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# How Does the Social Distance Between an Employee and a Manager affect Employee Competition for a Reward?<sup>1</sup>

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**Abstract:** *This study examines how employees internalize differences in social distance between themselves and their managers when they are competing for a reward given by the manager. In an employer/employee relationship, this difference in social distance between the employer and the various employees leads to a disadvantageous situation for the socially distant workers when raises, promotions, special considerations etc. are given. Since social distance is present in most organizations, understanding how employees work effort changes in response to changes in social distance is of utmost importance. In prior literature, this disadvantage has always been assumed/shown to lead to lower effort than the advantaged worker. The results partially back up this claim and show that females who are socially distant from their manager contribute much less than females who are socially closer or males regardless of the social distance.*

## 1. Introduction:

*“The typical worker operates in a setting where efforts are exerted in the hope of a promotion, salary revision, or bonus, which are typically at the discretion of superiors.”*

*Prendergast (1999)*

Previous research has shown that in a simple setting, rewards are in fact an effective mechanism to elicit higher work effort from employees. However, this effectiveness is likely altered when the workers who are competing for the rewards vary in their social ties to their manager. Because social ties are a natural part of most corporate settings, this topic is of utmost importance. To illustrate why social distance may matter, suppose a manager has a reward she must give to one of two employees; one who is socially close to her (or part of the in-group) and one who is not (or part of the out-group). If both

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employees produce equal outputs, the manager would likely give the reward to the employee who is socially closer to her.<sup>2</sup> More generally, there must be some threshold level of productivity for each worker where the manager is indifferent to giving the reward to the in- or the out-group member where this threshold will be lower for the in-group member than the out-group member. As a result, an out-group member will have to work harder to garner the same rewards as an in-group member. It stands to reason that in this instance, work effort may be much different than when social ties are not considered. The question remains how these workers internalize the advantage or disadvantage. If workers see social ties as a substitute for work effort, the out-group employee will contribute more than the in-group employee. If employees internalize the inequity in a purely strategic manner, the reverse will be true. In order to better understand how to design an effective incentive mechanism, understanding how workers internalize social distance is of utmost importance. This paper will use experimental methods to explore this issue focusing on how workers compete, via work effort, for a reward when social distance is present.

Since the reward structures used in organizations vary and the resulting response of the worker to these reward structures may also vary, rewards mimicking bonuses (can be given to multiple employees) and promotions (can be given to only one employee) will be taken into account. These two types of incentives are widely used as evidenced in the opening quote from Prendergast (1999), and pointed out by Baker, Jensen and Murphy (1988). The Baker et al. study argues that a company will use a bonus system when there are few promotable opportunities. For instance, a CEO is already at the top of the ladder and thus not promotable. They also classify small firms with fewer hierarchical levels and firms in declining industries as more likely to use bonuses over promotions.

In order to more closely examine the effect social ties have on employee competition, it must first be established that employees believe they are rewarded, at least partially, based on social distance from their superior. This seems to be an established fact both in the prior literature and in the popular press. As a specific example, social distance is a concern for current and potential telecommuters. These employees fear that once they are out of the office, their employers will forget about them when rewards are given out (Cooper and Kurland, 2002). This should be a concern for corporations wishing to take advantage of the cost saving measures tied to telecommuting. The popular view seems to be in line with the Kurland and Cooper study as evidenced in a *Network World* article which confirms this fear by stating that most executives believe office workers will be promoted before telecommuters.<sup>3</sup> The view that social distance is a determining factor for preferential treatment is held by office-based workers as well as seen by the

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<sup>2</sup> The social ties may make management feel more comfortable with certain workers when trust is needed for things such as implicit contracts (Knack and Keefer, 1997).

<sup>3</sup> <http://www.networkworld.com/news/2007/011707-telecommute-career.html>

advice given in a recent Yahoo Hotjobs article titled *How to get a raise*. The author asserts “If you stay cloistered in your cubicle, you'll probably be disappointed when raises are announced--no matter how hard you work.”<sup>4</sup> This is in line with a recent survey conducted by Johnathon Gardner of Georgetown University where he finds that 92% of managers claim to have witnessed cases in their firm where favoritism played a role in who was promoted.<sup>5</sup>

Beyond the specific cases, or the popular view, Westphal and Stern (2006) show that social ties are important for employees to gain board positions where these social ties are substitutes for ability or background. Their study suggests that if an out-group worker desires a preferred position, they must exert more effort to build interpersonal relations. Kristof-Brown (2000) find similar results for appointments into management positions. As pointed out in Schulze et al. (2001), this effect is generalizable to employees not in management roles and shows that favoritism results in a decline in the returns on assets and market-to-book ratios. Bandiera et al. (2009) further show that managers in a fruit picking setting show favoritism towards those socially closer to them which generates higher potential payoffs for socially close workers but at a cost to the firm.

Other lines of literature have examined how social distance affects employee effort *after* a reward is give. In these settings, social distance has been shown to evoke more reciprocal behavior (Chen and Li, 2009) which either benefits the firm (Brandts and Sola, 2010) or harms the firm (Bandiera et al. 2009).<sup>6</sup> In these papers which study how group identity affects behavior, it is assumed that the manager makes the first move or is the bottleneck and the employee must respond. Though these studies look at social distance, they do not examine how social distance affects work effort when workers are competing for the prize.

Though the current study was built around understanding how social distance affects work effort in the workplace, it is similar to previous studies of “unfair” tournaments (O’Keeffe, Viscusi and Zeckhouser (1984); Bull, Schotter and Weigelt (1987); Schotter and Weigelt (1992); Harbring and Irlenbusch (2003); Orrison, Schotter and Weigelt (2004)) and provides a nice compliment to many of these studies. One of the major focuses of previous studies of unfair tournaments was to understand how discrimination affected work effort. Experimentally, unfair tournaments were used where an “advantage” was induced for some workers since it is difficult to test things such as racial or gender discrimination. This means that how someone reacted to actual discrimination against them could not be directly studied. The basic finding when the advantage is induced is that anti-discrimination policies are quite effective.

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<sup>4</sup> [http://hotjobs.yahoo.com/career-articles-how\\_to\\_get\\_a\\_raise-1164](http://hotjobs.yahoo.com/career-articles-how_to_get_a_raise-1164)

<sup>5</sup> <http://msb.georgetown.edu/story/1242672465197.html>

<sup>6</sup> Refer to Chen and Li (2009) for a great review of this line of literature

Since the focus of the present study is to look at social distance between the worker and the manager, a real person will decide the reward allocations and thus the discrimination will be endogenously determined. This addition will allow the present research to have broader implications for understanding discriminatory behavior since it provides a nice avenue to determine if/how participants internalize the previously induced discrimination.

A third line of literature which is related to the current study focuses on how competitive outcomes differ by gender (Gneezy, Niederle and Rustichini, 2003; Niederle and Vesterlund, 2007, 2010; Sutter and Rützler, 2010; Wozniak, Harbaugh and Mayr, 2010; Gupta, Poulsen and Villeval, 2011). The basic finding of the Gneezy, Niederle and Rustichini study was that as the competitiveness of the environment increases, males increase their effort more than females in a real effort experiment. Niederle and Versterlund (2007) further show that men select into competitive pay schemes twice as often as women. Sutter and Rützler (2010) find that this competitive drive of males is present as early as three years old.

Taken as a whole, the above suggests that a reward that is meant to encourage higher work effort may actually have the opposite effect though confounding factors exist which make assertions about the direct influences of social distance on work effort difficult to ascertain. In order to cleanly identify these effects, lab experiments will be used. The sterile environment of the laboratory is an extremely useful tool in this scenario because of the inability in many field settings to observe work effort (even if productivity is observed), the employee's utility functions or the value of the reward to the workers; all of which can be controlled in the lab. The current paper will complement the existing literature in several important avenues. First, there is currently no concrete use of post-effort rewards with the presence of varying social distance. This paper introduces this factory by using two treatments meant to mimic a bonus or a promotion. Of the papers that do study post-effort rewards, non-induced advantages or disadvantages are rarely used. Because of this, experimental contests are usually ran in non-mediated environments. The research question necessitates the use of mediated contests and will build our understanding of behavior in this setting.

## **2.1 Model - Risk-Neutral Workers**

In this section, a simple model of employee competition will be highlighted where some employees are socially closer to the manager than others. Predictions derived from this framework will be tested using experiments. Based on the reward structure used in corporations, the following model will consider how social distance affects work effort when the reward is similar to a promotion or when it is similar to a bonus. Similar to the terminology used in Cason, Masters and Sheremata (2010), promotions can be

thought of as winner take all (WTA) contests while bonuses can be thought of as Proportional contests. The models rely on two primary assumptions; (1) how the worker internalizes the advantage or disadvantage and (2) their beliefs about what the person they are competing with will do.

In this simple setup, we will assume that social distance is fixed and agents are risk neutral. When agents are risk-neutral, there will be no predicted difference in effort between the two contests so the following will apply to both contests. This is because a risk neutral worker views a proportion of the prize the same as the expected value of the prize. This assumption will be relaxed in the next section. It will also be assumed that a worker is endowed with an initial amount of time and can divide their effort between a productive task and an outside option. Thus, a worker's payoff is a function of their value of the prize, their cost of effort and how much time they devote to their outside option. In this simple setup, it will be assumed there are only two workers competing for the prize; one who is socially closer to the manager (an in-group employee) while the other is not (an out-group employee). With the addition of social distance, a manager will discount the work effort of the out-group worker by a factor of  $\delta$  [0,1] or the manager views  $e_i = \delta e_o$  where  $e_i$  represents the effort of the in-group worker and  $e_o$  the effort of the out-group worker. With a non-linear cost function, the in-group (subscript i) and out-group (subscript o) workers have expected payoffs of:

$$\begin{aligned} \Pi_i &= I + \pi(e_i, \delta e_o)M - \frac{e_i^2}{c} \\ \Pi_o &= I + [1 - \pi(e_i, \delta e_o)]M - \frac{e_o^2}{c} \end{aligned} \quad (1)$$

Where I is total effort available, M is the value of the prize, c is a constant cost parameter and  $\pi(\cdot)$  is the probability the worker will win this prize. Notice that  $\pi(\cdot)$  is determined by the manager, but must be internalized by the employee if they wish to maximize their payoffs. When the manager is making their decision, the interpretation of observed effort will likely be "noisy." To account for this, the model will include a random variable which will be added to the productivity of each employee. This will be the employee output that a manager will use when making their decisions. This falls in line with the explanation of a random measurement error brought up by O'Keeffe, Viscusi, and Zeckhauser (1984). The main point of the error is that a manager may not distinguish between workers when their efforts are fairly close together. We will further make a simplifying assumption that the noise is a random iid term that is uniformly distributed with mean zero around [-a,a]. Thus, player i wins the prize M if their effort plus the noise term is greater than the discounted effort plus the noise term of the outside worker, or  $e_i + \varepsilon_i > \delta e_o + \varepsilon_o$  or,  $\pi(e_i, \delta e_o)$  is equal to  $\Pr(\varepsilon_o - \varepsilon_i > e_i - \delta e_o) = \Pr(Z < e_i - \delta e_o) = F(e_i - \delta e_o)$  where  $Z = \varepsilon_o - \varepsilon_i$ . Under these conditions, the probability a worker wins the prize is reduced to finding

the density of the sum of the two random variables ( $\varepsilon_i$  and  $\varepsilon_o$ ). This is carried out in the Appendix, and we find that  $\pi(e_i, \delta e_o) = \frac{1}{2} + \frac{e_i - \delta e_o}{2a} - \frac{(e_i - \delta e_o)^2}{8a^2}$ .

In the above, notice that the distribution of  $Z$  determines the structure of  $F(Z)$ . Given these assumptions, a PSNE exists. Note that there is no PSNE if there are no random shocks. This is because without the random term, an increase in effort will lead to an increase in the probability of winning the prize with certainty. If this were the case, the in-group worker will always be able to best the out-group worker and any effort the out-group worker chooses, the in-group worker will choose effort slightly above this. Through iterative reasoning, this would eventually lead the out-group worker to contribute nothing and the in-group worker to contribute slightly above that amount. But if this were the case, then the out-group worker would contribute slightly more than the in-group worker and the process continues cyclically. Thus, the random component guarantees that if a worker increases their effort above equilibrium effort levels, they will not win the prize with 100% certainty. If a worker is using a strict money maximizing strategy, they will maximize the above expected payoffs and set marginal benefits equal to marginal costs, or:

$$\begin{aligned} \frac{\partial \pi}{\partial e_i} M &= \frac{2e_i}{c} \\ -\frac{\partial \pi}{\partial e_o} M &= \frac{2e_o}{c} \end{aligned} \quad (2)$$

In the Appendix it is shown that  $e_i \delta = e_o$  which results in the equilibrium effort levels for the in-group worker:

$$e_i^* = \frac{2aMc}{8a^2 + Mc(1 - \delta^2)} \quad (3)$$

and for the out-group worker:

$$e_o^* = \delta * \frac{2aMc}{8a^2 + Mc(1 - \delta^2)} \quad (4)$$



From (3) and (4), we see that if the employees are risk-neutral, the in-group worker will contribute more effort than the out-group worker.<sup>7</sup> Notice that the two efforts are equal except one is discounted by  $\delta$ . This leads to the first proposition.

*Proposition 1: The in-group employee will contribute more than the out-group employee and the out-group employee will contribute less than the in-group employee.*

What is also apparent from (3) and (4) is that both workers will contribute more as  $\delta$  increases or as social distance decreases. This is easy to see from the derivatives of equilibrium effort levels w.r.t.  $\delta$ ;  $\frac{de_i^*}{d\delta} = \frac{4a\delta(Mc)^2}{(8a^2+Mc(1-\delta^2))^2} > 0$  and  $\frac{de_o^*}{d\delta} = \frac{(8a^2+Mc(1-\delta^2))2aMc+4a\delta(Mc)^2}{(8a^2+Mc(1-\delta^2))^2} > 0$ . This leads to the second proposition:

*Proposition 2: Overall work effort will decline as social distance increases.*

For comparison purposes, it is useful to point out that if social distance did not exist ( $\delta = 1$ ), the equilibrium effort levels reduce to:

$$e_k^* = \frac{Mc}{4a} \quad (5)$$

This result holds if both workers are from the in-group or both workers are from the out-group. This gives proposition 3.

*Proposition 3: Work effort will be highest when both workers share the same social connections with the manager.*

## 2.2 Risk Averse Workers

With risk neutral workers, there will be no difference in the predictions about work effort between a WTA contest and a proportional contest. The assumption of risk neutrality is often questioned and will thus be relaxed in this section. In this setting, that means that the workers must account for their own risk aversion and that of their co-workers which has been shown to be not analytically solvable for the more realistic heterogeneous risk parameters (see Skaperdas and Gan, 1995; Cornes and Hartley, 2003). For the purposes of this exposition, it will suffice to show the comparative statics with homogeneous constant relative risk aversion (CRRA) when one type of contest is compared to the other. While this will give the basic prediction indicating how individuals respond to different levels of risk aversion, heterogeneous risk

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<sup>7</sup> The above analysis follows closely the results obtained by Bull et al. (1987)

preferences will eventually be econometrically controlled for. With this in mind, we will assume a standard CRRA utility function of the form  $u(y) = y^\alpha$  where  $y$  is wealth and  $\alpha \in (0, \infty)$  is the risk aversion parameter where  $\alpha < 1$  represents a risk-averse person. It will be sufficient to show the comparison of the in-group worker as the result of the out-group worker has the same comparative statics. For the proportional contest, the utility for the in-group worker is now:

$$U_i(e_i, e_o; \delta) = \pi(e_i, \delta e_o) \left( I + M - \frac{e_i^2}{c} \right)^\alpha + [1 - \pi(e_i, \delta e_o)] \left( I - \frac{e_i^2}{c} \right)^\alpha \quad (7)$$

For the winner take all contest, the in-group worker has utility:

$$U_i(e_i, e_o; \delta) = \left( I + \pi(e_i, \delta e_o)M - \frac{e_i^2}{c} \right)^\alpha \quad (8)$$

In the above, and in the experimental design,  $I \geq \frac{e_k^2}{c}$  for all feasible  $e_k$ . To understand how effort will vary in the two contests, we must find the optimal effort in each reward scenario and compare efforts from the two. The optimal effort in (8) is the same as (3), or:

$$e_i^{WTA} = \frac{\partial \pi}{\partial e_i} * \frac{MC}{2}$$

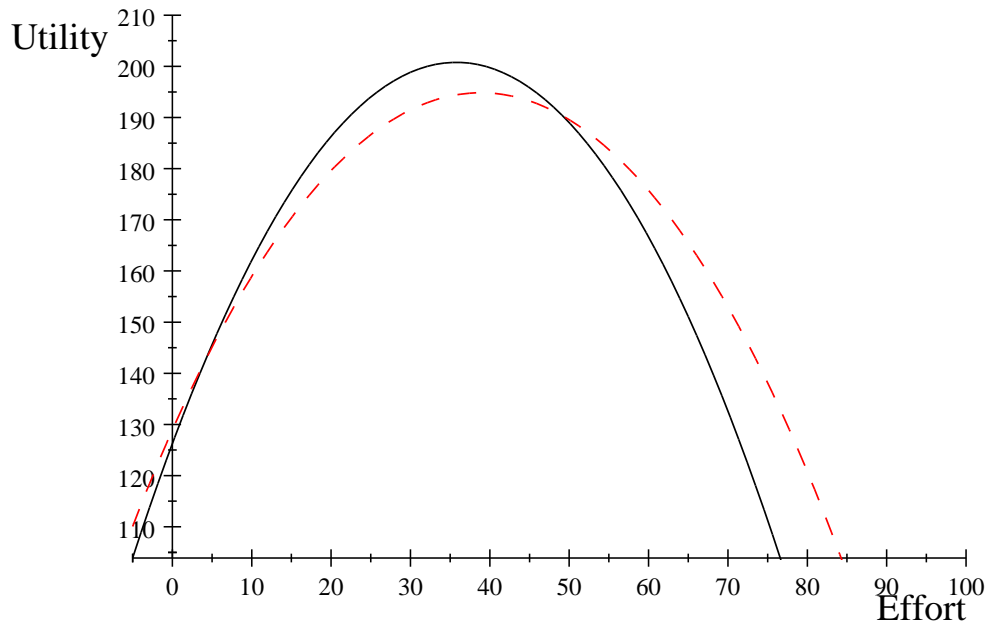
The optimal effort in (7) is somewhat more complex:

$$\begin{aligned} \frac{\partial \pi}{\partial e_i} \left( I + M - \frac{e_i^2}{c} \right)^\alpha + \frac{2e_i \pi \alpha}{c} \left( I + M - \frac{e_i^2}{c} \right)^{\alpha-1} + \frac{2e_i \alpha}{c} \left( I - \frac{e_i^2}{c} \right)^{\alpha-1} &= \frac{\partial \pi}{\partial e_i} \left( I - \frac{e_i^2}{c} \right)^\alpha + \frac{2e_i \pi \alpha}{c} \left( I - \frac{e_i^2}{c} \right)^{\alpha-1} \\ &= 0 \end{aligned}$$

The simplest examination of the comparative statics is done through fixing the parameter values and graphing the utilities as seen in Figure 1. This figure shows how the utility functions change as effort increases. The solid line represents utility in the proportional contest while the dashed line represents the utility in the WTA contest. From this graph, notice that optimal work effort in the WTA is greater than that in the proportional contest. This leads to the final Proposition.

*Proposition 4: Risk-averse workers will contribute more effort in the WTA contest than the proportional contest.*

*Figure 1: Comparative statics of optimal effort with risk-aversion*



### 3. Experimental Design

Since the main point of the paper is to determine if subjects act as theory predicts when social distance is present, subjects played three main games which are meant to separate out other confounds. In order to test the above predictions, 108 subjects were recruited to one of 9 sessions at The Ohio State University using ORSEE (Greiner 2004). The experiment lasted about an hour where the subjects made an average of \$22.32. Out of the 108 subjects; 2/3 were assigned to play the role of an employee, 42 of whom were assigned to the proportional contest.

Once in the lab, subjects were asked to fill out a consent form. After all consent forms were collected, instructions were handed out for the first part.<sup>8</sup> The subjects were not told how many parts were in the experiment and only knew that they were recruited for 1 ½ hours. In the first part, subjects were asked to choose which painting they preferred out of five pairs that were shown at the front of the room. The paintings were done by either Paul Klee or Wassily Kandinsky.<sup>9</sup> This methodology has been used to generate a salient group identity in psychology for some time (Tajfel, Billig, and Claude, 1971) and more recently in Economics (Chen and Li 2009). Subjects were next divided into two groups, where the first group (group A) was comprised of 2/3 of them who preferred Klee more often than the other 1/3 while

<sup>8</sup> Instructions are available in the appendix.

<sup>9</sup> The paintings by Klee were *Ancient Sound*, *Abstract on Black*; *Red Balloon*; *Carnival in the Mountains*; *Paukenspieler*; *Angelus Novus* and the ones by Kandinsky were *Transverse Line*; *Fugue*; *Yellow-Red-Blue*; *Black Spot I*; *Orange*.

the rest were in the second group (group B).<sup>10</sup> The experimental participants next had the opportunity to meet and talk with others in their group where everyone in group A met at the front of the room and everyone in group B met in the back. They were given topics to discuss and were encouraged to get to know the others in their group. This aspect of the design was used to strengthen the group identity and more closely mimics the environment of interest. Buchan, Johnson and Croson (2006) found this kind of “personal communication” increased other regarding preferences. After 10 minutes, everyone was called back to their seats to begin the paying portion of the experiment.

To test the above predictions, three main pieces of information will be needed which will be provided by the following games. In all three games, the payoff to the employees will be equal to the amount of the prize given to them by the manager plus their initial endowment minus their cost of effort or:

$$m + I - \frac{e_{i,o}^2}{c}$$

Where  $m \in [0, M]$  is the amount given to the employee by the manager. Though not the interest of the paper, the payoff to the manager will just be the amount both employees contribute to them multiplied by 2 to mimic a productive activity. Because of the complexity of the employee payoffs, subjects in this role were given an on-screen calculator where they could calculate potential payoffs before they made their decisions final. Within group A, 1/2 of the subjects were assigned the manager role, while the other 1/2 were in the role of an employee; everyone in group B was an employee.<sup>11</sup> Subjects then played the following three games in groups of 3; one manager and two employees where the matchings were randomly made and at no point did any subject know specifically who they were matched with. In all the games, each subject's group affiliation was common knowledge. Before each game, instructions were handed out and read out loud and screenshots were shown at the front of the room to ensure that every subject knew what each type would see so that all information was common knowledge. The experiment was conducted using z-Tree (Fischbacher, 2007). The three games were played in two main treatments; where the prize,  $M$ , is non-divisible (winner take all contest), or when it is divisible (proportional contest). The data is used from 4 periods of the game, where there is one period of Games 1 & 2 and two periods of

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<sup>10</sup> Ties were broken randomly

<sup>11</sup> Neutral wording was used in the experiment where the managers were told they were a type A player and the employees a type B while groups were labeled “Group 1” and “Group 2.”

Game 3.<sup>12</sup> The parameter values chosen for the experiment are represented to the subjects as tokens and are  $I = 100$ ,  $M = 300$  and  $c = 100$ . The subjects were paid on an exchange rate of 1 token = \$0.01.

#### Game 1:

In this first game, the employees and managers moved simultaneously and were in a group comprised of one manager (who is always from group A), one employee from group A and one employee from group B. Notice when the matchings are made in this manner, the employee from group A is from the same group as the manager who together form the in-group while the person from group B forms the out-group. Both the employees and the manager started out with an endowment of money. The endowment that the manager had,  $M$ , can be viewed as the amount of the prize they must give and the amount the employee starts with can be seen as how much effort they can potentially give to productive activities. The employees must choose how much of their endowment to keep and how much to give to the manager who will either be in their group or not. In order to mimic a productive activity, their contributions to the manager will be doubled. The manager's decision was to decide how much of their endowment to give to someone in their own group and how much to give to someone in the other group with no option to keep any for herself. Neither the employees nor the manager were able to observe the allocation of the person(s) they were matched with when they made their allocation decisions. This will give an estimate of in-group bias ( $\delta$  in the model) which will be used in game 3. Because of the simultaneous nature of the moves of the manager and the employees, there will be no competition amongst employees for the prize in this game.

#### Game 2:

Propositions 2 and 3 rely on knowing how employees compete for the reward in the absence of social distance. Game 2 was designed to address these hypotheses. This game was similar to Game 1 except the moves were sequential where employees moved first and after seeing the employees' decisions, the manager decided their allocation choices. To make certain social distance is the same for the employees, both were from the same group. So, both employees were either from the group A or group B. The theory does not distinguish between which group the employees belong to as long as they both belong to the same group. This game will serve as a baseline for competition when social distance is the same for both employees.

#### Game 3:

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<sup>12</sup> There were another two periods of game three which were played but there was a software glitch for these periods so the data won't be used. It was verified that the two periods of data used are not different thus the periods with the unused data had no statistical effect on the data being used.

This game is similar to Game 2 except the employees are now from different groups and were shown the in-group bias of the manager which was determined from the manager's decision in Game 1. Propositions 1 and 2 rely on employees knowing the bias thus it is important to make sure employees knew the advantage or disadvantage they face. This game mimics employees competing for a reward when social distance is present. This game was repeated twice where the matchings were randomized each time.

Since the theory relies on beliefs of the competing employee's chosen effort, a belief-elicitation mechanism was implemented after the second iteration of game 3. Subjects did not know this task was coming when they played game 3 and was only played by employees. Subjects were paid using a quadratic scoring rule (Palfrey and Wang, 2009) based on how close their guess was to the actual contributions of the other employee matched to the same manager as them. In addition to the above games, Proposition 4 requires that a subject's risk preferences be accounted for. To accomplish this, a traditional Holt-Laury risk assessment test (Holt and Laury 2002) was given to the subjects.

#### **4. Results**

Though not the focus of the current study, the behavior of the manager will be examined first. It is important to analyze this for two basic reasons. First, since mediated contests are rarely used to study competition, a manager's decision in this setting is not well known. More importantly though, it is pertinent to examine managerial decisions since testing the above propositions relies on understanding if managers show a bias to in-group workers and if so, the size of this bias. The summary statistics for managers are given in Table 1. There are a couple of things that stand out. First, on average, managers give 18 percentage points more to in-group workers than out-group workers in Game 1. This advantage represents  $\delta$  in the above equations. Notice also that even though managers receive only 53% of their income from in-group workers in Game 3, they give them 62% of the total prize. Controlling for the extra 6% given them by the in-group workers, the managers decision in Game 3 is consistent with the advantage seen in Game 1 of 18 percentage points. This means that the advantage given to the employees in Game 3 wasn't completely earned.

Now that the manager's in-group bias has been established, we will turn our attention to employee behavior and Proposition 1. Proposition 1 states in-group workers (IGW) will contribute more than out-group workers (OGW) and OGW will contribute less than IGW. To test this proposition, the results from game 3 will be examined. Table 2 gives the summary statistics for employee contributions while Table 3 gives regression results of Game 3.

*Table 1: Managers' Decisions and Payoffs*

	% Given by Manager		Statistical test for difference	Sequential Move?	% of Managers income from In-Group
	In-Group	Out-Group			
Game 1	59%	41%	t-test, $p < .01$ Wilcoxon, $p < .01$	No	52%
Game 2	50%	50%	N/A	Yes	51%
Game 3	62%	38%	t-test, $p < .01$ Wilcoxon, $p < .01$	Yes	53%

*Note: By design, in Game 2 the manager had to give exactly 50% to in-group and 50% to out-group.*

We can see in table 2 that the difference in chosen effort in game 3 between in- and out-group employees is not found to be statistically significant. What becomes immediately evident from looking at Game 3 results though is that contributions are much different for males than females (61% vs. 36%). In this study, 45 of the subjects assigned to play the role of an employee were male. Previous studies have shown gender is important in competitive outcomes (e.g. Gneezy, Niederle and Rustichini, 2003; Niederle and Vesterlund, 2007, 2010; Sutter and Rützler, 2010; Wozniak, Harbaugh and Mayr, 2010; Gupta, Poulsen and Villeval, 2011). The basic finding of these studies that women compete less than men is also true of the current study as males contributed 69% of their endowment to the manager while females contributed 50% (differences are confirmed statistically; t-test,  $p < .01$ , Wilcoxon,  $p < .01$ ).

*Table 2: Employees' Decisions*

	% Given by Employee to the Manager		Statistical test for difference	Sequential Move?
	In-Group	Out-Group		
Game 1	35%	32%	t-test, $p = .59$ Wilcoxon, $p = .81$	No

Game 2	65%	63%	t-test, p = .79 Wilcoxon, p = .94	Yes
Game 3	66%	58%	t-test, p = .19 Wilcoxon, p = .20	Yes
Game 3 - WTA	74%	63%	t-test, p = .33 Wilcoxon, p = .24	Yes
Game 3 - Proportional	61%	54%	t-test, p = .38 Wilcoxon, p = .48	Yes
Game 3 - Male	70%	69%	t-test, p = .84 Wilcoxon, p = .57	Yes
Game 3 - Female	61%	36%	t-test, p = .01 Wilcoxon, p < .01	Yes

To control for gender and other relevant factors, Table 3 presents regression analysis of Game 3.<sup>13</sup> The dependent variable is the number of tokens out of 100 each employee gave to their manager. Model 1 includes dummy variables for In-Group and Female. It is shown that once gender is controlled for, in-group workers contributed more than out-group workers. Looking back at Table 2 though, we can see this is likely due to a specification error and that the results are likely driven by the female out-group worker. Model 2 in Table 3 adds an interaction between In-Group and Female to Model 1 while Model 3 adds the dummy variable for WTA. From the most complete Model 3, it is evident that female IGW contribute much more than female OGW. This gives us our first result. Table 2 shows that the difference in contributions of in-group females is confirmed higher than out-group females

*Result 1: In-group Females contributed more tokens to their manager than out-group females.*

*Table 3: Regression analysis of the amount the employee gives to the manager.*

	<b>Model 1</b>	<b>Model 2</b>		<b>Model 4</b>
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<sup>13</sup> For simplicity, Table 3 only presents the results of a standard OLS regression. Note that because of the use of only two periods of data, not much is gained from using panel data methods such as a random effects model or clustering. Nonetheless, for robustness an additional table is included in the Appendix where all of the Models are re-ran with these features.



Variable			Model 3	
In-Group	10.22** (4.68)	1.58 (5.81)	0.90 (5.68)	0.46 (5.65)
Female	-20.69*** (4.83)	-32.79*** (6.74)	-34.39*** (6.74)	-33.42*** (6.72)
Female*In-Group		23.16** (9.51)	25.12*** (9.31)	27.39*** (9.35)
WTA			12.77*** (4.56)	12.87*** (4.70)
Holt-Laury				-1.94* (1.04)
Advantage from the Manager				-0.01 (0.04)
Constant	64.72*** (3.67)	68.75*** (3.97)	63.96*** (4.24)	77.14*** (9.76)

Notes: Standard errors are in parentheses. Three (\*\*\*), two (\*\*), and one (\*) stars indicate statistical significance at the 1%, 5%, and 10% respectively.

From Table 2 it is shown that there is no statistical difference between the contributions of male IGW and male OGW. Once again, a more careful analysis is carried out in Table 3 and results using t-tests and Wilcoxon tests will be taken in concert with the regression results in Table 3. The effect of being a male IGW is captured in the variable for “In-Group” in Models 2 and 3. It is shown in these two models that being in the in-group is neither economically important for males nor statistically significant in any of the 3 Models.<sup>14</sup>

*Result 2: In-group males did not contribute significantly more tokens to their manager than out-group males.*

The equilibria found in the preceding section requires players to best respond based on correct beliefs about what the other player will do. To this end, the results from the belief elicitation task can be utilized to get a better idea of the underlying causes driving behavior. After decisions were made in the final round of Game 3, employees were asked to make an incentivized guess as to how many tokens they thought the person they were paired with in that period contributed. Combined with the allocation

<sup>14</sup> Because of the complexities of how gender may interact with other explanatory variables, many more tests were ran, but are omitted for brevity. None were found to add any insight above what is given in the included tables. As an example, it was examined whether females and males had asymmetric responses based on their respective risk attitudes and it was found that this is not the case. Another avenue explored was using game 2 decisions as a proxy for inequality aversion.

decisions, we will be able to tell if subjects are contributing more than, less than or equal to what they think their counterparts contributed.

In the final period of Game 3, in-group females contributed 68 tokens to the manager and they thought their out-group counterpart contributed 44. This difference is confirmed statistically (t-test,  $p = .03$ ; Wilcoxon,  $p = .07$ ). In the same period, out-group females contributed 34 while they thought their in-group counterpart contributed 44, though this difference is not confirmed statistically (t-test,  $p = .26$ ; Wilcoxon,  $p = .31$ ). Males, regardless of group, also contributed more than they believed their co-worker did. In-group males contributed 69 tokens while they thought their counterparts contributed 49 (t-test,  $p = .05$ ; Wilcoxon,  $p = .02$ ) while male OGW contributed 73 and thought the IGW contributed 45 (t-test,  $p = .05$ ; Wilcoxon,  $p = .02$ ).

*Result 3: Males and in-group females contributed significantly more than what they believed a co-worker contributed while it could not be confirmed that out-group females contributed less than what they thought their in-group counterparts contributed.*

We will now explore the predictions of Proposition 2. Proposition 2 states that as the advantage from being in the in-group increases, overall work effort will decline. To test this, Model 4 in Table 3 includes a continuous variable, “Advantage from the Manager”, which accounts for how many of the 300 tokens the manager gave to someone from their own group in Game 1. The variable measuring the advantage from the manager varies anywhere from 0 to 300 with the average being 178, a standard error of 10.5 and a 95% confidence interval ranging from 156 to 199. With this much variation, any effect coming from an increase in the advantage (or disadvantage) should be able to be identified in the econometric model. As seen in Model 4, the coefficient for this variable fails to reach statistical significance.<sup>15</sup>

*Result 4: Employee contributions to the manager do not vary with the strength of the advantage (disadvantage) given to the in-group worker (out-group worker).*

We will now turn our attention to Proposition 3. Table 4 compares the amount given by employees in Games 2 and 3. This table shows that there is only one instance where the difference between contributions in Game 2 and Game 3 is shown to be statistically significant, and this is only found using the Wilcoxon test but the result does not hold when using a t-test.

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<sup>15</sup>It can be argued that subjects view the advantage (or disadvantage) more broadly, or with some noise. For instance, it could be the case that they view 160 and 170 similarly. To test this other methods of classifying this “advantage” were used where the variable was categorized into broader categories and none were found to affect contributions.

*Table 4: Employees' Decisions in Game 2 compared to Game 3*

	% Given by Employee		Statistical test for difference
	Game 2	Game 3	
Total	64%	62%	t-test, p = .59 Wilcoxon, p = .35
In-Group	64%	66%	t-test, p = .68 Wilcoxon, p = .51
Out-Group	63%	58%	t-test, p = .17 Wilcoxon, p = .04
Male	70%	69%	t-test, p = .88 Wilcoxon, p = .75
Female	53%	50%	t-test, p = .49 Wilcoxon, p = .23

*Result 5: There is no difference in employee contributions to the manager when employees are competing for the reward with someone from their own group or with someone from the other group.*

This leads to the final untested Proposition. Proposition 4 states that because of risk aversion, work effort is greater in the WTA contest than the Proportional contest. We can see from Model 3 that the sign of the coefficient for “WTA” is both positive and significant meaning contributions from the employees to the manager is greater in the WTA contest than in the Proportional contest. For completeness, model 4 includes an additional variable, “HL”, which captures the results of a Holt-Laury risk-aversion test. It is evident from Model 4 that the WTA variable is still positive and highly significant.<sup>16</sup>

*Result 6: The contributions in the WTA contest are much greater than those in the Proportional contest.*

<sup>16</sup> When breaking the data down by gender, males are found to contribute more in the WTA contest than in the Proportional contest (t-test, p = .05, Wilcoxon, p = .02) while there is no difference for females (t-test, p = .53, Wilcoxon, p = .70).

## 5. Discussion

The aim of this paper is to determine if people view the in-group (or out-group) bias between themselves and their manager as theory predicts and what effect this will have on work effort when the employees are competing for a reward given out by the manager. It was found that females behave more or less as the theory predicts, while males do not. More specifically, females who were in the in-group contributed significantly more effort than females in the out-group while there was no difference in the contributions of males. In fact, there is no statistical difference in the contributions of female in-group employees and male employees (t-test,  $p = .24$ ; Wilcoxon,  $p = .13$ ). There are several implications from these findings.

First, these results may give additional insight into the gender pay gap. A large unaccounted for differential still exists which is currently attributed to discrimination (Blau and Kahn, 2000). The results of this experiment suggest that females are much more sensitive to social distance in this setting. Thus, if females view themselves as part of the out-group and workers are paid, at least partially, based on their perceived effort, we should expect female workers to make less than male workers if the results of the experiment hold. This can by no means be the entire explanation of the difference in the gender pay gap, but may serve as an additional explanation of some of the unexplained differences.

Second, there is a large body of literature which show that females contribute less in competitive environments than males (e.g. Gneezy, Niederle and Rustichini, 2003; Niederle and Vesterlund, 2007, 2010; Sutter and Rützler, 2010; Wozniak, Harbaugh and Mayr, 2010; Gupta, Poulsen and Villeval, 2011). The findings of the current study show that if employees are included in the managements social group, this effect may go away, or be lessened to a large extent for females. This should be an encouraging finding for the recent interest in group identity (Chen and Li 2009) and should increase the importance of such works as the Eckel and Grossman (2005) study which carefully dissects how to create team identity to reduce social distance.

Lastly, there is also encouraging news that work effort is much higher when competition is present than when it is not. This can be seen by comparing the results from Game 1 with Game 2 and Game 3. In all cases, competition leads to higher overall effort levels (t-test,  $p < .01$ ; Wilcoxon,  $p < .01$ ). So, the efficacy of the reward mechanism can be improved as mentioned above, but the inclusion of social distance does not drive behavior below what is observed with no competition at all.

## References:

- Baker, George P., Michael C. Jensen, and Kevin J. Murphy. 1988. "Compensation and Incentives: Practice vs. Theory." *The Journal of Finance*, 43(3): 593-616.
- Bandiera, Oriana, Iwan Barankay, and Imran Rasul. 2009. "Social Connections and Incentives in the Workplace: Evidence from Personnel Data." *Econometrica*, 77(4): 1047-1094.
- Blau, Francine, and Lawrence M. Kahn. 2000. "Gender Differences in Pay." NBER Working Paper 7732 <http://www.nber.org/papers/w7732>
- Brandts, Jordi, and Carles Solà. 2010. "Personal Relations and their Effect on Behavior in an Organizational Setting: An Experimental Study." *Journal of Economic Behavior and Organization*, 73: 246-253.
- Buchan, Nancy, Johnson, Eric and Croson, Rachel. 2006. "Let's get personal: An international examination of the influence of communication, culture and social distance on other regarding preferences." *Journal of Economic Behavior and Organization*, 60(3): 373-398.
- Bull, Clive, Andrew Schotter, and Keith Weigelt. 1987. "Tournaments and Piece Rates: An Experimental Study." *The Journal of Political Economy*, 95(1): 1-33.
- Cason, Timothy N., William A. Masters, and Roman M. Sheremata. 2010. "Entry into Winner-Take-All and Proportional-Prize Contests: An Experimental Study." *Journal of Public Economics*, 94: 604-611.
- Chen, Yan, and Sherry Xin Li. 2009. "Group Identity and Social Preferences." *The American Economic Review*, 99(1): 431-457.
- Cornes, Richard and Hartley, Roger. 2003. "Risk Aversion, Heterogeneity and Contests." *Public Choice*, 117: 1-25
- Cooper, Cecily D., and Nancy B. Kurland. 2002. "Telecommuting, Professional Isolation, and Employee Development in Public and Private Organizations." *Journal of Organizational Behavior*, 23: 511-532.
- Eckel, Catherine C. and Philip J. Grossman. 2005. "Managing diversity by creating team identity," *Journal of Economic Behavior & Organization*, 58(3): 371-392.
- Fischbacher, Urs. 2007. "z-Tree: Zurich Toolbox for Readymade Economic Experiments." *Experimental Economics*, 10: 171-178.
- Greiner, Ben. 2004. "An Online Recruitment System for Economic Experiments." *Forschung und Wissenschaftliches Rechnen*, 63: 79-93.
- Gneezy, Uri, Muriel Niederle, and Aldo Rustichini. 2003. "Performance in Competitive Environments: Gender Differences." *Quarterly Journal of Economics*, 118(3): 1049-1074.
- Gupta, Datta, Anders Poulsen, and Marie Claire Villeval. 2011. "Gender Matching and Competitiveness: Experimental Evidence." *Economic Enquiry*, forthcoming.

- Harbring, Christine, and Bernd Irlenbusch. 2003. "An Experimental Study on Tournament Design." *Labour Economics*, 10: 443-464.
- Holt, Charles A., and Susan K. Laury. 2002. "Risk Aversion and Incentive Effects." *The American Economic Review*, 92(5): 1644-1655.
- Kristof-Brown, Amy L. 2000. "Perceived Applicant Fit: Distinguishing Between Recruiters' Perceptions of Person-Job and Person-Organization Fit." *Personnel Psychology*, 53(3): 643-671.
- Knack, Stephen and Philip Keefer. 1997. "Does Social Capital Have An Economic Payoff? A Cross-Country Investigation." *Quarterly Journal of Economics*, 112(4): 1251-1288.
- Lazear, Edward P., and Sherwin Rosen. 1981. "Rank-Order Tournaments as Optimum Labor Contracts." *The Journal of Political Economy*, 89(5): 841-864.
- Niederle, Muriel, and Lise Vesterlund. 2007. "Do Women Shy Away from Competition? Do Men Compete Too Much?" *Quarterly Journal of Economics*, 122: 1067-1101.
- Niederle, Muriel, and Lise Vesterlund. 2010. "Explaining the Gender Gap in Math Test Scores: The Role of Competition." *Journal of Economic Perspectives*, 24(2): 129-144.
- O'Keefe, Mary, W. Kip Viscusi, and Richard J. Zeckhauser. 1984. "Economic Contests: Comparative Reward Schemes." *Journal of Labor Economics*, 2(1): 27-56.
- Orrison, Alannah, Andrew Schotter, and Keith Weigelt. 2004. "Multiperson Tournaments: An Experimental Examination." *Management Science*, 50(2): 268-279.
- Palfrey, Thomas R., and Stephanie W. Wang. 2009. "On Eliciting Beliefs in Strategic Games." *Journal of Economic Behavior & Organization*, 71: 98-109.
- Prendergast, Canice. 1999. "The Provision of Incentives in Firms." *Journal of Economic Literature*, 37: 7-63.
- Schotter, Andrew, and Keith Weigelt. 1992. "Asymmetric Tournaments, Equal Opportunity Laws, and Affirmative Action: Some Experimental Results." *The Quarterly Journal of Economics*, 107(2): 511-539.
- Schulze, William S., Michael H. Lubatkin, Richard N. Dino, and Ann K. Buchholtz. 2001. "Agency Relationships in Family Firms." *Organization Science*, 12(2): 99-116.
- Skaperdas, Stergios, and Gan Li. 1995. "Risk Aversion in Contests." *The Economic Journal*, 105(431): 951-962
- Sutter, Matthias, and Daniela Rützler. 2010. "Gender Differences in Competition Emerge Early in Life." IZA Discussion Paper 5015.
- Tajfel, Henri, M. G. Billig, R. P. Bundy, and Claude Flament. 1971. "Social Categorization and Intergroup Behavior." *European Journal of Social Psychology*, 1(2): 149-178.

Westphal, James D., and Ithai Stern. 2006. The Other Pathway to the Boardroom: Interpersonal Influence Behavior as a Substitute for Elite Credentials and Majority Status in Obtaining Board Appointments. *Administrative Science Quarterly*, 51(2): 169-204.

Wozniak, David, William T. Harbaugh, and Ulrich Mayr. 2010. "Choices about Competition: Differences by Gender and Hormonal Fluctuations, and the Role of Relative Performance Feedback." University of Oregon, Working Paper.

### Appendix A: Proof of $e_i^*$ (3) and $e_o^*$ (4).

With a non-linear cost function, the workers have expected payoffs of:

$$\left. \begin{aligned} \Pi_i &= I + \pi(e_i, \delta e_o)M - \frac{e_i^2}{c} \\ \Pi_o &= I + [1 - \pi(e_i, \delta e_o)]M - \frac{e_o^2}{c} \end{aligned} \right\} (1)$$

Where  $I$  is total effort available,  $M$  is the value of the prize,  $c$  is a constant cost parameter and  $\pi(\cdot)$  is the probability the worker will win this prize. If a worker is using a strict money maximizing strategy, they will maximize the above expected payoffs and set marginal benefits equal to marginal costs, or:

$$\left. \begin{aligned} \frac{\partial \pi}{\partial e_i} M &= \frac{2e_i}{c} \\ -\frac{\partial \pi}{\partial e_o} M &= \frac{2e_o}{c} \end{aligned} \right\} (2)$$

Actual decisional work effort will take the form:

$$y_k = e_k + \varepsilon_k$$

For  $k = i, o$  and where  $\varepsilon_k$  is a random iid shock that is uniformly distributed with mean zero around  $[-a, a]$ . Thus, the player wins the prize  $M$  if  $y_i > y_o$  which means that the probability an agent wins,

$\pi(e_i, e_j)$ , is equal to  $\Pr(\varepsilon_o - \varepsilon_i > e_i - \delta e_o) = \Pr(Z < e_i - \delta e_o) = F(e_i - \delta e_o)$  where  $Z = \varepsilon_o - \varepsilon_i$ .

To solve for the PSNE, we must figure out the probability a worker wins the prize which requires finding the density of the sum of the two random variables. Notice that the pdf of  $Z$  is just the triangular distribution ranging from  $-2a$  to  $2a$  with a mean at  $0$  and a maximum at  $\frac{1}{2a}$ . First, notice that

$$f_{\varepsilon_i}(\varepsilon_i) = f_{\varepsilon_o}(\varepsilon_o) = \begin{cases} \frac{1}{2a} & \text{if } -a \leq \varepsilon \leq a \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

And the density function for the sum is

$$f_Z(z) = \int_{-\infty}^{\infty} f_{\varepsilon_o}(z + \varepsilon_i) f_{\varepsilon_i}(\varepsilon_i) d\varepsilon_i \quad (4)$$

Because of (3), (4) becomes:

$$f_Z(z) = \frac{1}{2a} \int_{-a}^a f_{\varepsilon_o}(z + \varepsilon_i) d\varepsilon_i$$

Note that the integrand is 0 unless  $-a \leq z + \varepsilon_i \leq a$  (or if  $z - a \leq \varepsilon_i \leq z$ ). This sets up two different densities for  $z$ . The first is when  $-2a \leq z \leq 0$ . In this case,

$$f_Z(z) = \frac{1}{2a} \int_{-a}^z d\varepsilon_i = \frac{1}{2a} (F(z) - F(-a))$$

where  $\int_{-a}^z d\varepsilon_i$  is the CDF of the uniform which is  $\frac{x+a}{2a}$  in this scenario. Thus, the problem is reduced to

$$\frac{1}{2a} \left( \frac{z+a}{2a} - \frac{-a+a}{2a} \right) = \frac{1}{2a} + \frac{z}{4a^2}$$

Similarly, when  $0 \leq z \leq 2a$ ,

$$f_Z(z) = \frac{1}{2a} - \frac{z}{4a^2}$$

Notice, the convolution of two uniform distribution functions is just the triangular distribution with known CDF:

$$F(z) = \begin{cases} 0, & \text{if } z \leq -2a \\ \frac{1}{2} + \frac{z}{2a} + \frac{z^2}{8a^2}, & \text{if } -2a \leq z \leq 0 \\ \frac{1}{2} + \frac{z}{2a} - \frac{z^2}{8a^2}, & \text{if } 0 \leq z \leq 2a \\ 1, & \text{if } z \geq 2a \end{cases}$$

From this, the PSNE can be outlined. First, note that  $\frac{\partial \pi}{\partial e_i} = \frac{\partial F(e_i - \delta e_o)}{\partial e_i}$  and  $\frac{\partial \pi}{\partial e_o} = \frac{\partial F(e_i - \delta e_o)}{\partial e_o} =$

$-\frac{\partial F(e_i - \delta e_o)}{\partial e_i} \delta$ . Combining this with (2), we get that  $e_i = \frac{e_o}{\delta}$ . Using this, we know that in equilibrium



$0 \leq z \leq 2a$  which means that  $\frac{\partial \pi}{\partial e_i} = \frac{1}{2a} - \frac{e_i - \delta e_o}{4a^2} = \frac{1}{2a} - \frac{e_i - \delta^2 e_i}{4a^2}$  which, combined with (2) leads to the optimal effort level.

$$e_i^* = \frac{2aMc}{8a^2 + Mc(1 - \delta^2)}$$

For the in-group worker and

$$e_o^* = \frac{2aMc\delta}{8a^2 + Mc(1 - \delta^2)}$$

for the out-group worker.

## Appendix B: Robustness checks of Table 3

Table 3a: Random effects model with clustering at the subject level.

Variable	Model 1	Model 2	Model 3	Model 4
In-Group	10.22* (6.10)	1.58 (7.78)	0.90 (7.40)	0.46 (7.48)
Female	-20.69*** (6.21)	-32.79*** (8.60)	-34.39*** (8.02)	-33.39*** (8.45)
Female*In-Group		23.16* (12.04)	25.12** (11.54)	27.35** (11.74)
WTA			12.77** (5.85)	13.06** (5.70)
Holt-Laury				-1.94* (1.17)
Advantage from the Manager				-0.02 (0.02)
Constant	64.72*** (4.41)	68.75*** (4.70)	63.96*** (5.32)	78.10*** (10.82)

Notes: Standard errors are in parentheses. Three (\*\*\*), two (\*\*), and one (\*) stars indicate statistical significance at the 1%, 5%, and 10% respectively.

## Appendix C: Instructions-Proportional

This is an experiment on the economics of decision making. In addition to your participation fee, you will have the chance to earn money based on your decisions and the decisions of others. It is extremely important that you put away all materials including external reading material and turn off your cell phones and any other electronic devices. If you have a question, please raise your hand and I will come by and answer it privately.

In today's first task you will be shown five pairs of paintings and for each pair you will be asked to indicate which you like better. Each set of paintings will be shown on the projection screen at the front of the room and in each pair one will be labeled A with the other B. On your computer screen, you will choose either A or B, where your choice corresponds to the painting you like the best. There is no right or wrong answer here, so choose which one you like best.

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The paintings previously shown were either done by two different painters named Paul Klee and Wassily Kandinsky. You will now be divided into two groups where Group 1 comprises two-thirds of you who chose Klee more often than the other one-third (Note: ties are broken randomly). Thus, you will be grouped with others whose preferences for the paintings match your own. So, if you are in Group 1, you will be matched with others who prefer paintings by Klee over Kandinsky more often than those in Group 2 and if you are in Group 2 you are grouped with others who prefer Kandinsky over Klee more often than those in Group 1. On your computer screen, you will notice that it shows which group you belong to. You will remain in the same group for the duration of the experiment. Thus, if you are now in Group 1, you will always remain in Group 1 and similarly for those of you in Group 2. In a moment, you will get together with others in your group to get to know them. Below are some suggested topics to discuss, but feel free to talk about other things but use this time to get to know others in your group. You will have 10 minutes to talk, and after this time, I will call you back to your seats. At this time, if you are in Group 1, please meet with your group members at the front of the room and if you are from Group 2, please meet at the back of the room.

**Suggested discussion topics:**

1. If you could be any superhero and have super powers, which one would you like to have and why?
  2. If you could transport yourself anywhere instantly, where would you go and why?
  3. What is one item that you really should throw away, but probably never will?
  4. What is your favorite musical act?
  5. What's your favorite cartoon character, and why?
  6. What's the ideal dream job for you?
  7. What thought or message would you want to put in a fortune cookie?
  8. If you had to give up a favorite food, which would be the most difficult to give up?
  9. What is one food you'd never want to taste again?
  10. If you won a lottery ticket and had a million dollars, what would you do with it?
  11. You've been given access to a time machine. Where and when would you travel to?
  12. In your opinion, which animal is the best (or most beautiful) and why?
- 

For the remainder of the experiment, please do not talk with those around you. If you have a question, please raise your hand and I will come answer it. Remember, your group remains fixed for the entire experiment. If you are in Group 1, you and the others in Group 1 prefer Klee paintings more than those in Group 2 and if you are in Group 2 you and the others in Group 2 prefer Kandinsky paintings more than those in Group 1. Your group is also comprised of the same people you just chatted with. Additional to your group assignment, you will also be assigned to either be an A player or a B player. You will remain in this role for the entirety of the experiment. If you look on your computer screen, you will notice which role you have been assigned. If you are in Group 1, your role has been randomly determined by the computer. If you are in Group 2, you are automatically a B player.

There are multiple tasks in today's experiment. The instructions below describe period 1.

If you are a B player, you have been matched with an A player. You will begin with 100 tokens and your task is to decide how to split the 100 tokens with the A player you are matched with. Tokens that you choose to keep will generate 1 cent to you. Each token you choose to pass to the A player will be

worth 2 cents to them and  $(x - \frac{x^2}{100})$  cents to you where  $x$  is the amount passed to the A player. As an example, if you allocated 50 tokens to the A player and kept 50, the A player you are matched with will receive 100 cents and you will receive  $50 * 1 + (50 - \frac{50^2}{100}) = 75$  cents. There is a "Test" button that you can press if you would like to see the outcomes of any potential choices. Once you have made your final allocation decisions, you must hit the "Continue" button. In addition to this payment, you will also receive some amount allocated to you from an A player through a decision they will be making that will be described in a moment. You will not see how much was allocated to you by this person when you make your decision and they will not see how much you allocated to them when they make their decision. The only information you will be shown is if the person you are matched with is in the same group as you or not. Please look at the overhead for an example of the screen that B players will see.

If you are an A player, you have been paired with two B players, one from your own group and one from the other group. Your task is to decide how to allocate 300 cents between the two B players. You may allocate the tokens in any proportion you wish, but the total amount allocated must equal 300 and you do not have the option of keeping any for yourself. Every token you allocate to a B player will not cost you anything. When making your allocation decisions, you will be told which group the B players are from but not what their allocation decisions were. Once you enter the amounts you wish to allocate to the B players, you must hit the "Continue" button to move on. Your payment for this round is based on the decisions of B players, but you will not observe their decisions when you make your allocation choices and they will not observe your decisions when they make their choices. Please look at the overhead for an example of the screen that A players will see.

Summary: Your prior membership in Group 1 or 2 remains from the previous exercise and you have now been assigned to be either an A player or a B player. You will remain in the same roles and groups for the rest of the experiment. If you are a B player, your task is to decide how much of your endowment to allocate to an A player and how much to keep. If you are an A player, your task is to decide how to allocate 300 cents between someone in your group (Group 1) and the other group (Group 2) with no option to keep any for yourself. You will do this only once. Note: all A players are from Group 1 and the B players are split evenly into Group 1 and Group 2. After everyone has made their allocation decisions, the first period will be concluded and we will move on to the next task. Are there any questions?

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Remember, you will remain in the same group and role for the entire experiment. If you are in Group 1, you and the others in your group prefer Klee paintings more than those in Group 2 and if you are in Group 2 you and the others in your group prefer Kandinsky paintings more than those in Group 1. Your group is also comprised of the same people you just chatted with.

The following instructions apply for period 2. At the beginning of period 2, the computer will randomly assign two B players to be matched with one A player. The two B players will both be from the *same* group. Thus, if you are in Group 1, the B player matched to the same A player as you is also from Group 1 and similarly for Group 2. The tasks in this period are similar to those from the last period except

the A players will now observe the decisions of the B players before they make their decisions about allocating their endowment between the two B players.

As before, if you are a B player, you must decide how many of your 100 tokens to allocate to the A player you are matched with and how many to keep. There is another B player also matched to the same A player as you who will be simultaneously making the same decision as you about how much of their endowment to allocate to the A player. Tokens that you choose to keep will generate 1 cent to you. Each token you choose to pass to the A player will be worth 2 cents to them and  $(x - \frac{x^2}{100})$  cents to you where  $x$  is the amount passed to the A player. The only information B players will be given when they make their allocation decisions is if the A player is in the same group as them or not. Please look at the overhead for an example of the screen that B players will see.

After both B players have made their choice the A player will observe the allocation decisions of both B players and which group they are from before they decide how many of the 300 tokens to give to each B player. So unlike in the previous period when the A player was making their allocation decision knowing only the group membership of the B players, the A player will now be dividing up the 300 cents with full knowledge of the decisions made by the B players regarding how much of their endowments the B players each decided to pass to an A player. Please look at the overhead for an example of the screen that A players will see.

Summary: For this part of the experiment, two B players will again be matched with one A player. This time though, both B players will be from the same group and will make their decisions before the A players. A players will see the allocation decisions of the two B players they are matched with before they make their decisions. After everyone has made their allocation decisions, the second period will be concluded. This task will only be completed once. Again, all A players are from Group 1 and the B players are split evenly into Group 1 and Group 2. After everyone has made their allocation decisions, we will move on to the next task. Are there any questions?

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The following instructions apply for periods 3-5. Remember, if you are in Group 1, you and the others in your group prefer Klee paintings more than those in Group 2 and if you are in Group 2 you and the others in your group prefer Kandinsky paintings more than those in Group 1. Your group is also comprised of the same people you chatted with in the beginning. At the beginning of period 3, the computer will again randomly assign two B players to be paired with one A player. The two B players now will be from *different* groups. Thus, if you are from Group 1, the other B player matched to the same A player as you will be from Group 2. Otherwise the decisions will be made as before. Type B players will make an allocation decision between themselves and the A player with whom they are matched with and then after observing how much the two B players send to them, the A player will choose how to divide up 300 cents. In addition to this, the B players will be able to observe the first period allocation decisions of the A player they are matched with. Specifically, the B players will be able to see how many tokens the A player they are matched with previously allocated to someone in Group 1 and how many they allocated to someone in Group 2. Remember, this is the period where the A players could not observe what the B players did when they made their decisions. After B players make their allocation decisions, A players observe these results before they make their allocation decisions. Please look at the overhead for an example of the screens that A and B players will see.

This will be repeated for 3 periods. After the initial period, B players will observe what the other B player chose in the previous period but not see the decisions of the A players. Please look at the overhead for an example of the screen that B players will see.

The A or B player(s) you are matched with will remain fixed for the 3 periods.

Summary: For this part of the experiment, two B players will again be matched with one A player. This time though, the B players will be from different groups. They will still make their decisions before the A players. In addition to this, the B players will observe the first period allocation decisions of the A players and they will observe what the other B player contributed the prior period. A players will see the allocation decisions of the two B players they are matched with and which group each B player belongs to before they make their decisions. This is repeated for 3 periods. Again, all A players are from Group 1 and the B players are split evenly into Group 1 and Group 2. Are there any questions?

For period 6, if you are a B player, you are now paired with a different A player. If you are an A player, you are now paired with two different B players. Otherwise, all rules from the previous part are the same.

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The following instructions are for period 7. If you are a B player, you and another B player from a different group were matched with an A player last period. Your task is to try and guess how many tokens the other B player contributed the last period. Earnings in this period are tied to how close your guess is. If you correctly guess what they contributed, you will get an additional 300 cents. If you do not guess correctly, your earnings will be determined by the following formula:

$$E = 300 - \frac{3}{100} * (\text{Actual Contributions} - \text{Your Guess})^2$$

If for instance, the other B player contributed 30 tokens and you guessed 40. This would mean that you would receive  $300 - \frac{3}{100}(30 - 40)^2 = 297$  cents. If you instead guessed 50, you would receive  $300 - \frac{3}{100}(30 - 50)^2 = 270$  cents. If you guessed 60, you would receive  $300 - \frac{3}{100}(30 - 60)^2 = 273$  cents. Thus, notice that the farther you are away from the actual allocation, the amount you will receive decreases quickly.

If you are an A player, you will do nothing

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How does the social distance between an employee and a manager affect employee competition for a reward?

**Abstract**

This study examines how employees internalize differences in social distance between themselves and their managers when they are competing for a reward given by the manager. In an employer/employee relationship, this difference in social distance between the employer and the various employees leads to a disadvantageous situation for the socially distant workers when raises, promotions, special considerations etc. are given. Since social distance is present in most organizations, understanding how employees work effort changes in response to changes in social distance is of utmost importance. In prior literature, this disadvantage has always been assumed/shown to lead to lower effort than the advantaged worker. The results partially back up this claim and show that females who are socially distant from their manager contribute much less than females who are socially closer or males regardless of the social distance.

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