

Do workers discriminate against their out-group employers? Evidence from an online labor market

Sher Afghan Asad, Ritwik Banerjee, and Joydeep Bhattacharya

June 10, 2019

Abstract

A large body of literature in economics has demonstrated that prejudice or bias of the majority group towards members of an out-group identity – whether it be racial, religious, ethnic or gender in origin – is widespread in labor markets. Such biases often lead to discrimination when, all else same, a less-favorable treatment is systematically meted out to the out-group relative to the majority group. Such prejudicial treatment may reveal itself on either the extensive margin (the decision-to-hire stage) or the intensive margin (how much to pay, what sort of job conditions and work hours to offer existing employees, etc.). It is commonly believed that labor market discrimination is one-sided: driven by employers toward their out-group employees. In this research, we restrict attention to racial identity and seek to study possible discrimination on the intensive margin in the reverse direction, i.e., we ask, do workers discriminate on the intensive margin (say, by shirking or under-providing effort) for an out-race employer relative to an otherwise-identical, own-race one?

1 Introduction

2 Model and Treatments

We closely follow the model of Dellavigna and Pope (2018) for the worker side and modify it to incorporate 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 $j \in \{U, B, W\}$ where U , B and W denote the unknown, black or white race of an agent (employer or worker) respectively;

$$\underbrace{\max_{e_{ij} \geq 0} U_{ij}} = \underbrace{\max_{e_{ij} \geq 0} (F + (s_i + \rho_{ij} \mathbb{1}_{Gift} + \alpha_{ij} v_j + p) e_{ij} - c(e_{ij}))} \quad (1)$$

where e_{ij} is the number of points (on a button-pressing task) scored by worker i when working for an employer j , F is the fixed money paid for participating in the experiment, s_i captures the sense of duty, norm, intrinsic motivation, and competitiveness of worker towards the task which is independent of the employer. ρ_{ij} is the reciprocity parameter per unit of effort which is kicked in whenever an employer j awards gift to the worker i , à la Gneezy and List (2006). $\mathbb{1}_{Gift}$ is an indicator function which assumes a value 1 when a gift is rewarded by the employer, 0 otherwise. α_{ij} captures the altruistic preference of worker i towards employer j per unit of effort à la Becker (1974) given that v_j is the value of the unit of effort to the employer j . p is the piece rate per unit of effort. $c(e_{ij})$ is the cost of effort, which is assumed to be the 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) and DellaVigna, List, Malmendier, and Rao (2016) we assume the cost function to be either a power function or an exponential function i.e.

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

or

$$c(e) = \frac{kexp^{\gamma e}}{\gamma} \quad (3)$$

Power cost function (2) characterizes a constant elasticity of effort with respect to return to effort given by $1/\gamma$, while exponential function (3) represents decreasing elasticity of effort with respect to return to effort given by $1/\log(r/k)$ where r is the return to the effort. Both functional forms require the estimation of unknowns k , and γ which we will back out using observed effort at different piece rates.

Solving 1 leads to the following solution (when interior);

$$e_{ij}^* = c'^{-1}(s_i + \rho_{ij}\mathbb{1}_{Gift} + \alpha_{ij}v_j + p)$$

With power cost function this translates to;

$$e_{ij}^* = \left(\frac{s_i + \rho_{ij}\mathbb{1}_{Gift} + \alpha_{ij}v_j + p}{k} \right)^{1/\gamma}$$

While exponential cost function leads to the solution

$$e_{ij}^* = \frac{1}{\gamma} \log \left(\frac{s_i + \rho_{ij}\mathbb{1}_{Gift} + \alpha_{ij}v_j + p}{k} \right)$$

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 Piece Rate Treatments

In the piece rate treatments, each worker works on a task at a given piece rate. We assign four different piece rates between 0 and 10 cents. In the first treatment, workers are paid no piece rate. In the next three treatments, piece rates are 3, 6 and 9 cents per unit of effort. From the M-Turk standards, this variation in piece rates is substantial and is likely to elicit significant change in effort. The piece rates are earned on top of \$1 fixed participation fee. These four treatments differ only in the piece rates, everything else remains exactly the same.

These piece rates provide evidence on the responsiveness of effort to incentives for our particular task and hence allow us to estimate the baseline parameters (s_i , k , and γ) which will be used to estimate other behavioral parameters. Formally, in the piece rate treatments, worker i observes the piece rate p and then chooses effort e_{ij} by maximizing 1. There is no employer j in these treatments which implies that for any worker i , $\alpha_{ij} = 0$ and there is no gift from the employer implying $\mathbb{1}_{Gift} = 0$. The equilibrium efforts e_i^* in these treatments is thus given as;

$$e_i^* = c'^{-1}(s_i + p) \text{ for } i \in \{B, W\} \text{ and } p \in \{0, 3, 6, 9\}$$

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

2.2 Altruism Treatments

In the altruism treatments, each worker is matched to an employer (truthfully) and observes the (true) value of the effort to the matched employer. Each employer earns 1 cent for every 100 points scored by the matched worker. We set the piece rate to 0. There are three treatments under altruism treatments. In the first treatment (altruism baseline) a worker does not observe the identity of the matched employer. In the 'altruism black' and 'altruism white' treatment the matched employer is black and white respectively. Note that we only model "pure altruism" in the above setup, the "warm glow" of the workers, if any, is captured in the s_i parameter, which we don't aim to disentangle.

Formally, in the altruism treatments, worker i observes the zero piece rate ($p = 0$), the value of the unit of effort to the employer j ($v = 0.01$), and then chooses effort e_{ij} by maximizing 1. There is no gift from the employer implying $\mathbb{1}_{Gift} = 0$. The equilibrium efforts e_{ij}^* in these treatments is thus given as;

$$e_{ij}^* = c'^{-1}(s_i + \alpha_{ij}v_j) \text{ for } i \in \{B, W\} \text{ and } j \in \{U, B, W\}$$

We are implicitly assuming $\alpha_{ij} = \alpha_i + \Delta\alpha_{ij}$, i.e. the parameter α_{ij} can be separated into two components 1) α_i , which is independent of employer racial identity, identified when $j = U$ and 2) $\Delta\alpha_{ij}$, which represents the difference in altruistic preferences which are driven solely by the race of the employer. $\Delta\alpha_{iW} > \Delta\alpha_{iB}$ ($\Delta\alpha_{iW} < \Delta\alpha_{iB}$) represents the higher (lower) effort for whites as compared to blacks because of greater (lesser) altruistic preference towards the former as compared to latter. In other words, the difference

in effort between the treatments ‘altruism white’ and ‘altruism black’ is interpreted as resulting from the differential altruistic preferences of the workers. The three altruism treatments help us identify α_i , $\Delta\alpha_{iB}$, and $\Delta\alpha_{iW}$ given the baseline parameters.

2.3 Reciprocity Treatments

Reciprocity treatments build on from the altruism treatments and add a positive monetary gift (20 cents) from the employer to the worker. Rest of the details are exactly the same as in altruism treatments. The equilibrium effort is thus given as;

$$e_{ij}^* = c'^{-1}(s_i + \alpha_{ij}v_j + \rho_{ij}) \text{ for } i \in \{B, W\} \text{ and } j \in \{U, B, W\}$$

Once again we are implicitly assuming $\rho_{ij} = \rho_i + \Delta\rho_{ij}$, i.e. the parameter ρ_{ij} can be separated into two components 1) ρ_i , which is independent of employer racial identity, identified when $j = U$ and 2) $\Delta\rho_{ij}$, which represents the difference in reciprocal preferences which are driven solely by the race of the employer. $\Delta\rho_{iW} > \Delta\rho_{iB}$ ($\Delta\rho_{iW} < \Delta\rho_{iB}$) represents the higher (lower) effort for whites as compared to blacks because of greater (lesser) reciprocal preference towards the former as compared to latter. In other words, the difference in effort between the treatments ‘reciprocity white’ and ‘reciprocity black’ is interpreted as resulting from the differential reciprocal preferences of the workers. The three reciprocity treatments help us identify ρ_i , $\Delta\rho_{iB}$, and $\Delta\rho_{iW}$ given the baseline parameters and the altruism parameters.

3 Experiment Design

The main goal of this study is to investigate the possibility of discrimination from the worker side in an online labor market. We designed the experiment to allow for the possibility of discrimination in the effort by workers towards the employers. Our experiment is carefully designed to ensure that observed difference in the effort towards the employers could only realize because of the social preferences of workers, i.e., we shut down the possibility of statistical discrimination (the employers did not get to make any strategic choices such as wage offer, minutes of work, etc.).

3.1 Pre-registration

We pre-registered the design on AEA RCT registry as AEARCTR-0003885. Since our choice of the task is the 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 across all treatments have a standard deviation of around 660 points. Assuming this standard deviation for each treatment and assuming a minimum detectable effect of 0.2 standard deviations between two treatments, we will need around 400 subjects in each treatment to have a power of 80 percent. This implies that we will need $400 \times 10 = 4,000$ observations in total for all ten treatments. We pre-registered the rule for sample size: we aimed to recruit 6,000 participants from the United States within the first three weeks of posting the experiment. We were able to recruit _____ subjects within the first three weeks.

3.2 Recruitment of Subjects

Since this study involves the understanding of worker’s motivation towards their employers, we needed to recruit both employers and workers for this experiment.

3.2.1 Recruitment of Employers

To recruit employers, we invited male student subjects, above the age of 18, from Iowa State University, who racially identified as either African American or Caucasian. We randomly assigned each employer subject to one of the six social preference treatments. Based on the assigned treatment, subjects read from the script and demonstrated the task on a video. Each subject was paid \$5 for showing up to our lab and an average additional amount of ___ based on matched workers performance. Our final sample included six employers in each social preference treatment (36 employers).

3.2.2 Recruitment of Workers

We recruited the workers for this experiment 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 gives 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-minute screener survey to qualify for a study that starts immediately, take up to 15 minutes, and pays participation bonus \$1 with scope to earn extra. You will be required to watch and listen to a video. Do NOT take this study on mobile.”. Based on the responses in the screener 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. We paid five cents to each subject who did not meet the criteria.

3.3 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 parameters of distaste. For this purpose, we needed a task which is costly to workers and is not meaningful to any particular race. 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.

3.4 Race Revelation

We took the approach of revealing race via the revelation of skin-color (Doleac & Stein, 2013). To that end, we recorded videos of employers while they read off a script explaining and demonstrating the task. The camera placement only captured the hand of the employer along with the movement of the fingers alternating ‘a’ and ‘b’ button presses. Other identifiers, such as the face, were not captured in the video to avoid psychologi-

cal confounds which are associated with faces, such as attractiveness and trustworthiness (Eckel & Petrie, 2011). The employer’s hand was bare or covered (with full sleeves and latex gloves) depending on the assigned treatment. For black employers, we only restricted to participants with dark skin tone to avoid any ambiguity about the race of the person. We used the digital voice for the videos in the piece rate treatments.

3.5 Experiment Flow

The experiment proceeded as follows: (1) We recruited employers from Iowa State University and recorded videos of them explaining the task, (2) we then posted a HIT on Amazon’s Mechanical Turk for a screener survey for the recruitment of workers, (3) we invited subjects who consented and met the recruitment criteria (undisclosed) to initiate the experiment, (4) upon initiation we assigned each subject to one of the treatment groups. Following Czibor, Jimenez-Gomez, and List (2019), we used the blocked randomization design to assign subjects to treatments. We defined blocks based on demographic information collected in the screener survey (Gender, Age, Race, Education, Income, Political Party Affiliation, and the Most-lived US State),¹ (4) we presented instructions to each subject in a pre-recorded video (based on the assigned treatment). We programmed our study to require each worker to watch a video before proceeding to the task, and (5) each worker worked on a task for 10 minutes and then answered some questions aimed at elicitation of their beliefs about the matched employer.

3.5.1 Piece Rate Treatments

In the piece rate treatments, each worker saw a video demonstrating a task with a script: *“On the next page, you will play a simple button-pressing task. The object of the task is to alternately press the ‘a’ and ‘b’ buttons on your keyboard as quickly as possible for ten 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 ‘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*

¹See Cavaille (2018) for instructions on implementing sequential blocked randomization for online experiments.

Table 1: Summary of treatments

Category (1)	Treatment Wording (2)	Voice (3)	Skin Color (4)
Piece Rate	Your score will not affect your payment in any way.	Digital	Concealed
	As a bonus, you will be paid an extra 3 cents for every 100 points that you score.	Digital	Concealed
	As a bonus, you will be paid an extra 6 cents for every 100 points that you score.	Digital	Concealed
	As a bonus, you will be paid an extra 9 cents for every 100 points that you score.	Digital	Concealed
Altruism	I will earn 1 cent for every 100 points that you score. Your score will not affect your payment in any way.	Black & White	Concealed
	I will earn 1 cent for every 100 points that you score. Your score will not affect your payment in any way.	Black	Black
	I will earn 1 cent for every 100 points that you score. Your score will not affect your payment in any way.	White	White
Reciprocity	I will earn 1 cent for every 100 points that you score. In appreciation to you for performing this task, I have decided to pay you extra 20 cents as a bonus. Your score will not affect your payment in any way.	Black & White	Concealed
	I will earn 1 cent for every 100 points that you score. In appreciation to you for performing this task, I have decided to pay you extra 20 cents as a bonus. Your score will not affect your payment in any way.	Black	Black
	I will earn 1 cent for every 100 points that you score. In appreciation to you for performing this task, I have decided to pay you extra 20 cents as a bonus. Your score will not affect your payment in any way.	White	White

Notes: The table list all the treatments in this study. Each piece rate treatment differs just in the last line of the script, used the digital voice, and concealed the skin color of the hand. Social preference treatments (altruism and reciprocity) begin with the introduction of the employer (in the first person), explain the task using the same script as in piece rate treatments and then differ only in the last paragraph of the script. Both altruism and reciprocity categories have three treatments, each with black, white, and concealed skin tone of the employer. In the social preference treatments of concealed skin tone, the ratio of black and white employers was 1:1.

programs/scripts cannot be used), or task will not be approved. Feel free to score as many points as you can.” Then the last line was based on the assigned treatment (0, 3, 6 or 9 cents). The wording is provided in table 1.

3.5.2 Social Preference Treatments

In the altruism and reciprocity treatments, each video started with the introduction by the employer: “*Hi, I am another participant in this study who is matched to you. In this study, you will work on a simple button-pressing task, and I will earn some money depending on how well you do on the task.*” Then the script followed the same instructions as in piece rate treatments with the last paragraph being the only difference. The wording is provided in table 1. There were three treatments each in the category of altruism and reciprocity. Altruism baseline and reciprocity baseline concealed the skin color of the employer using latex gloves. Although the voice in the baseline treatments can reveal some racial markers, we recruited an equal number of black and white employers in these treatments, therefore, on average, the effect of race from voice, if any, should cancel out in the baseline treatments. The videos showed in the altruism black (white), and reciprocity black (white) revealed the black (white) skin of the employers.

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A Experiment Material Appendix