Managing Uncertainty: An Experiment on Delegation and Team Selection

Supplemental Appendix

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A A Benchmark Model of Organization Design

The following model captures the tradeoff between the misalignment of preferences and information asymmetries in a simple scenario where we have an organization comprised of three members, a Manager and two Workers who must complete their assigned tasks. The main aim of the Manager is to efficiently allocate tasks among Workers via two "levers": first, the structure of decision rights - in particular, to determine whether to retain or delegate to their Workers the ability to allocate tasks - and secondly, the skillsets of the Workers on their team.

Worker heterogeneity is modeled by different specializations θ_i on the interval $[0, 1]$. The Manager thus selects their team, (θ_1, θ_2) (For ease of exposition and without loss of generality, we assume throughout that $\theta_1 \leq \theta_2$). This specialized knowledge horizontally differentiates the Workers, endogenizing the coordination problem and the misalignment of preferences with the Manager. Ex-ante, an agent with a particular set of skills may not be better than another, depending on the nature of the task. This captures the idea that firms are often able to distinguish potential employee skill sets but it is more difficult to recognize ex ante a Worker's productivity (i.e. vertical differentiation). Once selected, each Worker independently receives a randomly drawn task, t_i^o for $i = \{1, 2\}$, from a uniform distribution function defined on the same interval, $U[0, 1]$.[1] Critically, Managers select their team prior to knowing the exact tasks to complete, (t_1^o, t_2^o).

Each Worker focuses exclusively on their own task and all tasks must be completed. The Manager therefore selects a team to minimize the total expected cost of the firm defined by $\mathbb{E}\big[\sum_{i=1,2} C_i(t_i^f, \theta_i)\big]$, where $C_i(t_i^f, \theta_i) = |\theta_i - t_i^f|$ and t_i^f is the final task assigned to Worker i.[2] In this task allocation framework, final task assignment depends on the randomly drawn tasks, i.e. $(t_1^f, t_2^f) \in \{(t_1^o, t_2^o), (t_2^o, t_1^o)\}$. The total cost to the firm increases as the distance between the Workers' specializations and their final assigned tasks increases. A higher distance may imply more time or resources spent by the firm to complete the tasks or a reduction in the quality of the final output. In our model, Workers observe both tasks with certainty, while Managers observe each task independently with some probability p, known ex-ante by all agents.

In this context, a centralized organization allows the Manager to reallocate tasks directly after observing one, both, or no tasks. In particular, a Manager unable to observe either task leads to potentially costly mistakes in task allocation, either by switching tasks when they should remain, or missing the opportunity to profitably switch tasks.

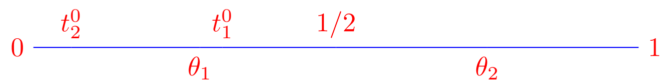
In a decentralized organization, Workers make the task allocation decision by voting to switch tasks or not. We assume each Worker receives a fixed payment that is sufficient to cover their best outside option, and focuses on minimizing their own cost, $C_i(t_i^f, \theta_i) = |\theta_i - t_i^f|$. When a Worker is assigned their

[1] We obtain qualitatively similar results assuming symmetric unimodal distribution functions defined on the same interval. However, this simple setup facilitates our empirical analysis.

[2] We obtain similar results with risk averse agents if we consider strict monotonically decreasing utilities as functions of the absolute value distance between Workers' specializations and tasks.

initial task, they also see the task of the other Worker in their group. If their task is farther from their position than the other Worker's task, they will vote to switch. Only if both Workers vote to switch will the tasks be exchanged. Critically, this implies that the Manager and Workers have imperfectly aligned incentives. Because unanimity is required to reallocate tasks in the decentralized organization, either Worker can unilaterally guarantee the status quo task assignment and a conflict of interest may arise. Figure A.1 shows a case where the Manager would like to exchange the tasks but one of the Workers will not. As a result, no exchange takes place, though both other group members would have preferred reallocation. The reallocation of tasks in this case also maximizes the joint profits for the entire group, yet because Workers do not internalize the impact of their decisions on their coWorker's cost, reallocation may not occur.

Figure A.1: Main incentive problem in a decentralized organization



While the differences in objective functions may favor a centralized organization, the Manager's information quality, p, plays a critical role in the trade-off between organizational structures. The relative importance of the misalignment of Manager and Worker preferences, and the availability of information for the Manager, are the key determinant of the Manager's delegation decision. Importantly, the team selected by the Manager endogenously impacts the balance between those two forces, as we explain shortly.

The timing of decisions in this game is as follows:

1. Given p, the Manager chooses whether to delegate the rights to reallocate tasks.
2. The Manager chooses (θ_1, θ_2) and the Workers receive randomly drawn tasks, (t_1^o, t_2^o).
3. The Manager observes each task with an independent probability p, while Workers observe both tasks.
4. The Manager (if in a centralized organization) or the Workers (if decentralized) determine the final task assignment, $(t_1^f, t_2^f) \in \{(t_1^o, t_2^o), (t_2^o, t_1^o)\}$.
5. Costs for the Manager and Workers are realized.

We proceed by solving for the sub-game perfect Nash equilibrium using backward induction. First, we solve the Manager's problem in a centralized organization and explain the main trade off the Manager faces. Then, we solve the Manager's problem in a decentralized organization and underline the main incentive conflict between the Manager and the Workers. Finally, we compare centralization to decentralization in order to determine the Manager's optimal delegation decision given the level of information, p.

A.1 The Manager's problem in a centralized organization

In a centralized organization, the Manager retains control over the decision rights to reallocate tasks. In this context, the following proposition is satisfied.

Proposition 1 *For any p, given (θ_1, θ_2), the Manager's optimal task allocation decision will depend on the observability of the initial task assignments (t_1^o, t_2^o) such that:*

1. *If the Manager observes both tasks, (t_1^o, t_2^o), she allocates tasks minimizing $\sum_{i=1,2} C_i(t_i^f, \theta_i)$.*
2. *If the Manager observes only one of the initial task assignments - t_o^o, she assigns this task to Worker θ_1 if $t_o^o \leq t^*$. t^* depends on (θ_1, θ_2) and takes the value $t^* = 1/2$ if and only if $\theta_1 + \theta_2 = 1$, which implies symmetry.*
3. *If the Manager does not observe either task, the Manager is indifferent between any assugnment.*

Without loss of generality, we assume the status quo prevails.

Proof.

For any p, $t^o \sim U[0,1]$ and given (θ_1, θ_2), the Manager's optimal task allocation decision will depend on the observability of the original task realizations (t_1^o, t_2^o) such that:

1. If the Manager observes both tasks, she will have perfect information on both Worker specializations and tasks. Then, by definition, she will minimize organizational cost, $\sum_{i=1,2} C_i(t_i^f, \theta_i)$. There are three cases to consider:
   (a) $0 \le t_1^o \le \theta_1 \le \theta_2$: If $t_2^o \ge \theta_1$ the Manager will prefer to assign t_1^o to Worker θ_1 in order to avoid incurring twice the cost generated by the distance $t_2^o - t_1^o$. In the complementary case, where $t_2^o < \theta_1$, the Manager is indifferent between both task allocation options. Thus, the Manager will not change tasks in this scenario.
   (b) $0 \le \theta_1 \le t_1^o \le \theta_2$: The Manager prefers to assign t_1^o to Worker θ_2 when $t_o^2 < t_1^o$ to avoid incurring twice the cost generated by the distance $t_1^o - t_2^o$ and to assign t_1^o to Worker θ_2 otherwise. Thus, the Manager will change tasks only when $0 \le \theta_1 \le t_1^o \le \theta_2$ and $t_2^o < t_1^o$.
   (c) $0 \le \theta_1 \le \theta_2 \le t_1^o$: The Manager prefers to assign t_1^o to Worker θ_2 when $t_2^o < \theta_2$ to avoid incurring twice the cost generated by the distance $t_1^o - t_2^o$ and she is indifferent otherwise. Thus, the Manager will change tasks only when $0 \le \theta_1 \le \theta_2 \le t_1^o$ and $t_2^o < \theta_2$. By symmetry, we also know that the Manager will change tasks when $0 \le t_2^o \le \theta_1 \le \theta_2$ and $\theta_1 < t_1^o$.

   To conclude, notice that in all the cases where the Manager would like to change the task allocation the following 3 conditions hold: $t_2^o \le \theta_2$, $t_1^o \ge \theta_1$ and $t_1^o \ge t_2^o$.
2. If the Manager observes only one task, she will minimize the expected cost for the organization given that the other task is uniformly drawn from the interval $[0, 1]$. Assuming that the Manager observes t_o^o, the Manager faces one of three cases:
   (a) $0 \le t_o^o \le \theta_1 \le \theta_2$: In this situation, if the unobserved task $t_u^o \ge \theta_1$ the Manager will prefer to assign the known task to Worker θ_1 in order to avoid incurring twice the cost generated by the distance $t_u^o - t_o^o$. In the complementary case, where $t_u^o < \theta_1$, the Manager is indifferent between both task allocation options.
   (b) $0 \le \theta_1 \le t_o^o \le \theta_2$: We calculate the expected cost for the two possible options available to the Manager:
   - If she assigns the known task t_o^o to Worker θ_1, the expected cost is: $(t_o^o - \theta_1) + E[|\theta_2 - t_u^o|]$
   - If she assigns the known task t_o^o to Worker θ_2, the expected cost is: $(\theta_2 - t_o^o) + E[|\theta_1 - t_u^o|]$
   - Since $E[|\theta_i - t_u^o|] = \theta_i^2 + (1/2 - \theta_i)$, we can replace this in the previous expressions and we get that the Manager minimizes organizational cost by assigning the task to Worker θ_1 if and only if
   $$t_o^o \le \theta_2 - \frac{(\theta_2^2 - \theta_1^2)}{2} = t^*$$
   - It is straightforward to show that $\theta_1 \le t^* \le \theta_2$ and if we replace $\theta_1 = 1 - \theta_2$, we have $t^* = 1/2$.

   (c) $0 \le \theta_1 \le \theta_2 \le t_o^o$: This case is similar to 2.a. but with the assignment of the known task to Worker θ_2. The Manager prefers to assign t_o^o to Worker θ_2 when $t_u^2 < \theta_2$ to avoid incurring twice the cost generated by the distance $t_o^o - t_u^o$ and she is indifferent otherwise.

   The previous cases imply that the Manager assigns t_o^o to Worker θ_1 if $t_o^o \le t^*$ and to Worker θ_2 otherwise.
3. If the Manager does not observe either task, the Manager is indifferent between (t_1^o, t_2^o) and (t_1^o, t_2^o). Without loss of generality we assume the status quo prevails.

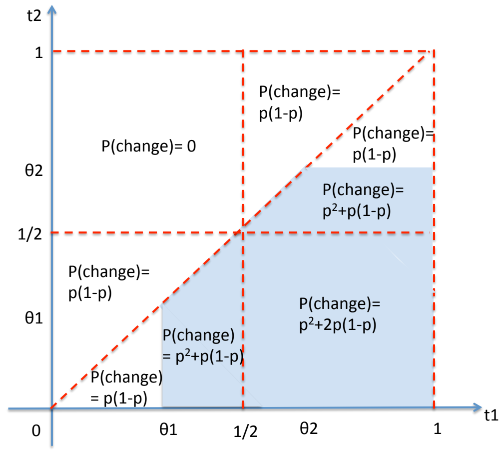
■

Figure A.2 shows the probability of task reallocation in a centralized organization given a particular and symmetric (θ_1, θ_2) as a function of p for all possible (t_1^o, t_2^o).[3] The shaded area represents the region where the Manager would like to exchange tasks under perfect information, given their selected team. Since the Manager

[3]For example, consider the case of two symmetric positions equidistant to $E[t^0]$ where $\theta_2 > \theta_1$. Proposition 1 implies that when a Manager observes only one task in this situation she will assign it to the Worker with the closest specialization. To clarify, imagine that $(t_1^o, t_2^o) = (1, 5/8)$ and $(\theta_1, \theta_2) = (1/4, 3/4)$, following proposition 1, we have that 1) If the Manager observes both tasks (with probability p^2), then she will reallocate the tasks, 2) If she observes 5/8 only (with probability $p(1-p)$), she will assigned this to the Worker on 3/4, keeping the status quo unintentionally, 3) If the Manager observes 1 only (with probability $p(1-p)$), they will assign this to the Worker on 3/4, reallocating the tasks, and 4) If they do not observe either task (with probability $(1-p)^2$), they maintain the status quo. Thus, in this scenario, Managers reallocate tasks with probability $p^2 + p(1-p)$. Figure A.2 extends this analysis to all possible (t_1^o, t_2^o) given a particular (θ_1, θ_2) and p.

does not always observe both tasks, they may make a mistake $ex-post$ in their task reallocation. Using these probabilities we can calculate the expected cost for the organization given (θ_1, θ_2) and p. Minimizing against (θ_1, θ_2) the Manager obtains the optimal team composition in a centralized organization for different levels of p as in the following proposition:

Figure A.2: Reallocation probabilities in a centralized organization



Given the optimal task allocation of the Manager in proposition 1, we step back in the game to analyze how Managers optimally select their teams in a centralized organization. Recall that Managers choose their team before learning if they will observe none, one or both original tasks, but knowing they will face those cases with probability $(1-p)^2$, $2p(1-p)$, and p^2 respectively. The Manager also knows the value of p. This information allows the Manager to map the probability to exchange tasks for any pair of (t_1^o, t_2^o) for a given (θ_1, θ_2). Then, the Manager has to select the pair of Workers' specializations that allows them to minimize their $ex-post$ errors in the task reallocation. Two types of errors appear as a consequence of the established rule. The Manager may fail to exchange tasks, or she may exchange tasks with some probability when she should not. Solving this problem results in our next proposition.

Proposition 2 *For any p, there is a unique and symmetric $(\theta_1^C(p), \theta_2^C(p))$ in a centralized organization, such that the heterogeneity of the team is a monotonically increasing function of p.*

Proof.

For any p, if $t_i^o \sim U[0,1]$ for $i = 1, 2$, the Manager must select their team composition (θ_1, θ_2) such that she minimizes the expected cost in a centralized organization. The Manager makes this decision before knowing if she will observe both tasks, one tasks or neither. However, she knows the probability with which she will face each of these options - p^2, $2p(1-p)$ and $(1-p)^2$ respectively. We can calculate the expected cost to the Manager for the three different cases:

1. When the Manager (M) observes both tasks:

$$E[C(\theta_1, \theta_2)|\text{M observes both tasks}] = \theta_1^2\left(2 - \frac{2}{3}\theta_1\right) + \theta_2^2\left(\frac{2}{3}\theta_2\right) + (1 - \theta_1 - \theta_2) \tag{4}$$

2. When the Manager observes one task:

$$E[C(\theta_1, \theta_2)|\text{M observes one task}] = 2\theta_1^2 + \theta_2\left(\theta_2^2 - \theta_1^2\right) - \frac{(\theta_2^2 - \theta_1^2)^2}{4} + (1 - \theta_1 - \theta_2) \tag{5}$$

3. When the Manager observes neither task:

$$E[C(\theta_1, \theta_2)|\text{M observes neither task}] = \theta_1^2 + \theta_2^2 + (1 - \theta_1 - \theta_2) \tag{6}$$

Then, the Manager's minimization problem is

$$\begin{aligned}\underset{\theta_1,\theta_2}{\text{Minimize}} \quad E[C(\theta_1, \theta_2)] = {} & p^2 E[C(\theta_1, \theta_2)|\text{M observes both tasks}] \\ & + 2p(1-p)E[C(\theta_1, \theta_2)|\text{M observes one task}] \\ & + (1-p)^2 E[C(\theta_1, \theta_2)|\text{M observes neither task}]\end{aligned}$$

Thus, replacing equations 4, 5 and 6 and deriving, we get the following first order conditions:

$$p^2\left[4\theta_1-2\theta_1^2-1\right]+2p(1-p)\left[4\theta_1-2\theta_1\theta_2-\frac{(\theta_2^2-\theta_1^2)}{2}(-2\theta_1)-1\right]+(1-p)^2\left[2\theta_1-1\right]=0$$
$$p^2\left[2\theta_2^2-1\right]+2p(1-p)\left[3\theta_2^2-\theta_1^2-\frac{(\theta_2^2-\theta_1^2)}{2}(2\theta_2)-1\right]+(1-p)^2\left[2\theta_2-1\right]=0$$

We can rewrite these first order conditions as

$$2\theta_1\left[1+(1-\theta_1)p^2+2p(1-p)(1-t^*)\right]=1 \tag{7}$$
$$2(1-\theta_2)\left[1+\theta_2p^2+2p(1-p)t^*\right]=1 \tag{8}$$

where $t^*=\theta_2-\frac{(\theta_2^2-\theta_1^2)}{2}$. These conditions are both satisfied only when $\theta_1+\theta_2=1$, which implies that in a centralized organization the optimal Worker positions are symmetric around the ex-ante expected task in equilibrium.[4] In other words, $\left|\frac{1}{2}-\theta_1^*\right|=\left|\theta_2^*-\frac{1}{2}\right|$. Thus, the optimal positions of the Workers in a centralized organization, $(\theta_1^C(p),\theta_2^C(p))$, are determined by

$$\theta_1^C(p)=\begin{cases}\frac{1+p-\sqrt{(1+2p-p^2)}}{2p^2}, & \text{if } p\in(0,1]\\ E[t^o], & p=0\end{cases} \tag{9}$$

$$\theta_2^C(p)=1-\theta_1^C(p) \tag{10}$$

Taking limits to $\theta_1^C(p)$, we have $\lim_{p\to1}\theta_1^C(p)\approx0.29$ and $\lim_{p\to0}\theta_1^C(p)\approx0.5=E[t^o]$.[5] Defining $\delta(\theta_1^C(p),\theta_2^C(p))=\frac{\theta_2^C(p)-\theta_1^C(p)}{2}$ as a measure of team heterogeneity, by symmetry we can rewrite it as $\delta^C(p)=E[t^o]-\theta_1^C(p)\geq0$. Since $\frac{\partial\theta_1^*(p)}{\partial p}<0$, then $\frac{\partial\delta^*(p)}{\partial p}=-\frac{\partial\theta_1^*(p)}{\partial p}\geq0$. ■

Managers prefer a more heterogeneous team in a centralized organization if they expect to successfully enable the reallocation of tasks, i.e. if they have better access to task information. A poor information environment increases the probability that the Manager makes bad decisions. As a consequence, the Manager will choose a more homogeneous team to minimize the impact of misinformation. When $p=0$, a Manager will minimize the maximum expected distance each Worker can face, positioning them on the ex-ante expected task locations, $\theta_1=\theta_2=E[t^o]=1/2$. However, when $p=1$, the Manager would not choose the same specialization for both Workers since task reallocation would not change the final outcome. To take advantage of reallocation possibilities, the Manager must select a more heterogeneous team.

A.2 Decentralized organization and incentive conflict

In a decentralized organization, the Manager delegates reallocation rights to the Workers. Workers decide unanimously whether to reallocate the tasks.[6] The Manager's objective is unchanged in the decentralized organization. She must choose a team that minimizes the expected distance between Workers' specialization and tasks. Recall that the Workers' preferences are not perfectly aligned with the Manager's preferences in this case. Because unanimity is required to reallocate tasks in the decentralized organization, either Worker can unilaterally guarantee the status quo task assignment as in Figure A.1.[7]

Proposition 3 *For any p, given (θ_1,θ_2), Workers reallocate tasks if and only if the following three conditions are satisfied: 1) $t_2^o\leq t_1^o$, 2) $t_2^o\geq\max(0,2\theta_1-t_1^o)$, and 3) $t_1^o\leq\min(1,2\theta_2-t_2^o)$.*

The proof follows directly from each Worker's task-reallocation conditions.[8] The shaded area of Figure A.3 represents the cases satisfying these conditions on the plane (t_1^o,t_2^o) for a particular (θ_1,θ_2). This area highlights the cases in which both Workers decide to reallocate tasks. On the other hand, the two striped triangular areas

[4]Remember that when $\theta_1+\theta_2=1$, $t^*=1/2$.

[5]Intuitively, one might expect the solution to be closer to the values 0.25 and 0.75. That is true if we minimize the sum of the distance between the selected positions and the expected minimum/maximum tasks, $|\theta_1-E[min(t_1^i,t_2^i)]|+|\theta_2-E[max(t_1^i,t_2^i)]|$. However, our Manager's problem is to minimize $E[|\theta_1-min(t_1^i,t_2^i)|+|\theta_2-max(t_1^i,t_2^i)|]$. Since, we are working with absolute value functions, both cases are not equivalent.

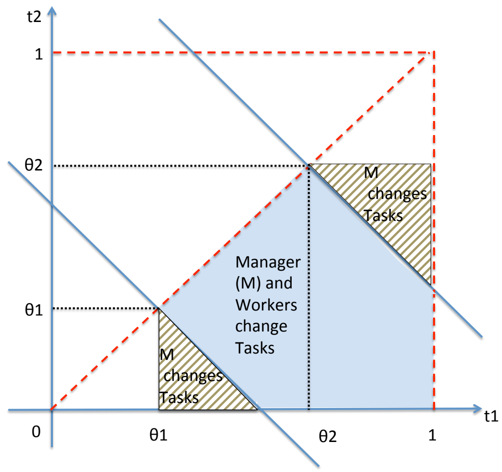
[6]Unlike in a centralized organization, initial task assignment plays an important role in the decentralized organization since both Workers may want the same task. For simplicity, we assume tasks are randomly assigned.

[7]We assume no monetary transfer between Workers.

[8] It is possible to show that the Worker θ_1 will be willing to reallocate tasks only if $t_2^o\in\left[\max\left(0,2\theta_1-t_1^o\right),t_1^o\right]$ and the Worker θ_2 will be willing to reallocate tasks only if $t_1^o\in\left[t_2^o,\min\left(1,2\theta_2-t_2^o\right)\right]$.

show cases where the Manager would like to exchange tasks when she has perfect information ($p = 1$), yet one of the Workers does not.[9] These areas are the graphical representation of the expected incentive conflict between Manager and Workers in a decentralized organization, given (θ_1, θ_2).

Figure A.3: Reallocation regions in a decentralized organization



The parallel downward-sloping diagonals in Figure A.3 determine the area where Workers reallocate tasks, and they cross the 45 degree line at the positions selected by the Manager. As the Manager chooses a more homogeneous team, these parallel lines converge and the areas representing the incentive conflict grow larger. A Manager can reduce the areas of conflict by choosing a more heterogeneous team, shifting the parallel lines outward. As a result, the members of the team exchange tasks more often. However, an overly heterogeneous team will increase the average expected distance between Worker specializations and tasks. Managers select their teams to minimize the total expected cost, given the Workers decision to reallocate tasks or not. Since the Manager affects the final results of the Workers only through the positions selected, the optimal positions are independent of the level of information p as the following proposition states:

Proposition 4 *For any p, there is a unique, symmetric (θ_1^D, θ_2^D) around the expected task in a decentralized organization. The optimal team composition is independent of p and it is more heterogeneous than the optimal team composition in a centralized organization for any p.*

Sketch of the Proof.

For any p, if $t_i^o \sim U[0,1]$ for $i = 1, 2$, the Manager must select (θ_1, θ_2) such that she minimizes the expected cost in a decentralized organization. Unlike the centralized organization, this decision is independent of the quality of the Manager's information, p. In the decentralized organization, Workers have perfect information about the original tasks and reallocate them in the cases highlighted by proposition 4. Workers reallocate tasks if and only if the following three conditions are satisfied: 1) $t_2^o \leq t_1^o$, 2) $t_2^o \geq \max(0, 2\theta_1 - t_1^o)$, and 3) $t_1^o \leq min(1, 2\theta_2 - t_2^o)$.

This case is similar to the case of perfect information in the centralized organization, but the nature of the constraints introduce some new challenges we must address. In particular, the functional form of the expected cost function changes as the Worker positions change. We can identify eight different cases which depend on the effect that realized values for t_1^o and t_2^o have on the constraints. For the second constraint, $t_1^o = 2\theta_1$ when $t_2^o = 0$, $2\theta_1$ could be less or greater than θ_2 and less or greater than 1. In the third constraint, $t_2^o = 2\theta_2 - 1$ when $t_1^o = 1$, $2\theta_2 - 1$ could be less or greater than θ_1 and less or greater than 0. We classify these eight cases into the following three categores:

1. Asymmetry to the right - $1/2 \leq \theta_1 \leq \theta_2 \leq 1$: In this case, $2\theta_1 \geq 1 \geq \theta_2$ and $2\theta_2 - 1 \geq 0$. Thus, we have two different cases: a) $2\theta_2 - 1 \geq \theta_1$, and b) $2\theta_2 - 1 < \theta_1$.
2. Asymmetry to the left - $0 \leq \theta_1 \leq \theta_2 \leq 1/2$: In this case, $2\theta_1 \leq 1$ and $2\theta_2 - 1 \leq 0 \leq \theta_1$. Thus, we have two different cases: a) $2\theta_1 > \theta_2$, and b) $2\theta_1 \leq \theta_2$.
3. Asymmetry or Symmetry around the ex-ante expected task: $0 \leq \theta_1 \leq 1/2 \leq \theta_2 \leq 1$: In this case, $2\theta_1 \leq 1$ and $2\theta_2 - 1 \geq 0$. Thus, we have four different cases: a) $2\theta_2 - 1 \geq \theta_1$ and $2\theta_1 > \theta_2$, b) $2\theta_2 - 1 \geq \theta_1$ and

[9] In the bottom left is the area where Worker θ_1 does not want to exchange tasks. In the top right is the area where Worker θ_2 does not want to exchange tasks. Notice that the shaded area plus the two triangular areas equals the region where a perfectly-informed Manager decides to reallocate tasks. In this graphical example we assume symmetric positions around $E[T^o]$, but this is not a necessary condition.

$2\theta_1 \leq \theta_2$, c) $2\theta_2 - 1 < \theta_1$ and $2\theta_1 > \theta_2$, d) $2\theta_2 - 1 < \theta_1$ and $2\theta_1 \leq \theta_2$.

We calculate the functional form of expected cost for each case and minimize respect to θ_1 and θ_2, subject to the constraints according to the case. Then, we compare the solutions in order to identify the one that minimizes the expected cost.[10] The optimal solution comes from the case 3.b. The minimization problem associated with this case is

$$\begin{aligned} \underset{\theta_1,\theta_2}{\text{Minimize}} \;\; & E[C(\theta_1,\theta_2)] = \frac{4}{3} + \theta_1\left[\left(2 - \frac{\theta_1}{3}\right)\theta_1 - 1\right] + \theta_2\left[\left(\frac{\theta_2}{3} + 1\right)\theta_2 - 2\right] \\ \text{subject to} \;\; & 2\theta_1 \leq \theta_2, \\ & 2\theta_2 - 1 \geq \theta_1 \text{ and} \\ & 0 \leq \theta_1 \leq 1/2 \leq \theta_2 \leq 1 \end{aligned}$$

The first order conditions obtained from the associated Lagrangian $L(\theta_1, \theta_2)$ are:[11]

$$\theta_1(\frac{\partial L_1}{\partial \theta_1}) = \theta_1\left(4\theta_1 - \theta_1^2 - 1 - 2\lambda_1 - \lambda_2\right) = 0$$

$$\theta_2(\frac{\partial L_1}{\partial \theta_2}) = \theta_2\left(2\theta_2 + \theta_2^2 - 2 + \lambda_1 + 2\lambda_2\right) = 0$$

where λ_1 and λ_2 are the Lagrangian multipliers for the first and second constraints respectively. Assuming that the constraints are not binding, thus $4\theta_1 - \theta_1^2 - 1 = 0 \implies \theta_1^D = 2 - \sqrt{3} \approx 0.27$ and $-2 + 2\theta_2 - \theta_2^2 = 0 \implies \theta_2^D = -1 + \sqrt{3} \approx 0.73$. This solution dominates the ones we get when one or both of the constraints hold with equality. Notice this solution is symmetric around the expected task and is independent of the level of Manager information, p. Then, $\delta^D(p) = \delta^{D*}$ is constant and since it is larger than $\delta^C(1)$, we have $\delta^{D*} > \delta^C(p) \; \forall \; p$. ■

A.3 Optimal organizational structure

Given the optimal team selection in centralized and decentralized organizations, we can integrate them into the Manager's organizational structure decision to compare the expected costs generated by both solutions based on the level of information, p:

Proposition 5 *There exists a level of information p^* such that:*

- *If $p \geq p^*$, the Manager prefers a centralized organization with $(\theta_1^*, \theta_2^*) = (\theta_1^C(p), \theta_2^C(p))$.*
- *If $p < p^*$, the Manager prefers a decentralized organization with $(\theta_1^*, \theta_2^*) = (\theta_1^D, \theta_2^D)$.*

Proof. Given the optimal positions in the decentralized organization - $(0.27, 0.73)$ - the expected cost of the Manager is $\mathbb{E}[C_D] \approx 0.4051$ for any p. Comparing this result with the expected cost the Manager would obtain in the centralized organization $\mathbb{E}[C_C(\theta_1^*(p), \theta_2^*(p), p)]$, we calculate that they are equated when the level of information is $p^* \approx 0.82$. Moreover, $\frac{\partial \mathbb{E}[C_C(p)]}{\partial p} < 0$, so we can conclude that there is a p^* such that for values of $p \geq p^*$ there exists some $(\theta_1^*(p), \theta_2^*(p))$ that gives us a lower expected cost in the centralized organizational structure than in the decentralized organizational structure. Additionally, for values of $p < p^*$, there does not exist any $(\theta_1^*(p), \theta_2^*(p))$ that gives us a lower expected cost in the centralized organization than under delegation. ■

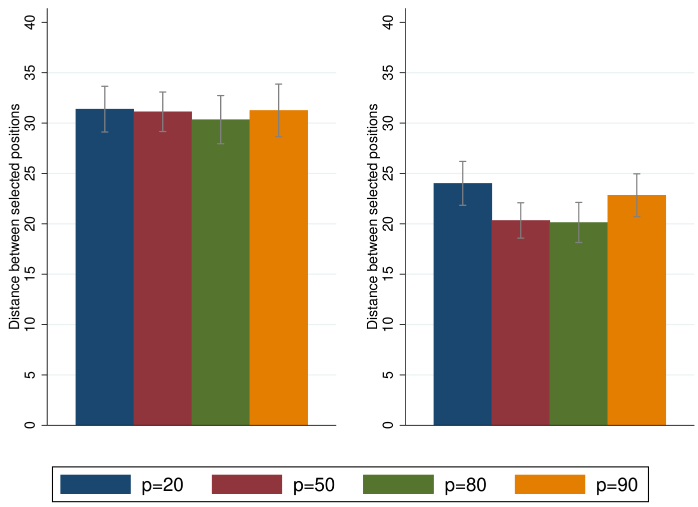
[10] Full calculations are omitted, but available from the authors upon request.
[11] We ignore the third constraint initially, and check that it is satisfied in equilibrium.

B Supplementary Analyses

The full dataset, as well as analysis code and all experimental materials, can be found on the Open Science Framework at https://osf.io/f6ypk/. DOI: 10.17605/OSF.IO/F6YPK.

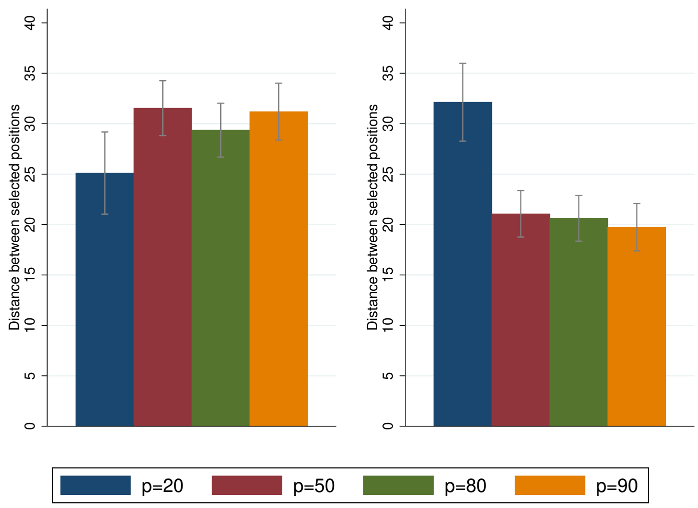
B.1 Team Selection by Treatment in the Selector Stage

Figure B.1: Team Selection in Selector Stage



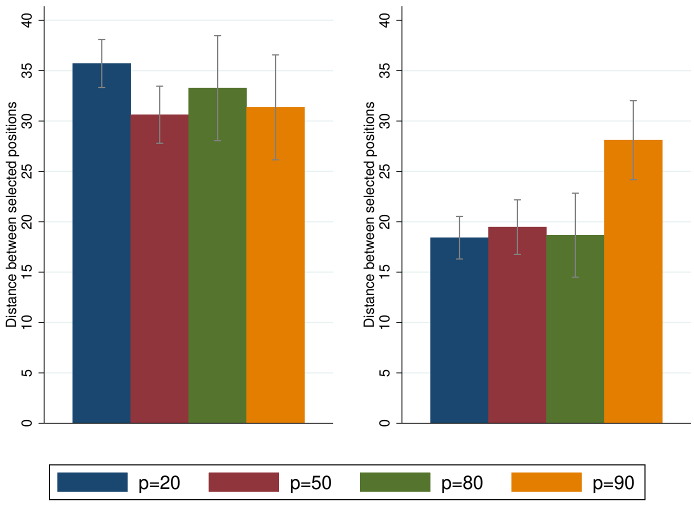
Notes. Distance between positions (left) and deviation from optimal positions (right) in the last 8 rounds of the Selector stage. Confidence intervals at 95% level.

Figure B.2: Team Selection in Selector Stage: Centralized Rounds



Notes. Distance between positions (left) and deviation from optimal positions (right) in the last 8 centralized rounds of the Selector stage. Confidence intervals at 95% level.

Figure B.3: Team Selection in Selector Stage: Decentralized Rounds



Notes. Distance between positions (left) and deviation from optimal positions (right) in the last 8 decentralized rounds of the Selector stage. Confidence intervals at 95% level.

B.2 Regression Analysis

Table B.1: Team Selection in Centralized Stage: Distance to Predicted Positions

	Treatment Effects		Cognitive Reflection			Risk Tolerance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$20\%_i$	3.893**	3.996**	5.411***	8.665***	8.763***	3.785*	8.562***	11.730***
	(1.96)	(1.96)	(1.99)	(2.78)	(2.75)	(1.95)	(2.54)	(2.60)
$50\%_i$	-3.213	-3.099	-2.631	2.191	3.087	-2.827	-0.721	0.638
	(1.98)	(1.98)	(1.96)	(2.45)	(2.45)	(1.97)	(2.77)	(2.75)
$90\%_i$	3.035	4.181*	4.140**	15.311***	16.094***	3.084	8.162***	11.507***
	(1.98)	(2.13)	(1.98)	(2.72)	(2.71)	(1.97)	(2.72)	(2.78)
$Reflective_i$			-5.058***	5.121*	7.988***			-6.860***
			(1.42)	(2.90)	(3.00)			(1.57)
$Reflective_i \times 20\%_i$				-9.850**	-11.703***			
				(3.98)	(3.99)			
$Reflective_i \times 50\%_i$				-13.171***	-14.475***			
				(3.98)	(3.96)			
$Reflective_i \times 90\%_i$				-21.540***	-24.162***			
				(3.94)	(3.99)			
$RiskTol_i$					-5.420***	-3.259**	0.909	4.770
					(1.62)	(1.41)	(2.81)	(2.90)
$RiskTol_i \times 20\%_i$							-11.463***	-13.949***
							(3.97)	(3.95)
$RiskTol_i \times 50\%_i$							-4.502	-6.359
							(3.99)	(3.95)
$RiskTol_i \times 90\%_i$							-9.318**	-12.996***
							(3.94)	(3.97)
$Constant$	23.227***	20.872***	24.155***	18.894***	17.557***	23.881***	16.415***	15.799***
	(1.38)	(3.78)	(2.00)	(3.75)	(3.74)	(2.05)	(3.94)	(3.88)
$RoundDummies$	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Controls_i$	No	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	590	590	590	590	590	590	590	590
R2	0.026	0.040	0.054	0.117	0.134	0.042	0.073	0.103

Notes. * p< 0.1; ** p<0.05; *** p<0.01. Linear regressions with treatment dummies. $Reflective_i$ is a dummy taking vaue of 1 if the agent has cognitive reflection test above 0 (implying she is a more reflective agent). T$RiskTol_i$ is a dummy taking vaue of 1 if the agent has an Eckel-Grossman test above 4. Controls include gender, age and country of origin. All regressions focus on the last 5 rounds of the Centralized stage.

Table B.2: Team Selection in Decentralized Stage: Distance to Predicted Positions

	Treatment Effects		Cognitive Reflection			Risk Tolerance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$20\%_i$	-0.580	-0.442	1.617	-0.878	-0.829	-0.722	2.953	6.208**
	(2.04)	(2.04)	(2.05)	(2.93)	(2.93)	(2.03)	(2.66)	(2.73)
$50\%_i$	1.023	1.149	1.865	4.032	4.481*	1.527	2.386	3.782
	(2.05)	(2.06)	(2.02)	(2.59)	(2.60)	(2.05)	(2.90)	(2.88)
$90\%_i$	-1.066	-1.533	0.533	5.026*	5.418*	-1.003	-2.713	0.726
	(2.05)	(2.22)	(2.04)	(2.87)	(2.88)	(2.04)	(2.84)	(2.91)
$Reflective_i$			-7.322***	-3.657	-2.221			-7.050***
			(1.46)	(3.06)	(3.19)			(1.65)
$Reflective_i \times 20\%_i$				2.321	1.392			
				(4.21)	(4.24)			
$Reflective_i \times 50\%_i$				-5.606	-6.259			
				(4.20)	(4.21)			
$Reflective_i \times 90\%_i$				-9.836**	-11.150***			
				(4.16)	(4.24)			
$RiskTol_i$					-2.715	-4.257***	-2.141	1.828
					(1.72)	(1.46)	(2.94)	(3.04)
$RiskTol_i \times 20\%_i$							-8.701**	-11.256***
							(4.15)	(4.13)
$RiskTol_i \times 50\%_i$							-1.724	-3.632
							(4.17)	(4.14)
$RiskTol_i \times 90\%_i$							2.300	-1.480
							(4.13)	(4.16)
$Constant$	24.480***	23.985***	26.768***	24.732***	24.062***	26.172***	20.917***	20.284***
	(1.44)	(3.93)	(2.06)	(3.96)	(3.98)	(2.13)	(4.12)	(4.06)
$RoundDummies$	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Controls_i$	No	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	590	590	590	590	590	590	590	590
R2	0.002	0.014	0.047	0.066	0.070	0.020	0.036	0.066

Notes. * p< 0.1; ** p<0.05; *** p<0.01. Linear regressions with treatment dummies. $Reflective_i$ is a dummy taking vaue of 1 if the agent has cognitive reflection test above 0. T$RiskTol_i$ is a dummy taking vaue of 1 if the agent has an Eckel-Grossman test above 4. Controls include gender, age and country of origin. All regressions focus on the last 5 rounds of the Decentralized stage.

Table B.3: Team Selection in Selector Stage: Distance to Predicted Positions

	Treatment Effects		Cognitive Reflection			Risk Tolerance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$20\%_i$	3.883***	4.121***	5.705***	7.056***	7.093***	3.794***	7.524***	10.779***
	(1.44)	(1.44)	(1.46)	(2.08)	(2.08)	(1.44)	(1.88)	(1.92)
$50\%_i$	0.203	0.456	0.901	1.417	1.756	0.518	-1.318	0.078
	(1.46)	(1.46)	(1.44)	(1.84)	(1.85)	(1.46)	(2.05)	(2.02)
$90\%_i$	2.703*	3.138**	4.029***	8.741***	9.036***	2.743*	3.323*	6.760***
	(1.46)	(1.57)	(1.45)	(2.04)	(2.04)	(1.46)	(2.01)	(2.05)
$Reflective_i$			-6.073***	-3.454	-2.372			-7.048***
			(1.04)	(2.17)	(2.26)			(1.16)
$Reflective_i \times 20\%_i$				-3.017	-3.716			
				(2.98)	(3.01)			
$Reflective_i \times 50\%_i$				-1.225	-1.717			
				(2.98)	(2.99)			
$Reflective_i \times 90\%_i$				-8.409***	-9.399***			
				(2.95)	(3.01)			
$RiskTol_i$					-2.046*	-2.665**	-1.958	2.009
					(1.22)	(1.04)	(2.08)	(2.14)
$RiskTol_i \times 20\%_i$							-8.640***	-11.195***
							(2.93)	(2.91)
$RiskTol_i \times 50\%_i$							3.730	1.823
							(2.95)	(2.91)
$RiskTol_i \times 90\%_i$							-0.517	-4.296
							(2.92)	(2.93)
$Constant$	20.133***	16.425***	21.958***	15.421***	14.916***	21.089***	13.742***	13.109***
	(1.02)	(2.92)	(1.71)	(2.94)	(2.96)	(1.76)	(3.04)	(2.99)
$RoundDummies$	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Controls_i$	No	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	944	944	944	944	944	944	944	944
R2	0.011	0.024	0.048	0.072	0.075	0.020	0.050	0.087

Notes. * p< 0.1; ** p<0.05; *** p<0.01. Linear regressions with treatment dummies. $Reflective_i$ is a dummy taking vaue of 1 if the agent has cognitive reflection test above 0. T$RiskTol_i$ is a dummy taking vaue of 1 if the agent has an Eckel-Grossman test above 4. Controls include gender, age and country of origin. All regressions focus on the last 8 rounds of the Selector stage.

Table B.4: Organizational Structure in Selector Stage: Percentage of Optimal Choices

	Treatment Effects		Cognitive Reflection			Risk Tolerance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$20\%_i$	1.469***	1.587***	1.340***	1.462***	1.466***	1.553***	1.370***	1.246***
	(0.20)	(0.21)	(0.20)	(0.30)	(0.30)	(0.20)	(0.28)	(0.29)
$50\%_i$	0.926***	1.024***	0.882***	0.880***	0.786***	0.869***	0.557*	0.505*
	(0.20)	(0.21)	(0.20)	(0.26)	(0.26)	(0.20)	(0.31)	(0.30)
$90\%_i$	1.628***	1.489***	1.545***	0.902***	0.819***	1.681***	1.371***	1.235***
	(0.20)	(0.23)	(0.20)	(0.30)	(0.30)	(0.21)	(0.29)	(0.30)
$Reflective_i$			0.528***	-0.130	-0.415			0.273*
			(0.14)	(0.33)	(0.34)			(0.16)
$Reflective_i \times 20\%_i$				0.248	0.429			
				(0.43)	(0.44)			
$Reflective_i \times 50\%_i$				0.337	0.473			
				(0.42)	(0.42)			
$Reflective_i \times 90\%_i$				1.140***	1.428***			
				(0.43)	(0.45)			
$RiskTol_i$					0.536***	0.764***	0.089	-0.070
					(0.17)	(0.14)	(0.31)	(0.33)
$RiskTol_i \times 20\%_i$							0.568	0.669
							(0.43)	(0.45)
$RiskTol_i \times 50\%_i$							0.785*	0.863**
							(0.42)	(0.42)
$RiskTol_i \times 90\%_i$							0.246	0.406
							(0.41)	(0.42)
$Constant$	-1.099***	-3.256***	-1.134***	-3.170***	-3.056***	-1.307***	-2.968***	-2.958***
	(0.15)	(0.45)	(0.24)	(0.46)	(0.46)	(0.25)	(0.48)	(0.48)
$RoundDummies$	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Controls_i$	No	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	944	944	944	944	944	944	944	944
$Pseudo-R2$	0.067	0.112	0.081	0.122	0.130	0.093	0.122	0.124
$Log-Likelihood$	-610.169	-580.351	-600.507	-573.586	-568.690	-592.764	-573.852	-572.417

Notes. * p< 0.1; ** p<0.05; *** p<0.01. Logit regressions with treatment dummies. $Reflective_i$ is a dummy taking vaue of 1 if the agent has cognitive reflection test above 0. T$RiskTol_i$ is a dummy taking vaue of 1 if the agent has an Eckel-Grossman test above 4. Controls include gender, age and country of origin. All regressions focus on the last 8 rounds of the Selector stage.

Table B.5: Continouos Cognitive Reflection Test Measure

	Deviation to Optimal Positions									Proportion of Opt. Org. Struc.		
	Centralized Stage			Decentralized Stage			Selector Stage			Selector Stage		
$20\%_i$	4.303**	8.084***	5.718***	0.053	0.361	2.111	4.483***	8.271***	5.745***	1.448***	1.206***	1.468***
	(1.95)	(2.59)	(2.03)	(2.02)	(2.72)	(2.11)	(1.43)	(1.91)	(1.49)	(0.20)	(0.27)	(0.22)
$50\%_i$	-3.024	0.884	-2.761	1.314	5.327**	2.626	0.478	1.886	1.362	0.924***	0.618**	0.846***
	(1.97)	(2.36)	(2.00)	(2.03)	(2.48)	(2.07)	(1.44)	(1.74)	(1.46)	(0.20)	(0.24)	(0.22)
$90\%_i$	3.436*	12.097***	5.458**	-0.448	4.350	0.883	3.288**	8.557***	5.035***	1.612***	0.813***	1.288***
	(1.97)	(2.57)	(2.16)	(2.03)	(2.70)	(2.24)	(1.44)	(1.89)	(1.58)	(0.21)	(0.28)	(0.23)
CRT_i	-2.050***	2.443*		-3.165***	0.855		-2.996***	-0.294		0.269***	-0.362***	
	(0.74)	(1.32)		(0.77)	(1.39)		(0.54)	(0.97)		(0.07)	(0.13)	
$CRT_i \times 20\%_i$		-6.009***			-1.880			-5.355***			0.633***	
		(2.13)			(2.24)			(1.57)			(0.22)	
$CRT_i \times 50\%_i$		-5.012***			-5.162**			-1.266			0.506***	
		(1.93)			(2.03)			(1.42)			(0.20)	
$CRT_i \times 90\%_i$		-9.330***			-6.749***			-5.472***			0.877***	
		(1.99)			(2.08)			(1.46)			(0.23)	
EG_i		-1.776***			-1.700***			-1.678***			0.222***	
		(0.57)			(0.60)			(0.42)			(0.06)	
$CRT_i = 1$			-6.896***			-6.883***			-5.318***			0.086
			(1.80)			(1.87)			(1.32)			(0.18)
$CRT_i = 2$			-5.059**			-9.143***			-8.442***			1.006***
			(2.04)			(2.11)			(1.49)			(0.23)
$CRT_i = 3$			-8.477***			-3.827			-8.109***			-0.333
			(3.13)			(3.24)			(2.29)			(0.29)
Constant	23.836***	22.932***	20.930***	26.437***	27.231***	23.669***	21.932***	18.759***	16.478***	-1.143***	-3.564***	-3.288***
	(2.02)	(3.93)	(3.73)	(2.08)	(4.13)	(3.86)	(1.72)	(3.02)	(2.87)	(0.24)	(0.48)	(0.46)
$Controls_i$	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	590.000	590.000	590.000	590.000	590.000	590.000	944.000	944.000	944.000	944.000	944.000	944.000
R2 (pseudo-R2)	0.046	0.110	0.072	0.034	0.069	0.053	0.044	0.096	0.067	(0.081)	)0.139)	(0.133)
Log-Likelihood										-600.947	-563.013	-566.673

Notes. * p< 0.1, ** p< 0.05, *** p< 0.01. We run linear regressions for the deviation to optimal positions and logit regressions for the proportion of optimal org. structures. CRT_i is the continous cognitive reflection variables taking values from 0 to 3 and EG_i is the continouos Eckel-Grossman risk aversion measure taking values from 1 to 5. We include round dummies in all the specifications.

Table B.6: Continouos Eckel-Grossman Risk Aversion Measure

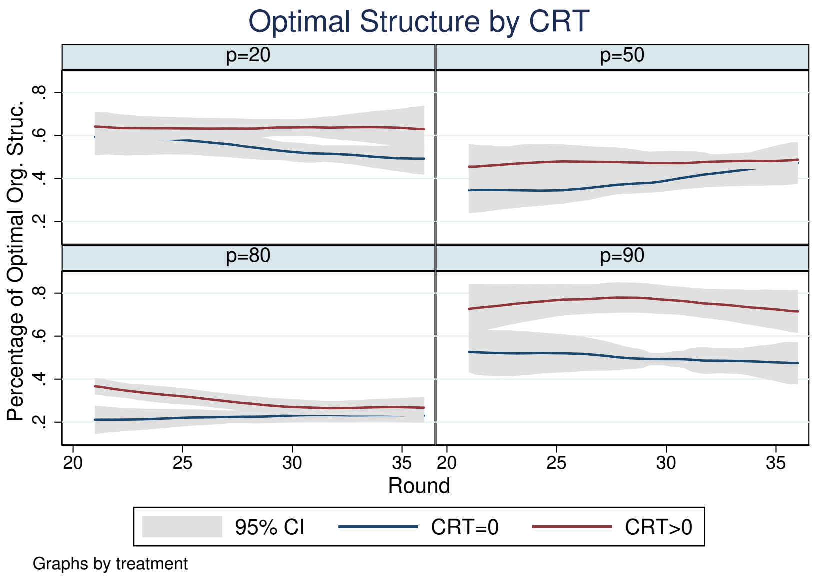
	Deviation to Optimal Positions									Proportion of Opt. Org. Struc.		
	Centralized Stage			Decentralized Stage			Selector Stage			Selector Stage		
$20\%_i$	3.465*	17.547***	3.375*	-1.255	6.930	-1.386	3.285**	19.229***	2.941**	1.631***	0.443	1.725***
	(1.96)	(5.34)	(1.96)	(2.02)	(5.55)	(2.04)	(1.44)	(3.85)	(1.43)	(0.21)	(0.59)	(0.21)
$50\%_i$	-2.917	1.899	-2.627	1.489	-2.036	1.429	0.615	-3.392	0.524	0.892***	-0.150	1.010***
	(1.97)	(5.83)	(1.97)	(2.03)	(6.07)	(2.04)	(1.44)	(4.21)	(1.44)	(0.20)	(0.64)	(0.21)
$90\%_i$	3.065	12.690**	3.997*	-1.020	-5.391	-1.657	2.744*	9.831**	2.961*	1.689***	0.964	1.519***
	(1.97)	(5.81)	(2.12)	(2.03)	(6.04)	(2.20)	(1.44)	(4.19)	(1.55)	(0.21)	(0.62)	(0.23)
EG_i	-1.286***	0.405		-2.026***	-1.392		-1.795***	-0.076		0.292***	0.001	
	(0.49)	(1.08)		(0.51)	(1.12)		(0.36)	(0.78)		(0.05)	(0.12)	
$EG_i \times 20\%_i$		-3.857***			-2.187			-4.309***			0.344**	
		(1.40)			(1.45)			(1.01)			(0.16)	
$EG_i \times 50\%_i$		-1.227			0.979			1.105			0.294*	
		(1.45)			(1.51)			(1.05)			(0.16)	
$EG_i \times 90\%_i$		-1.996			1.337			-1.405			0.119	
		(1.44)			(1.50)			(1.04)			(0.15)	
CRT_i		-2.823***			-2.650***			-3.615***			0.144*	
		(0.85)			(0.88)			(0.61)			(0.09)	
$EG_i = 2$			-0.618			1.887			-2.975			-0.241
			(2.84)			(2.95)			(2.08)			(0.29)
$EG_i = 3$			-4.531			-5.841**			-9.485***			0.520*
			(2.85)			(2.95)			(2.08)			(0.29)
$EG_i = 4$			-3.133			-5.292			-10.067***			0.487
			(3.34)			(3.46)			(2.44)			(0.32)
$EG_i = 5$			-7.435***			-6.480**			-9.310***			0.703***
			(2.64)			(2.74)			(1.93)			(0.27)
Constant	27.184***	16.723***	22.883***	31.758***	26.425***	25.992***	26.515***	13.605***	23.030***	-2.048***	-2.996***	-3.470***
	(2.65)	(5.25)	(4.61)	(2.74)	(5.46)	(4.78)	(2.14)	(3.88)	(3.48)	(0.32)	(0.65)	(0.52)
$Controls_i$	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	590	590	590	590	590	590	944	944	944	944	944	944
R2 (pseudo-R2)	0.045	0.086	0.063	0.032	0.061	0.044	0.039	0.108	0.064	(0.097)	(0.130)	(0.128)
Log-Likekihood										-589.953	-568.369	-570.027

Notes. * p< 0.1, ** p< 0.05, *** p< 0.01. We run linear regressions for the deviation to optimal positions and logit regressions for the proportion of optimal org. structures. CRT_i is the continous cognitive reflection variables taking values from 0 to 3 and EG_i is the continouos Eckel-Grossman risk aversion measure taking values from 1 to 5. We include round dummies in all the specifications.

B.3 Trends in the Selector stage by CRT and EG: Organizational Structure and Team Selection

To see the impact of CRT over time, we plot in Figure B.4 the percentage of optimal organizational structure decisions by round among more and less reflective Managers, separated by treatment. While more refflective Managers show consistently higher proportions of optimal decisions, we do not observe a large difference except in the 90% treatment.

Figure B.4: CRT and Organizational Structure Trends

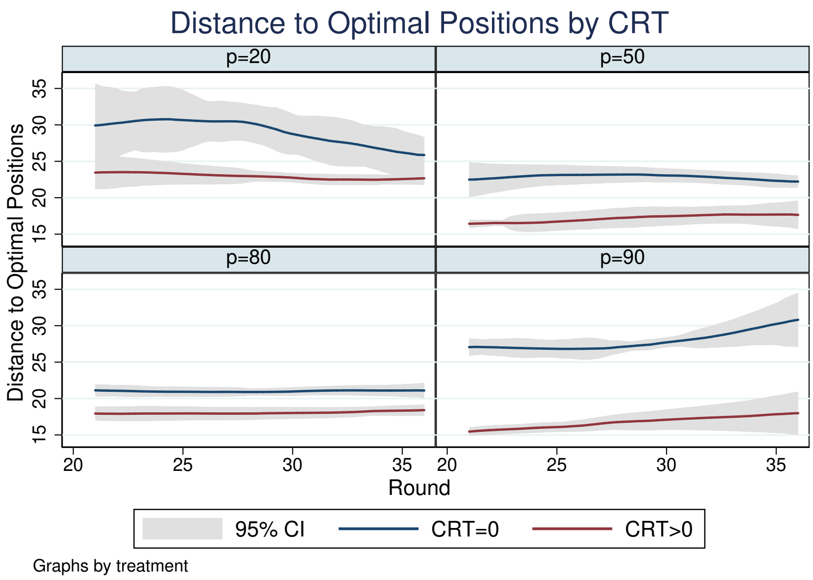


Notes. Percentage of optimal organizational structure choices over time in the Selector Stage, split by CRT score. Higher numbers reflect closer proximity to optimal structure. Each panel represents one treatment.

Similarly, figure B.5 plots the distance between the positions selected by the Managers and the optimal benchmark positions, by treatment (here, lower values indicate better decisions). Two results stand out: 1) Cognitive reflection is consistently an important determinant for team selection in all treatments. More reflective Managers are statistically closer to the benchmark predictions from the first round of the Selector stage in all treatments. 2) These more-reflective Managers are more stable in their strategies with narrower confidence intervals, particularly in the 20% treatment. Thus, the evidence suggest that cognitive reflection is even more relevant for team selection than choosing the correct organizational structure.

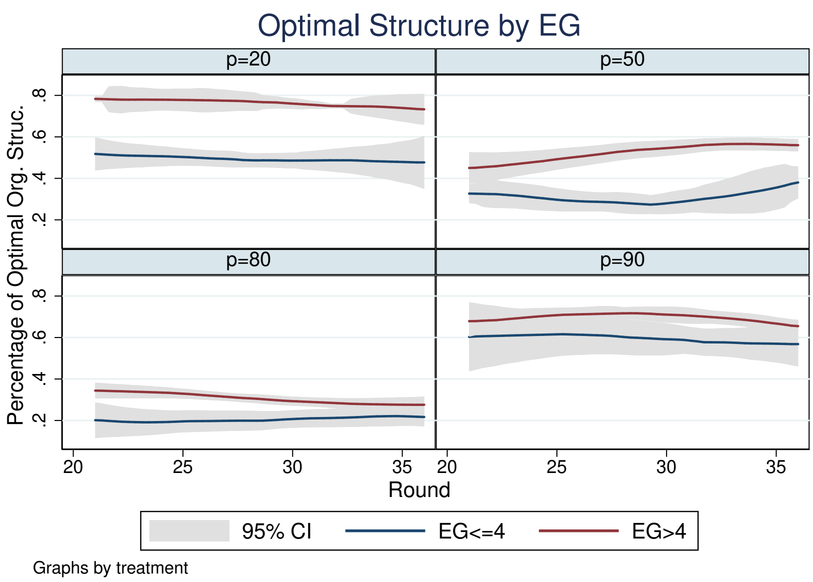
We next analyze the effects of risk tolerance over time in the Selector stage. Figure B.6 plots the percentage of optimal organizational structures selected by round, by risk preference, in each treatment. This figure confirms our previous results that risk tolerant Managers choose the optimal organizational structure more often, with the strongest improvements coming under greater uncertainty.

Figure B.5: CRT and Team Selection Trends



Notes. Average distance to optimal team composition over time in the Selector Stage, split by CRT score. Lower numbers reflect closer proximity to optimal teams. Each panel represents one treatment.

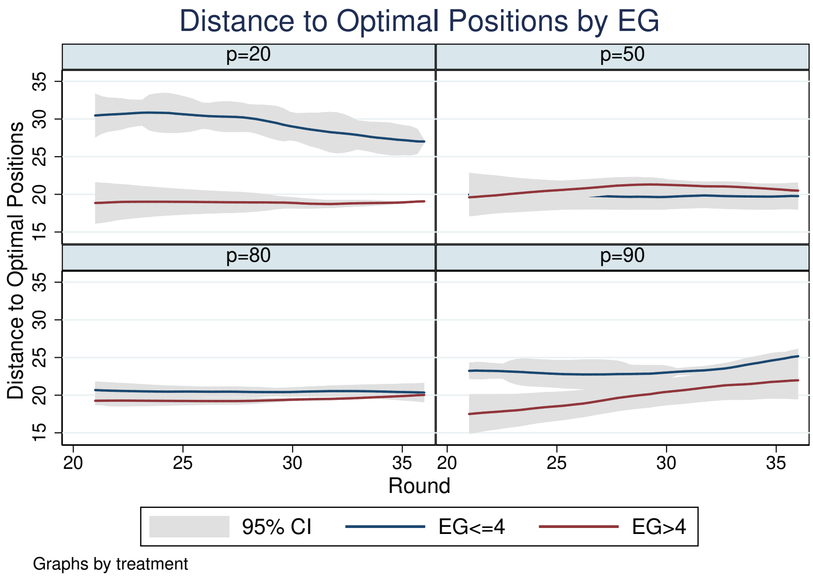
Figure B.6: Risk Tolerance and Organizational Structure Trends



Notes. Percentage of optimal organizational structure choices over time in the Selector Stage, split by EG score. Higher numbers reflect closer proximity to optimal structure. Each panel represents one treatment.

Figure B.6 plots the distance between Worker positions and those predicted by the benchmark model. Note that risk tolerance only shows a benefit in the 20% treatment. Interestingly, the effect in this treatment is not only significant, but the risk tolerant Managers are also more stable, as shown by their narrower confidence intervals.

Figure B.7: Risk Tolerance and Team Selection Trends

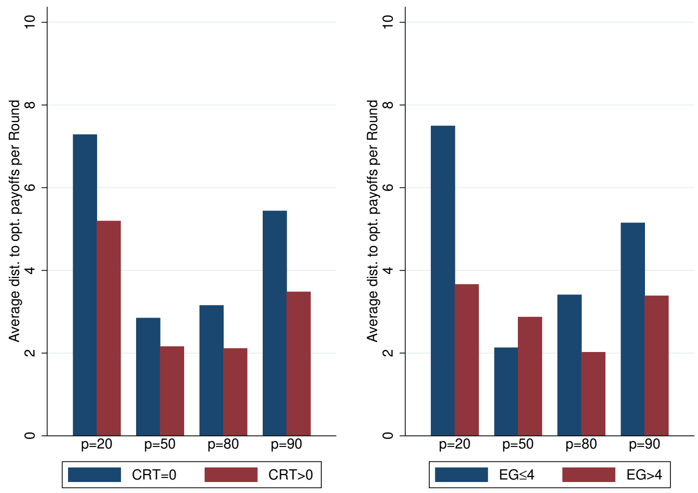


Notes. Average distance to optimal team selection over time in the Selector Stage, split by EG score. Lower numbers reflect closer proximity to optimal teams. Each panel represents one treatment.

B.4 Effects of CRT and EG in Payoffs

Figure B.8 shows that the less reflective and more risk averse Managers are significantly farther below their maximal earnings. In particular, note that the less reflective Managers are nearly 2 ECU per round farther away in both the best and worst information conditions. Likewise, risk averse Managers lag their counterparts by about 3 ECU per round in the 20% condition. These differences in payoffs amount to more reflective Managers earning the equivalent of more than two additional rounds of play. The less reflective Managers are so far behind, its as if they stopped the experiment early. Similar results are seen when comparing more and less risk tolerant agents.

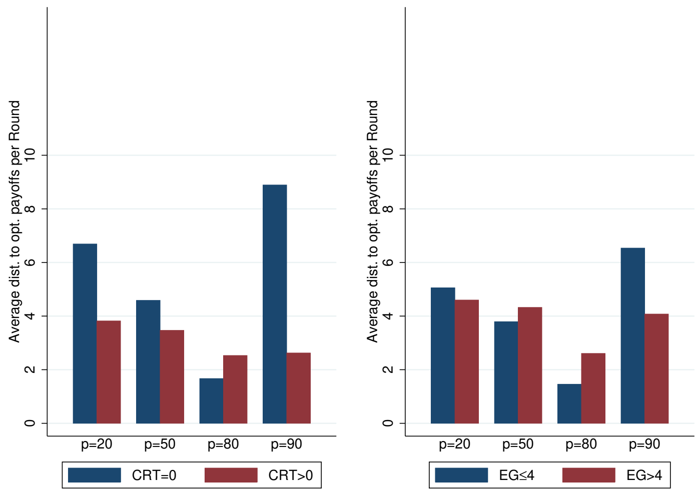
Figure B.8: Deviation from Maximum Payoffs by Treatment: Selector Stage



Notes. Average distance between realized payoffs and the potential payoffs obtained if the Manager had chosen the optimal team selection and allocation of decision rights (in ECU) in the Selector stage of each treatment, by CRT (left) and risk (right). Lower scores reflect closer-to-optimal payoffs.

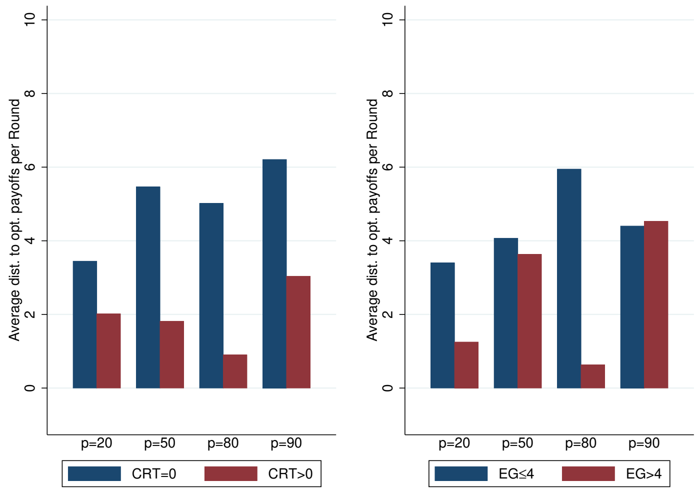
Figures B.9 and B.10 replicate the same analysis for the Centralized and Decentralized stages.

Figure B.9: Deviation from Maximum Payoffs by Treatment: Centralized Stage



Notes. Average distance between realized payoffs and the potential payoffs obtained if the Manager had chosen the optimal team selection (in ECU) in the Centralized stage of each treatment, by CRT (left) and risk (right). Lower scores reflect closer-to-optimal payoffs.

Figure B.10: Deviation from Maximum Payoffs by Treatment: Decentralized Stage



Notes. Average distance between realized payoffs and the potential payoffs obtained if the Manager had chosen the optimal team selection (in ECU) in the Decentralized stage of each treatment, by CRT (left) and risk (right). Lower scores reflect closer-to-optimal payoffs.

B.5 Homogeneous Teams

First, it is necessary to point out that the model does not predict a homogenous team in any of our treatments. However, it predicts that in a centralized organization, the Manager should select a more homogenous team as the probability to view tasks decreases. At the limit, when the Manager has no information the optimal team predicted is to position both Workers in the middle, at the level of the average task received.

We observe homogenous teams in 14% of all rounds (596 out of 4284) with 90% of them centrally-located ($\theta_1 = \theta_2 = 50$). They occur in all treatments, comprising 11.2%, 7.6%, 18.8% and 12.6% in the 20, 50, 80 and 90 treatments, respectively. By stages, we observe perfectly homogeneous teams in 14.2% (centralized), 15.2% (decentralized) and 9.9% (selector) of all observations. When we decompose the selector stage into centralized and decentralized groups, we find homogenous teams in 11.5% and 7.6% of the rounds, respectively. Three things to note: 1) The high number of homogeneous teams, especially when information quality is high. 2) Managers use this strategy less frequently in the selector stage, which suggests a learning process. 3) In the selector stage, Managers tended to use this strategy less often when they decided to decentralize, in line with the model predictions. When, then, do Managers decide to follow this strategy?

1. First, we observe that 40.6% of the rounds played with this strategy belong to players using it during the whole stage, selecting homogeneous teams in all 10 rounds of the centralized (6 agents) or decentralized (7 agents) stages, or in all 16 rounds of the selector stage (7 agents). One possible explanation could be that the most risk averse agents take this strategy to reduce payoff variance, but we do not see any correlation between our risk aversion measure and this result. Another explanation is that agents want to facilitate their decision-making, using this as a simplifying heuristic. We are going to analyze further the role of the CRT later.
2. Second, 46 agents begin a new stage using a homogeneous team and then change their strategy.
3. Third, Managers select a homogeneous team in 170 rounds after they obtained a bad result (28% of all homogeneous rounds). We define a bad result as realizing payoffs under 25 in a single round, which is the expected payoff for a completely homogenous team independent of the organizational structure.
4. Fourth, we observe that Managers change to a homogeneous team in only 53 cases after observing a good result (greater than 25 ECU). From these 53 cases, only 13 again selected such a homogeneous team.

These findings allow us to identify 3 main strategies to explain the observed homogeneous teams during our experiment: 1) Some agents decided to play a homogenous team during a complete stage. 2) Other agents start the stage with a homogeneous team and at some point, they abandon this strategy. 3) Finally, some agents start with a heterogenous team but after a bad result they react selecting a homogenous team. They played this homogeneous team for one or more rounds. Using these strategies, we can explain up 91.1% of the observed homogeneous teams.

In table B.7, we analyze the relationship between the cognitive reflection test and risk tolerance with the selection of perfectly homogenous teams. First, notice in Panel A that there are slightly more rounds with homogenous teams among risk tolerant and reflective agents. When we analyze these by stage, they are pretty similar between risk tolerant or risk averse agents. Comparing high and low CRT, this is not quite the case. We observe a positive correlation between CRT and homogeneity in centralized groups, but negative under decentralization. Panels A and B show that in the Selector stage, there are fewer rounds with homogeneous teams and fewer players using this strategy. While the number of players using this strategy decreases for all types, it decreases much more for high-CRT and risk tolerant agents. Finally, Panel C shows that those players who keep using homogenous teams in the selector stage increases the number of rounds playing this strategy. This is especially true for the risk tolerant agents. Also, we observe this pattern more clearly in the centralized rounds for the more reflexive agents and in the decentralized rounds for the less reflexive ones. So fewer people keep using homogeneous teams, but the people who do use homogeneous teams do so even more frequently.

Table B.7: Homogeneous Teams by Stage, CRT and EG

	Cognitive Reflection Test		Risk Tolerance	
	$CRT = 0$	$CRT > 0$	$EG \leq 4$	$EG > 4$
Panel A				
Homogeneous Teams (HT) by:				
All - Number (N)	291	305	289	307
All - Percent (%)	48.8	51.2	48.5	51.5
Centralized Stage (N)	65	113	81	97
Centralized Stage (%)	36.5	63.5	45.5	55.5
Decentralized Stage (N)	118	90	104	104
Decentralized Stage (%)	56.7	43.3	50.0	50.0
Selector Stage:				
Centralized Rounds (N)	54	84	68	70
Centralized Rounds (%)	39.1	60.9	49.2	50.8
Decentralized Rounds (N)	54	18	36	36
Decentralized Rounds (%)	75.0	25.0	50.0	50.0
Panel B				
Agents playing at least 1 HT:				
Centralized Stage (N)	31	22	27	26
Centralized Stage (%)	51.7	37.9	42.2	48.1
Decentralized Stage (N)	34	25	31	28
Decentralized Stage (%)	56.7	43.1	48.4	51.9
Selector Stage:				
Centralized Rounds (N)	16	12	16	12
Centralized Rounds (%)	26.7	20.6	26.7	22.2
Decentralized Rounds (N)	16	7	14	9
Decentralized Rounds (%)	26.7	12.1	23.3	16.7
Panel C				
Av. rounds with HT for players in Panel B:				
Centralized Stage	2.1	5.0	3.0	3.7
Decentralized Stage	3.5	3.6	3.4	3.7
Selector Stage				
Centralized Rounds	3.4	6.7	4.8	5.2
Decentralized Rounds	4.1	3.5	3.0	5.3

Notes. This table analyzes the distribution of the rounds where Managers played homogeneous teams by their level of reflection (CRT) and risk tolerance (EG). Panel B includes the total amount of Managers per characteristic. We have 60 agents with $CRT \leq 0$ and 58 agents with $CRT > 0$. Also, we have 64 agents with $EG \leq 4$ and 54 agents with $EG > 4$.

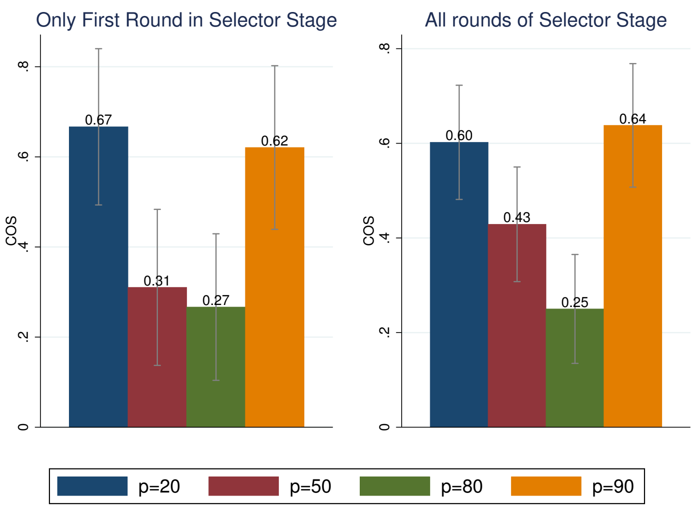
B.6 Investigation of reputation and reciprocity motives

In this section we show that there is little evidence that Workers systematically behave based on reputational concerns or reciprocity motives. There are several possible reasons behind this result. First, Workers have a very simple decision to make. In order to maximize payoffs, Workers must choose the task closer to their specialization. Second, Workers make decisions only in a decentralized organization. Third, reciprocity can only appear when there is a conflict of interest between the Worker and the rest of the team. In those situations, a Worker may decide to increase the payoffs of their team members at cost to themself (which is our measure of cooperative behavior). Conflict of interest appears in 20.75% of all rounds played in the experiment and in 20.5% of the rounds where Workers make the task allocation decision. We find evidence of cooperative behavior only in 2.4% of these delegated rounds (49 rounds out of 1956), which represents only around 1% of the total number of rounds in the experiment. Importantly, it appears only in 0.9% of the rounds played in the Selector stage (18 out of 1888). Moreover, only 3 out of 119 Selector stage groups show this behavior multiple times.

Workers can only jointly punish the Manager if both Workers decide to exchange tasks to reduce the payoff of the Manager. However, it reduces their own payoffs as well. This type of behavior theoretically is ruled out as a possible outcome of the game because it is based on non-credible threats. Empirically, we find such behavior in less than 9% of decentralized rounds. If we focus only on the Selector stage, it happens only in 3.38% of the time (64 out of 1888 rounds). Once again, it appears multiple times in only 4 triads out of 119 in the Selector Stage. So, most of the cases we observe are in the decentralized stage. These decisions might be a result of the misunderstanding of the Workers while playing the decentralized stage, which improves when they play the Selector stage. It is not possible to disentangle between the latter explanation and the one related to punishments as a consequence of the Manager bad reputation.

It is possible to show that agents behave similarly, on average, in the first round of the selector stage as they do in all the others, particularly in their organizational structure decision. In the next figure, we show that we obtain similar results for the organizational structure decision in the first round of the Selector stage as when we consider all the rounds in this stage.

Figure B.11: Percentage of Optimal Org. Structure



Notes. The left-hand panel plots the percentage of optimal organizational structure decisions in the first round of the Selector stage and the right-hand panel plots the percentage of optimal organizational structure decisions in all the rounds of the Selector stage. There are 30 Managers in the 20% and 80% treatments and 29 Managers in the 50% and 90% treatments for totals of 480 and 464 rounds, respectively.

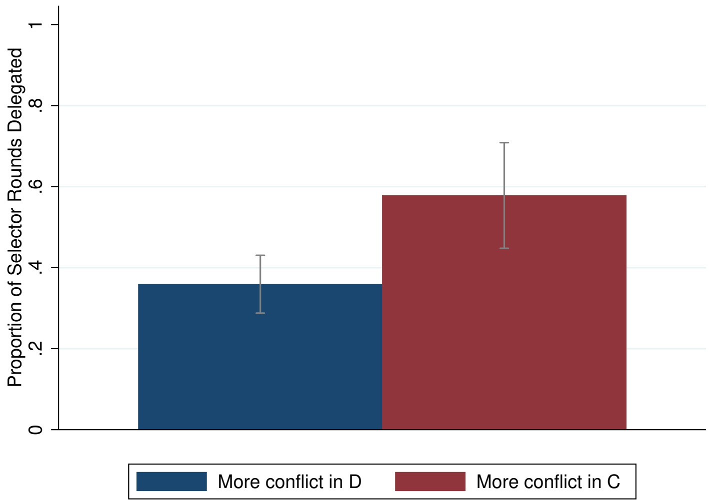
This figure plots the percentage of rounds where the Managers are choosing the optimal organizational structure by treatment. We obtain the same pattern for most treatments, with improvement only in 50% treatment. No significant difference in team heterogeneity is discernable across treatments in the first round of the selector stage compared to all rounds. Managers tend to select the correct organizational structure more often in the extreme informational treatments, and delegate less as the level of information increases.

In any case, we conclude that reciprocity and reputational concerns cannot robustly explain behavior in the Selector stage.

B.7 More evidence on Mechanisms

In addition to our analyses in section 5.3.2 of the manuscript, we find that Managers react to bad outcomes in the first two stages, which we define as either outcomes in which they realize that they made a mistake in centralized rounds, or outcomes that went against their preferences in the decentralized rounds. Bad outcomes in the first two stages influence delegation decisions in the Selector stage, as shown in Figure B.12. Managers who realized more outcomes that went against their preferences in the forced decentralized (centralized) stage delegated less (more) often in the Selector stage.

Figure B.12: Effect of Conflict in Stages 1 and 2 on Selector Delegation



Notes. Percent of rounds delegated in Selector stage, based on whether the Manager observed more outcomes against their preferences in either the first two stages, C or D.

C Experimental Materials

Here we explain the subject recruiting procedure in greater detail, report sample size determination and power, include our experimental instructions,and screenshots of the ztree software. Instructions were presented on the computer screens, with the bold sub-headings denoting a new screen.

C.1 Recruiting Procedure

Treatments were randomized by session in advance, and were not communicated to participants in the recruitment email. These recruitment emails used the standard language for each laboratory location, identifying the session as an experiment in economic decision making and noting the duration and show-up fee.

The following table shows how demographic characteristics were distributed by location.

Table C.1: Summary Statistics

All Participants

	All Sample			Spain			USA			T-test by Country
Category	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	p-value
Gender	340	0.56	0.50	112	0.65	0.48	228	0.51	0.50	0.01*
Age	340	21.14	2.28	112	20.85	2.71	228	21.29	2.02	0.13
CRT	354	0.71	0.92	126	0.73	0.98	228	0.69	0.88	0.72
EG	354	3.40	1.45	126	3.47	1.40	228	3.37	1.48	0.53

Participants in Manager Role

	All Sample			Spain			USA			T-test by Country
Category	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	p-value
Gender	118	0.51	0.50	42	0.62	0.49	76	0.45	0.50	0.07
Age	118	21.14	2.15	42	20.86	2.81	76	21.29	1.69	0.37
CRT	118	0.79	0.94	42	0.86	1.05	76	0.75	0.88	0.58
EG	118	3.64	1.44	42	3.55	1.38	76	3.7	1.48	0.58

Notes. * p< 0.1. Gender = 1 if Female. CRT takes values from 0 to 3, while EG takes values from 1 to 5. Some participants in Spain forgot to complete their age and gender.

Table C.2: Summary Statistics by treatment

Participants in Manager Role

	20% Treatment			50% Treatment			80% Treatment			90% Treatment		
Category	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD
Gender	30	0.50	0.26	29	0.52	0.26	30	0.50	0.26	20	0.52	0.26
Age	30	21.10	5.09	29	21.07	4.57	30	21.40	5.83	29	20.97	3.39
CRT	30	0.87	0.67	29	0.76	0.90	30	0.67	1.20	29	0.86	0.84
EG	30	3.33	2.37	29	3.90	1.95	30	3.67	1.86	29	3.69	2.15

Notes. * p< 0.1. Gender = 1 if Female. CRT takes values from 0 to 3, while EG takes values from 1 to 5. Some participants in Spain forgot to complete their age and gender.

C.2 Sample Size and Power

We determined our sample size based largely on the need to evenly balance observations across locations for each treatment. The need to counter-balance our first two stages led to our collecting four sessions of each treatment. This gives us a total of 118 Managers, with at least 29 Managers in each treatment. The repeated nature of the experiment gives us enough total observations to identify results at the traditional power level of 0.8. In Table C.3, we report the observable effect sizes for various sample sizes. In our regressions of stages 1 and 2, we focus on the final five rounds, which gives us approximately 300 observations. This doubles to 600 is we consider all rounds of stages 1 and 2. The Selector stage can similarly be divided into the final eight rounds (480 obs.) or all sixteen (960 obs.). Note that our minimum detectable effect size for the Team Selection decision is below almost all reported coefficients in the regressions. Similarly, these calculations show that our design is easily powered enough to identify the differences in delegation behavior observed in the regressions.

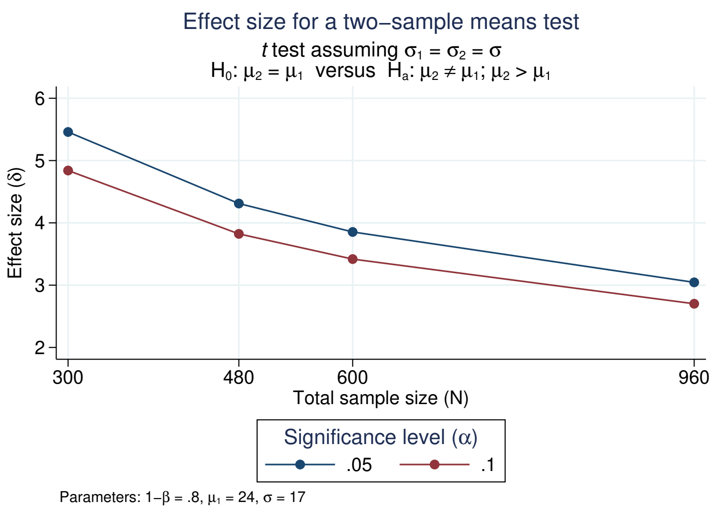
Table C.3: Power Test

	Minimum Detectable Effect Size				
N. Obs.	300	480	600	960	Power
	Team Selection				
95%CI	5.459	4.310	3.854	3.045	0.8
90%CI	4.840	3.823	3.419	2.701	0.8
	Delegation				
95%CI		0.1281		0.0905	0.8
90%CI		0.1136		0.0803	0.8

Notes. Top Panel: Deviation from optimal positions for all Managers, with mean of 23.53 and standard deviation of 16.82. Bottom Panel: Probability to select the correct organizational structure for all Managers, with mean of 0.48 and a standard deviation of 0.5.

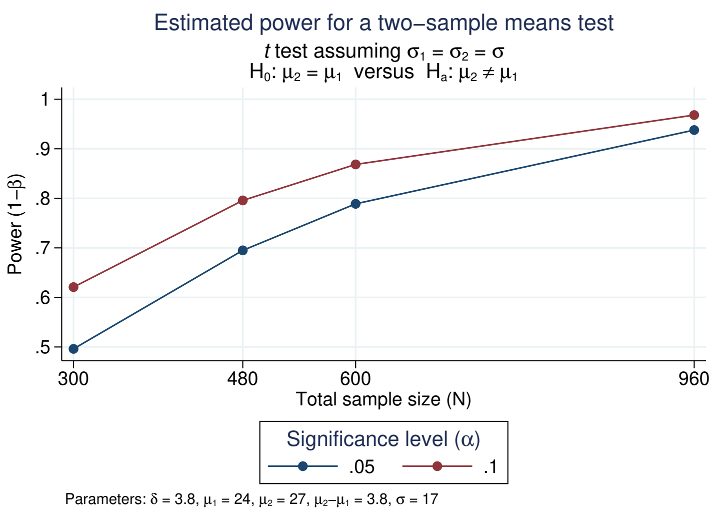
Figures C.1 and C.2 report minimum detectable effect size and statistical power for our team selection decision under two levels of significance and sample sizes that use either half of the rounds in a stage or all rounds.

Figure C.1: Minimum Detectable Effect Size: Team Selection



Notes. Deviation from optimal positions, mean of 23.53 and standard deviation of 16.82.

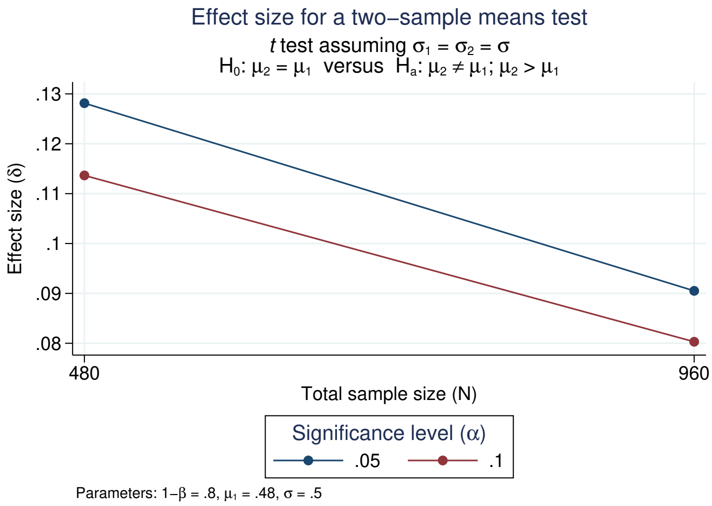
Figure C.2: Power Test: Team Selection



Notes. We assume a minimum detectable effect size of 3.8 which is the minimum significant value observed in Table B.1.

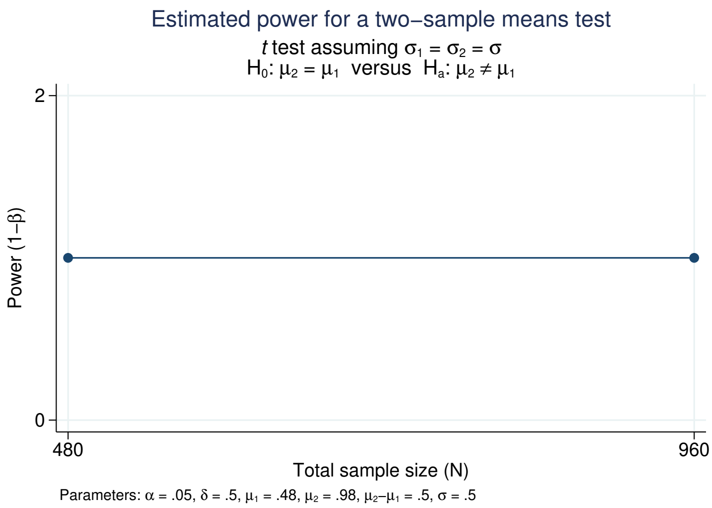
Figures C.3 and C.4 report minimum detectable effect size and statistical power for our delegation decision under two levels of significance and sample sizes that use either half of the rounds in a stage or all rounds.

Figure C.3: Minimum Detectable Effect Size: Delegation



Notes. Optimal organizational structure, with mean of 0.48 and standard deviation of 0.5.

Figure C.4: Power Test: Delegation



Notes. We assume a minimum detectable effect size of 0.5 which is the minimum significant value observed in Table B.4.

C.3 Instructions Sample: C-D version

The following are instructions for our experimental sessions that begain with the Centralized stage. Those sessions beginning with the Decentralized stage simply swapped the text describing stages 1 and 2. Treatment differences are in curved brackets.

General Information[12]

This is an experiment in decision-making. In addition to a $10 participation fee, you will be paid any additional money you accumulate during the experiment at the conclusion of today's session.

All payoffs during the experiment are denominated in an artificial currency, experimental currency units (ECU). At the end of the experiment, ECU will be converted to cash at the rate of $1 per 60 ECU. Upon completion of the experiment, your earnings will be converted to dollars and you will be paid privately, by check. The exact amount you receive will be determined during the experiment and will depend on your decisions and the decisions of others.

The identities of participants will remain confidential, meaning that at no point in time will we identify the role or actions of any individual to other participants. In other words, the actions that you take during this experiment will remain confidential.

If you have any questions during the experiment, please raise your hand and wait for an experimenter to come to you. Please do not talk, exclaim, or try to communicate with other participants during the experiment. Participants intentionally violating these rules or otherwise behaving in a disruptive fashion will be asked to leave the experiment and will not be paid.

Please click "Continue".

Description of Stages, Rounds, and Groups

This experiment will consist of three stages (I, II, and III). Right now we will go through the instructions for Stage I. You will receive new instructions later for Stages II and III.

Stage I will last for 10 rounds. In each round, you will be in a three-person group with two other participants. The participants you are grouped with will be the same for all rounds of Stage I.

Your group will consist of participants in two roles. One of the participants will participate in the experiment in the role of Participant A. The remaining participants in each group will be in the role of Participant B, identified as B1 and B2. All participants will be able to observe the outcomes for their group in each round of Stage I.

You will be informed of your role (A or B) prior to the beginning of Stage I.

Overview of the Tasks in Stage I

Each B participant will be assigned to one of two markers (labeled M1 and M2) at the beginning of every round. These markers will be randomly positioned on a scale with values from 0 to 100, with each position equally likely to occur. Each B participant will always see the position of his or her assigned marker as well as the marker position for the other B participant in his or her group. Specifically, each B participant observes both M1 and M2, regardless of the marker to which he or she is assigned.

In every round of Stage I, the A participant in each group will make two decisions, which we will call the Placement and Switch decisions. We will give an overview of these decisions before describing each of them in detail. Once we finish the detailed descriptions, we will take time to answer any decision-related questions before carefully explaining participants' payoffs.

Placement Decision

[12] The horizontal lines divide the instructions by screens viewed by the participants.

The first decision for A participants is the Placement decision. In this decision, each A participant must position the B participants in his or her group on the same scale used for the markers assigned to the B participants. This is done by choosing a value from 0 to 100 for each B participant. The goal of the A participant is to minimize the distance between the locations of each B participant and that participant's final assigned marker. Once the Placement decision has been made for both B participants, the B participants will know their position on the scale.

When A participants choose the placement for each B participant in their group, they will not know the initial marker position that was randomly assigned to each B participant.

Switch Decision

Once the A participant has positioned both B participants, each initial marker will be revealed to the A participant with a 20% {50%, 80%, 90%} chance. We will describe this in more detail shortly.

Once the markers have been revealed or not to the A participant, he or she will make the final decision in the round, the Switch decision. This decision gives the A participant the option to change the marker initially assigned to each B participant. Specifically, the A participant will choose whether to switch the initial assigned markers or leave them unchanged. The markers assigned after the Switch decision are the final markers of each B participant.

We will now look at an example of how this will work. Please click "Continue".

Description of the Placement decision in Stage I

In Stage I, the A participant in each group will complete the Placement decision on a scale like the one shown below. If you are an A participant, you will decide the position of each B participant individually. This is done by entering a value into the boxes below with any whole number between 0 and 100. Please take a moment to familiarize yourself with the positioning boxes. Note that when you choose the position values, two colored markers appear on the scale shown below. When you change the position values, the colored markers move as well. Also note that you may choose a different position for each B participant or place both B1 and B2 in the same position.

All A participants will make their decisions at the same time. All B participants will see the decisions made by the A participant in their group.

Once you have finished experimenting with the sample placement decision above, please click Continue.

Description of the Switch Decision in Stage I

After all A participants have made their Placement decision, each marker initially assigned to the B participants will be revealed to the A participant with probability p=0.2 {p=0.5, p=0.8, p=0.9}. This means that with 20% {50%, 80%, 90%} chance each marker will be revealed to the A participant. In other words, for each marker (M1 and M2), there is a 1 out of 5 chance (20%) {1 out of 2 chance (50%), 4 out of 5 chance (80%), 9 out of 10 chance (90%)} that the A participant will see the true marker position initially assigned to the B (B1 or B2) participant, and a 4 out of 5 chance (80%) {1 out of 2 chance (50%), 1 out of 5 chance (20%), 1 out of 10 chance (10%)} that he or she will not see the B (B1 or B2) participant's initial assigned marker position. The chance of seeing the position for M1 is separate from the chance of seeing M2's position. This means that the probability of seeing one marker is not affected by seeing the other marker. In each round, the A participant may see the position of one marker, both markers, or no markers. The likelihood of seeing a marker in any round is not affected by whether a marker was seen in the previous round.

Remember that the initial marker positions will always be revealed to the B participants. Each B participant will see the actual initial marker positions and the assignment of each marker, whether the markers are revealed to the A participant or not.

Whether each marker is revealed or not, the A participant may then Switch the markers initially assigned to each B participant in his/her group. This means that the B participant's final marker may be different than his or her initial marker. After that Switch decision has been made, all participants will see the results of the round.

Description of Role A Participant Payoffs

All A participants will begin each round with 50 ECU. If you are an A participant, your payoff will depend on the positions of the B1 and B2 participants in your group (variables B1 and B2, respectively), as well as the value of the two randomly determined markers assigned to each B participant (variables M1 and M2).

Your payoffs will increase when the positions of the B participants are closest to their matched marker. Specifically, your payoffs will be determined by the following equation:

$$A\ Payoff \ = 50 - 0.5 \times |M1 - B1| - 0.5 \times |M2 - B2|$$

In the above example equation, participant B1 is matched to marker M1 and participant B2 is matched to marker M2. If the A participant chooses to switch markers, the payoffs would then be given by:

$$A\ Payoff \ = 50 - 0.5 \times |M2 - B1| - 0.5 \times |M1 - B2|$$

Note that the payoffs are determined by each B participant's final assigned marker, not necessarily the initially assigned marker.

Please, take a moment to familiarize yourself with this formula. You can fill out the example boxes below with different position values to understand better how the payoff for each A participant is calculated.

It is, in principle, possible that you make negative earnings in a round. However, you can always avoid this with certainty through your own choices. Remember that your earnings from today's experiment will be accumulated over all rounds. In a given round, your expected payoff, in ECU, is positive.

Description of Player B Payoffs

All B participants will likewise begin each round with 50 ECU. If you are a B participant, your payoffs will depend on your distance from your assigned marker. Specifically, your payoffs will be given by the following equations:

$$\begin{aligned} B1\ Payoff \ &= 50 - |M1 - B1| \\ B2\ Payoff \ &= 50 - |M2 - B2| \end{aligned}$$

In the above example equation, participant B1 is matched to marker M1 and participant B2 is matched to marker M2. If the A participant chooses to switch markers, the payoffs would then be given by:

$$\begin{aligned} B1\ Payoff \ &= 50 - |M2 - B1| \\ B2\ Payoff \ &= 50 - |M1 - B2| \end{aligned}$$

Note again that the payoffs are determined by each B participant's final assigned marker, not necessarily the marker that was initially assigned.

Please, take a moment to familiarize yourself with this formula. You can fill out the boxes below with different position values to understand better how the payoffs for B participants are calculated.

It is, in principle, possible that you make negative earnings in a round. Remember that your earnings from today's experiment are accumulated over all rounds of the game. In a given round, your expected payoff, in ECU, is positive.

Results of Each Round

At the end of each round, all participants will see the results of the round and the results of the previous rounds played on Stage I.

If you are an A participant, you will see the position of the B participants in your group. You will also see which markers, if any, were revealed to you in the round. Lastly, you will see your payoffs for the round, in ECU, as well as the payoffs of the B participants in your group.

If you are a B participant, you will see your assigned position, the position of the other B participant, and the actual marker values. You will again see to which marker you have been assigned, as well as your payoffs for the round. You will also see the payoffs of the other B participant and your group's A participant. B participants will also see if the A participant decided to switch the markers or not.

Quiz: Payoffs

To make sure that everyone understands the payoffs for Stage I, please take a moment to complete the following example. The numbers used in this example were randomly drawn from the same 0 - 100 scale described previously. Click Continue once you have completed the example.

Imagine the A participant positions B1 at 10 and B2 at 80. The marker M1 is at 50 and the marker M2 is at 30. Initially, B1 is matched to M1 and B2 is matched with M2.

If the A participant does not switch markers, enter the payoffs for each participant:

- B1 participant (use entry boxes)
- B2 participant
- A participant

If the A participant instead chooses to switch markers, enter the payoffs for each participant:

- B1 participant
- B2 participant
- A participant

Quiz: Stage I Information

To make sure that everyone understands the instructions for Stage I, please take a moment to answer the following questions. Once everyone has responded correctly, we will proceed to the first round of Stage I.

(use radio True/False buttons)

1. The three members of your group will be fixed for all rounds of Stage I. (TRUE)
2. The B participants will never see their randomly initial assigned markers. (FALSE)
3. The A participants will see each marker position assigned to the B participants with a 20% {50%, 80%, 90%}chance. (TRUE)
4. The B participants will know where their A participant has positioned them. (TRUE)
5. The A participants will never see both marker positions assigned to participants B in a round. (FALSE)
6. The A participant will make both the Placement and Switch decisions in each round. (TRUE)

Placement Decision (A Participant)

Select the positions of the B participants. Remember, you have to minimize the distance between the final marker assigned to each B participant (the assigned marker after the Switch decision) and the position selected. Notice, you can assign the same position for both B participants. Remember that there is a 1 in 5 {1 in 2, 4 in

5, 9 in 10} chance that you will observe each of the initial markers assigned to the B participants, and then you will complete the Switch decision.

After you have chosen the positions that you prefer, press the "Select" button. Then, press "Continue".

Hypothetical Placement Decision (B Participants)

Please complete this hypothetical decision while the A participant in your group is completing the Placement decision.

Imagine that you are the A participant. Using the boxes, select the hypothetical positions of the B participants in your group. This will not affect your payment from today's experiment, but we are interested in your answers. Remember, the A participant's goal is to minimize the distance between the final marker assigned to each B participant (the assigned marker after the Switch decision) and the position selected. Notice, you can assign the same position for both B participants. Remember, the A participant knows he or she will observe each of the initial markers assigned to the B participants with a 1 in 5 {1 in 2, 4 in 5, 9 in 10} chance and then he or she will complete the Switch decision.

After you have chosen the positions that you prefer, press the "Select" button. Then, press "Continue".

Stage II

We have now concluded Stage I of the experiment. Stage II will consist of 10 rounds.

Your group in Stage II is composed of yourself and two different participants than your Stage I group, but all participants will play the same roles that they played in Stage I. In other words, your Stage II role (A, B1 and B2) will be the same as your role in Stage I. In Stage II, the A participants will again complete the Placement decision by choosing a position for each B participant in his or her group. The possible positions will be identical to Stage I. Once again, the B participants will be assigned randomly an initial marker and each marker will once again be revealed to the A participant with a 20% {50%, 80%, 90%} chance, just as in Stage I. As in Stage I, seeing one marker does not raise or lower the A participant's chance of seeing the other marker. Also, the A participant seeing a marker in one round does not affect the likelihood of seeing a marker in the next round. All B participants will see the initial marker values in every round, just as in Stage I. Payoffs in Stage II will be calculated exactly as they were in Stage I using the same payoff functions.

However, in Stage II the A participant will no longer complete the Switch decision. In each round of this stage, participants B1 and B2 will complete the Switch decision. To make their decision, B participants will vote on whether or not to switch their initial assigned markers. The markers will only be switched if both B1 and B2 choose to switch. If only one B participant chooses to switch, no switch will occur. Therefore, a switch will only occur if it is unanimously agreed upon by the B participants.

Please click "Continue".

Results of Each Round

At the end of each round of Stage II, A participants will see the same information they saw in Stage I, and they will now also see whether the B participants chose to switch markers or not.

Each B participant will see all the information they saw in Stage I, and will now see whether they unanimously chose to switch markers.

This means that all participants will see the same information they saw in Stage I, including their decisions, the decisions of other members of their group, their payoffs, and the payoffs of his/her group members.

Quiz: Stage II Information

To make sure that everyone understands the instructions for Stage II, please take a moment to answer the following questions. Once everyone has responded correctly, we will proceed to the first round of Stage II.

(use radio True/False buttons)

1. The three members of your group will be fixed for all rounds of Stage II. (TRUE)
2. Your group members are the same three participants from Stage I. (FALSE)
3. The A participant will make both the Placement and Switch decisions in each round. (FALSE)

Placement Decision (A Participant)

Select the positions of the B participants. Remember, you have to minimize the distance between the final marker assigned to each B participant (the assigned marker after the Switch decision) and the position selected. Notice, you can assign the same position for both B participants. Remember that there is a 1 in 5 {1 in 2, 4 in 5, 9 in 10} chance that you will observe each of the initial markers assigned to the B participants, and then the B participants will complete the Switch decision.

After you have chosen the positions that you prefer, press the "Select" button. Then, press "Continue".

Hypothetical Placement Decision

Please complete this hypothetical decision while the A participant in your group is completing the Placement decision.

Imagine that you are the A participant. Using the boxes, select the hypothetical positions of the B participants in your group. This will not affect your payment from today's experiment, but we are interested in your answers. Remember, the A participant's goal is to minimize the distance between the final marker assigned to each B participant (the assigned marker after the Switch decision) and the position selected. Notice, you can assign the same position for both B participants. Remember, the A participant knows he or she will observe each of the initial markers assigned to the B participants with a 1 in 5 chance, and then the B participants will complete the Switch decision.

After you have chosen the positions that you prefer, press the "Select" button. Then, press "Continue".

Stage III

We have now concluded Stage II of the experiment. Stage III will consist of 16 rounds.

Your group in Stage III is composed of yourself and two different participants than your Stage I or II group, but all participants will play the same roles that they played in Stage I and II. In other words, your Stage III role (A, B1 and B2) will be the same as your role in Stages I and II.

Before assigning positions B1 and B2, the A participant will now make a new decision. At the beginning of each round of Stage III, the A participant will choose who will complete the Switch decision - the A participant (as in Stage I) or the B participants (by vote, as in Stage II). We will refer to this new decision as the Selector decision.

If the A participant chooses to make the Switch decision himself or herself, then that round will be identical to the rounds in Stage I. If the A participant chooses to have the B participants make the Switch decision, the round will be identical to the rounds in Stage II. Therefore, each round of Stage III will be identical to a round from one of the first two stages of the experiment, as selected by the A participant.

All participants in your group will learn who will make the Switch decision in each round.

Results of Each Round

At the end of each round of Stage III, A and B participants will see the same information they saw in previous Stages.

This means that all participants will see their decisions, the decisions of other members of their group, their payoffs, and the payoffs of group members.

Selector Decision (A participant)

In Stage III, you choose which group members make the Switch decision in each round. You may choose to make this decision yourself or let the B participants make this decision.

Who do you prefer to make the Switch decision in this round?

1. You, the A participant
2. The B participants

Hypothetical Selector Decision (B participants)

Please complete this hypothetical decision while the A participant in your group is completing the Selector decision.

Imagine you are the A participant and choose which group members make the Switch decision in each round. This will not affect your payment from today's experiment, but we are interested in your answers. The A participant may choose to make this decision himself or let the B participants make this decision.

Who do you prefer to make the Switch decision in this round?

1. The A participant
2. The B participants

Placement Decision (A Participant)

Select the positions of the B participants. Remember, you have to minimize the distance between the final marker assigned to each B participant (the assigned marker after the Switch decision) and the position selected. Notice, you can assign the same position for both B participants. Remember that there is a 1 in 5 {1 in 2, 4 in 5, 9 in 10} chance that you will observe each of the initial markers assigned to the B participants, and the Switch decision will be as in Stage I or Stage II depending on your Selector decision.

After you have chosen the positions that you prefer, press the "Select" button. Then, press "Continue".

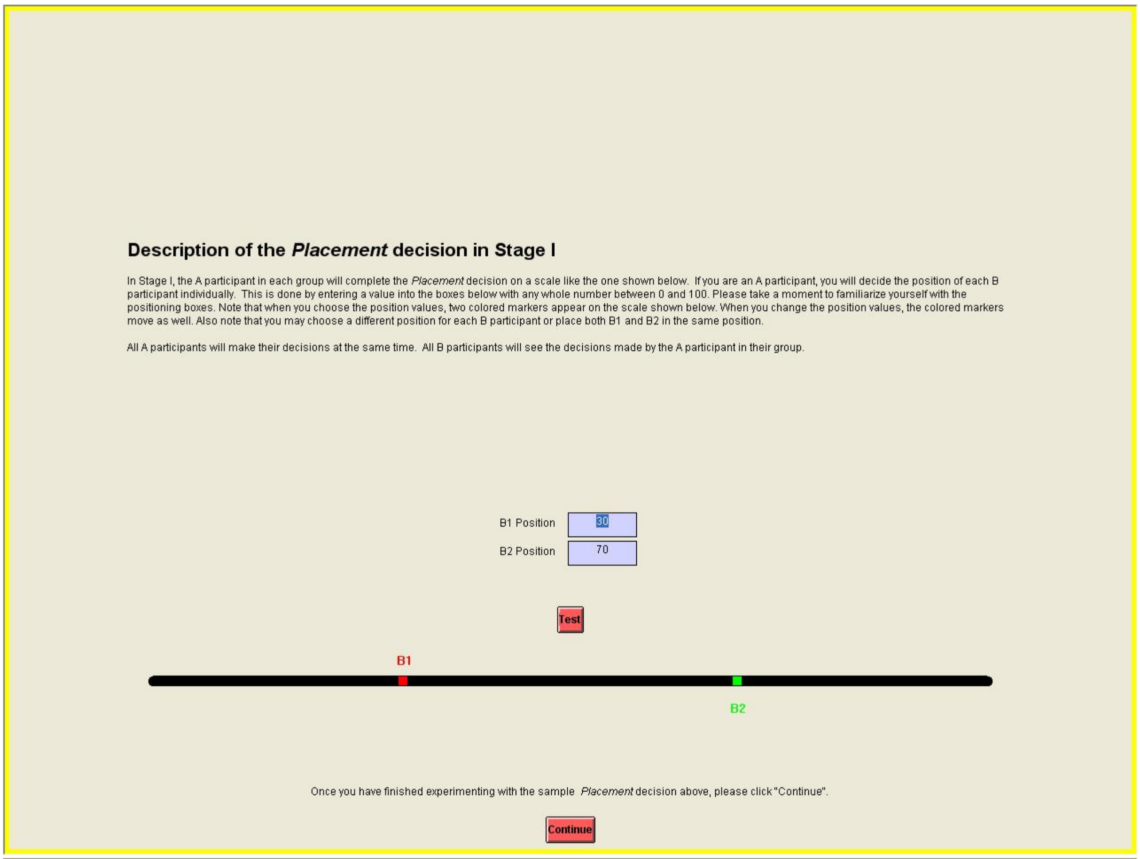
Hypothetical Placement Decision (B Participants)

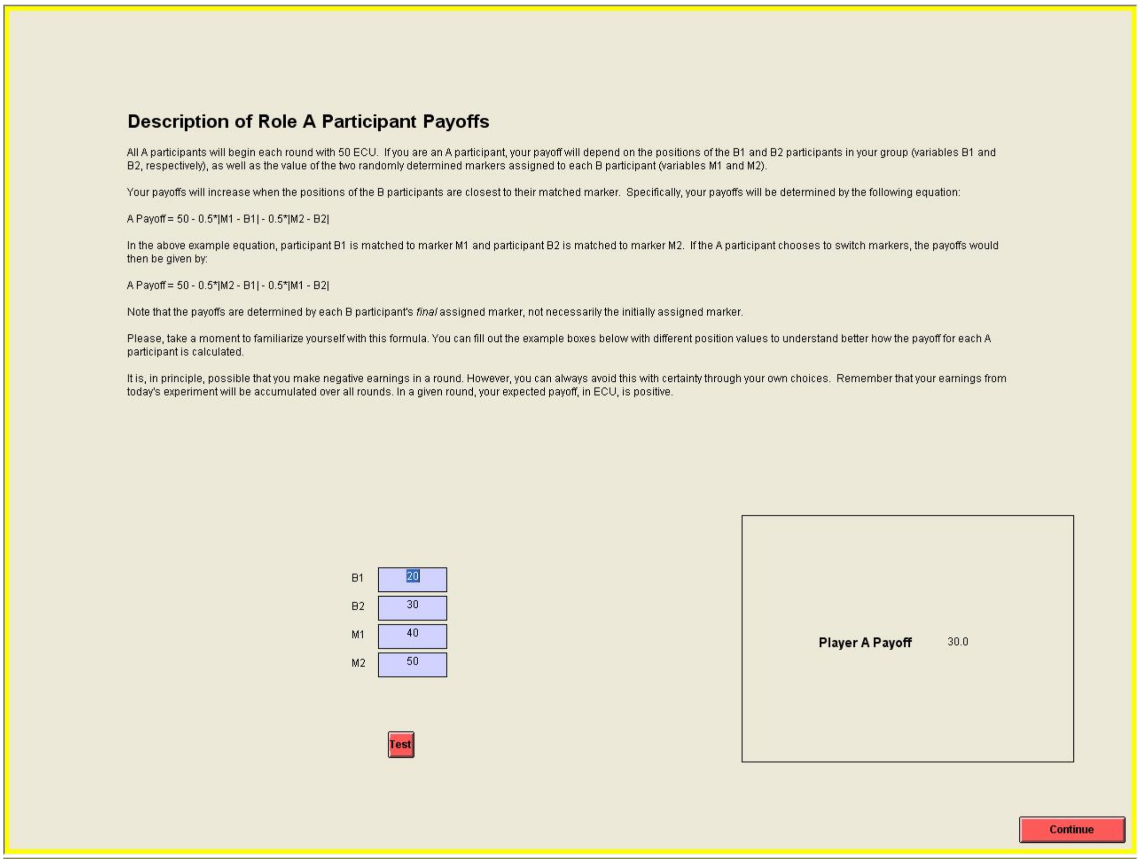
Based on your hypothetical Selector decision on the previous screen, please complete this hypothetical Placement decision. The A participant in your group is currently making the Placement decision that will count for your group.

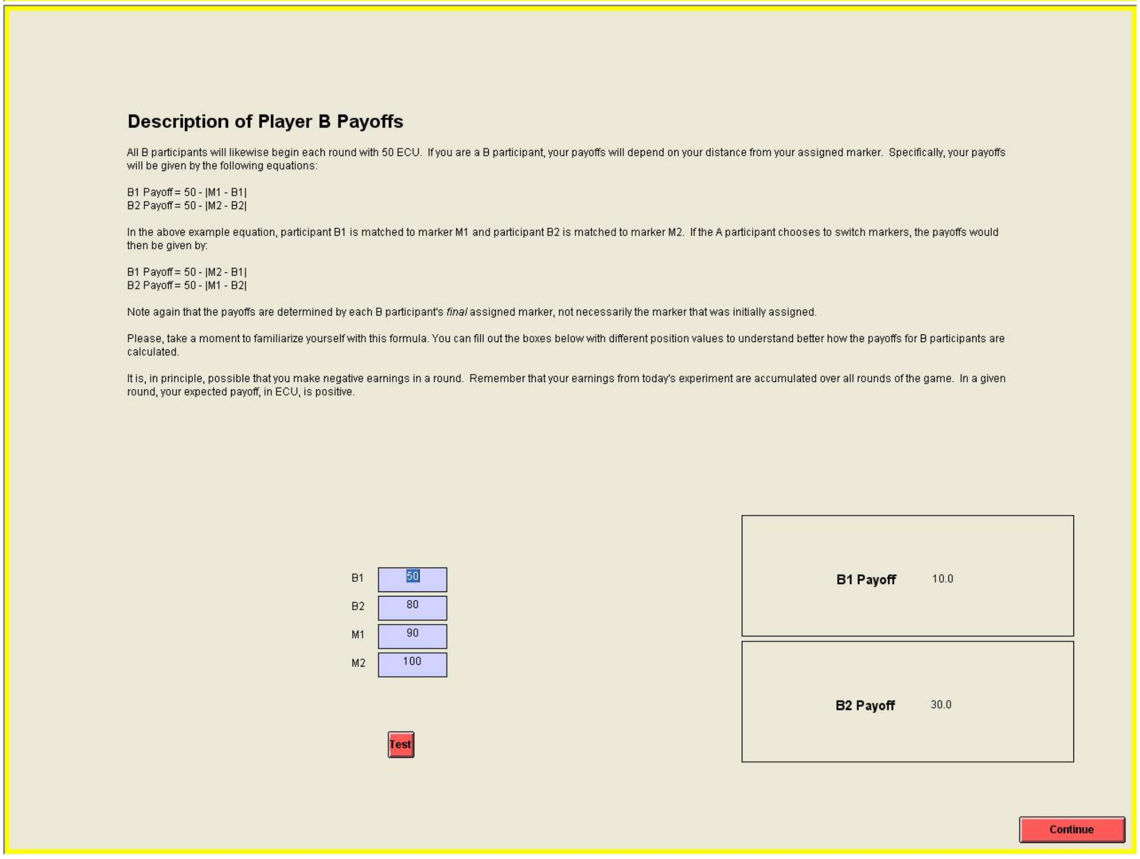
Imagine that you are the A participant. Using the boxes, select the hypothetical positions of the B participants in your group. This will not affect your payment from today's experiment, but we are interested in your answers. Remember, the A participant's goal is to minimize the distance between the final marker assigned to each B participant (the assigned marker after the Switch decision) and the position selected. Notice, you can assign the same position for both B participants. Remember, the A participant knows he or she will observe each of the initial markers assigned to the B participants with a 1 in 5 {1 in 2, 4 in 5, 9 in 10} chance, and the Switch decision would be as in Stage I or Stage II depending on your hypothetical Selector decision.

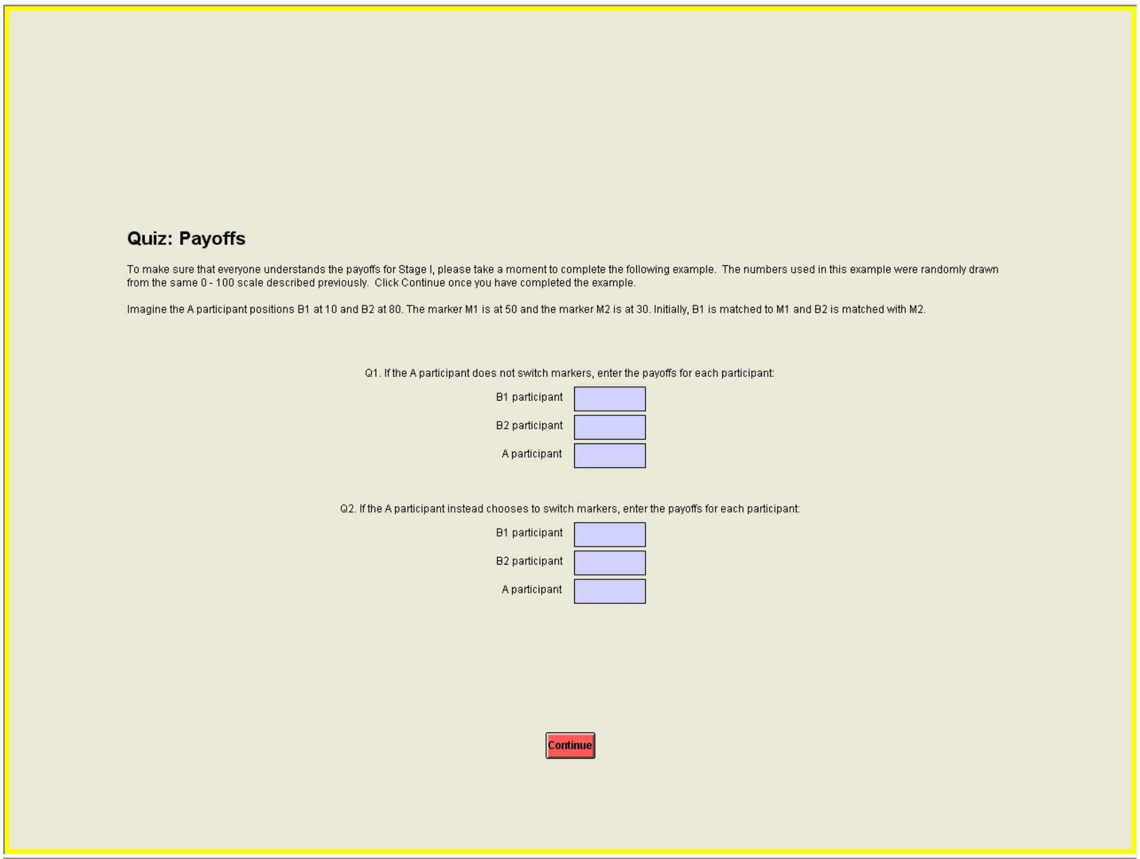
After you have chosen the positions that you prefer, press the "Select" button. Then, press "Continue".

C.4 Experimental design: Screenshots




Description of Role A Participant Payoffs
All A participants will begin each round with 50 ECU. If you are an A participant, your payoff will depend on the positions of the B1 and B2 participants in your group (variables B1 and B2, respectively), as well as the value of the two randomly determined markers assigned to each B participant (variables M1 and M2).
Your payoffs will increase when the positions of the B participants are closest to their matched marker. Specifically, your payoffs will be determined by the following equation:
A Payoff = 50 - 0.5*|M1 - B1| - 0.5*|M2 - B2|
In the above example equation, participant B1 is matched to marker M1 and participant B2 is matched to marker M2. If the A participant chooses to switch markers, the payoffs would then be given by:
A Payoff = 50 - 0.5*|M2 - B1| - 0.5*|M1 - B2|
Note that the payoffs are determined by each B participant's *final* assigned marker, not necessarily the initially assigned marker.
Please, take a moment to familiarize yourself with this formula. You can fill out the example boxes below with different position values to understand better how the payoff for each A participant is calculated.
It is, in principle, possible that you make negative earnings in a round. However, you can always avoid this with certainty through your own choices. Remember that your earnings from today's experiment will be accumulated over all rounds. In a given round, your expected payoff, in ECU, is positive.
B1 20
B2 30
M1 40
M2 50
Test
Player A Payoff 30.0
Continue


Description of Player B Payoffs
All B participants will likewise begin each round with 50 ECU. If you are a B participant, your payoffs will depend on your distance from your assigned marker. Specifically, your payoffs will be given by the following equations:
B1 Payoff = 50 - |M1 - B1|
B2 Payoff = 50 - |M2 - B2|
In the above example equation, participant B1 is matched to marker M1 and participant B2 is matched to marker M2. If the A participant chooses to switch markers, the payoffs would then be given by:
B1 Payoff = 50 - |M2 - B1|
B2 Payoff = 50 - |M1 - B2|
Note again that the payoffs are determined by each B participant's *final* assigned marker, not necessarily the marker that was initially assigned.
Please, take a moment to familiarize yourself with this formula. You can fill out the boxes below with different position values to understand better how the payoffs for B participants are calculated.
It is, in principle, possible that you make negative earnings in a round. Remember that your earnings from today's experiment are accumulated over all rounds of the game. In a given round, your expected payoff, in ECU, is positive.
B1 50
B2 80
M1 90
M2 100
Test
B1 Payoff 10.0
B2 Payoff 30.0
Continue



Quiz: Payoffs

To make sure that everyone understands the payoffs for Stage I, please take a moment to complete the following example. The numbers used in this example were randomly drawn from the same 0 - 100 scale described previously. Click Continue once you have completed the example.

Imagine the A participant positions B1 at 10 and B2 at 80. The marker M1 is at 50 and the marker M2 is at 30. Initially, B1 is matched to M1 and B2 is matched with M2.

Q1. If the A participant does not switch markers, enter the payoffs for each participant:

B1 participant

B2 participant

A participant

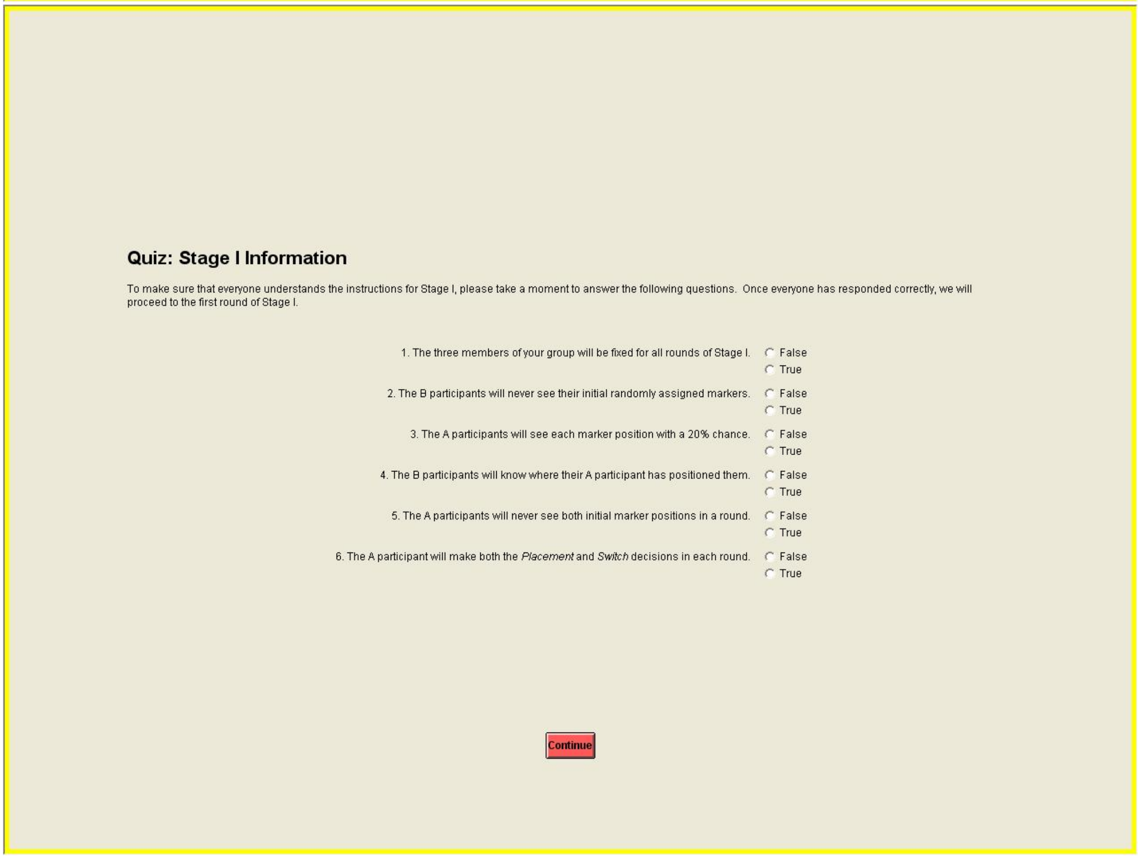
Q2. If the A participant instead chooses to switch markers, enter the payoffs for each participant:

B1 participant

B2 participant

A participant

Continue



Quiz: Stage I Information

To make sure that everyone understands the instructions for Stage I, please take a moment to answer the following questions. Once everyone has responded correctly, we will proceed to the first round of Stage I.

1. The three members of your group will be fixed for all rounds of Stage I. False / True
2. The B participants will never see their initial randomly assigned markers. False / True
3. The A participants will see each marker position with a 20% chance. False / True
4. The B participants will know where their A participant has positioned them. False / True
5. The A participants will never see both initial marker positions in a round. False / True
6. The A participant will make both the *Placement* and *Switch* decisions in each round. False / True

Continue

C.5 Experimental design: Eckel-Grossman Risk Elicitation

GAMBLE DECISION

In this part of the study you will select from among five different gambles the one gamble you would like to play. The five different gambles are listed on the next screen. You must select one and only one of these gambles. To select a gamble click the appropriate button. Each gamble has two possible outcomes (Event A or Event B) with the indicated probabilities of occurring. Your compensation for this part of the study will be determined by: 1) which of the five gambles you select; and 2) which of the two possible events occur.

Please note that if you should select either gamble 4 or gamble 5 and Event B occurs, your losses will be deducted from your total earning for completing Part 1 of the study.

For example: If you select gamble 4 and Event A occurs, you will be paid $34. If Event B occurs, you will have $2 deducted from your earnings so far.

For every gamble, each event has a 50% chance of occurring.

After you have selected your gamble the computer will generate a random number between 0 and 1 to determine which event will occur. If the number is less than 0.5, Event A will occur. If the number is greater than 0.5, Event B will occur. If the number exactly equals 0.5 the computer will generate a new number.

Gamble	Event	Payoff	Probability	Your Selection
1	A B	100 100	50% 50%	Gamble 1
2	A B	180 60	50% 50%	Gamble 2
3	A B	260 20	50% 50%	Gamble 3
4	A B	340 -20	50% 50%	Gamble 4
5	A B	420 -60	50% 50%	Gamble 5

Please choose one of the Gambles on the left by clicking one of the five Gamble buttons.

C.6 Experimental design: CRT questions

The Cognitive Reflection Test (CRT)

(1) A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost? _____ cents

(2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes

(3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days