].

Taken together, these works suggest that design, more than a way particular kinds of people do, make, and think, is a practice that implies certain social orders: between inventors and implementers, between centers of innovation and peripheries of consumption, between those who make progress and those who follow. HCI scholars have highlighted the blind spots of this modernizing vision of design — a neglect of maintenance and repair [47, 48] and a neglect of everyday design among users [90].

TURKOPTICON: INFRASTRUCTURING AID, PROVOKING DEBATE

The importance of social, historical, and ideological stocktaking of design came out of our experiences designing, maintaining, and explaining Turkopticon in public since 2009. We became curious about AMT as computer science and HCI practitioners in 2009. Technology media celebrated the system. We saw a system with no minimum wage or steadiness of employment. Neither computer science nor HCI curricula — even at the graduate level — had prepared us with histories of labor, automation, or ideological legitimation to help us make sense of these circumstances, or the disjuncture between our reaction and that of the media. We were worried and wanted to know more.

Competing Public Images of Turking

AMT was initially celebrated by media and business scholars as an example of massively distributed networked production that made new kinds of informational goods possible (e.g. Wikipedia and YouTube) [e.g. 5, 74]. Building on the insight that people could easily recognize patterns that were difficult in AI, von Ahn and colleagues sparked a field of inquiry into how computation could marshal the cognitions of masses for widespread cultural good. Early examples of human computation in national news included von Ahn's 2006 MacArthur genius award for combining AI and "natural intelligence" for problems of "profound theoretical and practical importance" [60]. In 2007, those searching for lost-at-sea Microsoft Researcher Jim Gray made national news for using AMT as a volunteer clearinghouse to visually search through hundreds of gigabytes of satellite data [76]. AMT was seen as a part of crowdsourcing and human computation — an emerging area that signaled new domains of mass collaboration, co-production, and collective intelligence. *Wired* editor Kevin Kelly even included Mechanical Turk as part of a new wave of "digital socialism" and mass cooperation [50].

A different view dominated in cultural analysis of media circles. Media theorists saw AMT as exploitative. The lack of minimum wage and worker protections appeared to extend precarious work conditions. The small tasks were regarded as largely repetitive and menial. These transformations have been a long-standing topic in sociology, discussed as the growth of "the temp economy," flexibilization, casualization, and precarity. In recent years, the sharing and on-demand economies thrust these questions into public headlines as news and policy debates.

Even celebratory accounts of crowdsourcing depicted the ambivalence of these two competing images of Turking. Journalist Jeff Howe, author of the otherwise celebratory book *Crowdsourcing*, characterized 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…[AMT] allows clients to farm out the kinds of menial clickwork that we all wish computers could do, but can't" [39]. He illustrated his explanation of clickwork with an image of a computing primate, marking Turkers as somehow stripped of fully self-actualized humanity. Describing these tasks as about-to-be-automated positioned Howe as an optimist about technology's capacity to relieve humanity from drudgery, while simultaneously excusing inadequate support and compensation for Turkers as a historical hiccup soon to fade into memory.

From Mutual Aid to Occasion for Public Debate

We sought a way of intervening to draw attention to work conditions on AMT, beginning with what workers themselves saw as problems and vulnerabilities on the job.

Turkopticon launched in 2009 as a website and a browser plug-in that allowed workers to publish reviews of employers. These reviews were a form of mutual aid among workers, helping them choose among hundreds of potential employers a day, avoiding those who had upset or wronged other workers. A fuller account of the tool's design and motivation can be found in our CHI 2013 paper, "Turkopticon: Interrupting Worker Invisibility in Amazon Mechanical Turk" [45]. We sought to bring visibility to

problems Turkers faced in their distributed workplace and provoke public discussion among Turkers.

In what follows, we detail what happened as stories about Turkopticon circulated in public life. These circulations were, in some sense, evidence of the success of the intervention — the design drew attention to issues of work conditions not only on AMT but on newer contingent work platforms such as Uber, Lyft, and TaskRabbit. But these debates stretched HCI's analytical tools for understanding how power shapes the work of designing in public.

Turkopticon launched quietly, first among workers on AMT. We announced the tool on existing worker discussion forums at the time. The CEO of CrowdFlower, one digital microlabor company, also helped promote Turkopticon among AMT workers in his labor pool by including a footer in his tasks. He understood Turkopticon differently than we did. To him, it was a way to perfect market information between consumers and sellers of labor. We were grateful to have more Turkers learn about the tool.

The same CEO ushered Turkopticon into public debates on Turking when he invited us to present the system at an early crowdsourcing meetup in San Francisco. The Amazon manager in charge of AMT was in attendance, as were journalists for *O'Reilly Radar* and engineers and scientists using AMT. The same CEO also suggested the first author for a panel on crowdsourcing put on by the California Commonwealth Club. Turkopticon provoked discussions at these meetings that ranged from more ethical forms of interface design for digital labor to industry insider worries about government regulation should they not improve conditions themselves. In these spaces, we came into contact with overlapping but distinct social worlds: the technology press, AI researchers, and business consultants tracking an emerging site of wage arbitrage.

Between 2009 and 2015, Turkopticon attracted 15 news articles in venues including O'Reilly Radar, Huffington Post, New Scientist, The Sacramento Bee, San Jose Mercury News, The Verge, and Slate. Titles included:

• "Union 2.0: how a browser plug-in is organizing Amazon's micro-laborers."

• "Digitale mikrojobs – fleksibilitet eller slaveri?" (Digital microjobs: flexibility or slavery?)

• "Opinion: Time to Focus on Welfare of Online Workers"

• "The Dystopian Digital Sweatshop that Makes the Internet Run."

• "Mechanical Turk: Amazon's New Underclass"

• "Will Technology Make Work Better for Everyone?"

Broadly, this coverage drew attention to questions of worker welfare and class stratification. It also focused on technology — either AMT as determining Turkers' fates or Turkopticon as a technological intervention that would innovate worker organizing as "Union 2.0."

In this sense, Turkopticon had the kind of public impact often debated in the hallways of SIGCHI. The tool was widely used by workers, with over 20,000 monthly users. Through the design and development of the tool, we had also pursued a line of inquiry into how technological mediation shapes labor relations, and also into how designers can intervene in large socio-technical systems beyond their control; in this sense, the project was research through design [27]. As a critical design project, Turkopticon occasioned wider debates about the relationship between technology, work, and social contracts.

When Design, Not Labor, Became the Headline

Turkers' Critique I: The Design Savior Complex

Turkers — keeping close tabs on media representations of their work in forums — pointed out a common trope across each of these articles. Each of these pieces told a common story: technologists created this problem of the "digital sweatshop," and technologists — the makers of Turkopticon — can come along and fix it.

This narrative, a Turker posting to one forum pointed out, cast Turkers as dopes in the system. AMT exploited Turkers, and journalists celebrated design saviors — the makers of Turkopticon — as coming along to innovate us out of the problem.

Consider, for example, the headline "Union 2.0." Unions in the United States have been declining since the 1970s under a variety of pressures, including American companies seeking out cheaper labor beyond US borders with the growth of free trade agreements and calculated assaults on American workers' abilities to unionize. Unions are not uncontroversial among Turkers. We had read threads in which Turkers decried unions as taking decisions out of individual workers' hands. Others, Martin et al. point out, see TurkerNation as an informal union and site of collective agency for workers [62].

To call Turkopticon "Union 2.0", then, is to suggest that our system — only one part of the ecology of worker forums and mutual aid — is the next version of this historied labor institution. While the article briefly discussed forums, the forums were not the news item. Turkopticon and its designers were. Following those that critique development as the performances of white saviors descending to help others, we call this the design savior complex.

Turkers' Critique II: The Limits of "Digital Sweatshops"

Kristy Milland, the operator of TurkerNation, also pointed out to us that these articles sometimes had perverse consequences. Journalists intended to draw attention to problematic work conditions and inspire political will to improve them. Yet Milland observed that these articles often publicized AMT as a place where people could get

data processing work done cheaply. Journalists hoped to scandalize readers with Turker-reported incomes of $1-$2 an hour (numbers generated from our own informal surveys). Yet, as Milland points out, they underestimated readers' pragmatic sensibilities. New employers learned about AMT this way and flocked to the site with expectations that they could hire workers at a pittance.

These articles focused on work conditions, but did nothing to dispel the reputation of Turk work as simple, menial, repetitive or low skill (to which we'll turn in the next section). In trying to raise awareness (and sometimes winning journalism awards for it), they reinforced images of Turking that legitimize the low pay in the eyes of economists, employers, and some parts of the public.

These depictions of AMT as a low-skill data sweatshop reinforced the design savior complex by positioning Turkers as labor without agency — labor cast in the role of simply following instructions, programmed by employers with higher-value skills and market-making intuitions.

These unintended consequences of the press on Turking and Turkopticon were not simply misunderstandings. Rather, they stemmed from the valorization of design, invention, and innovation in our contemporary culture and economy.

How Attending to Design Put Turkers in the Periphery

While the "union 2.0" trope looked to designers and innovators for exogenous, futuristic answers to problems of exploitation, the "digital sweatshop" trope presumed that Turkers' work was routine and low-skill. Both tropes rode on the paired assumptions that creative work was good work and creativity did not come from Turkers.

Turkers operate a variety of forums, employer review sites, and job sharing platforms. Tens of thousands of workers congregate on two major worker-run web forums; there, workers share advice with one another, negotiate norms of work [62], and struggle to establish more interactive and participatory relationships with employers. These collectives are sites where workers manage themselves and other workers, set norms, help employers, and sometimes coordinate work refusals. These sites include TurkerNation, MTurkGrind, and the mturk and HITsWorthTurkingFor "subreddits," among others. Turkers operate the forums, fundraise hosting feeds, and moderate communities. They regulate conversations, recruit requesters into collaboration, and educate newcomers [62]. They also might band together to support fellow Turkers in acute need, lending money or prayers. When we built Turkopticon, we were aware of some of these forums and we specifically avoided replicating their functionality. We did not want to compete with these worker-controlled sites of community.

Turkers also have a variety of skills, backgrounds, and languages. Workers we've met online include laid-off teachers, mobility-impaired professionals, military retirees, agoraphobic writers, undersupported college students, stay-at-home parents, temporarily out-of-work engineers, and Malaysian programmers-in-training. This variety benefits employers running surveys, commissioning web articles, virtualizing focus groups, getting translations, and sorting permissible web 2.0 content from policy violations. Among the most active AMT workers, nearly 58% already have a bachelor's degree or higher. (An AMT worker, clickhappier, cross-tabulated this statistic from NYU professor Panos Ipeirotis' data. [18]).

Turkopticon also runs on labors and inventive skills that remain hidden even to the co-founding design team. For years, Turkopticon ran on a personally funded Bluehost server on a machine shared with other subscribers. As its popularity grew, user demand and our own coding inefficiencies led the server to lag. We discovered in 2013 that a silent benefactor — a Turkopticon user and Turker we later came to know as Miku — ran a mirror of Turkopticon at http://turkopticon.istrack.in/. Miku scraped our site and kept a cached version running for moments when the main server grew too slow. This mirror was widely known among Turkers before we came to know it.

In 2014, a worker showed us another tool that extended the utility of Turkopticon by embedding Turkopticon reviews in community web forums. Tjololo, a Turker, created a tool called "Great HIT Export" [94] to integrate information on fresh HITs into vBulletin forums. GHE generates embed code that displays information about a HIT and requester, including Turkopticon reviews. This allows Turkers in forums to draw from Turkopticon but participate in daily threads of "awesome HITs" — a form of forum-based mutual aid. Rather than going to Turkopticon and interacting with workers from a variety of forums, users of the tool prefer to communicate with fellow forum members but use Turkopticon data to contextualize. The tool comes with a sense of humor as well. A poster can set the ratings graph bars to appear as a row of radiation symbols (☢) or hammers and sickles (☭). Because the tool is scripted using the Greasemonkey browser script creation platform, its code is readily visible and can run on any browser with the Greasemonkey extension. The script is not compiled into machine code. It is interpreted by the browser each time it is run. This means that the code is readily readable by users who know where to find the file. At time of writing, four other versions of GHE—including one with Turkopticon reviews removed—were available. We had no involvement in the creation of the tool, but this tool extends the value of the Turkopticon community and the data the community produces into new technical environments — ones designed and configured by Turkers but out of the public eye.

Among Turkers are educated professionals and skilled technologists. Yet public narratives of innovation highlighted our work as designers—rather than these subtle and sustaining capacities to shape the futures of work.

Design in the Public Imagination

"Design saviors" and "digital sweatshops" were not simply errors in storytelling. Rather, they are symptoms of design's

place in broader the public imagination. As innovation has grown central to many national economic planning imaginaries, so have efforts attract designers, programmers, and entrepreneurs of young, high-growth companies [63:45, 28, 44, 49]. The promise of tapping new markets and generating enterprise spurs consumer products firms, social enterprise philanthropies, and venture capital firms to pick designers as heads of social enterprise, VC partners, and members of innovation arms. Business schools train their MBAs in design thinking, prototyping, and user research [52].

Data processing workers are also key to economic growth imaginaries, but they occupy a different position in the hierarchy of labor. They are not seen as sources of new, investable ideas; rather, they are tasked with fulfilling managers' plans. Their creativity and improvisation are rendered invisible [84].

This bifurcation between creative and non-creative work recurs in social theory as well. Political economist Manuel Castells bifurcates information society workers into "self-programmable labor" and "generic labor" [8: 377]. He would call designers "self-programmable" labor. "Self-programmable" workers innovate and exercise a large degree of control over the content of their work. By contrast, Castells might call Turking "generic labor" — labor that "is assigned a given task" based on the programs of higher status, more "self-programmable" workers. He theorizes that these workers only "receive and execute signals" as "human terminals" that can easily be replaced by machines [15: 377]. Castells paints a world of two kinds of workers — some program and others are programmed — that appears to describe AMT, as well as other task-based APIs that literally allow programmers to command others' labor through code.

We have described AMT in these terms in the past ourselves [43, 45, 46]. Some have begun to describe this divide between the creativity haves and have-nots as the difference between jobs "above the API" and "below the API" [54]. The API, or Application Programming Interface, is a term for programming protocols that allow someone to invoke code, services, or action without concerning themselves with the details of its implementation. As companies like AMT, Uber, HomeJoy, and 99Designs design task-completion APIs, they make work programmatically available through acts of coding. These companies pay people to complete the tasks for now, but "below the API" debates suggest that these tasks can be semi-automated or even fully automated, displacing people as technologies and machines capabilities grow. Futurists Andy McAfee and Eric Brynjolfsson call this "the race against the machine" [12] and argue that only creative workers like designers can stay ahead of it. They echo earlier advice by Daniel Pink [67], Tim Ferris (see [43]) and others about how workers could stay ahead of the outsourcing of "routine" work by developing their creative capacities. Within this framework, "below the API" jobs are "dead end" and policy makers' challenge is to encourage people to seek "above the API" jobs – jobs like design, marketing, and entrepreneurship.

Turkopticon intervened in these economic imaginaries, and was also interpreted within them—by our universities, by journalists, and by entrepreneurs. Our claim to have designed Turkopticon positioned us as planners and managers of a system that has value for others. This abstraction is one that has cultural and economic legs. A startup offered to buy Turkopticon from us. They saw us as the designers and founders and, therefore, the owners of the platform's value. We refused this idea that design creates the value; without reviews produced by workers, Turkopticon would be worthless. We turned down the offer on the grounds that much of Turkopticon's value is produced by Turkers and was not ours to sell. This was only the beginning of tactics we developed to counter "design saviors" and "digital sweatshops." These tactics took us beyond questions of design to ones of the social and institutional settings in which design took place.

BEYOND DESIGN: RESPONDING TO FAILURE

How did a project team specifically aiming to interrupt the invisibility of workers end up participating in rendering them invisible, or worse, objects of rescue? Our work built on early debates in HCI and CSCW about the politics of representing work from managerial points of view and the role of user-centered research in drawing out the creative complexity of invisible labor [71, 79, 84]. We knew how managers often underestimate the value of the work done by hierarchical subordinates, and often transfer this naivete to systems designers who believe tasks can simply be replaced by rule-based automation [81, 84]. These works prepared us to question the claim that AMT work was repetitive, menial, or simple. HCI and CSCW scholarship did not prepare us, however, to navigate the innovation imaginaries through which journalists and technologists heard and understood us.

Journalists as Technological Translators

Journalists drew on commonsense ideas about technological work — that designers, inventors, and engineers make technologies and others, whether workers or consumers, use them. Despite a decade of critique in STS and HCI drawing out the importance of user appropriation [65] and "invisible work" [79], journalists assumed that invention means new things and we were makers of such new things. As Vines et al. [95] observed, journalists seized on Turkopticon as a solution rather than a symptom of a problem.

What EuroAmerican culture commonly understands to be a "new thing" — a designed invention — created a blind spot that occluded Turkers' own technological production to engage in mutual aid. Turkers built their web forums on existing code libraries. The social and technical work of sustaining these forums is complex. These are not the sorts of socio-technical achievements, however, that look like

large scale, million user applications or the seeds of novel futures. Nor does the work of installation, configuration, and maintenance easily read as "design"; forums are achieved by ongoing work over a long period rarely punctuated by eventful launches that present themselves as a break with the past. Journalists, like most EuroAmericans, are not trained in the arts of noticing ongoing articulation work as the stuff progress and survival might be made of.

We adopted several tactics in response to these challenges. First, we changed the way we told the story of Turking and infrastructures of mutual aid. Even when asked about Turkopticon, we emphasized that Turkopticon was only one small element of a thriving ecology of forums and encouraged journalists to speak with forum moderators. We emphasized that contemporary understandings of technology and design overlook or undervalue community moderation, maintenance, and user configuration but that without this, all inventions would fall apart or amount to nothing. We drew on scholarship from HCI and Science Studies [47, 48, 65, 79, 83] to teach journalists a different way to think about people's relationship to technology that let design share the stage with other practices of making, articulation, maintenance, and communication.

Second, we told journalists that we would not work with them on a story unless they spoke with workers. Though many workers do not jump at the opportunity to talk to the press, some have been willing to and willing to do so often. We impressed upon journalists the importance of the forums in making AMT work and sustaining workers behind the scene. While we could not speak to the complexity as well as workers could, we could prepare the journalists to listen better. We shifted from seeing any publicity as evidence of our impact to looking at the labor politics of the stories we supported. We also began to see that we had something important to give to journalists — a story that they needed for their own work production. We essentially withdrew our cooperation unless they cooperated in including workers.

The Absence of Workers in HCI Venues

Though HCI venues speak often for the user, they do so primarily through experts who mediate user voice into papers and presentations delivered from podiums. Though the HCI community was central to the invention and innovative use of human computation, the Turkers that make these systems work had no place at our conferences except through special efforts by people working against the grain of our community's rules for inclusion. Conferences attendance fees are US$500 or more, talks are given with the assumption of a professional audience, whether academics or professional designers, and a spot on stage requires the preparation of an accepted paper or panel.

We have experimented with a variety of tactics for bringing Turkers closer to the production of knowledge about crowdsourcing. As we have come to recognize the insufficiency of design tactics as a vehicle for transforming the cultures, narratives, and hierarchies of value in crowdsourcing, we have experimented with other tactics to bring Turker skills and expertise into the spotlight. First, several researchers pooled funds to support a Toronto Turker and forum moderator to attend CHI 2014. Second, a later project to build a safe space for Turker activism, Dynamo, more actively included Turkers in the design of the system and attempted to give a platform to facilitate Turkers' own interventions and actions rather than relying on our platform design. Some Turkers also co-authored the CHI 2015 paper about Dynamo [69]. Third, when Scott Klemmer invited us to serve as experts on ethical AMT practices for his Interaction Design online course [53], we redirected him to Turkers who could serve as experts instead. Rochelle LaPlante, a moderator on MTurkGrind, agreed to speak about tactics and best practices for employing Turkers and valuing their contributions. We also encourage AMT workers to write publicly and cite them as author-experts rather than as qualitative data [18, 55].

Challenges to Workers Speaking & Acting Collectively

The objective of our initial interventions had been to provoke workers to imagine what better working conditions might be. To that end, we asked workers to articulate a "Worker's Bill of Rights" from their perspective [45:614] and designed an agonistic homepage for Turkopticon that compared it to other forms of contingent work without protections. While Turkopticon provoked and created one infrastructure for mutual aid, we found that Turker forums did not always allow workers to forge unities of voice and will on issues of common interest.

Challenges to collective voice and action were many. Different forums had different cultural ethos; forums sometimes splintered in the face of conflict. Workers frequently joined and left the AMT workforce. Many workers joined the system because they valued freedom and independence; some reported skepticism of American-style unions. Others feared retribution from employers or from Amazon, including losing their AMT accounts. In such a fractious environment, it was difficult for workers to speak out about all but the most obvious shared issues without fear of frustration or drama, even on forums.

One of We Are Dynamo's first campaigns, organized by TurkerNation operator Kristy Milland, generated a very different kind of publicity around AMT labor than innovation-centric stories about Turkopticon. Milland organized a campaign of worker letters to Amazon CEO Jeff Bezos. The letters sought to humanize Turkers, showing both their dedication and their struggles as workers not reducible to computation. The campaign gained coverage in major news outlets including *The Atlantic* and *Financial Times*, but with Turkers as organizers.

We Are Dynamo was a complement to the limitations of Turkopticon and existing worker forums. It emerged out of an assumption that AMT workers did harbor ideas for improving their work, but that the existing technical and

political environment posed challenges to those ideas gathering constituencies, mandates, and collaborators.

CONCLUDING DISCUSSION

Design and Other Labors in Innovation Supply Chains

The longer history of our work on AMT reveals how the social and historical position of "designer" shaped the effects of our intervention. It built on analytical turns to maintenance, repair, and other forms of creativity from below. It also revealed the limitations of this turn.

HCI scholars have opened the question of "design" as a social and historical category and the limitations of that vision for understanding how technologies emerge within social practices. Jackson and colleagues argued that the devaluation of maintenance and repair work shapes funding structures for ICTD projects, reproducing failure when projects have support for initial invention and installation but not for the work of keeping a technology working and aligned with its environment [47]. Lindtner draws on the example of manufacturing hub Shenzhen to demonstrate how user-driven innovation and the "maker movement" rely not only on the availability of maker tools but on manufacturing geographies that let designers touch materials, consult on labor organization, and shape their design visions in turn [59]. This turn to repair, maintenance, and manufacture offers a vision of ontogenesis, or the coming into being of things, as an ongoing accomplishment rather than histories of invention, novelty, and diffusion [40]. Creativity, knowledge, and labor suffuse these systems and give them their form.

Turkers too maintain and repair AMT. They help resolve breakdowns through Turkopticon and through their forums. They advise employers about flawed task designs or bugs. They teach each other how to use tools. In short, they do much invisible work, some of which helps AMT as a system appear to work as intended. In this way, they are like the secretaries making copies, deviating from management rules to achieve management intention [84]. They also devise tools, infrastructures, and social norms to make their work more to their liking. It is not enough, however, to locate the creativity, knowledge, and innovation that suffuses the tentative order of this socio-technical system. Creativity is everywhere, and the unjust system of value distribution of which AMT is a part relies on that fact.

Showing the creativity is not enough. The expansion of what counts as creativity might expand our view of where value gets produced, but it does not help us understand why value flows as it does. To do this, we must recognize AMT not only as a site of production but as part of a supply chain in the computing industries. Typical CSCW modes of attention direct us to sites of coordination, cooperation, and work. The supply chain view draws into attention questions like where work goes, why it is needed, how it is compensated, and how distance and invisibility shape work and value [42]. Consider a Turker in their home. Perhaps their parents feed and house them. They might be translating English phrases into Italian. Moving up the supply chain, that Turker might be doing translations for a startup that wants to prove that it can semi-automate translation and attract investors to generate salaries, office space rent, and legitimacy for its enterprise. Moving further up the supply chain into the realm of speculative finance, venture capitalists will value this company based on novelty, projected revenues and costs, and based on the efficiencies and automations the startup promises to create.

Within this supply chain, the startup gets to remain agnostic about how workers generate the translations it sends to AMT. It pays not for worker time but for data volume. The startup might not even know much about the craft of good translation. This is what anthropologist Anna Tsing calls "salvage accumulation": "the process through which value created in noncapitalist value forms is translated into capitalist assets, allowing accumulation" [89]. It is how the translator's love of Italian poetry and Hollywood film, as well as their parents' affection and support, gets absorbed into the startup's capitalist enterprise. The startup itself translates Turk work — data labor acquired through APIs and interfaces — into data.

In this supply chain, the startup appears as a crowdsourcing company rather than a temporary labor or translation company. AMT allows the company not only to distribute work but appear cutting edge in competition for capital. The VC, seeing the startup as a software company rather than a labor company, uses larger "multipliers" to estimate the company valuation (see [43:231]).

Salvage accumulation allows enterprises to generate value through processes they cannot even design, plan, or fully understand. By organizing production into supply chains, companies contract out work and squeeze vendors to produce more for less while disavowing the conditions and creative achievements by which such efficiencies are achieved. Taking the supply chain into view, we can see crowdsourcing and user-driven innovation as ways of engineering the creativity and tacit knowledge of everyday life into forms of value that sustain enterprises at scale and over time. While including a broader range of actors in the production of value, these supply chains do not substantively "democratize" innovation, redistribute control over the ultimate product, or redistribute value [9:42].

To say that Turkers' labors can include both the routine and the inventive, then, says too little. Supply chain production relies on the diversity of skill, labor, location, and regulation—coupled with cost control. 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 them. These same ideologies attributed innovation to us as designers.

In the innovation supply chain, Turkers' creativity keeps data flowing while design creativity identifies new markets, needs, and sites of investment. While designers and Turkers might both create, designers' creativity promises business plans and untapped consumer needs. This is why Google Ventures includes designers as partners to aid entrepreneurs. This is why VC firm Kleiner Perkins hires designer John Maeda as a partner. This is why Nike keeps design and marketing in-house, outsourcing manufacturing to those who meet its standards most cheaply [89:118].

Turkers fit in an economy of innovation in which we, as designers, are also key players. Economies of innovation are those that prioritize new products, new enterprises, and new investment vehicles for capital. Capitalism has long searched the world for sources of value — labor, raw materials, rare goods. Innovation draws the focus to the production of novelty, the search for financial value [87], and the importance of entrepreneurs in assembling those novel combinations [72].

These economic imaginaries challenge us to refine our conception of reflexivity in design. In HCI, reflexivity has been taken up as a way to produce better knowledge by recognizing designers' positions, values, limitations, and standpoints [11, 14]. These values and positions cannot be completely anticipated; the work of the design project itself can reveal designers' limitations if designers know how to notice [4]. Our experience with Turkopticon suggests that reflexive design must take stock not only of designers' voice, values, and assumptions, but also the ways designers are positioned, read, and supported within global economic imaginaries. That we act as designers at all implies stories about designs that diffuse from designers to users, and where the value of one's labor ought to be tied to the value it uniquely produces for investors of globalized capital [66]. These are values that haunt our work, legitimize it to policy makers, and even attract resources to us. But we must be honest about this if we propose to investigate and reshape ideologies as critical, reflective, feminist, or postcolonial design practitioners.

What Can HCI Researchers Do?

Much HCI work locates the power of design in acts of making together, imagining alternatives, and tinkering with our worlds. Designers' capacities appear in the things they make, the futures they make palpable [91], or the collaborations, collectives, and publics they facilitate [23, 57]. Turkopticon's challenges, however, remind us of Dunne and Raby's provocation: "the power of design is often overestimated. Sometimes we can have more effect as citizens than as designers. Protests and boycotts can still be the most effective ways of making a point" [25].

Rather than putting protests and designed objects in competition, we look to social theory for models of political change that, in turn, suggest strategies for HCI response. The political theorist Antonio Gramsci argued that unjust economic structures persisted not only through oppression but through the organization of "common sense" – the routines, relationships, and everyday practices by which people come to feel and understand the world [33]. Civil society institutions like churches, schools, and clubs were as important as unions and factories sustaining consent, legitimizing oppression, and producing dominant beliefs, or hegemony. Gramsci argued that activists needed to find the "good sense" in people's existing practices and expand those into counter-hegemonies [33].

From Gramsci, we notice our community organizes degree programs, curricula, hackathons, workshops, and computing clubs. We notice the stories we tell about labor, amongst ourselves, to students, to the press. We translate design into something people know symbolically, feel in their bodies, and learn to do socially. These are ways – beyond our designs – in which we shape civic life, sustaining or countering hegemony. We can develop and tell stories about design that do not implicitly value our labor more than others'. With alternative ideologies about how design, labor, technology and value hang together, we can undercut and counter discourses of innovation that legitimize inequality. As social scientists, we can locate and run with seeds of "good sense" – mutual aid, solidarity with others – to generate counter-hegemonies.

This approach requires things, critiques, and protests, but also experiments in more just ways of life that make justice into new forms of common sense.

Where the Action Is: HCI in the Longue Duree

The very stories about labor that attracted us to design were the same stories that devalued Turkers' work. Stories about "innovation" and "design" conditioned Turkopticon's meaning and its impact on workers. We could only discern this in the long term. It takes time to let meanings develop and stabilize. It takes time to build sufficiently thick relationships with project participants to let critiques of project conveners emerge. It takes time to experiment with ensembles of responses, including finding different story telling strategies, rearranging terms of inclusion, and following up with projects that address previous shortcomings. This work and reflection [73] expands the frame of action over half a decade of making, watching, waiting, being surprised, and trying again. We find where the action is stretched out over time, strung together in supply chains in contested systems of value and meaning.

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