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Crowdsourcing Surveys: Alternative Approaches to Survey Collection

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Abstract

A challenge often facing survey researchers is finding an appropriate sample that is representative of the target population. Researchers are often constrained by resources (e.g., cost) and time which often limits them to using convenience sampling (e.g., student population). With the increase availability and use of crowdsourcing services, many researchers are finding a resource that provides a larger, random population to target. This paper discusses two approaches to crowdsourcing, social networking site and Amazon Mechanical Turk, to help researchers understand the options available for crowdsourcing surveys. Techniques are presented as well as benefits and potential issues to these approaches for survey research.

Keywords: Surveys, Samples, Crowdsourcing, Amazon Mechanical Turk, Social Networking Sites

1. INTRODUCTION

Surveys provide an important tool for testing various research models or retrieving the opinions of participants on certain topics. While there has been numerous studies on designing surveys, the challenge many researchers face is finding the appropriate population. Much of survey research has a common goal: provide a sampling of the population to draw conclusions to the broader population at large (Cooper & Schindler, 2013). The challenge with achieving this goal is finding the appropriate sampling of participants that would be representative to the broader population. This is exasperated by numerous constraints such as the cost of sampling and the time it takes to achieve an appropriate sample size.

The purpose of this paper is to discuss some of the challenges facing researchers conducting surveys using traditional sampling approaches followed by the popularity of alternatives approaches such as crowdsourcing. New approaches such as using social networking sites or Amazon Mechanical Turk (i.e., MTurk) provide researchers with an opportunity to collect a broader, random sample, cost effectively. These two approaches are discussed including how to setup, distribute and effectively collect data.

2. SAMPLING

The primary goal of survey research is to sample a population to make inferences based on their responses. Sampling involves the selection of subset from a particular population with the intended purpose of generalizing the results from the subset to the greater population being studied (Blumberg et al., 2014). Aims of sampling include to make an inference about an unknown parameter or to test a statistical hypothesis

relating to a certain population (Krishnaswami & Satyaprasad, 2010). Since the target population may be too broad (e.g., professionals worldwide), sampling may involve contacting local companies or professionals to participate in a survey (Bhattacherjee, 2012).

Types of sampling can include both probability (random sampling) and non-probability sampling. Random sampling typically yields more generalization and a greater accuracy of estimation of population parameters (Cooper & Schindler 2013). Conversely, non-probability sampling is often chosen based on convenience and can be used to make general inferences under specific conditions. Non-probability samples may be very helpful to understand a phenomenon that is happening at the moment in an exploratory manner (Cooper, 2008). For example, a student population may be considered a common, non-probability sample used within research when trying to generalize to the greater population. This can also be useful when the goal is instrument testing or measurement validation such as pilot testing (Bhattacherjee, 2012).

Characteristics of a good sample include (Krishnaswami & Satyaprasad, 2010):

- **Representativeness**: is the sample representative of the population you are interested in or in other words, is this a valid sample?
- **Accuracy**: is bias absent from the sample (i.e., is it free from any influence that may cause a difference b/w sample and population)?
- **Precision**: standard error and standard deviation of the sample estimate (the smaller error/estimate, higher the precision)
- **Size**: is the size of the sample large enough that an inference can be drawn with a certain level of confidence (i.e. reliability)?

Other factors/constraints to consider when choosing the appropriate survey approach include sampling precision, budget/cost, facility availability, and time (Sreejesh et al., 2014). Given the constraints and characteristics needed for a good sample, researchers must determine the most appropriate approach to collecting the sample using various survey approaches.

3. TRADITIONAL SURVEY APPROACHES

Researchers have a variety of approaches to choose from for sampling. This can be accomplished through both voluntary and paid approaches. A common approach for researchers has been mass emails to an intended subset of a population of interest. Challenges with this approach include the intended recipient may not receive the email, response rate is best within only the first few days and researchers often have to monitor/remind participants through repeated emails.

Alternatively, phoned interviews have been successful for companies such a Pew Research or McKinsey. While this can be effective, this is often expensive and does not always render higher response rates. However, both of these approached do render a more random (or probabilistic) sample. Unfortunately, due to many of the limitations listed previously, many researchers opt for a convenience (non-probabilistic) sample such as a student population which may limit the generalizability of the results.

While the previous approaches are often based on voluntary participation, an alternative approach may be to pay an external firm to collect data. Companies such as Survey Monkey price their respondents based on survey length, targeting (or worker qualifications), incidence & complexity. This again is often price prohibitive especially for researchers with limited budgets. Other companies do offer similar, more limited services often restricted to only a few questions (e.g., Pollfish and Survata). Google has even gotten into the survey collection service, starting at $0.10 for a single question, $1 for two questions and larger projects starting at $2000 per project

4. CROWDSOURCING SURVEYS

Due to the numerous constraints with survey research (e.g., budget, time, etc.), researchers have begun to use alternative approaches to the more traditional sampling methods such as mass emails or hiring external companies. The focus of this paper is on exploring the use of crowdsourcing as an alternative to data collection. Specifically, the use of social networking sites and Amazon Mechanical Turk (MTurk) as a means of crowdsourcing survey data collection.

The use of crowdsourcing is not a new topic as researchers use this technique as an approach to survey research. However, many researchers have limited knowledge of how to start using this technique as well as potential issues. The goal of the current paper is to discuss details concerning the initial setup and administration of these approaches. The benefits and drawbacks are also discussed.

Survey Tool
With either approach, a researcher must first decide on what platform to create their survey. This may be accomplished through specific university resources available (e.g., university survey system), an external company providing either a free or paid survey hosting service (e.g., Qualtrics or Survey Monkey) or through the specific service being used (e.g., Amazon Turk offers a basic survey creation tool). Much like traditional survey research, the tool chosen will depend upon the functionality needed in the survey. For example, Qualtrics has a built in function that will display certain questions dependent upon a participant's previous answers (i.e., Display Logic).

There are some considerations researchers must be aware of that may vary from traditional survey research. One is device compatibility. Since SNSs are commonly accessed via mobile devices, researchers may opt for a survey tool that is mobile ready (e.g., Qualtrics). Another consideration is the ability to interface with other sites such as Mechanical Turk. To pay participants in mTurk, a random number needs to be generated and tracked. These approaches will be discussed further in the subsequent sections concerning the approach to survey collection.

5. SOCIAL NETWORKING SITES

Because of their increased popularity and widespread use, social networking sites (SNS) have become new outlets for the recruitment of survey participants. A SNS has been broadly defined as "*a web-based service that allows individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system*" (Boyd and Ellison 2008, p.211). There are a number of different approaches depending on the SNS chosen. This paper will discuss the use of the currently popular sites Facebook and Twitter.

Facebook
Facebook currently has 1.09 billion daily active users worldwide in over 70 different languages. This provides a very diverse subject pool for sampling. A commonly used survey approach is the use of Facebook Ads for survey recruitment. Ads allow researchers target a specific audience by location, demographics, interests, behaviors and connections (details can be found at: https://www.facebook.com/business/products/ads/ad-targeting/). Ads then appear in a FB user's news feed and when clicked, will redirect the user to the external survey site. Ads are charged per click no matter if the survey is taken or not and can be set to limited number of clicks per day.

Other recruitment strategies include the creation of fan pages and groups within FB. These tend to be less effective than the placement of ads. While LinkedIn is not specifically discussed in the current paper, it does provide another avenue for targeting more professional users through similar methods such as LinkedIn groups.

Twitter
Twitter currently has over 310 million monthly active users with 79% of accounts outside the US and supports over 70 different languages (see https://about.twitter.com/company). Twitter is a micro-blogging site limiting the user to 140 character messages (Java, et al., 2007). Much like Facebook, Twitter can provide a random sample of a large population.

A popular approach is to set up an account and begin to follow organizations affiliated with the topic of interest being explored (e.g., for researchers interested in gaining insights from project managers, following PMI institute's twitter feed) or individuals prominent in field (e.g., following Bruce Schneier, a prominent security analyst, to find more users in the security community). Researchers then send tweets directly to the organization or individual asking them to retweet the survey. Setting up a hashtag for the survey also allows users to follow the number of retweets.

Sibona and Walczak (2012) used a similar approach in which they used directed messaging from one user to another (@reply mechanism) with a request to take the survey. Recruitment consisted of searching for tweets containing specific words and then sending a direct message to those users. Their research found that of 7,327 tweets/retweets concerning the survey, 2,865 users started the survey with 1,544 users completing the survey.

There are a number of suggestions for sending out a successful tweet concerning a survey. As mentioned earlier, messages are limited to 140 characters so there is a need to be concise. Miller (2011) suggests the following tweet format:

- Start with a short message about survey
- Ask users to participate
- Use a Bit.ly or TinyURL link to conserve space
- Include relevant Hashtags
- Finish by always asks for a retweet

Benefits and Drawbacks to SNS

There are a number of benefits to using SNS over traditional approaches. Researchers are able to go beyond a convenience sample to survey a more random sample of the population. Additionally, depending on the research question, Facebook allows one to target a specific population with ads. While some research has successfully used SNS for recruitment (see Sibona & Walczak, 2012), it is not without drawbacks.

Prior research has found mixed results using Ads with some finding recruitment for medical surveys to be effective (Yuan, et al., 2014) while others found this to be a more expensive approach compared to other recruitment strategies such as traditional mailings with survey information (Gu, et al., 2016). Others have concern around the representativeness of the population (especially the offline population) as well as the unknown of actual/fictitious accounts (Ahmed, 2015).

6. AMAZON MECHANICAL TURK

Amazon Mechanical Turk (MTurk) is a crowdsourcing application which allows "Requesters" to submit tasks for online "Workers" to complete. This can be a variety of tasks from software development projects (e.g., building applications) to solving business problems (e.g., data processing). It relies on a network of Workers who sign up to complete tasks called "Human Intelligence Tasks" or HITs.

The demographics of MTurk workers are estimated to be ~65% female, average age of 36, and a majority of workers in the US (47%) with a significant number, 34%, from India (Paolacci, Chandler & Ipeirotis, 2010). While not publically published by Amazon, it is estimated that there are approximately 7500 full time Workers with some estimates suggesting close to 500,000 part-time workers (Guarino, 2015).

MTurk has been used for a variety of applications in academic research. This technique has been used in a number of fields including political sentiment analysis (Diakopoulos & Shamma, 2010) and behavioral marketing studies (Collier & Barnes, 2015). Within IS research, MTurk has been used in perception studies concerning security (Kelley, 2010) or privacy (Liu et al., 2011). The goal of the following subsections is to provide researchers with an overview of conducting research on MTurk and benefits/issues with using MTurk.

Creating a New Project

Before creating a new project within MTurk, a researcher needs to setup a requester account through the website which will allow the researcher to post new projects or HITs to the system. This will link to your existing Amazon account and will also link to a credit card for purchasing prepaid HITs. The system is setup to only allow a researcher to create a project with payment that can be covered with the available balance from the prepaid HITs (can be found under "My Account").

Once an account has been created and approved, the researcher can move on to the creation of a project (or HIT) through MTurk. While the focus of this section is on the details concerning how to create an effective project, a detailed outline of creating projects is included in Appendix A. The first task is to decide on the type of project to be used. Built in functionalities of a new Turk project include general data collection, writing, transcription categorization, sentiment analysis and other various approaches. Survey options include either a link to an external survey site ("Survey Link" option) or the use of the built in survey function on Turk ("Survey" option). Since the MTurk built-in survey functionality is limited, most researchers chose external sites such as Qualtrics or Survey Monkey to use for data collection. These sites offer more functionality and data can be downloaded into various formats.

Entering Properties

The next step is defining the properties for the HITs used in the project. This includes the description, setting up the HIT and worker requirements. As part of setting up the HIT, the researcher must decide on the appropriate reward per assignment (i.e., how much will paid for completing the survey). There is much debate on the appropriate amount to pay workers for the assignment. Recent research suggests that incentivizing workers does result in higher quality data with studies suggesting the target per hour rate be close to minimum wage (Litman et al. 2015; Mitra et al., 2015). Thus, the researcher should pilot the survey to get an estimate of the time of completion to calculate the amount to reward per assignment. For example, a survey taking approximately 5 - 6 minutes to complete might be rewarded $0.50. MTurk does have a surcharge of 10%, thus the final cost per subject is effectively $0.55. This is still a much debated aspect of using MTurk especially between academicians and workers who feel they are underpaid. However, research has found the average pay rates of $0.50 to $0.75 per respondent in MTurk (Bernisky, Huber & Lenz,

2012). This is much less compared to the average non-student sample cost which can be as high as $15 to $20 per respondent (Bernisky, Huber & Lenz, 2012).

Other properties for the HITs include the number of assignment (i.e., the number of survey participants wanted), time allotted to complete the HIT once started (provide more time to complete the task than what you calculated in the pilot), time the project will be available to complete and the auto-approve of payment to workers. MTurk enables the requester to approve or reject a worker's assignment within a given period of time. This ensures that workers respond to the survey appropriately and don't give the same value for all answers (more hints will be discussed further to limit this from occurring). If you don't approve/reject the worker assignment, it will automatically be approved after a time set in this section.

The last section, Worker requirements, should be evaluated more closely during the creation of the project. MTurk has a classification of workers known as "Mechanical Turk Masters." These are considered to be high performing workers across multiple types of tasks in MTurk. A challenge with using this category of workers is the reward typically needs to be higher to attract these workers and surveys using these workers take longer to complete due to the limited number of MTurk Masters. An alternative approach to attracted more qualified workers is to add additional criteria or qualifications that workers must meet to respond to the HIT. A generally accepted practice is to set "HIT Approval Rate (%)" to greater than 95 and "Number of HITs Approved" to greater than or equal to 50. This ensures the requester gets experienced workers with a have high approval rate. A final qualification to consider is location. The requester can limit the workers to a specific (e.g., US worker only) if the target is a specific country. Aside from the system qualifications provided by MTurk, requesters also have the option of creating custom qualifications they can assign to specific workers. For example, if a specific worker consistently does quality work on surveys, the requester could create a qualification called "Quality Worker" and assign the worker this qualification. This allows the requester to include the qualification "Quality Worker" into a specific project to limit only those workers that have been assigned this qualification by the requester. A warning against custom qualifications is it may limit the number of workers for a specific project. MTurk currently allows up to 5 qualifications.

Design Layout

In design layout, the requester provides a brief summary/instructions for the worker who wants to accept the HIT assignment. Provide enough instruction that the worker knows what needs to be accomplished but not so much information that they are overwhelmed. There is no specific limit to the amount of instructions provided but being succinct will encourage users to finish the task. Assuming an external site is being used, this is where the worker will be able to click on the link to the external site as well as provide a survey code. The survey code is used to ensure the worker completed the task and can be used by the requester to ensure the responses were appropriate.

There are two options that can be used to validate the worker completed the task. One option is to include an area in the actual survey (e.g., a input textfield in Qualtrics) which requires the worker to enter the MTurk worker ID for verification purposes. The researchers should also state that they must completely finish the HIT to receive payment. This is a simple way of verifying the worker's survey quality in which the need for a verification code is not needed. However, the preferred approach by most researchers is to include a survey code displayed at the end of the survey within their external survey tool. This requires additional work within the survey site (e.g., Qualtrics or Survey Monkey). There are links in Appendix B which walk through the steps of including a randomly generated survey code in both Qualtrics and Survey Monkey. In either option, the output from the survey results will include a unique code (either worker ID or survey code) that can be used to pay workers in MTurk.

The final step is to preview the design layout and then "Publish Batch" under the "Create" heading. Once the batch is published, the requester will receive daily reports of the workers accepting the HIT. Any emails from workers having difficulty with the assignment will also be sent so checking email frequently at the beginning of a batch is suggested in case there are any issues.

Benefits and Drawbacks to MTurk

MTurk provides solutions for many of the issues faced with traditional methods by providing a larger, more diverse subject pool with a faster experiment cycle at a lower cost (Mason & Suri 2012). However, researchers have to be aware of some of the potential quality drawbacks such as less experienced participants, awareness of manipulations and "data" quality (Chandler et al. 2014; Horton et al. 2011). Based on their research concerning naiveté of workers, Chandler

et al. (2014) suggests that researchers be aware that many workers may have seen similar experiments by other researchers on MTurk. They suggest trying to avoid common paradigms that may have already been used by other researchers and attempt to measure whether workers have engaged in a similar experiment in the past. Much like traditional survey approaches, the use of attention checks should also be used to ensure workers are engaged in the survey.

As for questions of validity, replication research comparing a traditional lab setting and an MTurk subject pool found similar results with internal and external validity present in the MTurk results (Horton, et al. 2011). Another benefit may be in the ability to do longitudinal studies. Since researchers have the ability to track and store quality workers, they have the ability to selectively choose who to respond to a subsequent survey using the custom qualification discussed in the previous sections (Paolacci, Chandler & Ipeirotis, 2010). Additionally, studies have found that MTurk workers were more attentive to instructions and responded correctly to attention checks more often than a student subject pool (Hauser & Schwarz, 2015). Thus, while there are some concerns of quality, studies have found that MTurk workers can consistently provide valid and reliable data.

7. CONCLUSION

Traditional approaches to recruiting survey participants has often been limiting based on cost and time, especially for researchers at smaller institutions with limited funding. This has led many researchers to employ convenience samples (e.g., student population) causing issues with generalizability of results.

Crowdsourcing provides an alternative approach of gaining a broader sample that can achieve the characteristics suggested for a good sample. This technique allows researchers to reach a broader sample of participants. While this does not provide an exhaustive review of all literature related to these techniques, this paper provides guidelines for researchers considering the use of crowdsourcing techniques including social networking sites and Amazon Mechanical Turk.

Survey research is often about compromises. It can be challenging and expensive to get a representative sample with any technique used. The use of MTurk may provide researchers a better representative sample for a given research questions compared to other techniques (e.g., student samples).

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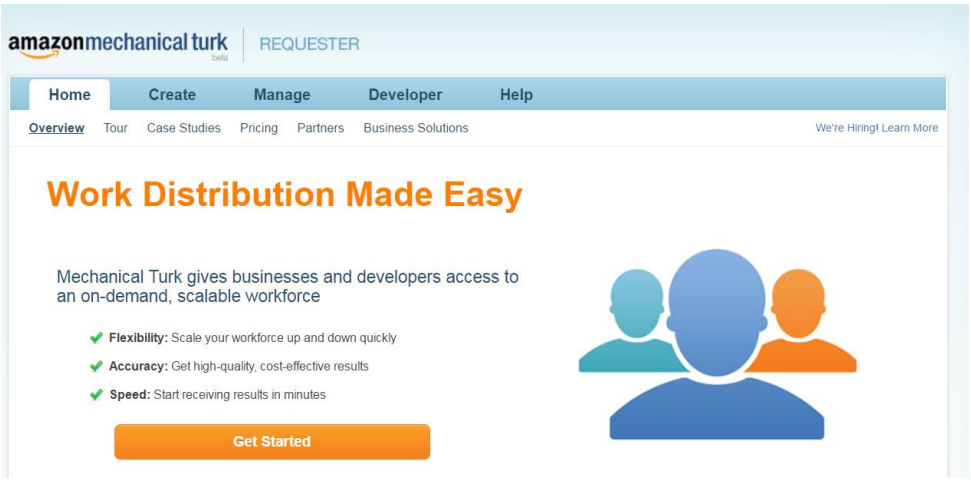
Editor's Note:

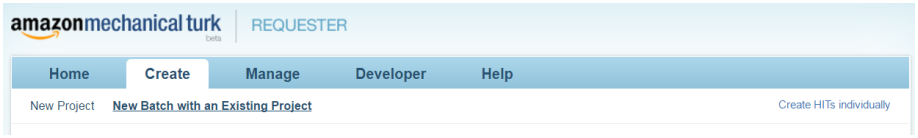
This paper was selected for inclusion in the journal as a CONISAR 2016 Meritorious Paper. The acceptance rate is typically 15% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2016.

Appendix A:
Setting up a Project in Amazon Mechanical Turk

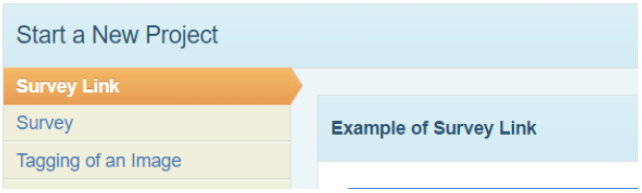
Requester home page (when logged-in as a Requester)



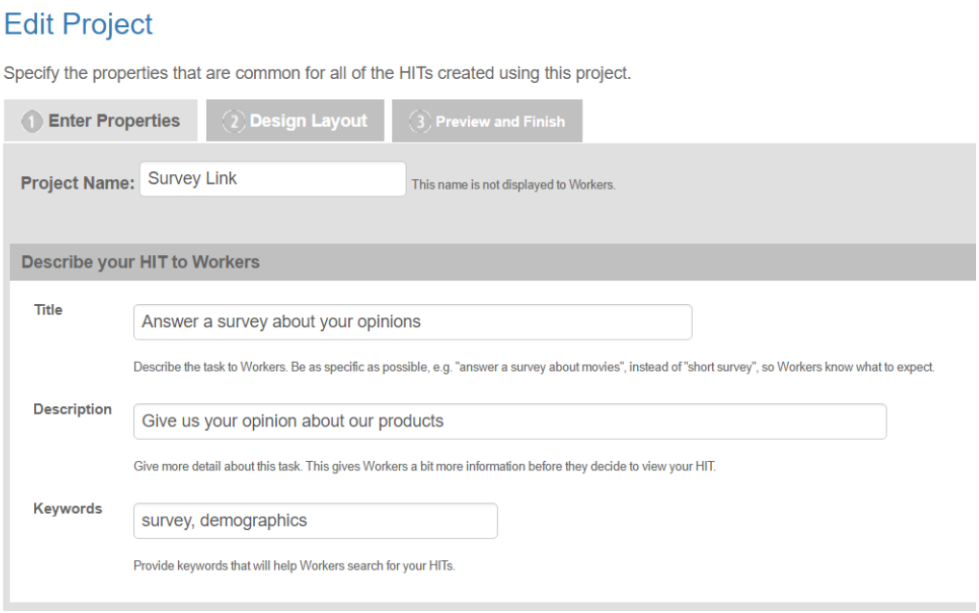
1.) Click on Create and select New Project



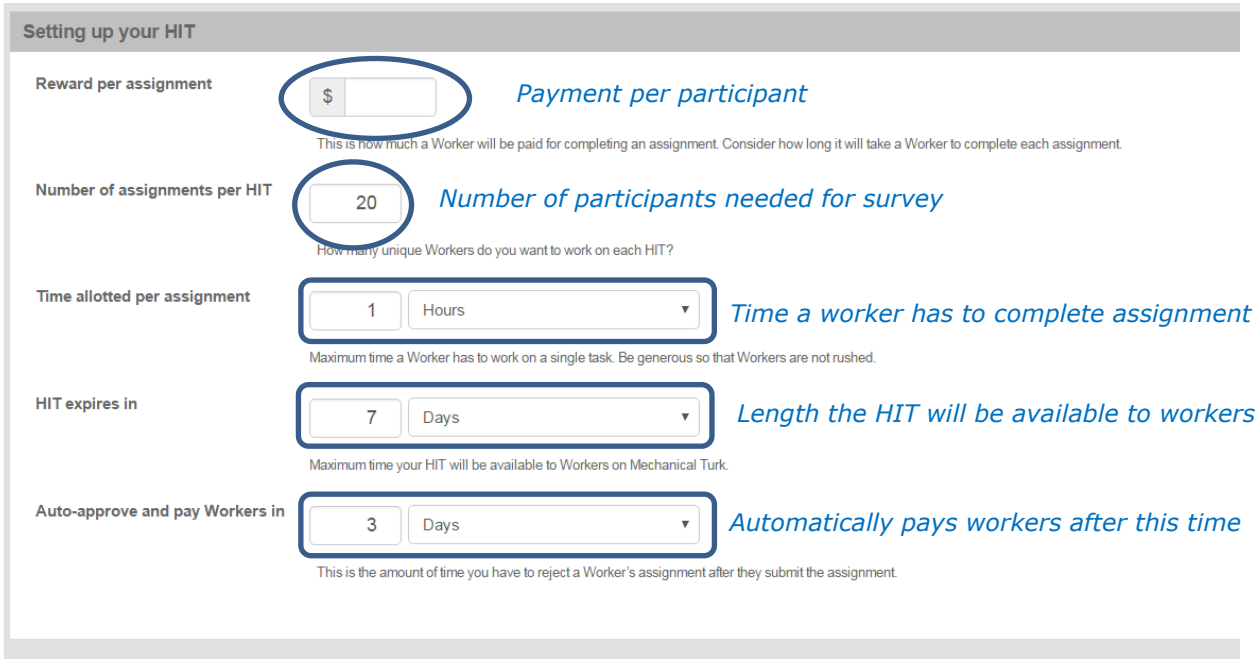
2.) The next page will be the selection of the type of project you plan on conducting. This paper has focused on the use of a "Survey Link."



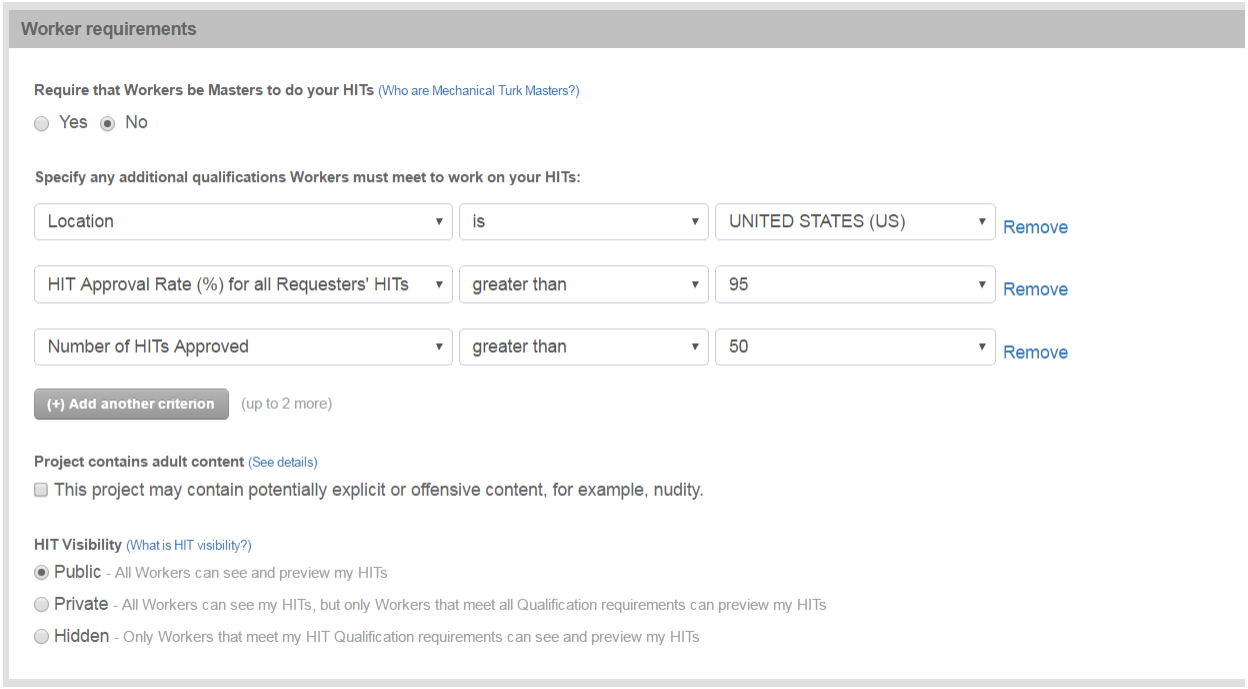
3.) Enter the project title, description and keywords of the project. This is what the worker will see when searching for HITs.



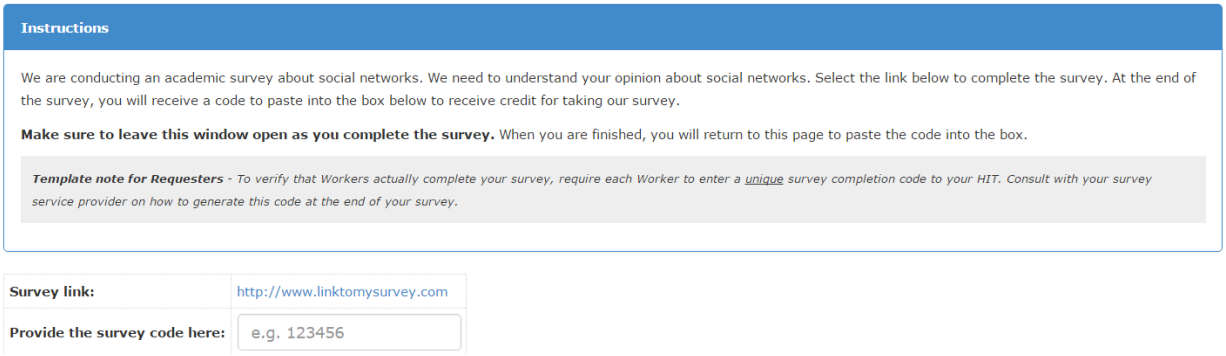
4.) The next section under properties is how to set up your HIT.



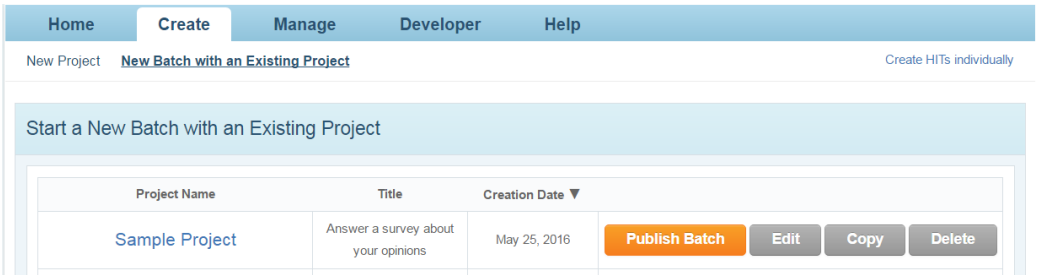
5.) The last section of properties allows you to set up the worker requirements. The image below captures the suggested settings mentioned in the paper.



6.) The last step is to create the list of instructions, include the link to the survey and provide an area for entering the survey code (discussed in paper).



7.) Once you have saved the project, you will be taken back to the page listing your projects and the last step is to "Publish Batch." This will make the HIT available for Workers to complete.



Appendix B:
Additional Resources

Random Survey Code Generator – these are step by step guidelines to including a survey code at the end of the survey.

Qualtircs

You will need to do the following to have a survey code generated. These steps are all done within Qualtrics. This will allow the researchers to verify the survey code generated in Qualtrics with the code entered in MTurk. This can be used to ensure you only pay workers who completed the survey appropriately.

1.) Create an end of survey message (under Library tab). Select End of Survey Messages as the Category. Include the following in the message box after you have thanked the participant for completing the survey:

MTurk Survey Code:
${e://Field/MTurkCode}

2.) Next, select the Edit Survey tab and then click on the Survey Options button. This will allow you to add a "Custom end of survey message…".

3.) The last step is to modify the Survey Flow which can be found under the Edit Survey Tab. Add a new element (Web Service) to the end of the survey. The URL to enter is http://reporting.qualtrics.com/projects/randomNumGen.php. Then, test the link which will allow you to "Add Embedded Data" and set "Embedded Data" to MTurkCode (the same as the piped text in step 1). You will also need to "Add parameters to send to web service" to generate the random number.

A more detailed outline of this process is outlined here:
https://tylerburleigh.com/MTurk/survey-completion-codes-in-qualtrics/

Survey Monkey:

Survey Monkey offers a similar way of generating a random survey code for workers to enter into MTurk upon completion of the survey. A detailed description of generating this code can be found at: http://nicholasnicoletti.com/blog/2015/06/survey-monkey-and-mechanical-turk-the-verification-code/