

Discrimination in an Online Labor Market

Sher Afghan Asad

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Abstract

The issue of discrimination is explored at great length in economic literature however almost all the literature has tend to investigate the issue on the premise that discrimination is always driven by the employers. In the present study we investigate the issue from a different angle and investigate whether discrimination can run in an opposite direction i.e. whether workers from one group may exhibit biases towards the employers from the other group when working for opposite group employers. To our knowledge the possibility of racial bias from the worker side has not been explored in the economic literature. We design a model based real effort experiment on Amazon Mechanical Turk to answer our research questions. This study serves as a pilot for the full study that will be implemented based on the learning from this exercise.

1 Introduction

A large body of literature in economics has demonstrated that discrimination – whether it be racial, religious, ethnic or gender in origin – is widespread in labor markets¹. However, almost all the literature has tend to investigate the issue on the premise that discrimination is driven by the employers i.e. employers have some animus (Becker, 1957) or beliefs about the productivity of workers (Arrow, 1973; Phelps, 1972) from disadvantaged group and that leads them to discriminate against the equally productive workers from the disadvantaged group in favor of workers from the advantaged group. In this study we

¹See Riach and Rich (2002) and Rich (2014) for a survey of evidence of discrimination using field experiments.

investigate the issue from a different angle and see whether discrimination can run in the opposite direction i.e. whether a worker from the advantaged (disadvantaged) group may exhibit bias towards the employer from the disadvantaged (advantaged) group. To be specific, we explore whether workers exhibit bias when providing effort based on employer's racial identity? To our knowledge the possibility of discrimination from this direction has not been explored in the economics literature.

It is important to understand what we mean by discrimination from the worker side and why is it an important issue that merits investigation. We define worker discrimination as when employers from one group are treated differently (less favorably) than employers from another group with identical characteristics. For example, workers discriminate when they under-provide effort to employers from one group as compared to the other group with otherwise identical characteristics (such as wages, job conditions etc.). The investigation of this issue is important for several reasons. First, in the absence of perfectly enforceable contracts, this form of discrimination directly affects the profitability of the employers because of workers under-performance. Second, it can provide a partial explanation for why employers tend to have lower callbacks for workers from the opposite group, as observed in studies such as Bertrand and Mullainathan (2004). That is, if employers expect that workers from a particular group are going to under-provide effort then it is rational for even unbiased employers to not hire from that group. Finally, this line of research can also explain why discrimination, even after various affirmative action policies by governments all over the world, continue to exist in one form or another (Bayer & Charles, 2017). One possible explanation for why those policies haven't achieved the discrimination free society could be that those policies were aimed at employers and they were perceived as the only entity responsible for causing discrimination. However, our research aims to investigate if discrimination can also be driven by those who are traditionally "discriminated against" and if it is, then one needs to target both sides of market to address the issue of discrimination (Craig & Fryer, 2018).

Fundamentally, economists view discrimination as arising in one of two ways. Becker (1957) introduced the notion of taste-based discrimination postulating that discrimination exists because of prejudice/animus of the advantaged group toward the disadvantaged group. Phelps (1972) and Arrow (1973) instead view discrimination as statistical, in which

an employer, lacking information about the worker's productivity, forms belief about the worker's productivity based on worker's group identity using the aggregate distribution of worker's group traits.² For the purpose of our research, we make the similar distinction about the discrimination from the worker side. We define taste-based discrimination as the discrimination that results because of animus or prejudice of workers towards the employer's group identity. For example, if a White worker prefers working for a White employer as compared to the equally rewarding opportunity from a Black employer, then we call this taste-based discrimination against the Black employer. Statistical discrimination from the worker side would be the discrimination that results when a worker, lacking information on the employer, forms beliefs about the desirability of the job with the employer using stereotypes about the group of employer. For example, a White worker may believe (correctly or incorrectly) that Blacks employers are generally less generous (in compensations; monetary or otherwise) towards their workers as compared to White employers and therefore the worker may discriminate against the Black employer in favor of the equally desirable job from the White employer.

Our research question is close to Glover, Pallais, and Pariente (2017); in their study the authors found that disadvantaged-group workers under-provide effort when working under the biased managers. However, our study is different in a sense that we argue that workers may under-provide effort even in the absence of bias from the employer. Ours is the only study which explores the possibility of bias driven from the worker side in the absence of any discrimination or anticipation of discrimination from the employer. Another closely related study is Craig and Fryer (2018), in which the authors build a theoretical model allowing for the possibility of statistical discrimination from both worker and employer side. However, the authors do not allow for the possibility of taste bias from worker side. They also do not provide any empirical evidence to support the claim. Ours is the first study to explore the possibility of taste bias from worker side and presents an experimental evidence to test the claim.

The discrimination by workers can be on various margins, however, in this paper we explore the discrimination in productivity by the workers towards the employer's racial identity. Specifically, we are interested in answering whether workers provide more/less

²See Fang and Moro (2011) for the nice review of models of discrimination.

effort for White employers as compared to Black employers given that they are already working for the employer and thus there is no option of choosing an employer. So we need a setting in which 1) workers work on a task in which productivity can be measured 2) they do not choose their employer and 3) employer identity can be revealed to workers in an unobtrusive way³.

As we explain in section 2, our experimental design for this pilot study is based on a model of behavior to identify the parameters of taste.⁴ Based on the model, we come up with two set of treatments: Baseline and Race Salient Treatments. In the baseline treatments, workers do not observe the identity of the employer and only observe the selected wage by the employer before starting to work on the task. In race salient treatments, each worker observes the race of the employer along with the chosen wage rate before starting to work on the task. In either of these treatments, an employer selects a wage offer for a worker, the worker observes the selected wage and then works on the task.

To test whether workers exhibit taste bias in providing effort to the employer, we run an artefactual field experiment (Harrison & List, 2004) using subjects from Amazon's Mechanical Turk (M-Turk). Here is how the experiment is implemented; 1) we post an assignment for a demographic survey on M-Turk, 2) subjects who report their race as either Black or White in the survey are asked to initiate the experiment 3) upon initiation a subject is randomly assigned to one of the treatment groups and to the role of employer or worker a' la Fehr, Kirchsteiger, and Riedl (1993). Each employer is (truthfully) matched with a unique worker. Each employer selects a wage rate for the matched workers (the choice is framed such that a higher wage for a worker means a lower return for the employer). The worker observe the chosen wage by his/her matched employer and then works on a simple button-pressing task for up-to ten minutes⁵. The wage rate serves as an incentive for working on the task for workers. The worker is also informed of the return to the employer from his/her effort. In the baseline treatment, workers do not

³We need to reveal race in an unobtrusive way, so that workers are not primed for race of the employer. See Benjamin, Choi, and Strickland (2010) for discussion on how identity priming can affect behavior.

⁴See DellaVigna (2017) and Low and Meghir (2017)for motivation on using structural models for design of experiments.

⁵The button-pressing task is adopted from Dellavigna and Pope (2018) in which workers press 'a' followed by 'b' on their keyboard to score a point.

observe the race of the matched employer, while in race salient treatments the race is revealed using a picture of the hand of the employer (Doleac & Stein, 2013). The picture was taken by the employer using his/her web-camera. Worker's identity is never revealed to the matched employer. We give four wage options to employers, therefore the baseline treatment consists of 4 sub-treatments. In the race salient treatment, a wage is chosen by either a Black or a White employer, so there are 8 sub-treatments in this treatment. Therefore, we basically have 12 sub-treatments, which are endogenously determined by the racial composition of the sample and the wage choices by the employers.

Our final sample for this pilot study consists of 202 subjects (37 Blacks and 165 Whites). Overall we do not observe significant differences in effort choices for black employers versus white employers at any of the possible wage levels because of the very limited sample that we collect. We observe the positive correlation between wage rate and effort in both baseline and race salient treatments, however we remain unable to test for this wage-effort relationship on the basis of employer's race.

Using the data from the baseline treatment, we estimate the parameters of the cost of effort function, which are then taken as given for the estimation of taste parameters towards black or white employers. We find that the taste parameter for black employers is higher in magnitude than for white employers, implying that workers derive higher satisfaction from working for the black employer as compared to the white employer. However, these parameters have enormous standard errors and therefore we do not have any confidence in these estimates.

This research relates to the broad literature on discrimination in the labor markets. As explained earlier we specifically look at worker's vertical discrimination towards their employers, complementing a larger literature about horizontal discrimination between co-workers (e.g. Becker (1957) and Sasaki (1999)). This pilot study is specifically related to experimental literature on discrimination. See Neumark (2018) and Bertrand and Duflo (2016) for reviews of experimental research on discrimination.

This research also relates to literature on identity and social preferences at work (Akerlof & Kranton, 2005; Benjamin et al., 2010; Y. Chen & Li, 2009). The main contribution of this study in this context is the novel design that can estimate the social preference towards the employer's group in a unique environment of an online labor market.

The rest of the paper proceeds as follows. In Section 2 we present the model of behavior and come up with the treatments to identify the parameters of interest. In Section 3 we present the experiment design. Section 4 and 5 present the data and results respectively. In Section 6 we estimate the model from Section 2 and present estimates of structural parameters. Section 7 concludes this pilot study.

2 Model and Treatments

We closely follow the model of Dellavigna and Pope (2018) for the worker side and modify it to incorporate the employer side and the possibility of discrimination from the worker side. Assuming risk neutrality, a worker $i \in \{B, W\}$ solves the following problem when working for an employer $j \in \{B, W\}$ where B and W denote the black or white race of an agent (employer or worker) respectively;

$$\underbrace{\max}_{e_{ij} \geq 0} U_{ij} = \underbrace{\max}_{e_{ij} \geq 0} (F + (s_{ij} + p)e_{ij} - c(e_{ij})) \quad (1)$$

where e_{ij} is the number of points (on a button-pressing task) scored by worker i when working for employer j , F is the fixed money paid for participating in the experiment, s_{ij} (as in Dellavigna and Pope (2018)) captures the sense of duty, norm, intrinsic motivation, and competitiveness of worker towards the task. We argue that s_{ij} also include the taste (like or dislike) of worker i towards the employer j per unit of effort e_{ij} . p is the piece rate chosen by the employer j , we allow employers to select piece rate from anywhere between 0 cents and 10 cents per 100 points (in increments of 3 cents). $c(e_{ij})$ is the cost of effort, which is assumed to be same for all workers i . We assume the regularity conditions $C'() > 0$, $C''() > 0$, and $\lim_{e \rightarrow \infty} C'(e) = \infty$. Following Dellavigna and Pope (2018) we assume the cost function to be a power function i.e.

$$c(e) = \frac{ke^{1+\gamma}}{1+\gamma} \quad (2)$$

Power cost function (2) characterizes a constant elasticity of effort given by $1/\gamma$. The function requires the estimation of unknowns k , and γ which we will back out using observed effort at different piece rates.

Solving 1 leads to following solution (when interior);

$$e_{ij}^* = c'^{-1} (s_{ij} + p)$$

With power cost function this translates to;

$$e_{ij}^* = \left(\frac{s_{ij} + p}{k} \right)^{1/\gamma}$$

We make a simplifying assumption that the workers of type i are homogeneous given a treatment i.e. they will make the same effort choice in a given treatment.

2.1 Baseline Treatment

In the baseline treatment an employer chooses a wage, a worker observes the wage and then works on the task. We allow employers to select a wage between 0 and 10 cents. Workers work on a simple button-pressing task for 10 minutes⁶. From the M-Turk standards this variation in piece rates is substantial for the 10 minute task. Employers also offer a flat fee (F) of \$1 to each worker.

These piece rates provide evidence on the responsiveness of effort to incentives for this particular task and hence allow us to estimate the parameters of the cost function which will be used to estimate other behavioral parameters.

Formally, in the baseline treatment, employer j selects a piece rate p for worker i , worker i observes the piece rate p and then chooses effort e_{ij} by maximizing 1. Workers do not observe the identities of the employers which implies that for any worker i , $s_{iW} = s_{iB} = s_i$. The equilibrium effort e_i^* in this treatment will be given as;

$$e_i^* = c'^{-1} (s_i + p) \text{ for } i \in \{B, W\}$$

This treatment will give us the baseline measure of effort of worker i for the given piece rate p . For each i , the solution of effort has one behavioral unknown (s_i), and two unknowns from the cost function (k and γ). To back out these parameters we use effort

⁶We use the exact same task as in Dellavigna and Pope (2018)

corresponding to three different piece rates which gives us three equations to identify three parameters.

2.2 Race Salient Treatments

In the race salient treatment, workers will observe the race of the matched employer along with the selected piece rate, and then work on a task. In the presence of group biases i.e. when workers derive different level of social preference for different employer's group then;

$$e_{ij}^{RS} = c'^{-1} ((s_i + \Delta s_{ij}^p) + p)$$

We are implicitly assuming $s_{ij} = s_i + \Delta s_{ij}$ i.e. the parameter s_{ij} can be separated into two components 1) s_i , which is independent of the employer type and include everything such as sense of duty, norm, intrinsic motivation, competitiveness of worker etc. and 2) Δs_{ij} , which represents additional utility or dis-utility from working for the employer of type j which we interpret as taste towards the employer, a' la Becker (1957).

$\Delta s_{ij}^{RS} > 0$ ($\Delta s_{ij}^{RS} < 0$) will represent the increase (decrease) in effort because of taste of worker i towards (against) the employer j . For $j \neq i$, $\Delta s_{ij}^{RS} < 0$ will be interpreted as the decrease in effort due to taste bias of worker i towards the opposite group employer j . In other words, the difference in provided effort between the white employer and black employer ($e_{iW}^{RS} - e_{iB}^{RS}$) for a given piece rate is construed as a difference which is only driven by the taste bias of the workers of group i . The main goal of this research is to identify the parameter Δs_{ij}^{RS} at different piece rates which we do in Section 6.

3 Experiment Design

The main goal of this study is to investigate the existence of discrimination in the online labor market. We designed the experiment to allow for the possibility of discrimination in effort by workers towards the employers. Our experiment is carefully designed to ensure that observed difference in effort towards the employers could only realize because of the taste bias of workers i.e. we shut down the possibility of statistical discrimination.

3.1 Recruitment of Subjects

The subjects for this experiment were recruited from an online labor market, Amazon’s Mechanical Turk. Mechanical Turk is a crowd-sourcing web-service that allows employers (called requester) to get tasks (called Human Intelligence Tasks (HITs)) executed by employees (called workers) in exchange for a wage (called reward). Mechanical Turk is a widely used platform in research in economics and give access to a large pool of applicants at a much affordable rate hence allowing for the well powered study. See Paolacci, Chandler, and Ipeirotis (2010) and Paolacci and Chandler (2014) for a discussion on demographic characteristics and representation of subjects from Mechanical Turk.

To recruit subjects we posted the screen-er survey as the HIT on Mechanical Turk with the following description “*Fill out this 2-minutes screener survey to qualify for the immediate second study (that study will take ~15 minutes and pay 1 dollar plus bonus). You MUST use your webcam and take a picture (following guidelines) to be considered for the study.*”. The screen-er survey is given in the Appendix A.

Based on the responses in the screen-er survey, we invited participants above the age of 18 who reported their race as “Black or African American” or “White or Caucasian” to participate in the experiment. Everyone else was shown the exit screen.

Since our choice of task is same as Dellavigna and Pope (2018), we can use results from their study to determine the sample size that can achieve sufficient power for our study. Dellavigna and Pope (2018) found that the points scored in each treatment have a standard deviation of around 660 points. Assuming this standard deviation for each treatment and assuming a minimum detectable effect of 185 points between two treatments, we will need around 200 observations in each sub-treatment to have a power of 80 percent. This implies that we will need $200 \times 12 = 2,400$ observations in total for all 12 sub-treatments. In our design one observation constitutes two subjects - one employer and one worker - therefore we need to recruit around 400 subjects in each treatment implying a total sample of size 4,800. These calculations are obviously for the full study, and they assume that we have control on the number of subjects in each treatment. As we learned from the pilot, we need to recruit 10 white employers to find one black employer and thus these sub-treatments are not going to have balanced sample sizes. In the light of this, we will be revising our design for the full study.

3.2 Task

We designed this experiment to observe whether workers discriminate in their effort when working for different employer types and then to back out the behavioral parameter of distaste. For this purpose we needed a task which is costly to workers. We settled on a button-pressing task as in Dellavigna and Pope (2018). The task involves alternating presses of “a” and “b” on a keyboard for 10 minutes. We settled on this task because it is simple to understand and has features that parallel clerical jobs: it involves repetition and it gets tiring, thus testing the motivation of the workers.

3.3 Experiment Flow

The experiment proceeded as follows: (1) A HIT was posted on Mechanical Turk for a screen-er survey, (2) subjects were presented with the consent form, (3) those who consented and met the criteria were shown a screen to initiate the experiment, (4) upon initiation a subject was randomly assigned to one of the treatment groups and then to the role of employer or worker. The first person to initiate the experiment was always assigned the role of employer while the second person was made the worker. One employer and one worker formed a group for this experiment. The flow of the screenshots of the screens that subjects saw are given in Appendix A. The application for the experiment was designed using oTree (D. L. Chen, Schonger, & Wickens, 2016).

The instructions to the employers and workers for each treatment are given in Appendix A.

3.3.1 Baseline Treatment

In the baseline treatment employers were informed (truthfully) that they will be paid 10 cents for every 100 points scored by the randomly matched worker and they could choose if they wanted to transfer part of the 10 cents to workers as a piece rate. Employers were allowed to select a piece rate of 0, 3, 6 or 9 cents for the matched worker. Employers did not know the identity of a worker for whom the piece rate was selected; neither did a worker observe the identity of the employer before starting to work. Once an employer selected a piece rate, a matched worker was informed of the selected piece rate and was

given 10 minutes to work on the task.

3.3.2 Race Salient Treatment

The race salient treatment was identical to the baseline treatment except that when a worker observed the selected piece rate, he/she also saw the picture that was taken by the matched employer when he/she selected the piece rate. When employers selected the piece rate they were instructed to write the selected piece rate on a piece of paper and take a picture with only the part of their hand showing in the picture. Showing a hand with a piece rate is a subtle way of revealing the race (Doleac & Stein, 2013) and avoids psychological confounds which are associated with facial pictures, such as attractiveness and trustworthiness (Eckel & Petrie, 2011).

4 Data

We ran our experiment for 9 days from September 24th, 2018 to October 2nd, 2018. There were 483 subjects who filled out the screen-er survey, 331 of them qualified to participate in the experiment. Since an employer and a worker constitute a group, we dropped a group if a worker in that group dropped out of the experiment before starting to work on the task. We ended up dropping 34 groups because of worker attrition. We additionally dropped 5 groups because workers in these groups joined our experiment using mobile phones and the app did not allow them to score points on the button-pressing task. 22 other groups were dropped because they failed to score any point, this is likely to be due to some technical issue at the worker's end. We were finally left with 101 groups (202 subjects).

Many of the workers (12% of workers who started the experiment) dropped out at the stage of control questions. These are probably those subjects who did not understand instructions and did not bother spending time to understand them. Workers in our experiment could not move forward without answering these control questions correctly.

We designed the interface for this experiment to ensure that pages by employers auto submit after certain time has elapsed on each page. This made sure that even if an employer dropped out, a matched worker would still be able to proceed with the

experiment rather than waiting indefinitely for the employer's decision. We went with the default choice for piece rate of 0 cents per 100 points if the employer dropped out before selecting a piece rate for a worker. We revealed the employer's race as black if the employer dropped out before taking a picture in race salient treatment. We use these default choices because we expected limited number of choices of 0 cents per 100 points and limited number of blacks. Also, as the first person to join the group was assigned the role of employer, he/she could make a decision without waiting for a worker, hence by the time the worker joined, employer may have already selected a piece rate for him/her. This design allowed us to control attrition by workers from waiting for the employer. Eventually only 2 workers dropped out while waiting for the employer. There were 15 employers who dropped out before selecting a piece rate, but we still use the data from their corresponding workers (who saw a piece rate of 0 cents per 100 points and a race of Black⁷). There were five additional subjects who could not be linked to the demographic survey because of incorrect worker id.

4.1 Summary statistics

The final sample included 202 subjects (37 Blacks and 165 Whites). The overall demographic information of the sample is given in table 1. Overall the demographics are similar for both racial groups. The majority of subjects are female, with at-least some college education and representing age groups from 25 years to 40 years old. The table also presents demographic information for each racial group and for employers and workers separately.

4.2 Pictures

All subjects in our experiment were required to take a picture of the back of their hand using webcam. We use that picture to verify if the reported race is consistent with the observed color of the skin. Since we are only looking at Black and White pictures, it is easier to identify the race from the skin color of the subject. The majority (96 percent) of our subjects reported race correctly, in a few other instances the reported race was

⁷We are thankful to Arthur Nunoo at Iowa State for allowing us to use picture of his hand for this case.

Table 1: Demographic information of final sample

	(1) All Subjects	(2) Blacks	(3) Whites	(4) Employers	(5) Workers
Gender					
Male	0.40	0.54	0.37	0.42	0.39
Female	0.59	0.43	0.62	0.58	0.59
Race					
Black or African American	0.18	1.00	0.00	0.22	0.15
White or Caucasian	0.82	0.00	1.00	0.78	0.85
Age					
18-24	0.11	0.09	0.12	0.09	0.13
25-30	0.29	0.23	0.30	0.27	0.30
31-40	0.37	0.50	0.36	0.40	0.35
41-50	0.11	0.14	0.10	0.11	0.10
51-64	0.10	0.05	0.11	0.10	0.10
65 and over	0.02	0.00	0.02	0.02	0.01
Education					
Less than high school	0.01	0.00	0.01	0.01	0.01
High school or equivalent	0.13	0.14	0.13	0.13	0.13
Some college	0.29	0.27	0.30	0.32	0.27
College graduate	0.39	0.41	0.39	0.39	0.39
Master's degree	0.16	0.18	0.16	0.13	0.19
Doctoral degree	0.02	0.00	0.02	0.03	0.00
Observations	202	37	165	101	101

Notes: The table presents demographic information of final sample. Column (1) presents proportion of all the subjects by their gender, race, age and education. Column (2) and column (3) presents these information for only Blacks and Whites respectively. Column (4) and column (5) presents these demographics for subject which were assigned the role of employer and worker respectively.

ambiguous or incorrect as compared to the pictures. We could also figure out the gender from the taken pictures because of masculinity of the hand, the display of jewelry, and in some cases from the body frame of the subject. In 90 percent of the cases gender was consistent with the reported gender, while in other cases it could not be discerned from the picture or the gender was incorrectly reported. It should be noted that incorrect reporting of race or gender in this case is not an issue, because these pictures or the reported race were never revealed to the other participant and hence could not influence behavior.

The pictures that were revealed to the workers were the pictures of piece rates taken by employers. As already mentioned these pictures were only revealed in the race salient treatment. We analyze whether the observed race from the picture is consistent with reported race. In-case the race revealed from the picture is not same as reported race, we use the race from the picture to determine the treatment status for the worker in race salient treatment. The piece-rate images had a large variance in how much of the person's hand was revealed. A little over 75 percent of the employers in the race salient treatment provided images where their hands were at least partially visible. However, many of these images showed only one or two fingers or their skin was a very small portion of the image. Alternatively, a small minority of employers in the race salient treatment provided images where they showed their entire hands or even showed their faces. Of the pictures which showed part of the hand, not all the pictures could clearly be identified as either Black or White. Only around 70 percent of pictures from race salient treatment were such that a race could be identified from the shown picture. This proportion is quite low given the small number of observations in the race salient treatment, we should remove these observations (employer and worker pair) from the analysis to make sure that workers actually observed the race with piece rate in the picture, however because of the limited number of observations we do not drop these pairs and therefore the results should be interpreted with caution.

Another issue that we need to be concerned about is the revelation of gender along with race in some of the pictures. In 35 percent of the pictures in the race salient treatment gender could be identified by the worker because of a combination of the factors such as painted nails, wedding ring style, and a revealed face or torso. We do not control for this

effect because gender revelation was not significantly different between Black employers and White employers in the race salient treatment.

Based on what we learned from this experiment, we are less inclined to use pictures to reveal race in the full study. Some of our subjects also expressed concern when using the web-camera for M-Turk even though these pictures were not collecting any personally identifiable information⁸.

5 Results

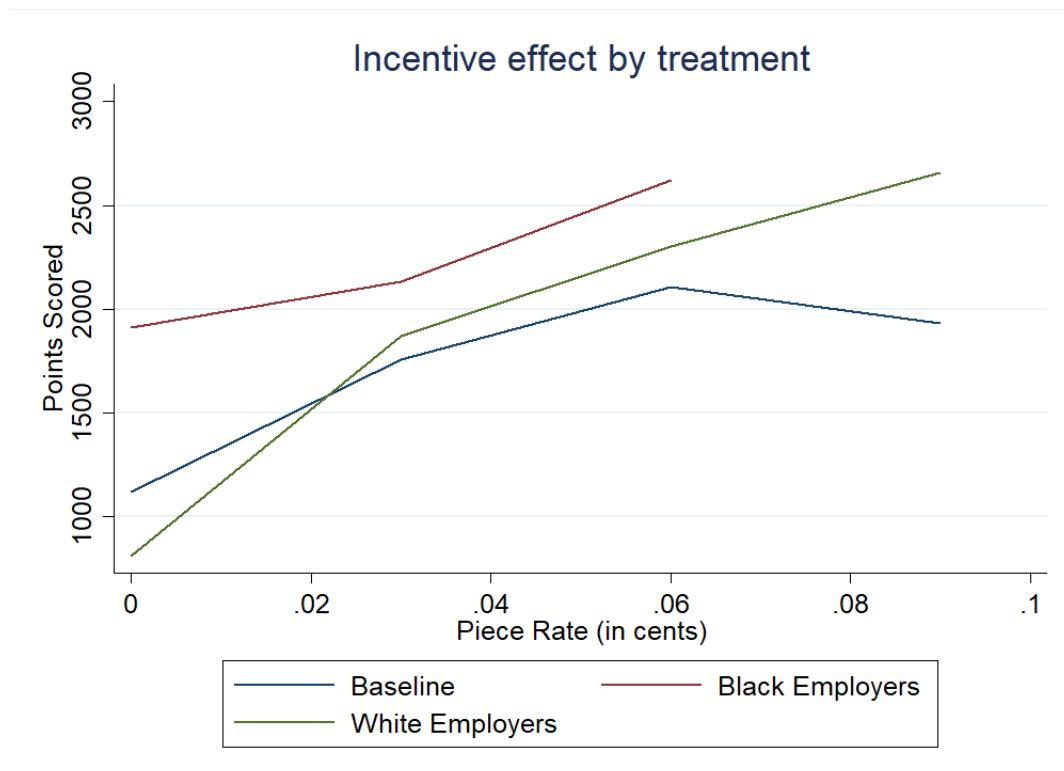
We present effort by treatments and piece rates in table 2. Incentives have powerful effect on effort, raising performance from an average of 1125 points (0-cent piece rate) to 1926 points (9-cent piece rate) in the baseline treatment. The standard errors for mean effort are very large for all the treatments because of the limited sample that we collected. Because of the small sample size, we don't have sufficient power to detect the difference in effort between treatments at different piece rates, so we won't make those comparisons here. For illustration the relationship between effort and piece rate is plotted in figure 1.

Table 3 presents the reduced form estimates from the OLS regressions. Clearly, piece rate has a strong effect on effort and is the main driver of effort in all the given specifications. Workers provide slightly more effort in the Race Salient treatment as compared to Baseline treatment. The higher effort in race salient treatment may be due to increased salience of employer/task as the worker could see the picture taken by the employer and hence employer's existence is made more salient. However, this effect of pictures is not significant once we control for the demographic information of the workers. The main coefficient of interest in this specification is the "Race Salient x Black Employer", this shows that Black employers in the Race Salient treatment are eliciting significantly more effort as compared to White employers in the same treatment. But once again these coefficients should be interpreted with caution as we do not have enough power to detect the effect sizes.

We now examine how effort varies based on the identity of worker. Table 4 presents the breakdown of effort by the racial group of workers towards the racial group of employers.

⁸According to M-Turk's Terms of Service, one cannot collect personally identifiable information of the workers.

Figure 1: Piece rate and effort



Note: The figure presents the fitted relationship between effort and piece rate for different treatments. Blue line presents fitted relationship between effort and piece rates in the baseline treatment, red line presents this relationship for black employers while green line present the relationship for white employers.

Table 2: Effort choices by treatment

		(1) Baseline		(2) Black Employer		(3) White Employer
	N	Mean (s.e)	N	Mean (s.e)	N	Mean (s.e)
0.00	8	1125.13 (440.38)	6	1912.83 (171.27)	3	812.00 (757.64)
0.03	17	1750.82 (166.49)	1	2133.00 (.)	13	1868.38 (258.51)
0.06	23	2111.65 (115.72)	4	2623.25 (425.20)	17	2303.59 (96.29)
0.09	6	1926.00 (263.22)			3	2654.00 (338.22)
Total	54	1831.28 (107.73)	11	2191.18 (196.90)	36	2051.33 (138.85)

Notes: The table presents average effort by workers under each treatment and for each piece rate. Column (1) presents workers who worked without knowing the identity of an employer. Column (2) and column (3) presents workers who knew that their employer was Black or White respectively.

Once again, because of limited sample size, we do not interpret these results in any meaningful manner.

5.1 Fairness and Effort

Although this experiment was not designed to analyze fairness concerns but the collected data enable us to better understand the choices from the experiment. Figure 2 compares the distribution of piece rates chosen by employers with the piece rate as deemed fair by the workers. More than 80 percent of workers deem piece rate of at-least 6 cents as fair as compared to only around 50 percent of employers actually making the offer of 6 cents or more. It seems as though workers identify 6 cents as the standard for fairness. Also workers may also have the sense that since they are the ones doing the work, they should earn more than the employer and that may explain why most workers think that they should receive a larger share of pie.

Overall it seems that there is high correlation between the offered piece rate and

Table 3: OLS regression results for effort

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
Piece Rate	18.94*** (0.000)	18.66*** (0.000)	18.88** (0.004)	17.62* (0.016)
Baseline	-0.15 (0.474)	0.12 (0.619)	0.12 (0.625)	0.09 (0.744)
Race Salient × Black Employer		0.80* (0.036)	0.80* (0.037)	0.69 (0.111)
Fair			-0.02 (0.953)	0.07 (0.825)
Constant	6.59*** (0.000)	6.41*** (0.000)	6.41*** (0.000)	6.59*** (0.000)
Fixed Effects	No	No	No	Yes
Observations	101	101	101	99

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Dependent variable is effort (log of points scored). In model 1, base level for Baseline is Race Salient treatment. In Model 2, 3 and 4, the base coefficient for reported interaction term is 'Race Salient x White Employer'. Other interactions terms are omitted from this table but included in the regression. Fixed Effects include dummies for Gender, Race, Age and Education level.

Table 4: Effort choices by worker's group

		(1) White-White		(2) Black-White		(3) White-Black		(4) Black-Black	
		N	Mean (s.e)	N	Mean (s.e)	N	Mean (s.e)	N	Mean (s.e)
0.00	2	1163.50 (1162.50)	1	109.00 (.)	5	1881.40 (206.20)	1	2070.00 (.)	
0.03	12	1824.50 (276.95)	1	2395.00 (.)	1	2133.00 (.)			
0.06	15	2320.73 (105.64)	2	2175.00 (265.00)	4	2623.25 (425.20)			
0.09	3	2654.00 (338.22)							
Total	32	2093.56 (142.60)	4	1713.50 (548.12)	10	2203.30 (217.27)	1	2070.00 (.)	

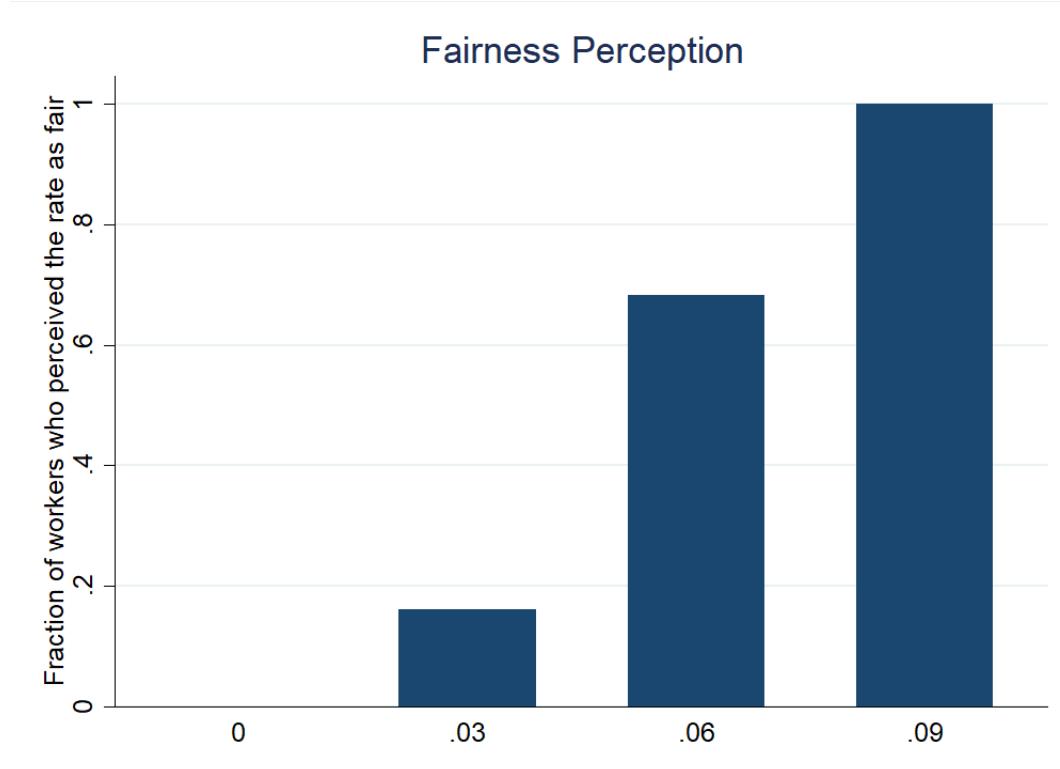
Notes: The table presents the breakdown of effort in the race salient treatment by the racial group of workers towards the racial group of employer. Column (1) presents effort by the white workers towards the white employer. Column (2) presents effort by the black workers towards the white employer. Similarly column (3) and column (4) presents the average effort by the white workers and the black workers towards the black employers respectively.

Figure 2: Chosen piece rate vs. fair piece rate



Notes: The figure presents the distribution of piece rates as chosen by employers with the distribution of piece rates as deemed fair by the workers.

Figure 3



Notes: The figure presents the fraction of workers who perceived the selected piece rate as fair. The x-axis presents the piece rates in cents that the employer could select, y-axis shows the fraction of workers who reported the fair piece rate at-most as great as the selected rate by employer.

perception of that rate as fair by worker. Figure 3 highlights that no worker perceived 0 cents as the fair rate, while almost 70 percent of workers thought that 6 cents was a fair choice.

In Models 3 and 4 of table 3 we test for whether fairness derives the change in effort in any direction. It turns out that fairness concerns are overshadowed by the piece rate i.e. workers respond more to the monetary incentives than the concern for reciprocity in this set up.

6 Structural Estimation

We designed our experiment with the structural model given in Section 2. The advantage of designing field experiments on the basis of model of behavior is that it allows researchers to estimate the nuisance parameters in the environment that are relevant to the decision making (DellaVigna, 2017). Because of the simplicity of our task, the nuisance parameters only enter the cost function. We will thus use data from the baseline treatment to identify these parameters. Once we have the estimate of these nuisance parameters, we can estimate parameters of taste/distaste using data from the race salient treatments. We will now present the estimation procedure and the resulting estimates.

We use data from the baseline treatment, specifically the average effort corresponding to three piece rates (0 cents, 3 cents and 9 cents), to estimate $\hat{\gamma}$, \hat{s} , and \hat{k} using minimum distance estimation. In the minimum distance estimation one identifies the set of moments in data (average effort) and then find the set of model parameters that minimizes the distance between the empirical moments and the theory-predicted moments. The minimum distance estimator just relies on the moment and hence does not use all the variation in the data. There are methods such as maximum likelihood and non-linear least squares that can be used to estimate these parameters using all the variation in data but we do not run those estimations for this pilot. We effectively assume that all workers in a treatment are homogeneous and do not exhibit heterogeneity in any of the behavioral parameters.

The estimates of the minimum distance estimator are presented in table 5 for the power cost function. Given these estimates, we would then back out the estimate of Δs_{ij} for each piece rate (0, 3, 6 or 9 cents) by using the average effort in the race salient treatment corresponding to the respective piece rate for $i \in \{B, W\}$ and $j \in \{B, W\}$. However, because of limited data that we collected, we don't have enough observations to calculate these 12 parameters. Instead we just estimate two parameters - one for black employers and other for white employers ignoring the variation in piece rate. This means that we are assuming both Black and White workers to have same taste/distaste from working for the White/Black employer for each level of piece rate. That is, the average effort by workers (Black and White) for White employers for all piece rates in the race

salient treatment is given by;

$$e_{.W}^{RS} = c'^{-1} ((s + \Delta s_{.W}))$$

Similarly for Black employer, the average effort is;

$$e_{.B}^{RS} = c'^{-1} ((s + \Delta s_{.B}))$$

Given the estimates of $\hat{\gamma}$, \hat{s} , and \hat{k} , $\Delta \hat{s}_{.W}$ and $\Delta \hat{s}_{.B}$ are just identified. The estimates are presented in table 5. The parameter estimates for $\hat{\gamma}$, \hat{k} , and \hat{s} are close to Dellavigna and Pope (2018), however the standard errors are huge because of small sample size and thus large variation in the observed effort choices. The taste parameter is positive for both employer types, implying race revelation leads to larger effort as compared to the baseline treatment. The magnitude of the taste parameter is higher for black employers as compared to white, implying that black employers elicit more effort. However, once again because of enormous standard errors, we don't have any confidence in these estimates.

7 Conclusion

Do workers discriminate in effort based on the social identity of the employer? Is it possible for the worker side to exhibit a taste bias towards the employer in an environment of no possibility of statistical bias? Does fairness play a role in the effort decision of the workers when the punishment is costly to workers?

We designed a pilot experiment on Amazon's Mechanical Turk to answer the above questions. The model-based experiment design consisted of 12 treatment arms. Four piece-rate treatments with no information on employer's identity, and other eight treatments with revealed employer's race (Black or White) at each of the 4 piece rates. The worker's identity was always hidden so as not to confound behavior from employers in the worker's effort choice.

We find that monetary incentives work as expected i.e. higher piece rate lead to more effort in all the treatments. We do not find any discriminatory preferences among workers

Table 5: Estimates of behavioral parameters

	(1)
	Minimum distance estimator
<i>Baseline Parameters</i>	
Curvature γ of cost of effort function	19.63 (15.6)
Level k of cost of effort function	0.00 (1.5e+31)
Intrinsic motivation s (cents per point)	0.00 (4.5e+36)
<i>Race Salient Parameters</i>	
Taste parameter towards Black employer $\Delta s_{_B}$	1.32 (16.6)
Taste parameter towards White employer $\Delta s_{_W}$	0.36 (1.02)
Implied effort at 6-cents (using baseline parameters)	1872
N	741

standard errors in parenthesis

Notes: This table reports the structural estimates of the model in section 2. It uses the minimum-distance estimator employing the three moments (average effort corresponding to three piece rates (0, 3 and 9 cents) in baseline treatment) and thus three parameters (γ , s and k) are exactly identified. We use power cost function to estimate the model. The standard errors are derived via a bootstrap with 1000 draws. Implied effort is calculated using estimated parameters, the actual average effort in the 6 cents treatment is 2112 points. For the race salient parameters, the baseline parameters are taken as given and we use the average effort for Black employers and White Employer (subsuming piece rate and worker's race) from the race salient treatments to calculate $\Delta s_{_W}$ and $\Delta s_{_B}$. Standard errors are calculated by taking a bootstrap sample of 1000 draws and recalculating these parameters for each draw.

towards Black or White employers i.e. the effort provided to white employer is statistically not different from effort provided to the black employer. This once again highlights the fact that monetary incentive are considered more important in this environment than the social identity of employers and are the main driver of effort. We also do not find any concerns for reciprocity among workers. Although some workers do express discontentment when a lower piece rate is selected by employers (as observed from their optional feedback), the monetary incentive still take precedence over these concerns and the average effort is not statistically affected.

Since this study was only a pilot, there are significant limitation in the presented results and hence we do not interpret any of the results more than as noise. This is because of the limited sample size in each of our treatment cells and the resulting enormous standard errors. For the full study we are revising the design to answer the above questions among others.

This is the first study attempting to understand discrimination from the non-traditional side of the market and there is huge room for further research in this area. In an ongoing work, we are exploring issues such as the possibility of discrimination in reciprocity by workers, the documentation of statistical discrimination by workers and the general equilibrium interaction of discrimination from both sides of the market (employer and workers). We believe there is lot of research needed to fully explore the possibility of discrimination from this non-traditional side of the market. More evidence of this reverse discrimination or its lack in different environments and contexts will help improve our understanding of the issue.

Based on this pilot, we need to revise our research design as follows; 1) there is considerable ambiguity in the way race was revealed, we need to come up with another way of revealing race, 2) the current experimental design was not adequate because it lead to a disproportional number of observations in each treatment cell. We need to come up with a design in which treatment status is determined a priori and not endogenously determined during the experiment, 3) since our research question is aimed at examining the worker's problem we probably don't need to hire as many employers as we did for this experiment. It may be possible to use one employer for more than one worker, 4) since it is not easy to recruit blacks on M-Turk, we may way to restrict only to white workers

and study their performance for black versus white employers, 5) we also need to record the intensity of effort throughout the duration of task to see how it changes over time. We did not record this data for this pilot.

References

- Akerlof, G. A., & Kranton, R. E. (2005). Identity and the Economics of Organizations. *Journal of Economic Perspectives*, 19(1), 9–32.
- Arrow, K. J. (1973). The Theory of Discrimination. In *Discrimination in labor markets* (pp. 3–33).
- Bayer, P., & Charles, K. K. (2017). Divergent Paths: A New Perspective on Earnings Differences Between Black and White Men Since 1940. *The Quarterly Journal of Economics*, 133(3), 1459–1501.
- Becker, G. S. (1957). *The economics of discrimination*. University of Chicago Press.
- Benjamin, D. J., Choi, J. J., & Strickland, A. J. (2010). Social Identity and Preferences. *American Economic Review*, 100(September), 1913–1928.
- Bertrand, M., & Duflo, E. (2016). Field Experiments on Discrimination. *Prepared for the Handbook of Field Experiments*.
- Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination. *American Economic Review*, 94(4), 991–1013.
- Chen, D. L., Schonger, M., & Wickens, C. (2016). oTree-An open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance*, 9, 88–97.
- Chen, Y., & Li, S. X. (2009). Group Identity and Social Preferences. *The American Economic Review*, 99(1), 431–457.
- Craig, A. C., & Fryer, R. G. (2018). *Complementary Bias : A Model of Two-Sided Statistical Discrimination*.
- DellaVigna, S. (2017). Structural Behavioral Economics. *Handbook of Behavioral Economics* (December).

- Dellavigna, S., & Pope, D. (2018). What motivates effort? Evidence and expert forecasts. *Review of Economic Studies*, 85(2), 1029–1069.
- Doleac, J. L., & Stein, L. C. D. (2013). The visible hand: Race and online market outcomes. *Economic Journal*, 123(572), 469–492.
- Eckel, C. C., & Petrie, R. (2011). Face value. *American Economic Review*, 101(4), 1497–1513.
- Fang, H., & Moro, A. (2011). *Theories of statistical discrimination and affirmative action: A survey* (Vol. 1A).
- Fehr, E., Kirchsteiger, G., & Riedl, A. (1993). Does Fairness Prevent Market Clearing? An Experimental Investigation. *The Quarterly Journal of Economics*, 108(2), 437–459.
- Glover, D., Pallais, A., & Pariente, W. (2017). Discrimination as a Self-Fulfilling Prophecy : Evidence from French Grocery Stores. *Quarterly Journal of Economics*.
- Harrison, G. W., & List, J. A. (2004). Field Experiments. *Journal of economic literature*, XLII (December), 1009–1055.
- Low, H., & Meghir, C. (2017). The Use of Structural Models in Econometrics. *Journal of Economic Perspectives*, 31 (Spring), 33–58.
- Neumark, D. (2018). Experimental Research on Labor. *Journal of economic literature*, 56 (3), 799–866.
- Paolacci, G., & Chandler, J. (2014). Inside the Turk: Understanding Mechanical Turk as a Participant Pool. *Current Directions in Psychological Science*, 23(3), 184–188.
- Paolacci, G., Chandler, J., & Ipeirotis, P. (2010). Running experiments on amazon mechanical turk. *Judgment and Decision making*, 5 (5), 411–419.
- Phelps, E. S. (1972). The Statistical theory of Racism and Sexism. *American Economic Review*, 62(4), 659–661.
- Riach, P. A., & Rich, J. (2002). Field experiments of discrimination in the market place. *The Economic Journal*, 112(483), 480–518.
- Rich, J. (2014). *What Do Field Experiments of Discrimination in Markets Tell Us? A Meta Analysis of Studies Conducted since 2000*.
- Sasaki, M. (1999). An Equilibrium Search Model with Coworker Discrimination. *Journal of Labor Economics*, 377–407.

A Experiment Material Appendix

A.1 Informed Consent Document and Screen-er Survey

Informed Consent Document

Title of Study: Decision Making in an Online Labor Market

Investigators: Sher Afghan Asad, Joydeep Bhattacharya

This brief screener is a part of a research project at Iowa State University. You will receive \$0.05 for completing the screener, which will be used to see if you are eligible for the full study. Individuals who qualify will be immediately invited to participate in a 15-minute study for a participation bonus of \$1 plus any earned bonus. If you do not qualify for participation based on this screening questionnaire, all the information collected from you will be destroyed.

Description of Procedures

To be considered for participation in the study, you will have to answer few demographic questions and upload a picture of your hand using your web-camera. **In the next screen, your browser will ask permission to access your web-camera which you must accept.** Once you have filled out the survey and submitted the picture, you may be immediately invited to participate in the full study. In the full study, you will be randomly matched with another participant/worker on MTurk. You and your randomly matched participant will make decisions about bonuses for each other and one of you will work on a simple task that will affect your and your matched participant's earnings. The experiment will last for either 5 minutes or 15 minutes depending on your role in the experiment. Depending on your role in the study, you might be asked to write a number on a small piece of paper (like a Post-it), and use your webcam to upload a picture of that piece of paper. This picture of the number you wrote on a Post-it may be shown to your matched participant partner. The picture of your hand (which you will upload at the time of screener survey) will only be used by researchers and will not be shown to other participants. You will be given more information about the structure of the study in the instructions.

Risks or Discomforts

There are no foreseeable risks currently in participating in the study.

Benefits

If you decide to participate in this study, there are no direct benefits to you. It is hoped that the information gained in this study will benefit the field of economics by providing more insight into the process of how decisions are made in the labor markets.

Costs and Compensation

You will not bear any costs from participating in this study. If you participate you will spend no longer than 5 or 15 minutes depending on your role. Participants will earn \$1 for participating in the experiment and a bonus amount depending on the decisions in the experiment. Your final compensation will vary depending on your and your randomly matched participant's choices. You will need to complete a form to receive payment.

Participant Rights

Participating in this study is completely voluntary. You may choose not to take part in the study or to stop participating at any time, for any reason, without penalty or negative consequences. If you have any questions about the rights of research subjects or researchrelated injury, please contact the IRB Administrator, 515-294-4566, IRB@iastate.edu, or Director, 515-294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Confidentiality

This consent form, any other documents and uploaded picture will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy study records for quality assurance and data analysis. These records may contain private information. This experiment is approved by the Institutional Review Board at Iowa State University (ISU IRB: 18-201-00 Approved Date: 07/18/2018 Expiration Date: 07/17/2020). It is assured that the confidentiality of your data, your uploaded picture, and the choices that you make in the study will be strictly maintained. To ensure confidentiality to the extent permitted by law, the following measures will be taken: Data will be stored on a secure computer or department server under password protection. Your identifiable information will be separated from your decisions in the experiment. When we report results, we will group responses in aggregate; individual responses will not be shared. Please be aware that any work performed on Amazon MTurk can potentially be linked to information about you on your Amazon profile. We will not be accessing any information about you that you may have put on your Amazon public profile page. We will store your MTurk worker ID separately from the other information you provide to us.

Future Use of Data

De-identified information collected about you during this study may be shared with other researchers or used for future research studies. We may also get your uploaded picture rated on different factors. We will not obtain additional informed consent from you before sharing the de-identified data or getting your picture evaluated for different characteristics..

Questions

You are encouraged to ask questions at any time during this study. For further information about the study, contact Sher Afghan Asad at 515-735-6309 or saasad@iastate.edu or Joydeep Bhattacharya at joydeep@iastate.edu.

Consent and Authorization Provisions

By checking the box below you acknowledge, that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You may print a copy of this informed consent document for your records.

- I acknowledge that I have read the material above and I agree to participate in the study.*

If you don't agree with this consent document, then close this form and return the HIT.

[Next](#)

Enter your information

Please enter the following information.

MTurk Worker ID:

Gender you closely identify with:

- Male
- Female
- Prefer not to answer
- Other

Race you closely identify with:

- American Indian or Alaskan Native
- Asian (including East and South Asia)
- Black or African-American
- Hispanic or Latino
- Native Hawaiian or other Pacific Islander
- White or Caucasian
- Prefer not to answer
- Other

How old are you:

- Under 18
- 18-24
- 25-30
- 31-40
- 41-50
- 51-64
- 65 or over
- Prefer not to answer

Highest education level reached:

- Less than high school
- High School or equivalent
- Vocational/Technical School
- Some College
- College Graduate
- Master's Degree
- Doctoral Degree
- Professional Degree
- Prefer not to answer
- Other

Take a photo of the back of your hand (as shown in the sample picture) using your web-camera. **You must allow this page to access the web-camera in your browser.** Make sure your face is NOT shown in the picture.



Sample Picture

You may take multiple photos, click next only when you are satisfied with the picture shown on the right/bottom.



Take photo!

If your camera does not launch even after you have allowed this page to access web-cam, you should update your browser.

[Next](#)

Qualified

Congratulations! You meet the criteria to participate in the full study.

This study will take up to 15 minutes, pay a bonus of 1 dollar plus additional amount depending on your decisions in the study.

Make sure that you are not distracted for the next 15 minutes. When you are ready, click the following link to begin.

[Begin Study](#)

A.2 Interface for Employers

Instructions

You have 7 minutes maximum to read these instructions. If you finish early, you may proceed to the next page. Time remaining:
6:56

Welcome! Please read the following instructions very carefully.

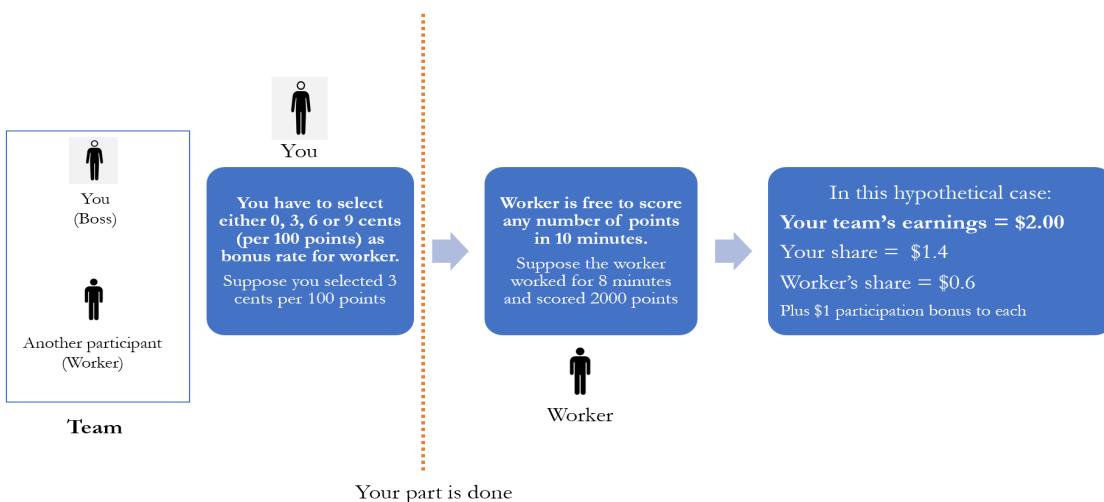
In this study, you and another participant have been matched together to form a two-member team - think of yourself as the boss and your team member as the worker. Your team member/worker will work on a button-pressing task (to be described on the next page) for up to 10 minutes. Each of you will earn \$1 simply for participating in this study. You may each earn additional bonus amounts based on the decisions you and your worker take. Your respective earnings will be transferred to your accounts within 24 hours.

Once the button-pressing task begins, your team will earn \$0.10 for every 100 points your worker will score. However, before the worker starts the task, you have to decide how much of these \$0.10 you want to split between yourself and your worker. The amount you select for the worker will serve as his/her bonus rate for the task. Specifically, out of the 10 cents per 100 points that your team will receive, you can choose to give 0, 3, 6 or 9 cents to your worker, keeping the rest for yourself. Of course, the bigger the bonus rate you choose for your worker, the less your own bonus will be. On the other hand, you would want to try and incentivize your worker to score as many points as possible.

Your worker will not know your identity and will only see the bonus rate selected by you before starting to work on the task.

To summarize, all you will need to do is select a bonus rate for your worker who will observe what you have chosen before starting work on the button-pressing task. Bonus payments will be determined once your worker has finished working on the task.

Here is one EXAMPLE of what can happen in the experiment.



Here is an illustrative calculator for practice which you can use to calculate hypothetical earned bonuses. To do that, first select a bonus rate for the worker (0, 3, 6 or 9 cents per 100 points). Next enter the number of points you **imagine** the worker will score. The calculator will show you the earned bonus amounts for you and your worker. Of course, these bonuses are hypothetical since you don't know how many points the worker will actually score. This calculator will remain accessible to you at the time you will be making your decision about the bonuses.

Bonus Calculator

Bonus rate for worker (per 100 points scored)	\$ Select here ▼
Your bonus rate (per 100 points scored)	\$ Auto Calculated
Points scored by worker	Your guess
Your bonus amount	\$Auto Calculated
Worker's bonus amount	\$Auto Calculated

On the next screen, you will see a description of the button-pressing task that the worker will be working on. You can always access these instructions by clicking "View Instructions" in the next pages.

Click next to continue.

Description of Button-Pressing Task

You have 2 minutes maximum to read this page. If you finish early, you may proceed to the next page. Time remaining: **1:58**

[View Instructions](#)

Here is the description of the button-pressing task that your worker will see. On the next screen, you will get a chance to familiarize yourself with the same task but only for a limited time of 30 seconds.

Description of the Task for Worker:

The object of the task is to alternately press the "a" and "b" buttons on the keyboard as quickly as possible for 10 minutes. Every time you successfully press the "a" and then the "b" button, you will score a point. Note that points will only be scored when you alternate button pushes: just pressing the "a" or the "b" button without alternating between the two will not result in points. Buttons must be pressed by hand only (key-bindings or automated button-pushing programs/scripts cannot be used) or the task will not be approved. Feel free to score as many points as you can.

[Start the practice button-pressing task](#)

Task

Time left to complete this page: **0:29**

Press 'a' then 'b'

Points: 0

[Next](#)

Control Questions

You have 7 minutes maximum to answer these questions. If you finish early, you may proceed to the next page. Time remaining:
6:58

[View Instructions](#)

You must answer the following questions correctly before you can proceed with the study. Feel free to refer again to the instructions by clicking the above button.

MTurk Worker ID:

1. As the boss, what are you supposed to do in this experiment?

- Work on a task for 10 minutes.
- Select a bonus rate for a team-member/worker who will work on a task.
- Select a bonus rate and work on a task.

2. As a boss you will be selecting a bonus rate for your worker from among 4 different options. What is the lowest bonus rate (in cents per 100 points) that you can select?

3. Similarly, what is the maximum bonus rate (in cents per 100 points) that you can select for your worker ?

4. The more points your worker scores, the higher is your and your worker's earning for any positive bonus rate you chose.

 ▼

5. Higher bonus rate for your worker means lower bonus rate for you.

 ▼

The next screen will ask you to select a bonus rate for your team member. Click next when you are ready.

[Next](#)

Select bonus rate

You have 3 minutes maximum on this page. If you finish early, you may proceed to the next page. Time remaining: **2:57**

[View Instructions](#)

As explained before, your team will earn \$0.10 for every 100 points scored by your worker. You, **as boss**, can choose to transfer either \$0.00, \$0.03, \$0.06 or \$0.09 to your worker. Please choose how much you want to transfer. Feel free to use the calculator given below.

----- ▼

How many points do you expect your worker to score in 10 minutes? You will be paid extra 5 cents if your guess is within the range of 100 points of the actual points scored.

Bonus Calculator

Bonus rate for worker (per 100 points scored)	\$ Select here ▼
Your bonus rate (per 100 points scored)	\$ Auto Calculated
Points scored by worker	Your guess
Your bonus amount	\$Auto Calculated
Worker's bonus amount	\$Auto Calculated

[Next](#)

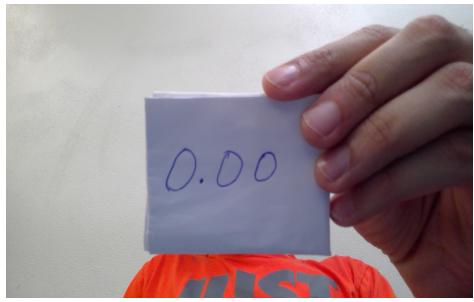
Take a photograph

You have 5 minutes maximum on this page. If you finish early, you may proceed to the next page. Time remaining: **4:55**

You selected \$0.00 per 100 points for your worker. Write this amount on a small (Post-it) piece of paper and take a picture of it using your webcam as shown below in the sample picture. Make sure you follow these guidelines when taking a photo. **Your HIT may not be approved if one or more of these guidelines are not followed.** This photo may be shown to your worker before he/she starts the task.

1. The written amount must be clearly visible.
2. Your face (or face of any other person) must NOT be visible.
3. Try to avoid showing any jewelry/watches/tattoos/markings etc.
4. You MUST show part of your hand.
5. Use a plain background, if possible.
6. Do NOT write anything on the paper other than the amount you choose to transfer to your worker.

Here is a sample picture for a hypothetical choice of \$0.00.



Sample Picture \$0.00

Click "Take Photo" to take a picture. If the picture shown on the right/below appears to you to not meet one or more of the above guidelines, you may retake the photo by clicking "Take Photo" again. Only click Next once you are satisfied with the picture. **Remember your HIT may not be approved if one or more of the above guidelines are not followed.**



Take photo!

Next

Feedback

Thank you for participating in this study, your bonus amount will be determined after your worker has finished working on the task. Please note that any bonus payment must be approved before they are given. Your bonus amount (if any) will be paid in 24 hours.

Did you have any questions, concerns or comments about this study? If so, enter them here. :

On the next screen, you will be given a survey code that you must enter into the textbox on Mechanical Turk to get paid.

[Next](#)

Survey Code

Your survey completion code is **3a9rie7e**

Above is a unique code that is tied to the completion of your specific survey. Please enter this code into the textbox on Mechanical Turk to get approved for this task and receive compensation.

A.3 Interface for Workers

Instructions

Welcome! Please read the following instructions very carefully.

In this study, you and another participant have been matched together to form a two-member team - think of yourself as the worker and your team member as your boss. You, as worker, will work on a button-pressing task (to be described below) for upto 10 minutes. Both you and your boss will earn \$1 simply for participating in this study. You may each earn additional bonus amounts based on the decisions you and your boss take. Your respective earnings will be transferred to your accounts within 24 hours.

Once you start working on the button-pressing task, your team will earn \$0.10 for every 100 points you score. However, before you start the task, your boss will decide and announce how he/she will split the \$0.10 between you and him/her. Your share (out of \$0.10) will be your bonus rate for working on the task. Of course, the bigger the bonus rate your boss chooses for you, the less his/her own bonus will be.

Specifically, your boss must select a bonus rate of either 0, 3, 6 or 9 cents for every 100 points scored by you. For example, if your boss chose 3 cents per 100 points for you, he/she will keep 7 cents for himself/herself.

The point at which your boss decided the bonus rate for you, he/she did not know anything about your identity. He/she will observe the points scored by you once you have finished working on the task.

To summarize, your boss has selected a bonus rate of either 0, 3, 6 or 9 cents for every 100 points scored by you on a button-pressing task. On the next screen, you will see the bonus rate selected and you will then work on the task for upto 10 minutes. Bonus payments will be determined once you have finished working on the task.

Description of the Task:

The object of the task is to alternately press the "a" and "b" buttons on the keyboard as quickly as possible for 10 minutes. Every time you successfully press the "a" and then the "b" button, you will receive a point. Note that points will only be rewarded when you alternate button pushes: just pressing the "a" or the "b" button without alternating between the two will not result in points. Buttons must be pressed by hand only (key-bindings or automated button-pushing programs/scripts cannot be used) or the task will not be approved. Feel free to score as many points as you can.

Below is an example of how the task will work. Try pressing "a" and "b" alternately to score points. Below we have limited the maximum number of points you can score to 30 as this is just practice, but the actual task will not have a point limit. In the actual task, you will have 10 minutes to score as many points as you can. You may stop anytime before the 10-minute mark is up. Of course, the longer you work on the task, the more points you will score.

Press 'a' then 'b'

Points: 0

Make sure you understand the instructions before proceeding. The next screen will ask you questions to test your understanding of the experiment.

[Next](#)

Control Questions

[View Instructions](#)

Answer the following questions correctly before you can proceed with the experiment. Feel free to refer again to the instructions by clicking the button above.

MTurk Worker ID:

1. What are you supposed to do in this experiment?

- Work on a task for 10 minutes.
- Select a bonus rate for a team-member/worker who will work on a task.
- Select a bonus rate and work on a task.

2. Who selects the bonus rate for you?

3. Your boss selects a bonus rate for you from among 4 different choices. What is the lowest bonus rate (in cents per 100 points) that he/she can select?

4. Similarly, what is the maximum bonus rate (in cents per 100 points)?

5. The more points you score, the higher is your and your boss's earnings for any positive bonus rate:

6. Higher bonus rate for you means lower bonus rate for your boss.

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Bonus Rate

Just for a moment, imagine yourself as the boss. What bonus rate do you think you would choose for your worker?

 ----- ▼

Before you see the bonus rate chosen by your boss, please select your best guess of what your boss would have chosen. This will not have any affect on the rate which has already been chosen by your boss. **You will be paid extra 5 cents if your guess is correct.**:

 ----- ▼

[View the selected bonus rate](#)

Bonus Rate

Just for a moment, imagine yourself as the boss. What bonus rate do you think you would choose for your worker?:

\$0.06

Before you see the bonus rate chosen by your boss, please select your best guess of what your boss would have chosen. This will not have any affect on the rate which has already been chosen by your boss. You will be paid extra 5 cents if your guess is correct.

\$0.00

Your boss has chosen a bonus of **\$0.00 per 100 points** for you;

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Bonus Rate

Just for a moment, imagine yourself as the boss. What bonus rate do you think you would choose for your worker?:

\$0.06

Before you see the bonus rate chosen by your boss, please select your best guess of what your boss would have chosen. This will not have any affect on the rate which has already been chosen by your boss. You will be paid extra 5 cents if your guess is correct.

\$0.00

Your boss has chosen a bonus of **\$0.00 per 100 points** for you;

Now, when you are ready click next to start working on the button-pressing task for next 10 minutes. You are free to score as many points as you can. The timer will start when you click the button below.

Start the button-pressing task

Task

You have 10 minutes maximum to work on the task. Time remaining: **9:59**

Press 'a' then 'b'

Points: 0

Your bonus payout: \$1 +

Your boss's bonus payout: \$1 +

Your boss has chosen a bonus of \$0.00/100 points for you and \$0.10/100 points for himself/herself.

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Fair Bonus

What, in your opinion, would have been a fair bonus rate for you/worker?



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Feedback

Thank you for participating in this experiment. Here is the summary of what happened in the experiment.

Bonus rate = \$0.00 per 100 points scored

Points = 0

Your bonus payout = \$1.05

Your boss's bonus payout = \$1.00

Please note that any bonus payment must be approved before they are given. Your bonus amount (if any) will be paid in 24 hours.

Did you have any questions, concerns or comments about this study? If so, enter them here.:

On the next screen, you will be given a survey code that you must enter into the textbox on Mechanical Turk to get paid.

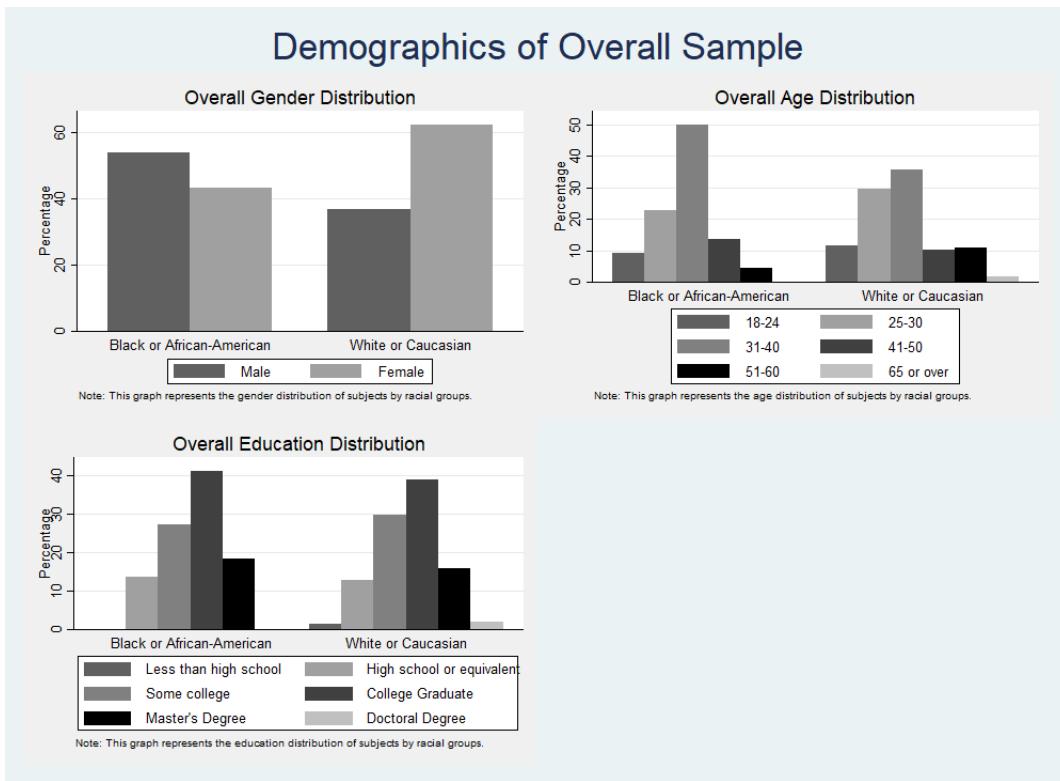
[Next](#)

Survey Code

Your survey completion code is **nixe475v**

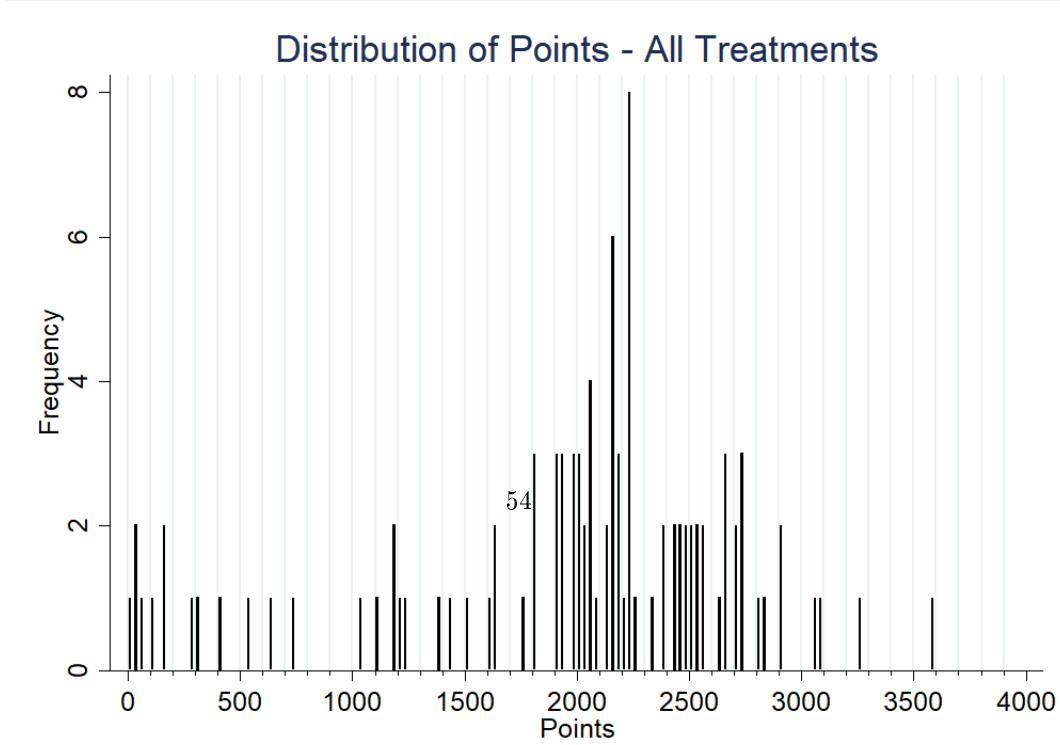
Above is a unique code that is tied to the completion of your specific survey. Please enter this code into the textbox on Mechanical Turk to get approved for this task and receive compensation.

Figure C.1: Overall Sample Demographics



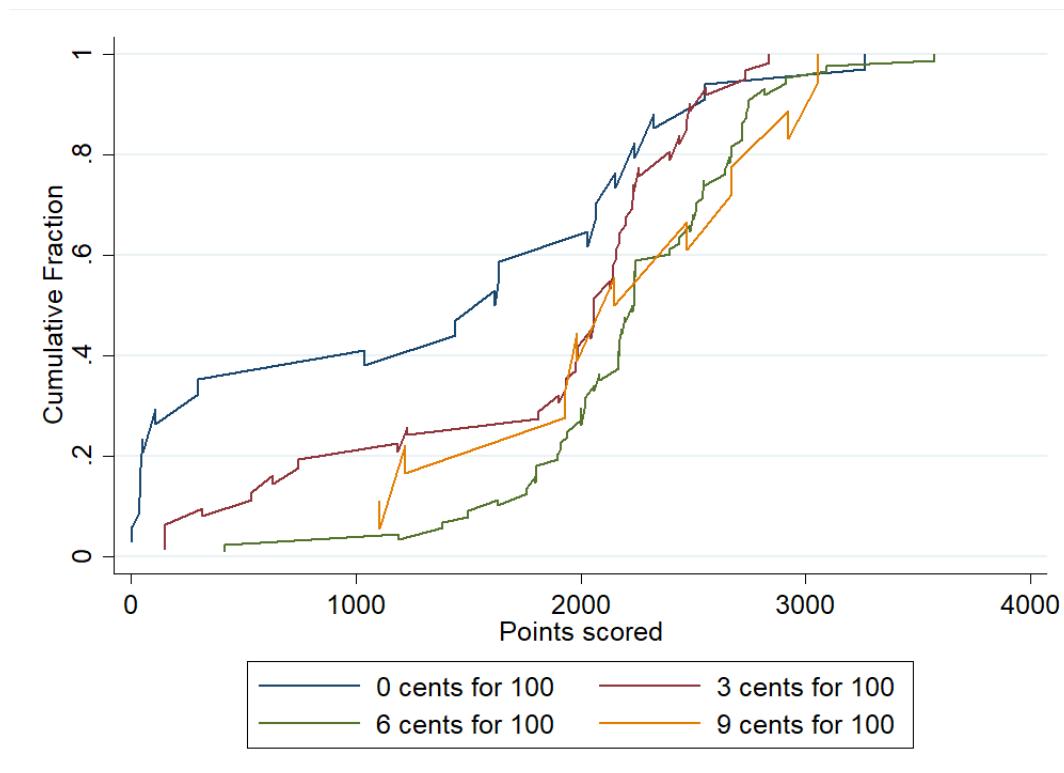
B Miscellaneous Tables and Figures

Figure C.2: Effort distribution



Notes: The figure shows the distribution of points scored by all workers.

Figure C.3: Effort Distribution by Piece Rate



Notes: The figure shows the cumulative distribution of points scored for all four piece rates from all the treatments combined.