POSITION PAPER

Dynamo: Designing Interactive Technology to Support Social Movements in Digital Labor

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Sara wakes up early in the morning. She quickly pours a cup of coffee and sits at her desk while still in her pajamas. Looking at the clock, she notices that she has at least an hour to get work done before her children wake up and she has to drive them to school. She opens her web browser and types in: mturk.com. Scrolling down the long list of available tasks, she searches for work. Good work isn't always available. Sara also signs into a worker forum in a new tab and looks up the thread for todays work. On the forum chat room she says hi to a few familiar screen names and chats about the new Katy Perry song while they wait for work to show up. After ten minutes, she finds a batch of web search tasks. The task asks her to search for a query on Google and write descriptions about the top five results for 50 cents. She quickly accepts the task and gets to work.

Amazon Mechanical Turk (AMT) is an example of a digital labor marketplace where thousands of people work flexible hours and get paid on a per task basis. Amazon organizes the web-based marketplace that connects this distributed workforce to tasks through online only interactions; thus, by nature the market poses new challenges for workers who aim to organize for labor rights. Over the last year we posted surveys and spoke to close to a hundred AMT workers (Turkers) in order to learn about their work and their relationships with employers and with one another.

These Turkers were primarily located in America and Canada. We learned that Turkers have built whole online communities that are resources for education and socialization. However, launching collective efforts within these communities have proven much more difficult. While scholars have raised doubts about how effective digital media can be in creating social change -- arguing that on the ground activism can not be substituted with online-only social interactions -- they have not considered labor markets that solely function online. What can "on the ground activism" mean for these workers?

As researchers we collaborated with workers of AMT to explore possibilities of digital media facilitated collective action. We built Dynamo, a system that supports workers to pitch ideas, gather to discuss them, define collective goals, and act on them. We started by speaking with workers about existing forms of activism and the challenges associated with them. We joined worker forums and participated in chat-rooms where we engaged in conversations about online labor and collective action. Based on our understandings, we designed a prototype system – Dynamo – in which workers could post messages and deliberate about projects to improve their work environment. We invited workers to the system both through our previous connections and by posting on public worker forums. As workers proposed efforts through Dynamo, we facilitated the campaigns to understand the social processes of organizing online and the possibilities and limits of digital media support. As workers offered feedback on the system, we tailored the design to needs that emerged as Turkers mobilized with it.

In this article, we will explain how we have designed Dynamo to address the barriers that Turkers face when they attempt to mobilize around shared issues. We will describe two actions that Turkers have organized through Dynamo as well as others that they have imagined and pursued through the system. Dynamo is a first step towards better understanding online labor markets and how these workers can leverage the affordances of digital media to take steps towards organizing for better work.

The Challenges of Online Labor

Amazon Mechanical Turk is a source of fast, temporary, and cheap data processing labor. On the platform, Turkers undertake short tasks on the order of minutes, such as tagging images or transcribing short audio clips, seemingly simple tasks that computers currently can't do. Turkers' work may also contribute to training machine learning algorithms. For instance, traces of users' activity on social media build up huge data sets. Industries are interested in using this data to predict users' behavior – for example to predict the likely-hood of a user clicking on an advertisement. But algorithms are incapable of understanding ever changing human emotions, psychology, and culture (Irani 2013). Thus, programmers train these algorithms on human judgments that are too complicated to be automated; this is where labor is passed on to Turkers.

The thousands of Turkers who work on AMT, experience a work environment very different from factories or white-collar offices. Turkers can choose which tasks to complete and may work for as many as 50 different employers in a single day. They never see these employers and most of the time they don't know who the employer is or what the results of their work will be used for. Researchers describe large groups of Turkers as highly educated workers who work full-time to make ends meet. These workers face a little-regulated labor marketplace, variable and often low wages, and unbalanced power relations privileging employers (Irani 2013, Kittur et al. 2013). For example, an employer can choose whether or not to accept (and pay for) completed work, while Turkers lack legal support in pursuing wage theft or minimum wages (Irani and Silberman 2013).

Irani and Silberman have argued that AMT's design directs the collective power of these workers

into reliable, steadily humming computational infrastructure. The infrastructure is designed to keep questions of ethical labor relations or worker variation out of employers' sight (Irani and Silberman 2013). Turkers rely on employers to post work frequently and to accept their work and pay them. These are risks that are usually taken collectively by a whole business. A fast food store for example, would still pay workers their hourly wage if no customers showed up a certain day. However, at its core a crowdsourcing platform passes down all risks and vulnerabilities directly to the individuals who do the work. This has resulted in a labor market where workers struggle to find good work and to assert their rights when they are mistreated.

Understanding Workers and Their Collectives

Turkers use social media and operate several a forums where they share leads on good work, discuss their experiences, and support one another. These interactions constitute strong online communities (Lee et al. 2006). The forums are an important way in which people learn to manage their work to meet their needs. As one worker explained to us:

> *"The community helped to introduce me to the rules, norms, and averages [...] I became accustomed to the norms and how to choose the right HITs, which plugins or add-ons that would be helpful, and what to do in case of a rejection."*

Workers also act collectively in more eventful ways, for example, we heard of several instances where workers had sudden events (e.g. sick pets) that threw up unexpected hardship and others raised money to help. We observed that when individual actions had effect (e.g. emailing requesters), and when efforts were not controversial, forums proved effective at coordinating. They struggled more when many hands were needed to share the burden or discussion was necessary. Furthermore, Turkers face serious risks in taking collective action: they do not want to be viewed as shirkers, and many cannot afford to lose their Amazon Mechanical Turk accounts, which connect them to an important stream of income. So crowd work collectives might appear to face an uphill battle in changing the sociotechnical infrastructure in which they work.

Most of the workers we spoke with over the course of the project interact exclusively online. As others have previously found, online-only communities may struggle to achieve trust among members (Earl and Kimport 2011). In the online world, people are hidden behind monitors and intentions are hard to recognize; thus, disagreements might erupt, or members may begin to suspect the motives of a particular member. We heard of disputes over members who were suspected of operating multiple accounts, colluding with employers behind the scenes, or even just making a statement taken as insult. The forums archive these interactions; this can make reconciliation difficult online as memories of conflicts persist. As researchers have shown, text-based and mostly asynchronous online communications are more likely to spur negative emotions and end in flames (Dahlberg 2001). Disagreements among individual workers were sometimes cast as fundamental rifts between entire communities. Workers called the most explosive of these exchanges "mega-drama."

Acting Together

How can Turkers move past these disputes and act together on matters that they do agree on? Just as paid crowdsourcing has reconfigured the dynamics of work, introducing a new form of labor that relies on temporary labor relations and short term tasks, it seems that the distributed nature of the workforce may also be transforming the requirements of labor activism. What would the equivalent of a labor union look like online?

The open, dynamic, ever-changing nature of the AMT workforce makes large-scale consensus building seem impossible; new workers join daily, under various circumstances, and for very different reasons. Many workers have given up trying to get their peers to listen, calling it "beyond impossible":

> *"Trying to change the minds of those who don't care as much about the job, or who have different views on working (less commitment to collective goals), will be beyond impossible."* – A Turker

There is no central communication platform for communicating with workers online. The total number of Turkers vastly out number all forum participants combined and even forum participants are not all regular visitors. As has happened before, a group could be boycotting a bad employer while others don't even know of these efforts. As one Turker who is also a labor activist put it:

> *"I've thought about it [activism for labor rights] but the community for it is so like, loose? That I don't even know where I would really begin that... I could go to all the forums and they would say, 'That's a great idea! We should do that!' and then, you know, (laughing) Where's it gonna go from there I guess?"*- A Turker

In addition to difficulty of communication, good intentions are hard to evaluate and influence online. Labor unions, for example, rely on peer pressure when organizing movements (Gallagher and Strauss 1991); online it is much more difficult to leverage peer pressure because of the invisibility of others' actions. One seasoned Turker explained that this online-only world makes it difficult to develop the trust and commitment needed to propel shared, collective action:

> *"You can't hold anyone to their word online so they can say they did x or will do y, but they won't"*

Moreover, many workers were attracted to Mechanical Turk because it affords personal independence. The notion of binding together into a single voice rubs against this idea of an independent contractor as master of their own fate. Opinions range from skepticism to distrust:

> *"If by "union" you mean a "labor union", I would not feel comfortable taking part. It runs against my grain because I am an individualist. I do not want to feel forced to go along with the "majority thinking" of the leaders within a labor union. I have never been a member of a union and hope to continue along my merry way. I consider myself self-employed...not working for anyone in particular."* – A Turker

Throughout this project we have worked with workers to better understand these challenges and think of the ways that Turkers can mobilize together. How can we design socio-technical systems to support these communities in acting collectively?

Dynamo: Engaging People

Based on our understandings and engagements with Turkers, we worked with them to design Dynamo (Figure 1), a platform to support collective action in the AMT ecology. Our process was highly interactive, but structured only in hindsight.

We began by looking for existing forms of collective action by reading publicly visible forums and posting surveys to AMT itself. We also found a few workers early on who were interested in the

possibilities of collective action and engaged them more directly. Slowly, as our design process progressed, we engaged larger numbers of workers, discussing Turking and the project with over 100 individuals in total. We talked with workers, we proposed scenarios to check our understanding and imaginations, and we responded to their critiques, feedback, and suggestions as we built and maintained Dynamo.

Turkers are busy and distributed, so much of this talk happened in email threads, in forum posts, in worker IRC (Internet Relay Chat) conversations, or in private forum messages. One member of our team was at times in communication with Turkers full-time online for several weeks. To enable workers to participate, we spent many hours online so that communication about the project could take place when workers had a lull, rather than at times that were convenient for us. This period of ethnographic research spanned more than a year.

We undertook this project not as outside observers, but as people with stakes in the ecology of human computation. Members of our team had been active requesters on Amazon Mechanical Turk, and each of us were invested in Computer Science, a field that produces and legitimizes human computation. We produced Dynamo through a process of collaboration with interested workers. We approached this not through the "detached intimacy" of focus groups but by working towards "located accountabilities" (Suchman 2002) that recognized the power relations between workers and our team. What this meant in practice was that, first, we began our design work with interested Turkers, while respecting that Turkers may not have the time to engage with our project. We also attempted to build with care (de la Bellacasa 2011) rather than moving fast and breaking things, as commonly described in the Silicon Valley ethos (Fattal 2012).

Dynamo: Design

Dynamo offers a web forum where members can submit ideas for shared actions, vote proposals up or down, and then discuss and mobilize around actions through threaded forum discussions and shared wikis.

In order for participants to engage in campaigns they have to trust others in the system. Therefore, we restricted membership to the design team as initial moderators, to workers who had completed at least 100 online tasks, and to others specifically invited to aid in campaigns. Membership on Dynamo is limited to one account for each worker. We ensure this by giving each worker a registration code through a task on AMT. In the prototyping phase we learned that past

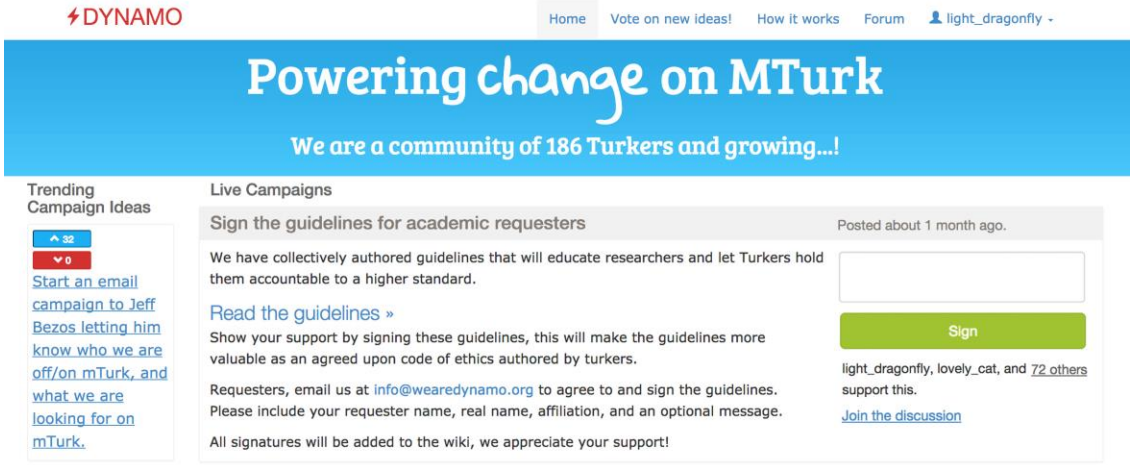

Figure 1. Dynamo is a collective action platform for Amazon Mechanical Turk workers. It has been used to author guidelines for ethical requester behavior, start a letter campaign to Amazon CEO Jeff Bezos, and eight other efforts.

events and disagreements within and between different communities hindered collective action. We needed to create a new space where people could concentrate on matters that they did agree on. To address this, Dynamo assigns randomly generated pseudonyms at registration time. These pseudonyms are in the form of "adjective_animal" and new members can flip through them to find one that they like (e.g. light_dragonfly, jittery_platypus). Members participate on Dynamo under these names as pseudo-anonymous Turkers. We assigned psuedonyms in the system so workers felt safe proposing ideas without judgment or endangering their reputations. Pseudonyms also prevented workers from prejudging others' contributions based on forum-based or personal conflicts. Workers did mobilize under their own names by revealing themselves, but within Dynamo, they controlled that self-disclosure.

For actions to move beyond the initiative of a single individual, initiators needed support and participants to share the labor. But for Turkers, time is limited and work comes in hard-to-predict waves. We needed workers to be able fit their Dynamo activities into their schedules and allow for various levels of involvement and time intensity. Therefore we designed Dynamo to focus on short idea pitches. Ideas act as polls that enable publics to form around them (Le Dantec and DiSalvo 2013). Pitching a new idea requires a 140-character description, for example "Start an email campaign to Jeff Bezos [Amazon's CEO] letting him know who we are off/on mTurk, and what we are looking for on mTurk". Workers can upvote or downvote the idea, thus expressing their opinions with minimum time commitment or they can participate in longer discussions and debates on the forum thread.

Campaigns require organizing and emotional labor to succeed, but for Turkers it was a risk to spend time and effort on a movement if others didn't join in. Therefore, we designed Dynamo so that campaigns launch when an idea acquires 25 upvotes and has more upvotes than downvotes. Thus, once a campaign starts it has already gone through a process of voting and discussion and has built up a group of supporters.

Once an idea graduates to become an active campaign, Dynamo's design allows users to discuss, take action, and track progress. Dynamo supports discussion through a web forum where each active campaign has at least one dedicated thread. In one of the campaigns Turkers needed a means to collaborate on a shared document. For those cases, we created a MediaWiki installation for users to author content through their pseudonyms. Another campaign required users to sign a declaration. We implemented buttons on the Dynamo site to enable one click petition signing.

During deployment we learned that we needed to keep campaign participants up to date as actions unfolded to maintain momentum and excitement. For this reason, Dynamo automatically subscribes users who vote on ideas on the relevant forum thread so they receive email updates. Dynamo also allows campaign organizers to produce weekly update emails to all users. Users author updates by editing a page on the Dynamo Wiki. This allows email to act as a megaphone, attracting attention and calling out to others to join.

Dynamo: Deployment

In the time since Dynamo's deployment on the web (starting July 20th 2014), 242 unique Turkers have registered. The site has had over 1,500 unique visitors and over 18,000 views. Among these Turkers are people that post vigorously on other forums and are active participants of Turker communities. Turkers have gathered on Dynamo to discuss ten ideas for action, and two have transformed into active campaigns.

One idea on Dynamo calls for a collective effort to show the world who Turkers are, written from

their own viewpoint. It is a reaction to media portrayals of Turkers as downtrodden, disempowered cogs in a machine. It instead aims to humanize perceptions of Turkers:

> *"This is a writing campaign for Turkers to let Jeff Bezos, head of Amazon and brainchild behind mTurk, and the rest of the world know all about who we are. The intent is to get Bezos to see that Turkers are not only actual human beings, but people who deserve respect, fair treatment and open communication."*

Dynamo's biggest effort was aimed at academic research practices. In the weeks prior to Dynamo's launch, an academic researcher began experimenting on Turkopticon, an independent Turker rating system. This experimentation included the injection of fabricated data into Turkopticon, causing disarray among Turkers who rely on the accuracy of this information for their jobs. After several days of investigation, the Turkopticon community discovered that this was the work of an academic researching the dynamics of requester reputation on AMT. This incident took up much time and energy and caused much frustration, prompting questions about the ethics of research on AMT. While this specific research project was approved by IRB, Turkers agreed that IRB committees lacked adequate exposure to issues and vulnerabilities they faced as Turkers, both individually and as a community.

A group of Turkopticon maintainers suggested that the community draft publicly available ethics guidelines. The guidelines were intended both to guide behavior, and also to back Turker claims about normative standards should Turkers take issue with a job's research ethics. Like in many social movements, emotionally charged incidents became a trigger for collective action [10]. This campaign became Dynamo's largest and most active. Using the Dynamo Wiki, members collaboratively generated a sprawling online guide on matters ranging from how to pay fairly, how to respect Turker privacy, and how to respect Turkers' communities online. The guidelines are also available online as a 22 page write-up that has been viewed 13'000 times.

After launching the guidelines[1], Turkers began soliciting endorsement from others within their communities and later from researchers involved in crowd work. In total, 107 participants signed the guidelines (28 researchers and 79 Turkers), indicating their support of the collective body of work and agreeing to uphold the guidelines. We have also observed requesters referencing the guidelines in their HITs: *"Wow, [academic requester] survey's debrief page has recommendations from Dynamo. Nice one Turk community." – A Turker* Some Turkers, however, have reported non-responsive IRBs so efforts continue.

Lessons on Supporting Collective Action

Despite these victories, movements on Dynamo faced difficulties along the way. In general, efforts face two cases of failure: either they lose energy and stop, or disputes and resultant tensions threaten collective action.

Here, we found that digital media alone could not facilitate these actions. We found ourselves facilitating movements with communicative labors to remove obstacles to action. First, we set deadlines for discussions, so participants knew when to gear towards building consensus. Second, we suggested and committed to next steps when efforts stalled but left space for participants to object, undo our action, and change course. Third, when participants' hope for success flagged, we worked to secure conditions that bolstered hope – offering a plausible theory of change, or a connection to a journalist, for example. Lastly, when disputes happened in movements, we

[1] http://guidelines.wearedynamo.org

mediated them. We reflected arguments as we understood them back to participants and proposed ways of address them. We found this type of structured labor effective in guiding efforts to success.

Note that for each of our aforementioned actions to be effective, Turkers had to trust that we would act neutrally, fairly, and predictably and we had to maintain that trust. We worked towards this by attending to people's responses to campaigns and addressing criticisms of project actions or us quickly. As with many social movements, we propose that whoever takes on the role of performing this labor within an online movement should build trust with and among the communities involved.

Conclusion

Legal scholar Alek Felstiner has argued that what makes crowds strong -- the wisdom produced by mass aggregation of independent assessments -- is also what makes crowds weak. Crowdwork infrastructures keep workers apart. In our work we found that Turkers did collaborate, deliberate, and even work in concert to address issues affecting them, from the socio-technical to the policy level. But converting public deliberation and debate into tactical actions proved far more difficult, particularly online.

Through this project we have taken initial steps towards understanding the ways to support and design for collective action within dispersed online crowds. Over the course of a year, we engaged with Turkers, deepening our understanding of the relationships Turkers have with each other, with us, and with collective action. The result was Dynamo, a pseudonymous, neutral platform for the creation of Turker's movements that aim for action and change. We also identified common failure scenarios that plague online communities in collective action and we detailed a set of structured behaviors that helped keep these communities from dissipating.

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