Participants in the Crowd: Deliberations on the Ethical Use of Crowdsourcing in Research

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Abstract
Finding and recruiting participants for research projects can be costly and time consuming; participants are often students, resulting in participant homogeneity. Crowdsourcing platforms can quickly and easily provide researchers with access to inexpensive and diverse study participants. While crowdsourcing may offer researchers the opportunity to harness the power of the crowd, the ethical implications of the crowdsourcing employment model has been called into question, particularly in the case of Mechanical Turk [9, 13]. However, all crowdsourcing platforms and models are not equal and thus the ethical implications of use will vary. In this position paper, I address the differences between crowdsourcing models and the ethical implications of their use in scientific research. I conclude with ethical considerations for researchers contemplating using crowdsourcing platforms to source research participation.

Author Keywords
Crowdsourcing; Ethics; Citizen Science

Introduction
Commentary on crowdsourcing and other online crowd initiatives, such as peer production and citizen science is predominantly positive. For example, [3, 7, 11, 22] describe peer production as a revolutionary economic model that democratizes production and consumption. Those who engage in this new model are better for it: they exercise productive autonomy and gain a sense of instrumentality. Crowdsourcing is "a story of cooperation, aggregation, teamwork, consensus, and creativity" [6, p. 1]. Following this narrative, crowd initiatives not only provide tremendous production power, they provide consumer-come-producer autonomy.

Types of crowd initiatives

Crowdsourcing is a project or task that would normally be completed "in-house" by an organization but has been outsourced to the crowd to complete [6]; e.g., iStock and InnoCentive.

Peer production is a project or task that a decentralized group of people complete. Unlike crowdsourcing, no governing entity profits from the project: "there is a separation of governance and management from property and contract" [4]; e.g., Linux and Wikipedia

Human Computation is a type of task that may be conducted by crowdsourcing or peer production participants. In it, humans to conduct tasks that computers cannot [19]; e.g., image identification and transcription

Citizen Science describes when scientists partner with volunteer laypeople who help them in various ways during the research process [10]; e.g., Zooniverse and Foldit

Positive press encourages innovative use of crowd initiatives, including ways to harness the power of the crowd to facilitate the pursuit of scientific and scholarly exploration. An early example of using the crowd to support research is the SETI@Home project. Since 1999, SETI (Search for Extra-Terrestrial Intelligence) has used distributed computing power, contributed by volunteers, to analyze data. Unlike SETI, which uses distributed computing, crowd initiatives provide researchers with access to numerous and demographically diverse populations [1]. For example, [15] and [2] tested the viability of using the crowdsourcing platform, Mechanical Turk, to conduct user studies and search engine results relevancy testing, respectively. The authors found that they were able to quickly and cheaply reach their desired number of participants, but that statistically accurate ratings when compared to expert ratings could only be achieved when participants correctly responded to verifiable questions on a pre-test. Like Mechanical Turk, citizen science projects, such as those aggregated via the Zooniverse portal, also use distributed human participants to aid scientific research. Volunteers choose projects or tasks in which they are interested, and contribute as much or as little as they like. Like research conducted using Mechanical Turk, citizen science projects have also been found to yield successful results; over 70 papers have been published using data analysis contributions of volunteers in the Zooniverse [25].

SETI@Home, Mechanical Turk, and Zooniverse are three examples of how crowdsourcing might be used during scientific research. However, each uses different models of production: SETI@Home uses computing power contributed by volunteers, the Zooniverse uses volunteered human power, and Mechanical Turk uses an employment model based on pay-per-task. Despite the seemingly unified and revolutionary economic model of crowd initiatives, closer inspection reveals different levels of contributions and different motivations for contributions. In discussing crowd initiatives, and the associated harms and benefits, the differences between initiatives are often ignored or conflated. Since the crowd consists of individuals, scholars using crowd models as part of their research need to consider ethical conduct related to research on human subjects, even though the individual themselves and the role they play in the research process may not be readily apparent [17]. This position paper highlights how characteristics of varied crowd models might impact ethical considerations when using each of these models in research, and concludes by suggesting pertinent questions for researchers to consider when using crowd models.

Characteristics of Crowd Initiatives

Using participatory web features, individuals have the opportunity to create and share information in a variety of formats (e.g., webpages, blogs, comments, and profiles) with a diverse audience (e.g., private groups, limited networks, or the public). Crowd initiatives, such as peer production, crowdsourcing, human computation, and citizen science are a type of participatory web activity as they involve distributed individual contribution, but may be grouped by their shared intent: working towards a goal or task. The definition of each initiative is outlined in the side bar. Crowdsourcing and peer production are the two initiatives most often conflated, likely because each describes an economic model of production based on crowd labour. However, the source of the project or task distinguishes the two models: crowdsourcing follows a traditional top down style of production (i.e., the project is controlled and managed by a few) while peer production uses a bottom up style of production (i.e., management and control is distributed)[4, 6]. Citizen science describes a particular type of project– one that uses various types of crowd contributions for scientific or scholarly gain. As citizen science projects are typically led by researchers, they have the top down production style of crowdsourcing, although theoretically, citizen science could work within the peer

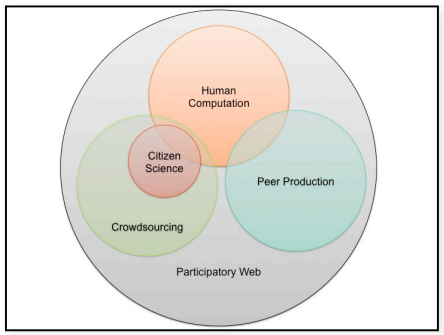

Figure 1. The relationship between various crowd models; adapted from [19]

production model. Human computation does not describe an economic model or project, but characterizes a task. Human computation tasks can be used to complete crowdsourced, citizen science, and peer production projects. Figure 2 shows the interrelationship of each initiative.

Ethical implications of crowdsourcing research

The ethical conduct of research is often predicated on the relationship between anticipated benefits and potential harm [17]. Benefits derived from research may be achieved at societal or individual levels. Given that individual projects will have varied societal benefits, the benefits addressed here are benefits associated with the individual.

Benefits

People participate in crowd initiatives for a variety of reasons, and the satisfaction of these motivations can benefit individuals who choose to participate in crowd initiatives. Motivations for participating have been examined in a variety of contexts. For example, contributors to the peer production modeled OpenStreetMap were motivated by the goals of the project, a general ethos of altruism, the OpenStreetMap community, and self-efficacy [8]. Contributors to iStock, a crowdsourced stock photography company, were motivated by the opportunity to earn money, and improve their photography skills [6]. Participants in the citizen science project, Galaxy Zoo, were motivated by the opportunity to contribute to original research, and an interest in the subject matter [20]. Turkers, as those who work in the Mechanical Turk micro-task platform call themselves, were predominantly motived by the opportunity to earn money, but many were also highly motivated by task autonomy and skill variety [14, 18]. Although a relationship between initiative type and motivation has not been empirically tested, [12] theorizes that there is a link between motivations and depth of participation. Lightweight participation (i.e., involvement that necessitates minimal dedication, tasks are simple, and interaction with others is low) is likely to be associated with extrinsic motivators such as money and the project ethos, and heavyweight participation (i.e., involvement that requires long term commitment to the project, complex tasks, and collaboration) is likely to be associated with both extrinsic and intrinsic (e.g., fun and love of community) motivators. Satisfaction of either extrinsic or intrinsic motivators is likely to benefit participants in some way.

Benefits may also be latent. For example [23] sought to determine if participants in a citizen science project learned from their contributions. By examining letters sent to researchers from participants in Cornell's Seed Preference Test, [23] were able to conclude that participation provided a way for participants to engage in scientific thinking.

Harms

In the literature on crowdsourcing, harms associated with crowd initiatives are primarily addressed in the context of crowdsourced human computation work, particularly the micro-task labour market (e.g., Mechanical Turk). While [16] claims that peer production and volunteered crowd work are unsustainable in the long term because the expectation of volunteered labour reduces opportunities for paid work, ethical implications associated with the use of the micro-task labour market is more pertinent due to its increasing use in research and the locus of control in the crowdsourcing model–in peer production, the community of contributors holds power while in crowdsourcing, power is held by the source (i.e., researchers). While participants in crowdsourced projects have the opportunity to opt out [6], opting out is the only way to exercise power [13]. Therefore, it is the responsibility of researchers to ensure that harms are reduced, and participants are treated fairly. What harms might crowd workers face? Two key issues are,

Figure 2. Mechanical Turk's logo

first, unfair employment practices, and second, the relegation of workers to machines.

Employment Practices

Work sourced to Turkers is highly fragmented. Numerous studies have sought to develop best practices for carving and structuring tasks so that the best work can get done for the least cost in the least amount of time [e.g., 2, 15, 21]. In this model, labour is fragmented into hyper-temporary jobs [13] for which Turkers are contracted. As Mechanical Turk is a task aggregator rather than an employer, Turkers are paid per task by requestors. As contractors rather than employees, Turkers are not guaranteed federal protections given to employees, for example, minimum wage and overtime protection [13]. [9, para. 4] comment on the economic impact of task fragmentation: "we observe the drawing of cheap labor from the so-called 'precariate"–a pool of unemployed, underemployed, or unemployable workers, compensating them well below minimum wage."

In addition to their inability to access employee rights, Mechanical Turk's platform is structured to cater to task requesters rather than Turkers. For example, when a Turker submits work, the task requester can choose whether or not to pay for it. While this measure is intended to discourage Turkers from gaming the system, it may result in wage theft [13]. When a Turker submits work, he or she loses intellectual property rights. Thus, if a requester uses Turkers' content without pay, Turkers have no way to force compensation [13]. This problem is compounded by the fact that due to the number of Turkers, requestors have difficulty responding to communications. Dispute resolution in any number of circumstances is rare [13].

Identity and Visibility

As crowd workers typically conduct human computation tasks, semantically speaking it could be presumed that the nature of the task itself leads to the conflation of humans and machines. As tasks are completed individually, human computation work can be alienating [9]. However, human computation is also conducted in citizen science projects, and as a part "games with a purpose" [24]. These are projects to which participants voluntarily contribute. Therefore, the conflation of humans and computers isn't an outcome of conducting human computation tasks, but rather stems from the role and perception of particular systems. In describing the power of classification systems, [5, p. 32] note that: "moral questions arise when . . . one group's visibility comes at the expense of another's suffering." As described by [13], the division and structure of the labour in Mechanical Turk results in Turkers becoming the infrastructure of the system; as part of the structure, they are dehumanized through invisibility. In an economy where workers' conduct is highly routinized, [9, para. 25] state that "employers, therefore, must consider employees as functionaries in 'an algorithmic system,' forcing the labor relation even further along the path of ruthless objectification than Ford or Taylor could have imagined." The position of its employees in the machine-human spectrum is reflected in Mechanical Turk's byline: "artificial artificial intelligence" (Figure 2). Relegated to a machine's status and deprived of the rights of employees, human micro-task workers risk losing both visibility and a sense of humanity in the context of their work.

Resolutions

The discussion of potential harms and benefits to participants in crowdsourced research is heavily weighted: identified harms apply only to the micro-work labour market. This is not to imply that ethical research can be conducted using crowd work so long as work is sourced from voluntary participants via citizen science projects or gamification. Rather, when conducting research via crowd work, it is important to consider the context of the platform and within that context anticipate the motivations of participants and work towards satisfying their motivations, to be transparent with research intent and the presentation

of results, and to treat crowd workers as human subjects or employees.

Satisfying motivations
As described above, people participate in crowd work for a variety of reasons. When their motivations are intrinsic, participants are likely to reap affective rewards, such as having fun, learning, and socializing. However, in systems such as Mechanical Turk where motivations are predominantly extrinsic [14] the risk of exploitation is higher because the reward to contribution ratio is more likely to be negatively skewed in favour of the task requestor. How might researchers satisfy the extrinsic motivations of Turkers (or other micro-task labour marker workers)? Given that pay is noted as a key factor of participation in Mechanical Turk, and given that employment protections do not apply to contractors, one way researchers can ensure that this motivation is fairly satisfied is to consider how long each task takes as well as the minimum wage in their area so that workers receive fair compensation for their work. In her talk at HCOMP, [18] asked task requestors to think about how much they would like to be paid for the work when they consider how much to pay per task.

Transparency and Communication
An indirect way of satisfying motivations is though transparency and communication. In studying why people drop out of citizen science projects [10] found that participants often worried that their contributions were not high enough quality to be of use, or that the work they were doing was of little use to the project. [10] recommends that feedback on contributions, as well as sharing publications that use the data contributed by participants could positively impact project retention. These recommendations could also apply equally well to other types of crowd work. Communication beyond feedback and results is also recommended. [18] emphasizes the importance of communication in Mechanical Turk. Communication with Turkers can improve relationships between Turkers and researchers, thereby increasing motivation, improving task construction, and improving data quality.

Crowds are people too!
What constitutes a human subject in Internet research is debated [17]. When using crowds in the research process, the people that make up those crowds are less apparent because they often provide data rather than personal information. When the level of analysis is the product of human contribution rather than the contribution of human subjects, the individuals are obscured–it's hard to see the trees for the forest. While informed consent may not always be required, it should be considered, particularly if survey instruments are tasked to Turkers. While gaming the system has been detected in Mechanical Turk, researchers should not treat all Turkers as though they are scammers [18]. Crowd workers should be treated with the respect and dignity of research assistants. Most literature on the use of crowdsourcing in research is directed at the source (researchers), rather than the crowd (participants). In academic literature on crowdsourcing, special attention needs to be paid to the crowd and special considerations need to be made to ensure their wellbeing. Through careful consideration, researchers can ensure that the dignity, welfare, and integrity of their participants is maintained.

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