Development of fairness views when facing unequal opportunities

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Meritocracy judges individual on choices and not on circumstances. However, only part of the meritocrats account for how better circumstances incentivize individuals to exert more effort. I explore how this fairness view develops as children enter into adolescence. I report from an experiment on school students aged between 10 and 15. Children decide how to distribute money between two workers offered different piece-rate payments for task completion. As children grow up they account more for the unequal opportunities faced by the workers. I show that cognitive maturity is part of the explanation. Older and more able children are better at dealing with the complex procedures of inferring counterfactual choices and incorporating them into decisions. These findings shed light on the role of procedural choice on fairness views adherence.

JEL-Classification: D91, D63, D83, D84.

Keywords: fairness, children, cognition, inequality of opportunities.

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1 Introduction

Fairness plays a crucial role in shaping individuals' acceptance of inequality. The prevailing view in western societies is meritocratic (Alesina and Angeletos, 2005; Almås et al., 2020; Cappelen et al., 2007; Stantcheva, 2021), by which inequalities arising from personal effort choices are fair, while those resulting from lucky circumstances are perceived as unjust (Cappelen et al., 2020; Konow, 2000).[1] However, effort choices are rarely detached from circumstances (Altmejd et al., 2021; Bursztyn et al., 2017; Falk et al., 2020; Glover et al., 2017; Parsons et al., 2011). Recent studies have shown that people acknowledge the influence of unequal opportunities on effort exertion, but only part of them want to correct the resulting inequality (Andre, 2022; Bhattacharya and Mollerstrom, 2022; Cappelen et al., 2023; Preuss et al., 2022).

In this paper, I study how this fairness view develops as children grow up. I report results from an experiment on school students from ages 10 to 15. Children decide how to distribute money between workers that completed tasks under unequal opportunities. The experiment consists of two phases. In the first phase, workers in a lab complete effort tasks for either a low or high piece-rate payment per task.[2] After all work is done, I form pairs consisting of one unlucky worker (assigned to the low piece-rate) and one lucky worker (assigned to the high piece-rate). In the second phase, I elicit children fairness preferences using a spectator game (Cappelen et al., 2007, 2013). Spectators have to distribute earnings within worker pairs. I ask spectators to state and reveal their preferences separately. This approach allows me to identify each spectator's fairness view and how they implement it. Stated preferences are directly asked. Revealed preferences are derived from the actual decisions. Decisions concern various scenarios with contingent worker choices and precede preferences declarations.

Children in my sample adhere to diverse fairness views: 13% declare as egalitarians (who want to equalize income regardless of effort exerted), 11% as libertarians (who want to maintain the existing distribution), and the remaining 76% as meritocrats. Among the latter, two thirds value more the efforts actually exerted, and the other third favor the efforts that would have been exerted under equal piece-rate payments. In line with recent literature, I label the first

[1] This ideal is closely intertwined with the notion of equality of opportunity, which often contrasts with reality. Various empirical works show that individual's income, educational attainment, and overall life outcomes tend to be closely tied to their family background (Akee et al., 2019; Becker et al., 2018; Chetty et al., 2014; Chetty and Hendren, 2018; Corak, 2013).

[2] The type of task is the same for all workers. I explain the task and ask workers to commit a number of tasks for each piece-rate. In average, workers commit twice as many tasks for the high piece-rate than for the low piece-rate. A lottery then determines each worker's piece-rate payment and workers follow through their commitments. See Section 2 for more details.

group as factual meritocrats and the second group as counterfactual meritocrats (Andre, 2022; Cappelen et al., 2023). To explore fairness development, I leverage age and cognitive ability variations. The sampling plan was pre-registered. Participats comprise students in 5th to 9th grade from a private full-day school, with ages ranging from 10 to 15 years old. These children share much similar schooling experiences and socio-economic background. Most entered the school at kindergarden, have received all their formal education there, live in the surrounding neighborhoods, and lack material deprivations. These features provide a clean group to explore how fairness preferences evolve with age and cognitive development, as there is limited scope for cofounding impact of different upbringing experiences.

I find that the share of meritocrats increases with age. Meritocrats climb from 71% among younger students (attending 5th to 7th grade) to 84% of the older students in my sample (8th and 9th grade). The rise is entirely explained by counterfactual meritocrats, who expand by 16.6 percentage points (p-value=.013). The prevalence among older children almost doubles the one within younger children. As a counterpart, the share of egalitarians decreases (-12.3 p.p., p-value=.005), while the share of libertarians remains stable. These results are in line with previous findings that suggest that children move towards more complex fairness views as they are more cognitively mature (Almås et al., 2010). Egalitarianism prescribes an invariant decision rule: dividing equally. Implementing libertarianism, although changing in each case, only implies maintaining the preexisting earnings. Meritocracy is slightly more complex, as it requires to assess efforts case by case and translate into earnings. And counterfactual meritocracy is even more complex, as individuals need first to infer what would have happened under equal opportunities.

I explore the role of cognitive maturity in explaining the differences. After the spectator game, I apply a Raven's Standard Progressive Matrices (SPM) test (Raven, 1936, 2000). This test comprises 12 questions and is a commonly used assessment for measuring cognitive ability for children in this age range. Though older students score higher on average, scores are dispersed within age groups. I split the sample into two groups by the median. Differences in the prevalence of fairness views mimic the ones by age. I find that, even controlling for age group, more cognitive able children are less likely to be egalitarians (-8.6 p.p., p-value=.073) and more likely to be counterfactual meritocrats (11.2 p.p., p-value=.084). In fact, the increase in counterfactual meritocrats is mainly concentrated among older and more able children. These results suggest that cognition plays a role in the change in fairness views prevalence.

Then, I show that stated preferences are indicative of actual decisions. I exploit a strategy method (Selten, 1967; Brandts and Charness, 2011) to analyze decisions for contingent choice differences between the unlucky and lucky worker. Spectators face scenarios in which the unlucky worker completes less or (at most) as much tasks as the lucky worker and always has lower preexisting earnings. I find that spectators that declare as egalitarians assign the unlucky worker the largest share, approaching equality. Libertarians assign the lowest share, closest to the unequal preexisting distribution. Meritocrats are in between: they partially correct the unequal earnings, but do not fully equalize. Among them, counterfactual meritocrats assign a higher share to the unlucky worker. This difference is in line with expected, as this view prescribes accounting for the increased effort provision under equal opportunities. In fact, I only find distinct behavior within meritocrats in the scenarios for which prescribed decisions contrast. I also show that spectators justify their decisions based on their stated preferences. I ask participants to report the reasons behind their decisions and analyze the concepts they use. Explanations differ in key aspects. Egalitarians talk more about equality, libertarians emphasize earnings, and meritocrats favor tasks and efforts. Among meritocrats, counterfactual meritocrats are more likely to refer to luck.

Lastly, I shed light on plausible behavioral underpinnings for the changes in the prevalence of fairness views. First, I focus on procedural complexity by evaluating the costs incurred in adhering to a fairness view. I show that counterfactual meritocracy is more costly to implement, but also that implementation capacity varies across individuals. Older and more able children have better implementation capacity, which facilitates their adherence to complex views, such as counterfactual meritocracy. Second, I concentrate on the additional information needed to implement counterfactual meritocracy. I show that more able children infer lower effort differences in equal opportunity scenarios, which makes that fairness view more relevant. I also find that information provision closes the gap between decisions from counterfactual meritocrats and factual meritocrats. In turn, prompting children to think about counterfactual choices before making decisions has no impact, stressing how uncertainty prevents meritocrats to decide based on counterfactuals.

Related literature. My work builds and contribute to the vast literature of fairness and inequality acceptance (e.g., Almås et al., 2020; Cappelen et al., 2007, 2013; Konow, 2000; Stantcheva, 2021). These studies show that a significant share of people are sensitive to the source of inequalities. I focus on a recent extension that distinguishes within meritocrats and complement this literature by testing behavioral underpinnings for its existence. Considering counterfactual choices implies belief formation, which makes for a more complex decision strategy.

My main finding shows that the prevalence of that fairness view increases alongside with age and cognitive maturity, as people find it cheaper to implement.

Two strands of this literature are closest to my study. One of them finds that people partly account for unequal opportunities on moral decisions (Andre, 2022; Bhattacharya and Mollerstrom, 2022; Cappelen et al., 2023; Preuss et al., 2022). Proposed explanations include uncertainty aversion, belief biases, and lack of recognition that circumstance-dependent effort is morally relevant. My work contributes to this literature in several aspects. First, I explore how counterfactual meritocracy develops as children grow up and connect it to cognitive maturity and its implementation complexity. Second, I provide behavorial underpinnings for the (lack of) prevalence of counterfactual meritocrats. My findings suggest that procedural complexity deters some people from adhering to it. I also underscore the role of uncertainty aversion, showing that while information provision is sufficient for impacting distribution decisions, counterfactual thinking is not. Third, I incorporate a measurement of stated fairness preferences into spectator games and show that it is consistent with preferences resulting from decisions. This allows to identify fairness views at an individual level and to assess its implementation.

The other strand of literature analyzes the development of social preferences in children (Almås et al., 2010; Fehr et al., 2008, 2013; Martinsson et al., 2011; Sutter et al., 2018). One important message from these studies is that fairness views evolve throughout childhood, partly due to cognitive maturity. I complement this literature by connecting these changes with age-appropiate and validated measurements of cognitive ability. I provide direct evidence that meritocrats increase alongside cognitive maturity, as proposed by Almås et al. (2010). My results also extend this literature by further dissentangling meritocratic views in two types: factual meritocrats and counterfactual meritocrats. I show that the fairness view which is more complex to implement is more prevalent among older and more able children, drawing again attention to the role of cognition in fairness development.

My work also relates to the automata literature in economics (Banovetz and Oprea, 2023; Enke et al., 2023; Gabaix and Graeber, 2023; Martínez-Marquina et al., 2019; Oprea, 2020). This literature shows that complexity costs determine procedural choices —i.e. the strategy that individuals adopt to optimize. Importantly, these costs vary across individual cognitive ability and so does the strategy they select. For instance, this has been used to explain behavior in consumption and finance (Aghion et al., 2023; Colliard and Georg, 2023; You and Zhang, 2009). I contribute by extending its application to explore the prevalence of fairness views. My findings that views that subscribe more complex strategies are more prevalent as individual mature both align with and add to results from this literature.

The remainder of the paper is structured as follows. Section 2 describes the experiment design and implementation. Section 3 presents the theoretical framework guiding my analysis. Section 4 shows the main findings and explores plausible mechanisms. Section 5 concludes.

2 Experimental design and implementation

The experiment is designed to investigate fairness views on the distribution of income between individuals that faced unequal opportunities. I additionally collect data on belief formation concerning non-observed equal-opportunity situations, and willingness to inform about such situations. I also assign participants to different treatments to explore the effectiveness of information availability in shaping distributive decisions.

The experiment consists of two phases.[3] In the Workers phase, workers perform simple effort tasks and accumulate earnings. In the Spectator phase, spectators state their preferred distribution criteria and make decisions that can affect the income of paired workers. The analysis focuses mainly on the spectators. The workers are recruited to create realistic economic conditions.

2.1 Workers phase

I hire workers on *Prolific* to perform a simple effort task, based on letter-to-number encryption (Benndorf et al., 2019) and programmed in *oTree* (Chen et al., 2016).[4] Participants are paid a 2.00 British Pounds ($\sim$ 2.50 USD) base payment and can earn additional money for each succesfully completed encryption.[5]

Workers encrypt '*words*' formed by letters, based on an encryption table. They can only proceed to the next '*word*' if the encryption is done correctly. There is no limited time or opportunities to answer. Before they start working, I inform participants about two possible piece-rate for each encryption succesfully completed: low piece-rate (π^L) of 0.05 British Pounds ($\sim$ 0.06 USD), or high piece-rate (π^H) of 0.50 British Pounds ($\sim$ 0.60 USD). I ask participants to commit a number of tasks for each piece-rate. I inform participants their final payoff can be influenced by

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[3] For summaries of the main instrutions for each phase, see Appendix C and D respectively.

[4] This word encryption task has many advantages that make it suitable for our experiment: (i) it is a simple and easy to explain task, (ii) it needs not any preexisting knowledge, (iii) it mostly eliminates the scope for guessing, and (iv) it minimizes learning after repetition.

[5] *Prolific* works with British Pounds. Participants with sufficient experience in the platform are used to it. On average, participants in my sample have previously completed 937 tasks on *Prolific*. Still, I display an approximation for United States Dollars (USD) for the sake of clarity.

a third-party. To avoid effort decisions to be distorted in anticipation, I restrict information about when, how, why, and who is involved in the income allocation. The resulting piece-rate is randomly assigned, and participants follow-up on their commitment. Appendix D summarizes the main instrutions for the workers.

After the worker phase is completed, I form worker pairs. Each pair consists of an unlucky worker (randomly assigned to the low piece-rate) and a lucky worker (randomly assigned to the high piece-rate).

2.2 Spectators phase

I invite school students to be spectators, in collaboration with a private full-day school in Montevideo, Uruguay. Students are between 10 and 15 years old. The project was granted ethical approval by the UAB Ethics Committee on Animal and Human Experimentation and the principal board of the school. Parents of involved students received a consent form asking approval for their children participation.[6] All parents gave their consent. Children were also instructed that their participation was voluntary. None refused to participate. Participants are offered prize baskets consisting of school canteen products worth 75 Uruguayan Pesos ($\sim$ 2.00 USD) and can earn additional prizes (worth up to 265 Uruguayan Pesos, $\sim$ 7.00 USD).[7]

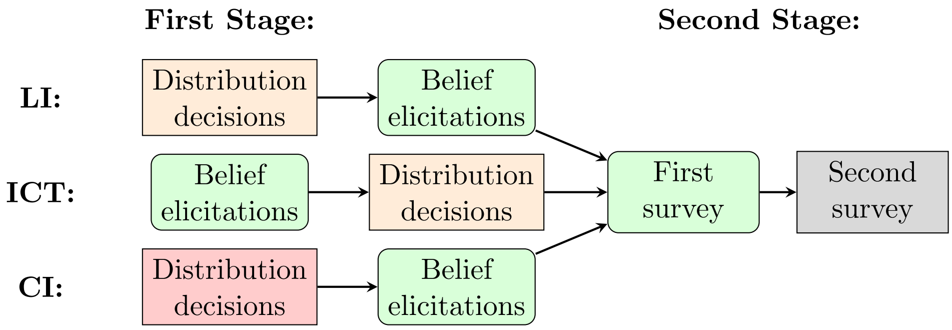
This phase consists of two stages: distribution and belief elicitations, and surveys (see Figure 1). Both are taken individually on a computer through a software programmed in *oTree* (Chen et al., 2016). I start by laying out the workers phase setting and explaining the decisions that spectators will make. Instructions were read aloud previous to being provided on the computer screens. To verify that all spectators understood the setting and instructions, I ask a set of comprehension questions.[8] I only allow participation after all questions are correctly answered. Instructed teachers provide explanations if required at any part of the study. Appendix C summarizes the main instructions for the spectators.

[6] The consent form contained information on the project and the rewards for the children, with an explicit school endorsement. No specific details on the tasks or aim of the research was communicated.

[7] The minimum (maximum) prize is worth more than 2 (8) days of average daily canteen expenditure in our sample. Average daily canteen expenditure within the sample is 32.5 Uruguayan Pesos ($\sim$ 0.87 USD), with low variance. Additional prizes are bundled together in different types of baskets, with each basket offering escalating rewards. See Appendix C for more details in the spectator phase payments.

[8] Afterwards, I also ask spectators to report how much they understood the instructions for that stage. None of the participants in my sample reported a lack of understanding of the instructions. Over 80% reported to mostly understand all of the task. I show results are robust to excluding those who failed to understand part of the instructions (see Section 4).

Figure 1: Stages of the spectator phase



Notes: This figure depicts the experiment flow for the spectator phase. Each row shows different treatment conditions: Limited Information (`LI`), Incentivized Counterfactual Thinking (`ICT`), and Complete Information (`CI`). Treatment conditions differ in the first stage. Distribution decisions in yellow are with Limited Information. Distribution decision in red are with Complete Information. The boxes filled in green are parts of the experiment in which participants can increase their chances of earning additional prizes.

2.2.1 Treatment conditions

I randomly assign spectators to different treatment conditions in a 2x2 between-subject setting. Only the first stage of the spectator phase varies across treatments. Each condition consists of information provision, distribution decisions, and belief elicitations sections. Treatments differ on the information provided before the decisions and in the order in which the belief elicitation takes place. As the flow order is inconsequential under complete information, I merge the two possible treatments into one. As detailed in Figure 1, my design involves three treatment conditions: Limited Information (`LI`) is my control group; Incentivized Counterfactual Thinking (`ICT`) has belief elicitations preceding distribution decisions; and Complete Information (`CI`) provides additional information on worker's performance in an equal-opportunity situation.

2.2.2 Distribution decisions

Spectators make distribution decisions for five scenarios with different worker pairs. Information provided for each spectator is the same for each scenario. I show all spectators the piece-rate, effort choice (i.e., tasks completed), and prexisting earnings of each worker in the pair.[9] All information is displayed using simple text, alongside graphical illustrations (see Figure 2).[10]

[9] Depending on the treatment condition, spectators receive additional information. In the `LI` and `ICT` treatment, spectators are only provided with the aforementioned information. In the `CI` treatment, I complement that information by disclosing worker's task commitment for an equal piece-rate. For each scenario, I randomly choose the low or high piece-rate and show both worker's commitment for it. I maintain the same disclosure piece-rate when eliciting beliefs.

[10] The visual design was created with input from local teachers. The focus was on making the information easy to understand and the interface intuitive to use. Teachers were not on the staff of the school where the experiment occurred and they were not informed about the research's objectives. Spectators decide on a setting where money is shown as equivalent points. Point conversion rate is 0.05 GBP = 1 point. Low piece-rate is

For each worker pair, the total amount to redistribute is the sum of both worker's earnings. Spectators decide on the final payoff of the workers by selecting which share of the total earnings each worker would get. Decisions are made with a slider and aided by a dynamic graph.

I employ a strategy method (Selten, 1967; Brandts and Charness, 2011). Spectators are informed that their decisions can have real consequences. I announce that one of the five contingency scenarios involves a real worker pair and that decisions for the real pair can be implemented after a lottery. The last scenario refers to a real worker pair from the workers phase. The preceding scenarios are hypothetical and displayed in random order. Spectators do not know which scenario is real and which are hypothetical.[11] The strategy method allows me to elicit merit judgements for various effort differences between the unlucky and lucky worker (see Table 1). I restrict the analysis to the hypothetical scenarios for consistent comparissons across spectators. Each spectator sees the same effort differences benchmarked to the real worker pair assigned.[12]

Table 1: Scenarios description

	Scenario			
	i	ii	iii	iv
Panel A. Effort differences				
Factual	0	5	10	15
Counterfactual	-10	-5	0	5
Panel B. Worker with higher share				
Factual	Equal	Lucky	Lucky	Lucky
Counterfactual	Unlucky	Unlucky	Equal	Lucky

Notes: This table shows characteristics of the hypothetical scenarios used in the spectator phase. Scenarios are presented to each spectator in random order. Numerical labels are used in this table only for reference. The real scenario is always presented after all the hypothetical scenarios. Panel A shows the observed and counterfactual effort difference. Differences are positive when favoring the lucky worker and negative when favoring the unlucky worker. The number of tasks presented to each spectator varies to accomodate with the reference point taken from the real workers. Panel B states the worker that exerts higher effort within the pair.

After deciding for the five scenarios, participants are randomly presented one of their decisions and

valued 1 point and High piece-rate is valued 10 points. I use points for the sole purpose of simplifying numbers for children. I explain that the points will be converted into money at the end of the experiment, but do not disclose the conversion rate.

[11] I randomly select 20 spectator decisions. This implies that 1 in 10 spectators makes a decision with real consequences. I ask spectators to guess which of the scenario they are presented is real. Responses for each scenario are all around the share selected by chance (20%). The share for the correct guess is 12%.

[12] Hypothetical scenarios show effort differences between the lucky and unlucky worker of 0, 5, 10, and 15 tasks. Scenarios are constructed taking as reference point the effort of the unlucky worker in the real scenario. Efforts choices are constructed by adding multiples of 5 to the reference point. For example, if the unlucky worker in the real scenario completed 16 tasks, the hypothetical scenarios will show workers completing figures such as 16, 21, 26, or 31 tasks.

asked to justify it in an open-ended form. Next, they are asked about their preferred distribution criteria for distributing within pairs. I present a close list, with simple statements, each adhering to (i) egalitarism, (ii) libertarianism, (iii) factual meritocracy, and (iv) counterfactual meritocracy. Responses are presented in random order.

Finally, spectators are offered the possibility of gaining additional information to remake decisions. Offered information is on worker's effort commitment under equal piece-rate payment. To access such information, spectators need to complete a counting-zeros task (Abeler et al., 2011). Spectators are able to take or not the opportunity. They can also give up the task in any point, loosing access to the additional information.

2.2.3 Belief elicitations

Spectators elicit their beliefs on workers' task commitment for an equal piece-rate for each of the five scenarios.[13] See Figure C.4 for an example of the belief elicitation. Belief elicitation is incentivized. Spectators increase their chances of receiving additional prizes if their guess is approximately correct.

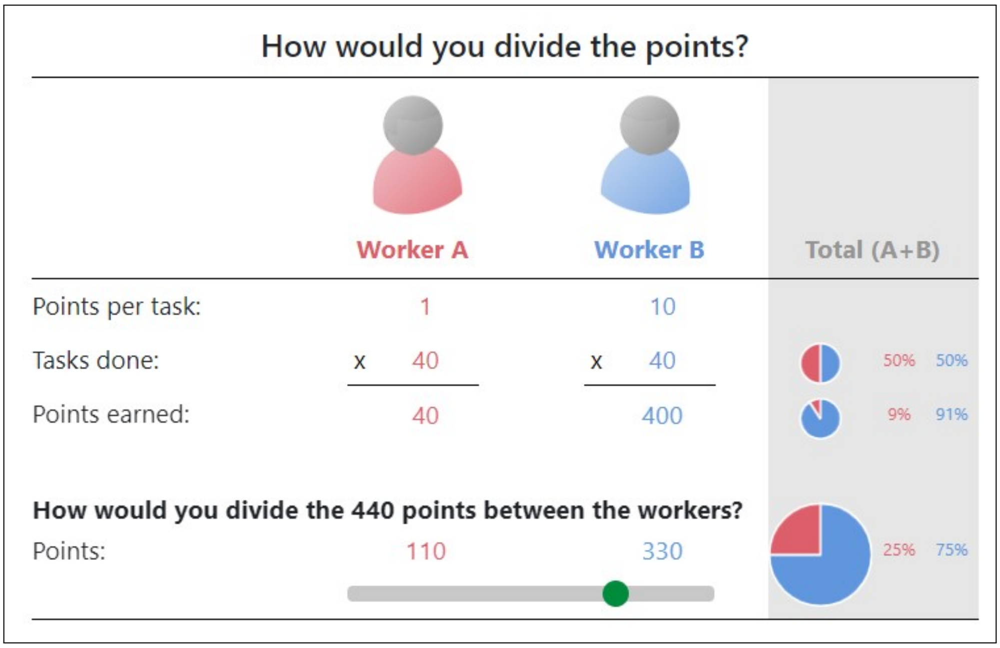
2.2.4 Surveys

Spectators answer two surveys. The first survey consists of the twelve items from Raven's Standard Progressive Matrices (SPM) test (Raven, 1936, 2000). The SPM is a non-verbal assessment used to measure cognitive ability, which has been used in various studies analyzing social behavior (e.g., Gill and Prowse, 2016; Proto et al., 2019; Lambrecht et al., Forth.). Each item consists of a 3x3 matrix with a missing cell in the bottom right corner. Participants are asked to select the missing cell out of eight choices provided (see Figure C.5 for an item example). Participants receive the test instructions before it begins.[14] Performance is incentivized. Participants increase their chances of earninig additional prizes if they answer correctly. The items in the test are presented in increasing difficulty order. Participants are able to navigate back and forth throughout the test to review and modify their answers as needed. The test lasts up to 6 minutes. All unanswered items are considered incorrect.

[13] The equal piece-rate is randomly chosen between the low and high piece-rate for each scenario, and is the same as the one disclosed in the `CI` treatment. I ask spectators to estimate how much the worker not assigned to that piece-rate would have worked for it. Piece-rate, effort choice, and initial earnings for both workers (as previously provided) are shown. Depending on the treatment, spectators answer about their beliefs before or after the distribution decisions. In the `LI` and `CI` treatment, spectators are asked about their beliefs after the distribution decisions. In the `ICT` treatment, I elicit beliefs before the distribution decisions. I also ask participants their certainty about the estimate for each.

[14] I require participants to answer a small set of comprehension questions. These refer to time allocation, number of correct options per item and an illustrative item (previously used in the instructions). The test only begins after all comprehension questions are correctly answered.

Figure 2: Distribution decision screen



Notes: This figures exemplifies the distribution decision screen. The figure shows a pair of workers. Piece-rate payment, tasks completed, and initial earnings for each worker are provided. Shares for tasks and earnings are automatically computed and displayed. Participants can modify the allocation by moving the slider. A dynamic graph updates with the spectator's decision. This figure correspond to the `LI`/`ICT` treatment conditions. In the `CI` treatment I additionally disclose the task commitment for a same piece-rate payment (randomly selected for each pair). See Figure C.2 for a comparisson between treatment conditions.

The second survey is non-incentivized and concernes age, gender, neighborhood of residence, and diverse socio-demographic questions. There is no time limit to answer this survey. After the surveys are completed, participants are thanked and dismissed. Participants pick-up their rewards when leaving. Rewards are delivered in sealed bags anonymously, based on computer's number.

2.3 Samples

2.3.1 Worker phase

I recruited 40 participants in *Prolific* on August 2023. Workers completed an average of 15.9 tasks (SD = 14.5) and earned an average of 7.13 British Pounds ($\sim$ 8.55 USD). Half of the workers were randomly assigned to the low piece-rate payment and the other half to the high piece-rate payment. Workers committed significantly more tasks for the high piece-rate (23.1 tasks vs. 11.8 tasks).[15] I form 20 pairs of workers. Each pair consists of one unlucky worker (assigned to the low piece-rate payment) and one lucky worker (assigned to the high piece-rate

[15] See Appendix D for detailed results of the worker phase.

payment).

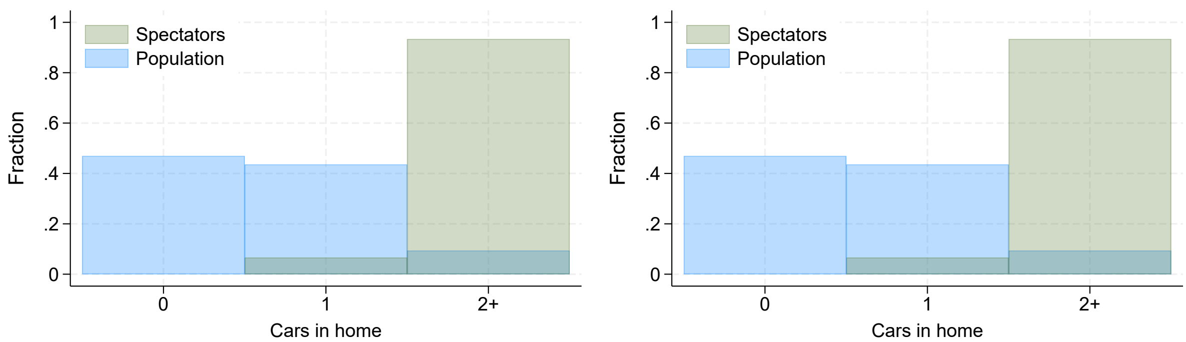
2.3.2 Spectator phase

I recruited 198 participants who attend a private full-day school in Montevideo, Uruguay. Spectators are between 10 and 15 years old and mostly live in high-class neighborhoods surrounding the school. The sampling plan was preregistered, as working with this sample allows me to hold constant many schooling and socio-economic factors that might otherwise confound the analysis.

Most students entered the school for kindergarden between ages 2 and 5, and had received their entire formal education at the school. Figure 3 compares characteristics of my sample with Montevidean population based on data from the 2022 Uruguayan Household Survey. Given the observed characteristics, it is reasonable to believe that spectators reside in households on the right part of the income distribution (see Table C.2 for further details). Moreover, households are much homogenous in their lack of limitations to provide material conditions for appropiate cognitive development.

Figure 3: Sample and population characteristics

(a) Cars **(b) Rooms**



Notes: These figures plot histograms for the spectators and comparable general population (same age bracket and city). Figure (a) shows total number of cars in the household. Figure (b) shows total number of rooms (excluding bathrooms and kitchen) in the household.

The experiment was conducted throughout four days on September 2023. Sessions took place during regular school hours at the computer lab and lasted 40 minutes. Attendance was high for all groups (see Table C.1). With the experiment ran during regular school hours and all attending students participating, there is no self-selection. The average value of the prize basket reward was 113 Uruguayan Pesos ($\sim$ 3.00 USD).

3 Theoretical framework

I describe a short theoretical framework to illustrate the role of fairness views for distribution decisions in situations with limited information about the effect of circumstances over effort exertion. My framework follows Andre (2022) and Cappelen et al. (2023), which build over the distributive choice model introduced by Cappelen et al. (2007).

First, I model circumstance-dependent effort choices by workers. Then, I model spectators distributive decisions for a pair of workers under unequal opportunities.

3.1 Workers

Workers decide how much tasks to complete under different piece-rate payments. Total income results from the number of tasks completed and the piece-rate payment. Task completion implies effort, which I assume is increasingly costly for workers.[16] I model workers utility as dependent of total income and effort disutility. The worker i optimization problem is as follows:

$$\max_{p_i} \quad U(y_i, p_i) = y_i - C_i(p_i) \tag{1}$$

$$\text{s.t.} \quad y_i = \pi_i \times p_i \tag{2}$$

where $U_i(\cdot)$ is worker i utility; y_i is income derived from task completion; p_i is total number of tasks completed; π_i is piece-rate payment; and $C_i(p_i)$ is worker's disutility from work.

Workers utility is maximized when the marginal cost of completing an additional task equals the piece-rate payment received for an additional task. With basic assumptions, solutions are interior and workers complete less tasks for the low piece-rate than for the high piece-rate:[17]

$$\pi_i = \frac{\partial C_i}{\partial p_i} \tag{3}$$

$$p_i(\pi^L) < p_i(\pi^H) \tag{4}$$

[16] I assume all workers have equal disutility from effort for simplicity. As long as spectators don't consider this heterogeneity in their decisions, it has a neutral effect over our main results. I incorporate increasing effort disutility of task completion. This is easily met with increasing difficulty in the tasks.

[17] Piece-rate payment equals income utility as I normalize it to 1. Main results are not affected for considering each worker to have particular income utility. Incorporating concave income utility yields similar results as using convex cost function. I further assume that workers find: (i) optimal to complete at least one task when piece-rate is high ($\pi^H - C'(\underline{p}) > 0$), and (ii) sub-optimal to complete the maximum allow number of tasks when piece-rate is low ($\pi^L - C'(\overline{p}) < 0$). I test these assumptions in my sample and find they are met. Results are shown in Appendix D.

3.2 Spectators

Spectators redistribute income between two workers for each situation. Worker A is the worker receiving the lower piece-rate payment. Worker B is the worker receiving the higher piece-rate payment. A situation is characterized by the actual tasks completed each worker ($p_A(\pi^L)$, $p_B(\pi^H)$), the counterfactual tasks each worker would have completed ($p_A(\pi^H)$, $p_B(\pi^L)$), and the pre-distribution incomes (y_A^{PRE}, y_B^{PRE}). The initial setting involves unequal piece-rate payments and pre-distribution incomes. I define worker A as the worker with lower pre-redistribution income.

The decision is on the costless redistribution. With total income and pre-redistribution incomes fixed, the redistributive transfer decision determines post-redistribution incomes. The spectator problem can be solved focusing in only one worker.[18] I assume spectator s utility depends on fairness concerns about worker A's income, as follows:

$$\begin{aligned}
\max_{r_s} \quad & U_s = -(y_A^{POST} - m_A)^2 & (5)\\
\text{s.t.} \quad & y_A^{POST} = y_A^{PRE} + r_s & (6)\\
& y_B^{POST} = y_B^{PRE} - r_s & (7)\\
& y_A^{PRE} + y_B^{PRE} = y_A^{POST} + y_B^{POST} & (8)
\end{aligned}$$

where $U_s(\cdot)$ is spectator s utility; m_i is what the spectator considers to be the fair income for worker i; y_i^{POST} is post-redistribution income for worker i; y_i^{PRE} is pre-redistribution income for worker i; and r_s is spectator s decision for the redistributive transfers, such that $(y_A^{POST}, y_B^{POST}) = (y_A^{PRE} + r, y_A^{PRE} - r)$ and $r \in \{-y_A^{PRE}, \ldots, 0, \ldots, y_B^{PRE}\}$. I define X as total income, which is fixed and equal to the sum of pre- and post-redistribution incomes.

With no stakes in play and no costs nor relevant restrictions in redistribution, the spectators maximize their problem by implementing what they consider to be the fair income for each worker.

$$y_i^{POST} = m_i \tag{9}$$

[18] Given only two workers, the redistributive transfer equals half the difference between the income difference in pre-redistribution and post-redistribution ($r = \frac{(y_B^{PRE} - y_A^{PRE}) - (y_B^{POST} - y_A^{POST})}{2}$). For instance, (i) closing post-redistribution income difference is achieved with a redistributive transfer of half the income difference in pre-redistribution; while (ii) making no redistributive transfers makes post-distribution income difference equal to that of pre-redistribution.

3.2.1 Fairness views

I consider spectators adhere to one of the three most salient fairness views: libertarianism, egalitarianism, and meritocratic fairness views (Cappelen et al., 2007). Decisions following each view are as follows:

Libertarians: Each worker should get according to their earnings: $m_i = y_i^{PRE}$.
Egalitarians: Both workers should get the same: $m_i = X/2$.
Meritocrats: Each worker should get according to their choices: $m_i = p_i$.

Redistributive transfers for libertarians and egalitarians are independent of unequal opportunities, but not for meritocrats. The existence of unequal opportunities present a dilemma for assessing each worker's choices. Part of the meritocrats consider the impact of unequal opportunities on choices should be accounted for. This is the same as making comparissons in a counterfactual situation with equal opportunities (for example one where the actual choices were $p_A(\pi^H)$ and $p_B(\pi^H)$). I label those spectators as counterfactual meritocrats. Other meritocrats only consider the actual choices by each worker, even if they originated in unequal circumstances. I label them as factual meritocrats. Decisions for each group are as follows:

Factual Meritocrats: Each worker should get according to their factual choice: $m_i = p_i(\pi_i)$.
Counterfactual Meritocrats: Each worker should get according to their counterfactual choice in an equal-opportunity scenario: $m_i = p_i(\pi_s)$, with π_s equal $\forall\, i$.

4 Results

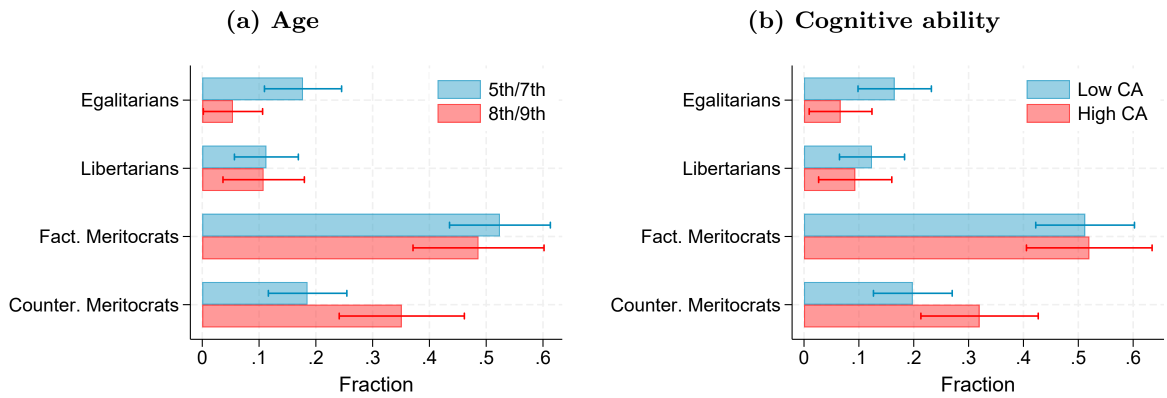
4.1 Stated preferences

I start by analyzing spectator's stated preferences. Although there are diverse fairness views in my sample, meritocracy is by far the most common (see Table A.1 for complete details). Around three quarters of the spectators (75.7%) adhere to meritocracy. The remaining spectators are split between egalitarianism (13.1%) and libertarianism (11.1%). Meritocrats can be classified into two groups: factual meritocrats and counterfactual meritocrats. Factual meritocrats value the efforts actually exerted. They represent 51.0% of the sample. Counterfactual meritocrats place a higher value on the efforts that would have been exerted under equal circumstances. They account for 24.7% of the sample.

Figure 4 shows the main findings. Fairness preferences vary across age. I split the sample into two groups. The first group comprises the younger children, who attend from 5th to

7th grade. These children are between 10 and 13 years old. The second group comprises the older children, who attend from 8th to 9th grade and are aged between 13 and 15 years old. Egalitarians are much less common among older children. Their share more than halves (-12.3 p.p., p-value=.005). Libertarians remain relatively stable across age groups. The share of factual meritocrats shows no statistically significant change. The only fairness view that increases with age is counterfactual meritocracy. The prevalence of counterfactual meritocrats almost doubles in size (16.6 p.p., p-value=.013).

Figure 4: Stated fairness preferences



Notes: These figures plot preferred criteria for distributing between workers, as declared by spectators. Figure (a) distinguishes between younger and older children. Differences in proportions are statistically significant at the 5% level using Fisher's exact test (p-value = .012), Pearson's chi-squared test (p-value = .014), and Likelihood-ratio chi-squared test (p-value = .010). Figure (b) distinguishes between children scoring above and below the median in the cognitive ability measurement. Differences in proportions are statistically significant at the 10% level using Fisher's exact test (p-value = .082), Pearson's chi-squared test (p-value = .081), and Likelihood-ratio chi-squared test (p-value = .072).

I leverage Raven's SPM test scores to explore the role of cognition in explaining the increase in counterfactual meritocracy. I split the sample by the median test score (8 out of 12) into two groups. There are children of all ages in both groups, but older ones are more likely to be in the group with higher cognitive ability (see Table A.2 and Figure A.1). Fairness views prevalence by cognitive ability mimics what observed by age groups. Egalitarians drop among children with higher cognitive ability (-9.9 p.p., p-value=.028), while counterfactual meritocrats increase (12.2 p.p., p-value=.064). I further explore changes by cognition within age groups. Table 2 shows differences on adherence to each fairness view by cognition, both without and including age group fixed effects. Even controlling for age group, more cognitive able children are less likely to be egalitarians and more likely to be counterfactual meritocrats. These results suggest that cognition is part of the explanation for the overall change in fairness views.

I also analyze the prevalence of each fairness view by cognitive ability group within each age

Table 2: Stated fairness preferences

	Egal.		Libe.		Fact. Merit		Counter. Merit.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High CA	-.109**	-.086*	-.022	-.022	-.013	-.004	.144**	.112*
	(.046)	(.048)	(.046)	(.051)	(.074)	(.077)	(.065)	(.065)
Age FE	No	Yes	No	Yes	No	Yes	No	Yes
Dep. var. mean	.131	.131	.111	.111	.510	.510	.247	.247
Effect magn.	-83%	-65%	-20%	-20%	-3%	-1%	58%	46%
Observations	196	196	196	196	196	196	196	196
R^2	.028	.047	.009	.009	.014	.015	.040	.061

Notes: This table reports the coefficients of dummies on cognitive ability groups on preferred distribution criteria. The independent variables are computed as dummy valued 1 for students scoring above the median (8 out of 12) on the cognitive ability measurement, and 0 otherwise. The dependent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. Each column reports estimates from a linear model. All estimates control for sex. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

group. With the sample twice splitted standard errors are large, but additional patterns arises (see Figure A.2). Younger children are not much different across cognitive ability groups, while older children are. In fact, older children scoring below the median in the cognitive ability test are similar to younger children in their stated preferences. The increase in counterfactual meritocracy appears on those who are both older and more cognitive able. Table 3 shows the estimates on the probability of adhering to the egaliarian and counterfactual meritocrat fairness view.[19] Older and more cognitive able children are 12.4 p.p. (95% of the sample mean) and 10.9 p.p. (83% of the sample mean) less likely to be egalitarians, respectively. Among older children, there are no statistically significant differences, but point estimates show those scoring above the median in the cognitive ability test to be less likely to be egalitarians. Coversely, older and more cognitive able children are 16.8 p.p. (68% of the sample mean) and 14.4 p.p. (58% of the sample mean) more likely to be counterfactual meritocrats, respectively. Older and high-cognition children are even more likely to be counterfactual meritocrats, 63% above the older group mean.

[19] Estimates in Table 3 control for sex and can yield marginally different values than those in Figure 4. In line with previous results, there are no significant differences for libertarians and factual meritocrats. See Table A.3 for estimates on all fairness views.

Table 3: Stated fairness preferences

	Egalitarian			Counter. Merit.		
	(1)	(2)	(3)	(4)	(5)	(6)
8th/9th	-.124***			.168**		
	(.044)			(.066)		
High CA		-.109**	-.067		.144**	.222**
		(.046)	(.054)		(.065)	(.110)
Sample	All	All	8th/9th	All	All	8th/9th
Dep. var. mean	.131	.131	.054	.247	.247	.351
Effect magn.	-95%	-83%	-124%	68%	58%	63%
Observations	198	196	73	198	196	73
R^2	.034	.028	.021	.051	.040	.058

Notes: This table reports the coefficients of dummies on age and cognitive ability groups on preferred distribution criteria. The independent variables are computed as dummy variables. Age groups are formed based on current school grade: valued 1 for students from 8th to 9th grade, and 0 otherwise. Cognitive ability groups are formed based on Raven's SPM test score: valued 1 for students scoring above the median (8 out of 12), and 0 otherwise. The dependent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. Each column reports estimates from a linear model. All estimates control for sex. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness checks. I test the robustness of the results to different analysis decisions.

Participant comprehension. One plausible explanation of the difference in stated preferences is that older and more cognitive able children have a better understanding of the instructions. I take several steps to ensure all participants understand the experiment instructions and to avoid that channel (see Appendix C for a detailed description of the procedures). To further check that lack of comprehension is not driving the results, I ask participants about their degree of understanding of the instructions after the spectator game. None of the participants report not understanding the instructions and most report almost complete understanding (over 80%). I replicate the main analysis excluding participants who failed to understand part of the instructions (see Table A.5). Results are robust to this exclusion.

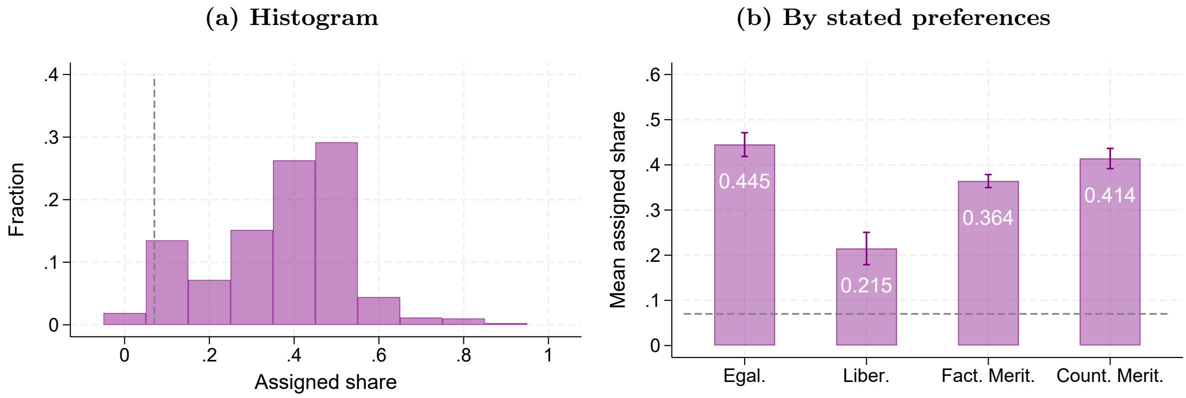
Age cutoff. Main results are based on splitting the sample into two groups by the median, both by grade (7th grade) and cognitive ability (score of 8 out of 12). To check the robustness of the results to this choice, I estimate differences for different cutoffs (see Table A.6). I split groups by age, using the 6th and 8th grade as the cutoff for older students. For both cutoffs, the share of counterfactual meritocrats is higher among older students. I split groups by cognitive ability, using scores of 7 and 9 as the cutoff for high cognitive ability. The share of counterfactual meritocrats is higher among the high cognitive ability group, but only significant for the group defined by the higher cutoff.

4.2 Revealed preferences

Stated fairness preferences change as children grow up and are more cognitive mature. I analyze whether these stated preferences are relevant for behavior.

Figure 5a plots the shares assigned to the unlucky individual for four scenarios with distinct effort differences between workers. In all scenarios the unlucky worker's effort is lower or equal than the one exerted by the lucky worker. Importantly, the prexisting earning distribution is always strongly disadvantaging the unlucky worker (7.0% for the unlucky worker in the mean). Figure 5b displays the mean share assignment by preferred distribution criteria. Spectators that declare as egalitarians assign the unlucky worker the largest share (44.5% in the mean). In 64.4% of the cases, they assign income equally across workers. In contrast, libertarians assign the lowest share to the unlucky worker (21.5% in the mean). Their assignments are closest to the preexisting earning distribution, which they maintain in 45.5% of the cases. Factual meritocrats assign on average 36.4% to the unlucky worker (44.3% in line with observed effort shares). Counterfactual meritocrats assign more to the unlucky worker (41.4% in the mean). They are the ones that implement the prescribed behavior the least (25.0% of the cases).

Figure 5: Assignments to the unlucky worker



Notes: These figures plot the shares assigned to the unlucky workers. Panel (a) is a histogram of the share assigned to the unlucky worker. Panel (b) plots the mean share assigned to the unlucky worker by stated fairness preference. Only the four hypothetical scenarios are included. The mean initial share of 7.0% is plotted as a dashed line in gray in both figures.

Table 4 reports estimates for these assignments by fairness view adherence. Compared to factual meritocrats, libertarians assign less to the unlucky worker, while counterfactual meritocrats and egaliatarians assign more. Differences are statistically significant. I also explore which worker is favored in the assignment. Again comparing with factual meritoctats: (i) libertarians favor more the lucky worker, (ii) egalitarians equalize more, and (iii) counterfactual meritocrats favor more the unlucky worker. These differences are in line with the prescribed behavior of each fairness view for the presented scenarios.[20]

Table 4: Distribution decisions

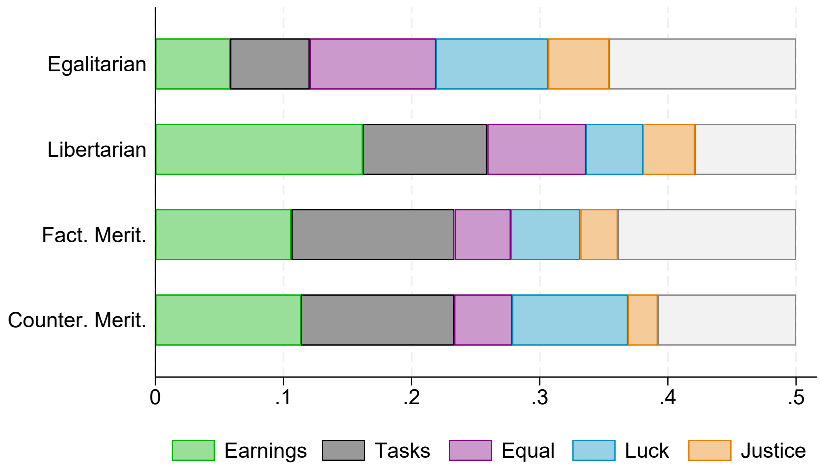
	Assign. to unlucky	Favored worker: Lucky	None	Unlucky
	(1)	(2)	(3)	(4)
Egalitarians	.081***	-.384***	.307***	.077*
	(.021)	(.075)	(.072)	(.044)
Libertarians	-.149***	.125***	-.082***	-.043
	(.029)	(.036)	(.024)	(.029)
Counter. Meritocrats	.050**	-.123***	.016	.107***
	(.020)	(.043)	(.028)	(.039)
Mean dep. var.	.370	.740	.152	.109
Observations	792	792	792	792
R^2	.147	.106	.093	.029

Notes: This table reports the coefficients of dummies on preferred distribution criteria on implemented decisions. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. Lucky worker refers to the worker paid the high piece-rate. Unlucky worker refers to the worker paid the low piece-rate. The dependent variable for column (1) is the assignment to the unlucky worker as a share of total assignments. The dependent variable for columns (2) to (4) are dummies for decisions assigning more to the lucky worker, to none and to the unlucky worker, respectively. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I also explore how spectators justify their decisions, leveraging the open-ended question in the survey. I extract each word used, classify it within concepts and quantify how much each concept repeats within each stated fairness preference (see Figure 6). Some key differences appear. Egalitarians talk more about luck, equality, and justice, and little about the work done and the earnings obtained. Libertarians strongly emphasize earnings. Both type of meritocrats center on tasks and earnings. Their explanations are much similar, but counterfactual meritocrats are more likely to mention luck and conditional choices when they explain decisions.

[20] Table A.7 shows estimates for each scenario. I focus on the cases in which the unlucky worker is favored. As all analyzed scenarios have the lucky worker exerting at least as much effort as the unlucky worker, favoring the latter is little expected. Counterfactual meritocrats are the ones that favor the most the unlucky worker. This result is driven by scenarios in which the observed effort of the unlucky worker is lower, but the difference is close enough to think it would revert if both worker have had equal opportunities.

Figure 6: Concepts used to justify distribution decisions



Notes: This figure plots the concepts used by spectators to justify their decisions, by preferred distribution criteria. Each color reports the share of words from each concept used over total words. Grey bars report the share of words that do not fit into any of the concepts and continue up to 100%. Earnings include 'points', and verbs 'contribute', 'achieve', 'win'. Tasks include 'tasks', and verbs 'complete', 'fulfill', 'decide', 'effort', 'choose', 'do', 'make'. Equality includes 'equal', 'same', 'team', 'half'. Luck includes 'luck', 'random', and verbs 'receive', 'get', 'chance', 'would', 'could', 'commit'.' Justice includes 'fair', 'unfair', and verbs 'owe', 'deserve'.

4.3 Plausible explanations

Older and more cognitive mature children are more likely to adhere to counterfactual meritocracy. I explore plausible explanations for this result, focusing on the procedural aspects of the decision. Counterfactual meritocracy requires spectators to asses what effort would have been exerted by workers in an equal opportunity situation, (i) making it more complex to implement, and (ii) dealing with additional information.

Procedural complexity. Counterfactual meritocracy is more complex and, thus, more costly to implement than the other fairness views analyzed. Its implementation requires case-by-case analysis, traslation of efforts into earnings, and belief formation on non-observed equal opportunity situations.[21] Individuals anticipating the complexity cost would be less likely to adhere to counterfactual meritocracy (Banovetz and Oprea, 2023). However, varying implementation capacity across individuals can affect cost assessments (Oprea, 2020), and with it the prevalence of counterfactual meritocracy across groups. I proxy implementation capacity by analyzing consistency with the prescribed behavior among spectators adhering to each stated fairness view.

[21] I show this increasing complexity indirectly. Decision consistency with the prescribed behavior differs across spectators adhering to each stated fairness view, in line with what expected due to their varying complexity (see Table A.9 for more details). Egalitarians are the most precise, libertarians and factual meritocrats follow. Implementation consistency is significantly lower for counterfactual meritocrats.

I show that implementation capacity varies alongside individual characteristics. Older and more cognitive able children are more consistent, even after controlling for the differring difficulty of implementing each fairness view (see Table 5). Results are partly independent, complementing each other. Being better at implementating prescribed behaviors, older and more cognitive able children can be less likely to be deterred of complex fairness views, such as counterfactual meritocracy.

Table 5: Implementation consistency

	(1)	(2)	(3)
8th/9th	.190***		.175***
	(.054)		(.055)
High CA		.128**	.092*
		(.054)	(.054)
Dep. var. mean	.423	.423	.423
Effect magn.	45%	32%	-
Observations	792	784	784
R^2	.091	.069	.096

Notes: This table reports the coefficients of dummies on age and cognitive ability groups on implementation consistency. The independent variables are computed as dummy variables. Age groups are formed based on current school grade: valued 1 for students from 8th to 9th grade, and 0 otherwise. Cognitive ability groups are formed based on cognitive ability measurement: valued 1 for students scoring above the median (8 out of 12), and 0 otherwise. The dependent variable is valued 1 for assignments aligned with the prescribed behavior of the stated preference (with a two-sided 5 percentage point margin), and 0 otherwise. Each column reports estimates from a linear model. All estimates control for fairness view adherence. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Additional information. Counterfactual meritocracy involves an extra step: getting information about the effort that would have been exerted by workers in an equal opportunity situation. Spectators can infer it or, in this experiment, can acquire it by completing a task. The values of the information used, their confidence in it, and the costs incurred in accessing it could explain differences in adherence to counterfactual meritocracy.

Table 6 shows differences are small across age and cognitive ability. I find differences in inferences by cognitive abiltiy, but not by age. More able children infer a higher response to benefitial conditions. This translates into a lower effort difference in equal opportunity scenarios and could explain favoring counterfactual rather than factual choices. There are no differences in confidence.[22]

Table 6: Additional information

	Inferred differences		Confidence		Acquire info.	
	(1)	(2)	(3)	(4)	(5)	(6)
8th/9th	.041		.046		.120**	
	(.048)		(.055)		(.059)	
High CA		.090*		.029		.056
		(.048)		(.055)		(.061)
Dep. var. mean	.227	.227	.295	.295	.763	.763
Effect magn.	18%	40%	16%	10%	16%	7%
Observations	792	784	792	784	792	784
R^2	.001	.007	.002	.001	.019	.004

Notes: This table reports the coefficients of dummies on age and cognitive ability groups on inferred effort difference for higher piece-rate payment, confidence in inferences, and information acquisition. The independent variables are computed as dummy variables. Age groups are formed based on current school grade: valued 1 for students from 8th to 9th grade, and 0 otherwise. Cognitive ability groups are formed based on Raven's SPM test score: valued 1 for students scoring above the median (8 out of 12), and 0 otherwise. The first dependent variable computes the inferred difference in effort choice for a same player between low and high piece-rate payment. The second dependent variable is valued 1 for spectators declaring and confidence in their inferences, and 0 otherwise. The third dependent variable is valued 1 for spectators acquiting information, and 0 otherwise. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses for columns (1), (2), (3), and (4). Robust standard errors are reported in parentheses for columns (5), and (6). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I offered spectators the opportunity to complete a task to acquire information. This situation resembles real life, where such information is not available but inputs for estimating it can be obtained at a cost. I find that older children are more likely to acquire the information. These results can reflect both a higher valuation of the information or a lower cost of obtaining the information. To test whether cheaper access to information impacts decisions, I compare spectators under different treatment conditions in a pre-registered randomized controlled trial (see Appendix B for more details). I find information provision to increase assignments to the unlucky worker (see Table 7). The effect is entirely driven by factual meritocrats. With complete information, the gap between assignments to the unlucky worker by factual and counterfactual meritocrats is almost closed. I also test whether preceding decision with counterfactual thinking achieves a similar result, as it forces spectators to make the inferences and have that estimates available to decide. I find no significant difference in assignments to the unlucky worker on

[22] Spectators adhering to distinct fairness views differ in their confidence in their inferences regarding the effort that would have been exerted by workers in an equal opportunity situation (see Table A.14). Meritocrats are more confident than egalitarians and libertarians. Though counterfactual meritocrats are slightly less confident than factual meritocrats (in line with Cappelen et al., 2022), differences are not statistically significant.

aggregate level, nor by fairness view adherence. These results suggest it is not only information availability, but the uncertainty that prevents meritocrats to decide based on counterfactuals (in line with Cappelen et al., 2022).

Table 7: Assignments to the unlucky worker

	(1)	(2)	(3)	(4)	(5)	(6)
Counterfactual thinking	.010					
	(.023)					
Information disclosure		.037*	.006	-.044	.060**	-.003
		(.021)	(.040)	(.071)	(.025)	(.033)
Dep. var. mean	.370	.370	.445	.215	.364	.414
Sample	All	All	Egal.	Libe.	Fact.	Counter.
Observations	536	544	68	64	268	144
R^2	.001	.013	.001	.015	.040	.000

Notes: This table reports the treatment coefficients on assigned share to the unlucky worker. The dependent variable is computed as assignment to the unlucky worker as a share of total assignment. The independent variables are treatment condition dummies, comparing the Limited Information (LI) treatment with the Incentivized Counterfactual Thinking (ICT) treatment for column (1) and comparing the Limited Information (LI) treatment with the Complete Information (CI) treatment for the remaining columns. Sample is restricted to the hypothetical scenarios and to each treatment comparisson. Columns (1) and (2) cover all spectators. Columns (3) to (6) cover spectators stating adherence to each fairness view. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Conclusion

Meritocrats face a dilemma when facing unequal opportunities: they want to reward effort, but effort is rarely detached from circumstances. I show children increasingly account for circumstance-dependent choices as they grow up and provide evidence that the changes are related to cognitive maturity. I connect the prevalence of that fairness view with its implementation complexity. Older and more able children are better at dealing with the complex procedures it implies, which can explain why they adhere to it more.

Evidence on the impact of procedural complexity will help understanding disagreements about inequality. Difference assessment capacity could influence individual moral decisions, potentially leading to sub-optimal collective decisions. Unlike disagreements stemming from pure variations in fairness views, disagreements arising from complexity aversion can be addressed through policy interventions. Possible informational campaigns can help individual decide without avoiding the use of additional information.

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A Additional results

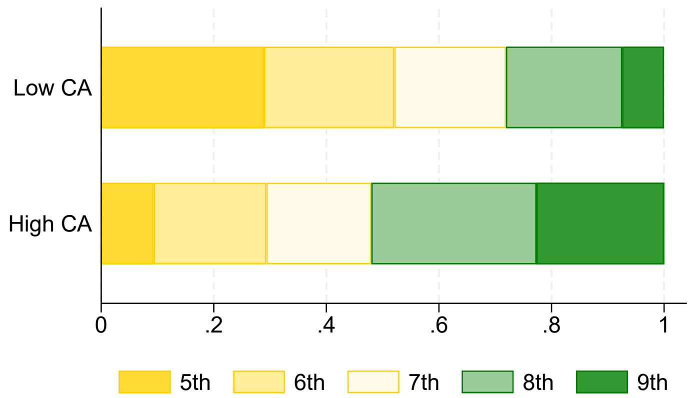
A.1 Stated preferences

Table A.1: Stated fairness preferences

		Age			Cognitive Ability		
	Total	5th/7th	8th/9th	Diff.	Low	High	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Egalitarians	.131	.177	.054	-.123***	.165	.067	-.099**
				(.043)			(.045)
Libertarians	.111	.113	.108	-.005	.124	.093	-.031
				(.046)			(.045)
Fact. Merit.	.510	.524	.486	-.038	.512	.520	.008
				(.074)			(.074)
Counter. Merit.	.247	.185	.351	.166**	.198	.320	.122*
				(.066)			(.065)

Notes: This table reports stated preferences shares. Columns (1) show refers to the whole sample. Columns (2) to (4) distinguishes by age group. Groups are formed based on current school grade. The first group comprises students from 5th to 7th grade. Ages in those grades range from 10 to 13 years old. The second group comprises students from 8th to 9th grade. Ages in those grades range from 13 to 15 years old. Columns (2) and (3) report the share of each fairness view in each group. Columns (4) reports the difference between the two groups. Columns (5) to (7) distinguishes by cognitive ability. Groups are formed based on the median of the cognitive ability measurement. The first group (low) has scores below the median. The second group (high) has scores above the median. Columns (5) and (6) report the share of each fairness view in each group. Columns (7) reports the difference between the two groups. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A.1: Grade distribution within cognitive ability groups



Notes: This figure plots the distribution of participants in each cognitive ability group. Cognitive ability groups are split by the median score in the Raven's SPM test (8 out of 12). Students grade is distinguished. Grades colores in yellow comprise the younger age group. Grades colored in green comprise the older age group. For more details, see Table A.2.

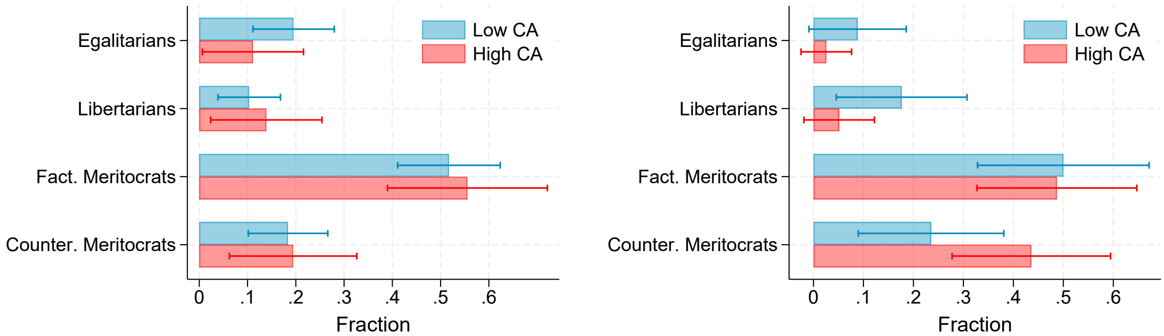
Table A.2: Cognitive Ability and Age

	Cognitive Ability	
	Mean score	Share High
	(1)	(2)
Panel A. Age		
Ages 10-12	.583	.293
Ages 13-15	.700	.534
Panel B. Grade		
Year 5	.532	.167
Year 6	.605	.349
Year 7	.616	.368
Year 8	.688	.468
Year 9	.721	.654

Notes: This table reports cognitive ability measurements by school grade. Column (1) shows mean scores out of 100%. Column (2) shows the share of students above school median score.

Figure A.2: Stated fairness preferences

(a) 5th/7th grade (b) 8th/9th grade



Notes: These figures plot preferred criteria for distributing between workers, as declared by spectators. Figure (a) restricts to younger children, from 5th to 7th grade. Differences in proportions are not statistically significant at the 10% level using Fisher's exact test (p-value = .725), Pearson's chi-squared test (p-value = .699), and Likelihood-ratio chi-squared test (p-value = .680). Figure (b) restricts to older children, from 8th to 9th grade. Differences in proportions are not statistically significant at the 10% level using Fisher's exact test (p-value = .107), Pearson's chi-squared test (p-value = .110), and Likelihood-ratio chi-squared test (p-value = .101).

Table A.3: Stated fairness preferences

	Egalitarian				Libertarian			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
8th/9th	-.123***				-.005			
	(.043)				(.046)			
High CA		-.099**	-.084	-.063		-.031	.035	-.125
		(.045)	(.068)	(.056)		(.045)	(.067)	(.075)
Sample	All	All	5th/7th	8th/9th	All	All	5th/7th	8th/9th
Dep. var. mean	.131	.131	.177	.054	.111	.111	.113	.108
Observations	198	196	123	73	198	196	123	73
R^2	.031	.021	.010	.019	.000	.002	.003	.040

	Fact. Merit.				Counter. Merit.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
8th/9th	-.038				.166**			
	(0.074)				(.066)			
High CA		.008	.038	-.013		.122*	.011	.201*
		(.074)	(.099)	(.119)		(.065)	(.079)	(.109)
Sample	All	All	5th/7th	8th/9th	All	All	5th/7th	8th/9th
Dep. var. mean	.51	.51	.524	.486	.247	.247	.185	.351
Observations	198	196	123	73	198	196	123	73
R^2	.001	.000	.001	.000	.035	.019	.000	.044

Notes: This table reports the coefficients of dummies on age and cognitive ability groups on preferred distribution criteria. The independent variables are computed as dummy variables. Age groups are formed based on current school grade: valued 1 for students from 8th to 9th grade, and 0 otherwise. Cognitive ability groups are formed based on cognitive ability measurement: valued 1 for students scoring above the median (8 out of 12), and 0 otherwise. The dependent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. Each column reports estimates from a linear model. Robust standard errors are reported in parentheses for the remaining columns. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.1.1 Robustness checks

Table A.4: Stated fairness preferences

(a) Boys

		Age			Cognitive Ability		
	Total	5th/7th	8th/9th	Diff.	Low	High	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Egalitarians	.116	.155	.049	-.106*	.132	.083	-.048
				(.055)			(.061)
Libertarians	.134	.141	.122	-.019	.145	.111	-.034
				(.066)			(.067)
Fact. Merit.	.455	.465	.439	-.026	.474	.417	-.057
				(.098)			(.101)
Counter. Merit.	.295	.239	.390	.151	.250	.389	.139
				(.092)			(.096)

(b) Girls

		Age			Cognitive Ability		
	Total	5th/7th	8th/9th	Diff.	Low	High	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Egalitarians	.151	.208	.061	-.147**	.222	.073	-.149*
				(.070)			(.075)
Libertarians	.081	.075	.091	.015	.089	.073	-.016
				(.063)			(.059)
Fact. Merit.	.581	.604	.545	-.058	.578	.585	.008
				(.111)			(.108)
Counter. Merit.	.186	.113	.303	.190**	.111	.268	.157*
				(.092)			(.085)

Notes: These tables report stated preferences shares. Panel (a) restricts to boys. Panel (b) restricts to girls. Column (1) show refers to the whole sample. Columns (2) to (4) distinguishes by age group. Groups are formed based on current school grade. The first group comprises students from 5th to 7th grade. Ages in those grades range from 10 to 13 years old. The second group comprises students from 8th to 9th grade. Ages in those grades range from 13 to 15 years old. Columns (2) and (3) report the share of each fairness view in each group. Column (4) reports the difference between the two groups. Columns (5) to (7) distinguishes by cognitive ability. Groups are formed based on the median of the cognitive ability measurement. The first group (low) has scores on the median or below. The second group (high) has scores above the median. Columns (5) and (6) report the share of each fairness view in each group. Column (7) reports the difference between the two groups. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Stated fairness preferences

		Age			Cognitive Ability		
	Total	5th/7th	8th/9th	Diff.	Low	High	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Egalitarians	.099	.127	.050	-.077*	.131	.048	-.083*
				(.044)			(.044)
Libertarians	.111	.118	.100	-.018	.131	.081	-.051
				(.050)			(.049)
Fact. Merit.	.531	.549	.500	-.049	.535	.532	-.003
				(.082)			(.081)
Counter. Merit.	.259	.206	.350	.144*	.202	.339	.137*
				(.074)			(.073)

Notes: This table reports stated preferences shares. **Sample excludes participants who failed to understand part of the instructions.** Column (1) show refers to the whole sample. Columns (2) to (4) distinguishes by age group. Groups are formed based on current school grade. The first group comprises students from 5th to 7th grade. Ages in those grades range from 10 to 13 years old. The second group comprises students from 8th to 9th grade. Ages in those grades range from 13 to 15 years old. Columns (2) and (3) report the share of each fairness view in each group. Column (4) reports the difference between the two groups. Columns (5) to (7) distinguishes by cognitive ability. Groups are formed based on the median of the cognitive ability measurement. The first group (low) has scores on the median or below. The second group (high) has scores above the median. Columns (5) and (6) report the share of each fairness view in each group. Column (7) reports the difference between the two groups. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Stated fairness preferences

(a) Age

	6th grade			8th grade		
	5th/6th	7th/9th	Diff.	5th/8th	9th	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)
Egalitarians	.244	.045	-.200***	.140	.077	-.063
			(.051)			(.059)
Libertarians	.116	.107	-.009	.122	.038	-.084*
			(.045)			(.045)
Fact. Merit.	.465	.545	.080	.517	.462	-.056
			(.072)			(.105)
Counter. Merit.	.174	.304	.129**	.221	.423	.202**
			(.060)			(.102)

(b) Cognitive ability

	Score = 7			Score = 9		
	Low	High	Diff.	Low	High	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)
Egalitarians	.182	.091	-.091*	.147	.071	-.076
			(.050)			(.049)
Libertarians	.136	.091	-.045	.122	.071	-.050
			(.046)			(.048)
Fact. Merit.	.477	.536	.059	.526	.452	-.073
			(.072)			(.087)
Counter. Merit.	.205	.282	.077	.205	.405	.200**
			(.061)			(.083)

Notes: These tables report stated preferences shares, distinguishing by age and cognitive ability groups. Panel (a) distinguishes by age groups. Age groups are formed based on current school grade. Columns (1) to (3) split groups by 6th grade. The first group comprises students from 5th to 6th grade. Ages in those grades range from 10 to 12 years old. The second group comprises students from 7th to 9th grade. Ages in those grades range from 12 to 15 years old. Columns (4) to (6) split groups by 8th grade. The first group comprises students from 5th to 8th grade. Ages in those grades range from 10 to 14 years old. The second group comprises students 9th grade. Ages in those grades range from 14 to 15 years old. Panel (b) distinguishes by cognitive ability. Columns (1) to (3) split groups starting from a test score of 7. The first group (low) has scores of 7 or below. The second group (high) has scores above 7. Columns (4) to (6) split groups starting from a test score of 9. The first group (low) has scores of 9 or below. The second group (high) has scores above 9. For both panels, columns (1) and (2) report the share of each fairness view in each group. Column (3) reports the difference between the two groups. Columns (4) and (5) report the share of each fairness view in each group. Column (6) reports the difference between the two groups. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.2 Revealed preferences

Table A.7: Assignment to unlucky worker

		Observed diff.			
	Total	0	5	10	15
	(1)	(2)	(3)	(4)	(5)
Egalitarian	.081***	.073***	.081***	.088***	.082**
	(.021)	(.025)	(.028)	(.029)	(.035)
Libertarian	-.149***	-.141***	-.144***	-.170***	-.143***
	(.029)	(.038)	(.043)	(.030)	(.038)
Counter. Meritocrats	.050**	.049*	.060**	.058**	.033
	(.020)	(.027)	(.025)	(.026)	(.027)
Higher counter. share	-	Unlucky	Unlucky	Equal	Lucky
Observations	792	198	198	198	198
R^2	.147	.141	.159	.198	.128

Notes: This table reports the coefficients of dummies on preferred distribution criteria on the assigned share to the unlucky worker. The dependent variable is computed as assignment to the unlucky worker as a share of total assignments. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. Column (1) covers all decisions in hypothetical scenarios. Columns (2) to (5) cover each a scenario, which differs in the observed effort difference. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses for the first column. Robust standard errors are reported in parentheses for the remaining columns. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8: Favor unlucky worker

		Observed diff.			
	Total	0	5	10	15
	(1)	(2)	(3)	(4)	(5)
Egalitarian	.077*	.044	.113	.037	.114
	(.044)	(.086)	(.083)	(.056)	(.074)
Libertarian	-.043	-.103*	-.034	-.040**	.006
	(.029)	(.057)	(.052)	(.020)	(.049)
Counter. Merit.	.107***	.056	.166**	.124**	.083
	(.039)	(.068)	(.068)	(.057)	(.051)
Higher counter. share	-	Unlucky	Unlucky	Equal	Lucky
Observations	792	198	198	198	198
R^2	.029	.016	.052	.048	0.030

Notes: This table report the coefficients of dummies on preferred distribution criteria on decisions favoring the unlucky worker. The dependent variable is a dummy valued 1 when assignment to the unlucky worker is larger than the one to the lucky worker, and 0 otherwise. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. Column (1) covers all decisions in hypothetical scenarios. Columns (2) to (5) cover each a scenario, which differs in the observed effort difference. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses for the first column. Robust standard errors are reported in parentheses for the remaining columns. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.9: Implementation consistency

	(1)	(2)	(3)	(4)
Egalitarian	.201***	.201***	.229***	.214***
	(.072)	(.072)	(.077)	(.078)
Libertarian	.011	.008	.009	-.031
	(.104)	(.104)	(.104)	(.100)
Counter. Merit.	-.193***	-.196***	-.235***	-.259***
	(.055)	(.056)	(.055)	(.055)
Sex	No	Yes	Yes	Yes
Age	No	No	Yes	Yes
CA	No	No	No	Yes
Observations	792	792	792	784
R^2	.058	.058	.093	.133

Notes: This table reports the coefficients of dummies on preferred distribution criteria on implementation consistency. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. The dependent variable is valued 1 for assignments aligned with the prescribed behavior of the stated preference (with a two-sided 5 percentage point margin), and 0 otherwise. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

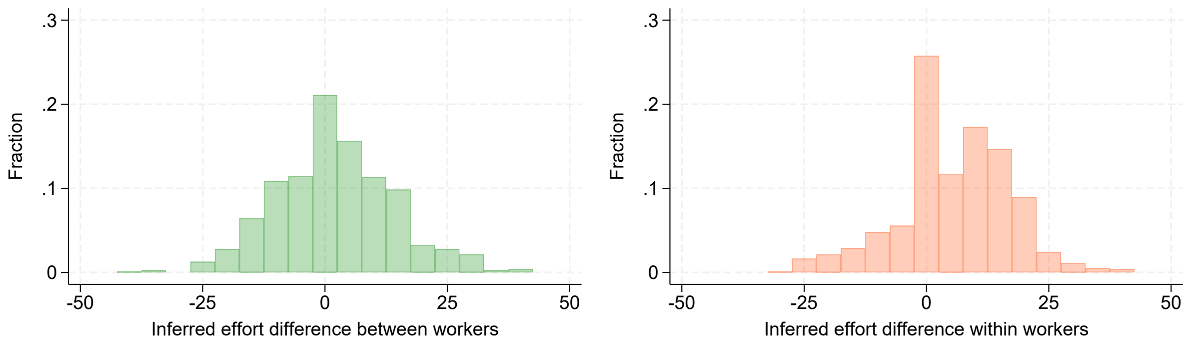
Table A.10: Inferred effort differences

	(1)	(2)	(3)	(4)
Egalitarian	-.053	-.054	-.021	-.065
	(.073)	(.072)	(.076)	(.070)
Libertarian	-.089	-.075	-.066	-.078
	(.093)	(.091)	(.089)	(.092)
Counter. Merit.	-.029	-.016	-.020	-.023
	(.059)	(.057)	(.059)	(.060)
Sex	No	Yes	Yes	Yes
Age	No	No	Yes	Yes
Cognitive ability	No	No	No	Yes
Observations	792	792	792	784
R^2	.003	.009	.015	.045

Notes: This table reports the coefficients of dummies on preferred distribution criteria on on inferred effort difference for higher piece-rate payment. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. The dependent variable computes the inferred difference in effort choice for a same player between low and high piece-rate payment. Mean dependent variable in the sample is .XXX. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A.3: Inferred effort difference

(a) Between workers **(b) Within workers**



Notes: These figures plot mean inferred effort differences. Figure (a) shows inferred differences between workers in a pair when under equal opportunities. Figure (b) shows inferred differences when workers receive high piece-rate in comparisson to low piece-rate.

Table A.11: Inferred effort difference, by observed difference

	Between		Within	
	# Tasks	Relative	# Tasks	Relative
Observed diff.	(1)	(2)	(3)	(4)
0	-2.91		2.91	.095
5	-.74	-.147	5.74	.200
10	3.45	.345	6.55	.290
15	8.33	.555	6.67	.337

Notes: This table describes beliefs by observed effort differences between the lucky worker and the unlucky worker. Columns (1) and (2) show mean inferred effort difference between the lucky and the unlucky worker under equal opportunities. Column (1) reports the difference in number of tasks and column (2) reports the difference as a share of the observed difference under unequal opportunities. Columns (3) and (4) show mean inferred effort difference for high piece-rate versus low piece-rate within the same worker. Column (3) reports the difference in number of tasks and column (4) reports the difference as a share of the observed number of tasks.

Table A.12: Inferred effort difference, by observed difference

(a) Between workers

	Inferred effort diff.	
	(1)	(2)
Observed diff.	.758***	.758***
	(.061)	(.071)
Individual FE	No	Yes
Observations	792	792
R^2	.124	.528

Notes: This table reports the coefficients for observed effort difference on inferred effort difference. The dependent variable is the inferred difference between the number of tasks of the lucky worker and the unlucky worker under equal opportunities. The independent variable is the observed difference under unequal opportunities. Sample is restricted to the hypothetical scenarios, with observed differences in [0,5,10,15]. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(b) Within workers

	Inferred effort diff.	
	(1)	(2)
Observed diff.	.242***	.242***
	(.061)	(.071)
Individual FE	No	Yes
Observations	792	792
R^2	.014	.468

Notes: This table reports the coefficients for observed effort difference on inferred effort difference. The dependent variable is the inferred effort difference for high piece-rate versus low piece-rate within the same worker. The independent variable is the observed difference under unequal opportunities. Sample is restricted to the hypothetical scenarios, with observed differences in [0,5,10,15]. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.13: Inferred effort difference, by worker's luck

Observed diff.	Unlucky worker (1)	Lucky worker (2)	Unlucky vs. Lucky (3)
0	4.75	0.96	-3.79**
			(1.72)
5	6.74	4.76	-1.98
			(1.49)
10	6.75	6.35	-0.40
			(1.54)
15	7.27	5.83	-1.44
			(1.63)
Total	6.40	4.45	-2.72**
			(1.15)

Notes: This table reports inferred effort difference for unlucky and lucky workers. The outcome variable is the inferred effort difference for high piece-rate versus low piece-rate within the same worker. All responses are contemporary to those of vaccine distribution. Columns (1) and (2) show means. Column (3) shows differences between unlucky workers (randomly drawn the Low piece-rate) and the lucky workers (randomly drawn the High piece-rate). Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.14: Inference confidence

	(1)	(2)	(3)	(4)
Egalitarian	-.171**	-.170**	-.166***	-.160**
	(.069)	(.066)	(.062)	(.068)
Libertarian	-.252***	-.290***	-.278***	-.262***
	(.057)	(.059)	(.064)	(.075)
Counter. Merit.	-.033	-.069	-.081	-.093
	(.068)	(.066)	(.066)	(.066)
Sex	No	Yes	Yes	Yes
Age	No	No	Yes	Yes
Cognitive ability	No	No	No	Yes
Observations	792	792	792	784
R^2	.037	.090	.107	.136

Notes: This table reports the coefficients of dummies on preferred distribution criteria on certainty on effort inferences. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. The dependent variable is a 5-point Likert scale on confidence on effort infereces for non-observed equal opportunity situations. Mean dependent variable in the sample is .295. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.15: Information acquisition

	(1)	(2)	(3)	(4)
Egalitarian	-.195*	-.195*	-.128	-.126
	(.106)	(.107)	(.106)	(.113)
Libertarian	.046	.039	.052	.068
	(.093)	(.093)	(.092)	(.090)
Counter. Merit.	.044	.037	.028	.025
	(.070)	(.070)	(.067)	(.071)
Sex	No	Yes	Yes	Yes
Age	No	No	Yes	Yes
Cognitive ability	No	No	No	Yes
Observations	792	792	792	784
R^2	.031	.033	.109	.139

Notes: This table reports the coefficients of dummies on preferred distribution criteria on seeking additional information. The independent variables are valued 1 for each declared preferred distribution criteria, and 0 otherwise. The omitted category is Factual Meritocrats. The dependent variable is valued 1 for spectator that started the task to acquire additional information for deciding, and 0 otherwise. Mean dependent variable in the sample is .763. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B Counterfactual thinking and information provision

I test the effect of counterfactual thinking and information provision on inequality acceptance in a pre-registered experiment. First, I show balance tests for preceding sample characteristics and for experiment decisions. Following, I present the tested hypothesis and aggregate results.

B.1 Balance tests

Treatment assignment is randomized between participants. I test for balance in preceding sample characteristics and in experiment decisions.

Table B.1 shows balance tests for preceding sample characteristics. I separetely test for differences between the baseline treatment condition (`LI`) and each of the other treatments (`ICT` and `CI`). I find no significant differences in preceding sample characteristics between treatment conditions. A joint test of equality of means cannot reject the null hypothesis of equality of means across treatments.

Table B.2 shows balance tests for experiment decisions, both for singular and repeated decisions. Within singular decisions, I find no significant differences in fairness view adherence between treatments conditions. A joint test of equality of means cannot reject the null hypothesis of equality of means across treatments. Only instructions understanding is significantly different for the `ICT` treatment. Participants in the `ICT` treatment condition are less likely to understand most of the instructions. In the `ICT` treatment, participants make inferences before each decision. Not only it differs in the experiment flow, but also requires participants to alternate between tasks. Within repeated decisions, I find significant differences in implemented consistency, inferred differences, and confidence. A joint test of equality of means rejects the null hypothesis of equality of means across treatments at the 1% level.

Table B.1: Balance tests for preceding sample characteristics

	LI	ICT		CI	
	Mean	Mean	Diff.	Mean	Diff.
	(1)	(2)	(3)	(4)	(5)
Age	12.54	12.55	.01	12.45	-.04
			(.25)		(.13)
Males	.514	.565	.051	.625	.056
			(.087)		(.043)
Current grade	6.88	6.89	.01	6.81	-.03
			(.23)		(.12)
At school since kinder	.750	.677	-.073	.828	.039
			(.079)		(.035)
New at school	.028	.081	.053	.063	.017
			(.040)		(.018)
Cars in home	2.21	2.08	-.13	2.22	.00
			(.10)		(.06)
Rooms in home	5.90	5.34	-.56	6.30	.20
			(.36)		(.18)
Weekly allowance	24.07	21.16	-2.91	21.04	-1.51
			(6.10)		(3.15)
Weekly canteen exp.	31.15	33.87	2.72	32.59	.72
			(2.38)		(1.35)

Notes: This table reports sample characteristics across treatment conditions. Column (1) shows the sample in the baseline treatment condition (limited information: `LI`). Columns (2) and (3) shows the sample in the incentivized counterfactual thinking treatment condition (`ICT`). Columns (4) and (5) shows the sample in the complete information treatment condition (`CI`). Columns (1), (2) and (4) report means. Columns (3) and (5) report means difference with the `LI` treatment condition. The F-statistics for joint test of equality of means across treatment conditions are 0.85 (p-value=.569) and 1.43 (p-value=.184), comparing the `LI` with the `ICT` and with the `CI` respectively. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.2: Balance tests for experiment decisions

(a) Singular decisions

	LI	ICT		CI	
	Mean	Mean	Diff.	Mean	Diff.
	(1)	(2)	(3)	(4)	(5)
Understood most	.889	.742	-.147**	.813	-.038
			(.067)		(.031)
CA score	7.30	7.89	.59	7.41	.06
			(.40)		(.21)
Egalitarians	.111	.145	.034	.141	.015
			(.059)		(.029)
Libertarians	.139	.097	-.042	.094	-.023
			(.056)		(.028)
Fact. Meritocrats	.528	.548	.021	.453	-.037
			(.087)		(.043)
Counter. Meritocrats	.222	.210	-.013	.313	.045
			(.072)		(.038)
Prefer being high-paid	.986	.984	-.002	.969	-.009
			(.021)		(.013)
Acquire info.	.722	.758	.036	.813	.045
			(.076)		(.036)

(b) Repeated decisions

	LI	ICT		CI	
	Mean	Mean	Diff.	Mean	Diff.
	(1)	(2)	(3)	(4)	(5)
Implemen. cons.	.396	.399	.003	.477	.040*
			(.042)		(.021)
Inferred differences	.293	.182	-.111***	.196	-.049**
			(.043)		(.022)
Confidence	.240	.339	.099**	.316	.038**
			(.039)		(.019)

Notes: These tables report participant decisions across treatment conditions. Column (1) shows the sample in the baseline treatment condition (limited information: `LI`). Columns (2) and (3) shows the sample in the incentivized counterfactual thinking treatment condition (`ICT`). Columns (4) and (5) shows the sample in the complete information treatment condition (`CI`). Columns (1), (2) and (4) report means. Columns (3) and (5) report means difference with the `LI` treatment condition. For singular decisions, the F-statistics for joint test of equality of means across treatment conditions are 1.79 (p-value=.152) and 0.96 (p-value=.413), comparing the `LI` with the `ICT` and with the `CI` respectively. For repeated decisions, the F-statistics for joint test of equality of means across treatment conditions are 4.63 (p-value=.003) and 4.10 (p-value=.007), comparing the `LI` with the `ICT` and with the `CI` respectively. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B.2 Hypothesis 1

Hypothesis 1: *Spectators are (a) less willing to accept income inequality when counterfactual thinking is incentivized than with incomplete information, but (b) more willing to accept income inequality when compared with complete information.*

The ICT treatment creates incentives for spectators to think counterfactually. This can prompt spectators that have previously decided not to engage in counterfactual thinking to do so. It can also make spectators assign a greater weight to their beliefs, as in commitment-bias. As libertarians, egalitarians, and factual meritocrats do not consider counterfactual choices in their decision, I did not expected their decisions to change across treatments. In contrast, counterfactual meritocrats base their decisions in counterfactual choices. If they over-estimate the high-paid worker counterfactual choice, the information will correct beliefs and narrow the gap between counterfactual choices.

I only expected counterfactual meritocrats to change their decisions across treatments and aggregate inequality acceptance to be lower in the ICT than in the LI (if there were counterfactual meritocrats in the sample). I find no significant difference in inequality acceptance between the ICT and the LI treatments.

Table B.3: Assignments to the unlucky worker

	(1)	(2)	(3)	(4)	(5)
ICT	.010	.010	-.028	.013	-.012
	(.023)	(.044)	(.064)	(.030)	(.046)
Dep. var. mean	.370	.445	.215	.364	.414
Sample	All	Egal.	Libe.	Fact.	Counter.
Observations	536	68	64	288	116
R^2	.001	.001	.009	.002	.001

Notes: This table reports the treatment coefficients on assigned share to the unlucky worker. The dependent variable in that case is computed as assignment to the unlucky worker as a share of total assignment. The independent variables are treatment condition dummies, comparing the Limited Information (LI) treatment with the Incentivized Counterfactual Thinking (ICT) treatment. Sample is restricted to the hypothetical scenarios and to each treatment comparisson. Column (1) covers all spectators. Columns (2) to (5) cover spectators stating adherence to each fairness view. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The CI treatment discloses counterfactual choices, making spectators' beliefs fully converge to counterfactuals. Assuming spectators would not be fully accurate in their counterfactual thinking, I expected inequality acceptance to be higher in the ICT than in the CI if there are counterfactual meritocrats. I find no significant difference in inequality acceptance between the ICT and the CI treatments.

Table B.4: Assignments to the unlucky worker

	(1)	(2)	(3)	(4)	(5)
CI	.027	-.004	-.016	.047*	.008
	(.023)	(.046)	(.080)	(.025)	(0.050)
Dep. var. mean	.370	.445	.215	.364	.414
Sample	All	Egal.	Libe.	Fact.	Counter.
Observations	504	72	48	252	132
R^2	.007	.000	.002	.030	.001

Notes: This table reports the treatment coefficients on assigned share to the unlucky worker. The dependent variable in that case is computed as assignment to the unlucky worker as a share of total assignment. The independent variables are treatment condition dummies, comparing the Incentivized Counterfactual Thinking (ICT) treatment with the Complete Information (CI) treatment. Sample is restricted to the hypothetical scenarios and to each treatment comparisson. Column (1) covers all spectators. Columns (2) to (5) cover spectators stating adherence to each fairness view. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Result 1: There are no differences in inequality acceptance due to counterfactual thinking.

B.3 Hypothesis 2

Hypothesis 2: *Spectators are less willing to accept income inequality with complete information than with incomplete information.*

To test Hypothesis 2, I focus on the `LI` and `CI` treatments and compare assigned share to the unlucky worker. Similarly to hypothesis 1, I only expected counterfactual meritocrats to change their decisions across treatments and expected inequality acceptance to be lower in the `CI` (if there were counterfactual meritocrats in the sample).

I find significantly lower inequality acceptance in the `CI` than in the `LI` treatment. Contrary to what I expected, the effect is not driven by counterfactual meritocrats but by factual meritocrats.

Table B.5: Assignments to the unlucky worker

	(1)	(2)	(3)	(4)	(5)
CI	.037*	.006	-.044	.060**	-.003
	(.021)	(.040)	(.071)	(.025)	(.033)
Dep. var. mean	.370	.445	.215	.364	.414
Sample	All	Egal.	Libe.	Fact.	Counter.
Observations	544	68	64	268	144
R^2	.013	.001	.015	.040	.000

Notes: This table reports the treatment coefficients on assigned share to the unlucky worker. The dependent variable in that case is computed as assignment to the unlucky worker as a share of total assignment. The independent variables are treatment condition dummies, comparing the Limited Information (`LI`) treatment with the Complete Information (`CI`) treatment. Sample is restricted to the hypothetical scenarios and to each treatment comparisson. Column (1) covers all spectators. Columns (2) to (5) cover spectators stating adherence to each fairness view. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Result 2: Spectators are less willing to accept income inequality with complete information than with incomplete information.

B.4 Hypothesis 3

Hypothesis 3: *Spectators beliefs (a) are biased about worker's counterfactual choices, and (b) this bias varies with cognitive development.*

To test Hypothesis 3, I focus on the `LI` and `ICT` treatments and compare elicited beliefs for the equal-opportunity scenario with worker's commitment for equal piece-rate payments. The equal-opportunity scenario refers to the piece-rate payment for which the spectator elicits their beliefs. Bayesian spectators that aknowledge the impact of piece-rate payments on worker's effort decisions should understand that observed productions are not fully informative of an scenario of equal opportunities. Non-Bayesian spectators can be affected by cognitive biases. I expected spectators' beliefs to be biased favoring lucky workers (assigned the high piece-rate).

I find that aggregate spectators' beliefs are biased. The dependent variable is defined such that is negative when spectators belief effort exertion would have been higher than the counterfactual effort. On average, spectators believe workers would have exerted more effort that the counterfactual. The bias is entirely driven by beliefs regarding lucky workers. Spectators believe lucky workers would have exerted more effort if assigned the low piece-rate. Inferences about unlucky workers are unbiased.

Table B.6: Belief biases

	Worker		
	All	Unlucky	Lucky
	(1)	(2)	(3)
Belief bias	-1.099*	.454	-2.663***
	(.623)	(.842)	(.964)
Observations	536	269	267

Notes: This table reports one-sample mean comparisson tests on difference between counterfactual effort and inferred effort. The dependent variable is defined such that is positive when spectators belief effort exertion would have been lower than the counterfactual effort, and negative otherwise. Sample is restricted to the hypothetical scenarios. Column (1) shows belief bias for all workers. Column (2) shows belief bias for unlucky workers. Column (3) shows belief bias for lucky workers. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I then distinguish by cognitive ability measurements and participants age. Non-Bayesian belief updating is a cognitive bias, which can be lower as cognition develops. I expected belief biases to be lower among high-cognition and older spectators compared to low-cognition and younger spectators. I find that high-cognition spectators are not biased, while low-cognition spectators are biased. I find no significant differences in belief biases by age.

Table B.7: Belief biases, by cognitive ability and age

	Age		CA	
	5th/7th	8th/9th	Low	High
	(1)	(2)	(3)	(4)
Belief bias	-2.892**	-2.336*	-3.667***	-1.412
	(1.425)	(1.172)	(1.318)	(1.432)
Observations	157	110	150	114

Notes: This table reports one-sample mean comparisson tests on difference between counterfactual effort and inferred effort. The dependent variable is defined such that is positive when spectators belief effort exertion would have been lower than the counterfactual effort, and negative otherwise. Sample is restricted to the hypothetical scenarios. Column (1) covers spectators in 5th to 7th grade. Column (2) covers spectators in 8th and 9th grade. Column (3) covers spectators scoring below the median score in the cognitive ability measurement. Column (4) covers spectators scoring above the median score in the cognitive ability measurement. All columns show belief bias for lucky workers. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Result 3: Spectators are biased about workers effort on equal piece-rate payments. The bias is driven by beliefs about lucky workers. The bias is lower among high-cognition.

B.5 Hypothesis 4

Hypothesis 4: *Biased spectators are equally willing to acquire complete information for deciding.*

To test Hypothesis 4, I focus on the `LI` treatment and compare real effort-task completion considering spectator's belief biases. Spectators experience disutility from deviating from what they perceive fair. Biased beliefs can make part of spectators implement allocations they would have disagree having complete information. Those more biased could benefit the most from accurate information. But this is not the only possibility. Spectators may be unaware of their biases and wouldn't be affected of the deviation. Or belief biases could reflect a lack of interest on forming the beliefs. With expectated results much relying on assumptions about spectators preferences, I had no previous expectations about the results.

I find no significant differences in real effort-task completion between biased and unbiased spectators.

Table B.8: Belief biases, by cognitive ability and age

	All	Unbiased	Biased	Diff.
	(1)	(2)	(3)	(4)
Acquire information	.722	.667	.733	.067
				(.150)

Notes: This table reports share of spectators acquiring information. Column (1) shows the whole sample. Columns (2) and (3) distinguishes by biased beliefs. Biased spectators are split by number of biased beliefs in the four hypothetical scenarios. The first group (unbiased) comprises spectators with biased beliefs in less than 3 scenarios, accumulating almost 15% of the sample. The second group (biased) comprises spectators with biased beliefs in at least 3 scenarios, accumulating 75% of the sample. Columns (2) and (3) report the share in each group. Column (4) reports the difference between the two groups. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Result 4: Biased spectators and unbiased spectators are equally willing to acquire complete information for deciding.

C Spectator phase

C.1 Procedures

The spectator phase consists of two stages: distribution decisions with incentivized belief elicitations, and surveys. Participants are randomly assigned to different treatment conditions in a 2x2 between-subject setting. Treatments differ on the first stage and are equal in the second stage. Figure 1 in the main text details the spectator phase flow.

First stage. I start by laying out the workers phase setting. I explain that real people were hired to work in a number of effort tasks, that commitments were made for a low and high piece-rate value, that the piece-rate value was randomly assigned, and that workers had to follow-up their commitment. Throughout the spectator phase I use visual aid, created with a focus on making the information easy to understand. The piece-rate assignment is explained through fliping a red and blue coin. Those workers who get the red side of the coin are assigned the low piece-rate, while those who get the blue side are assigned the high piece-rate. The low piece-rate worker is labelled as 'Worker A' and is colored in red. The high piece-rate worker is labelled as 'Worker B' and is colored in blue. I explain that workers earn points, which can be later traded for money. The point-to-money conversion rate is 0.05 GBP = 1 points, implying that the low piece-rate is 1 point and the high piece-rate is 10 points. Participants are not aware of the conversion rate.

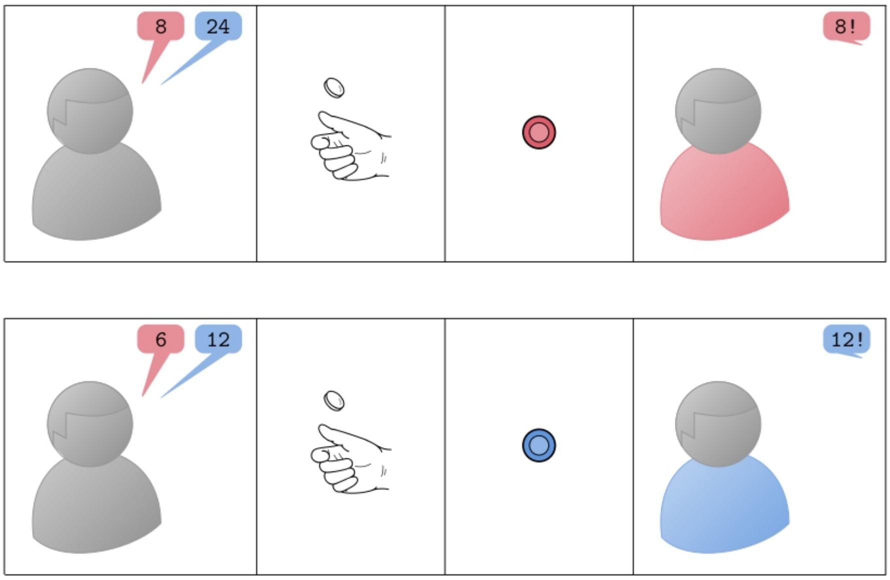
Then, I explain the pair formation, noting that each pair comprises one red worker (receiving the low piece-rate) and one blue worker (receiving the high piece-rate).[23] I inform participants that they will decide how to distribute points within pairs, emphasizing that there is no correct or incorrect answer. I explain participants that they will be presented five pairs, one of which is real and that their decisions could be implemented in real life. I announce that 1 in 10 spectators will make a decision with real consequences. Spectators are aware that workers expect a third-party may influence their payment, but cannot know their identity.

Before starting with the distributions and belief elicitations I run a comprehension test. There is no limited time or opportunities to answer. Participants are allowed to ask questions to the assisting teachers in the room. Teachers were explained the setting in the weekly coordination

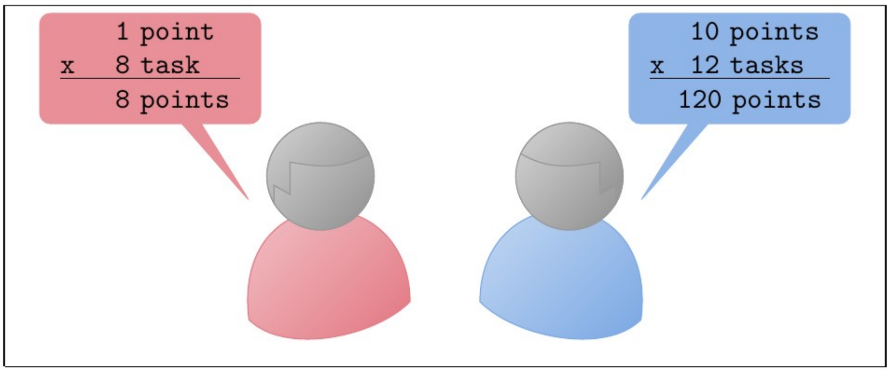
[23] I match workers according to their relative performance within piece-rate, focusing on the differences stemming from unequal opportunities (Roemer, 1993; Ramos and Van de gaer, 2016). This matching assumes that those at the same percentile of the income distribution conditional on their circumstance have exerted the same degree of effort. In my setting, the fundamental assumptions to derive it are met as circumstances are randomly assigned and the worker's payment structure is strictly increasing in exerted effort. For more details, see Fleurbaey (1998).

Figure C.1: Figures used to explain the worker phase

(a) Piece-rate assignment



(b) Pair formation



Notes: These figures were shown to explain the worker phase. Figures (a) show the task commitment and random piece-rate assignment. I use colors to differentiate commitments and assignments to different piece-rates. Red is used for the low piece-rate and blue for the high piece-rate. I use a coin flip to explain the random assignment. Figure (b) shows team formation.

meeting, but are unaware of the experiment's research questions. Participants can only start with the distributions and belief elicitations after all questions in the comprehension test are correctly answered. Depending on the treatment, participants are first presented with the distribution decisions or with belief elicitations.

For treatment conditions `LI` and `CI`, participants are first presented with the distribution decisions. Participants decide on the point distribution within pairs in 5 scenarios. After the 5 scenarios, participants respond a post-decision survey. Followingly, spectators are offered the possibility of gaining additional information to remake decisions. Finally, participants are presented with the belief elicitations.

For treatment condition `ICT`, participants are presented first with the belief elicitations. Participants guess one worker's task commitment for the non-assigned piece-rate in one scenario. Then, participants are presented with the distribution decision for the same scenario. The distribution decision is made as in treatment conditions `LI` and `CI`. For each scenario participants complete the belief elicitation and the distribution decision. After the 5 scenarios, participants respond a post-decision survey. Finally, spectators are offered the possibility of gaining additional information to remake decisions.

Distribution decisions. See Figure C.2 for a screenshot of the distribution decision. Participants decide on the point distribution within pairs for five scenarios. Decisions are made with a slider and aided by a dynamic graph plotting the share assigned to each worker. There is no time limit, but a pop-up window appears 1 minute after the scenario is presented.

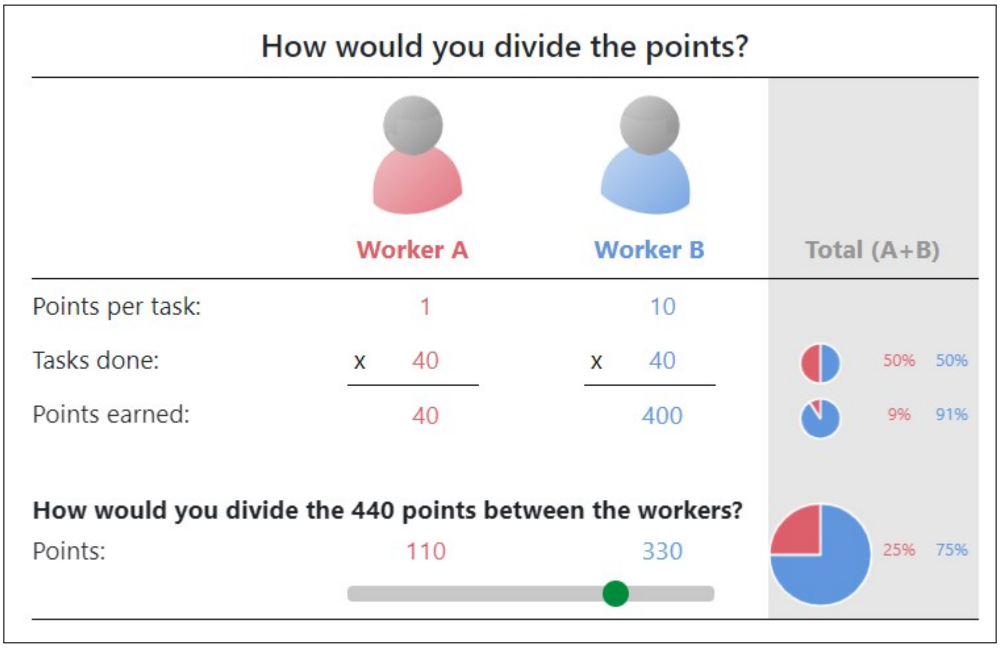
Post-decision survey. After deciding for the five scenarios, participants are randomly presented one decision and asked to justify it. There is a minimum character limit of 100 characters. In the next screen, participants answer a non-incentivized survey. I ask which is their preferred distribution criteria for distributing within pairs. I present a close list, with each statement adhering to (i) egalitarism, (ii) libertarianism, (iii) factual meritocracy, and (iv) counterfactual meritocracy. Responses are presented in random order. I also ask about the worker they would prefer to be, the identity of the real team, and the degree of understanding of the task.

Gaining additional information. After the post-decision survey, spectators are offered the possibility of gaining additional information to remake decisions. Offered information is on worker's effort commitment under equal opportunities. To access such information, spectators need to complete a counting-zeros task (Abeler et al., 2011). Spectators are able to take or not the opportunity.

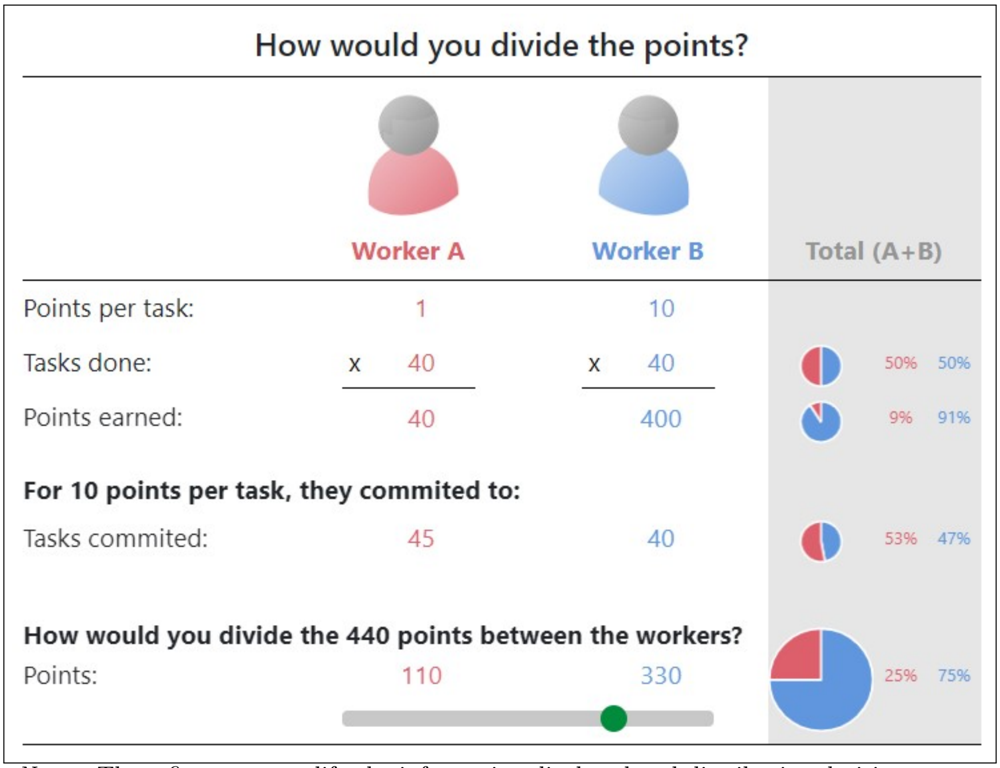
The task consists on counting zeros in a matrix. I present a square matrix composed of 1s and 0s (see Figure C.3). The task is to enter the total number of 0s in the matrix. There is no limited time or opportunities to answer. I ask participants to complete one matrix to acquire information. Participants are able to withdraw from the task at any time, loosing access to the additional information.

Figure C.2: Distribution decision screen, by treatment conditions

(a) LI/ICT treatments

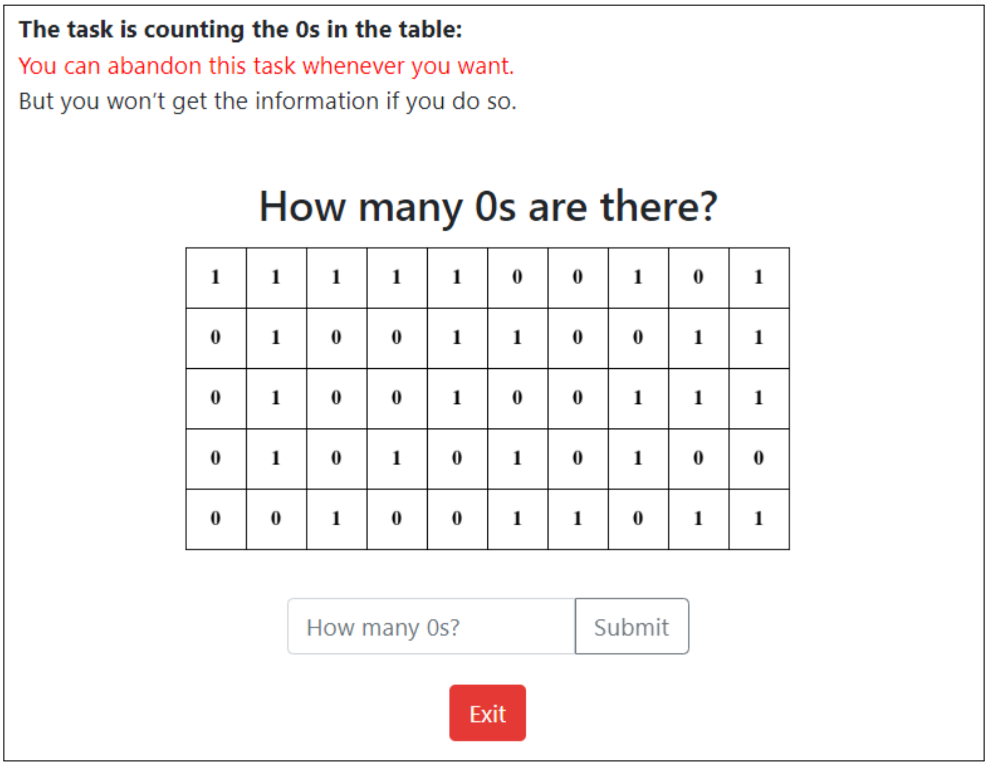


(b) CI treatment



Notes: These figures exemplify the information displayed and distribution decision screen. Each figure shows a pair of workers. In the LI/ICT treatments I provide information about piece-rate payment, tasks completed, and initial earnings for each worker. In the CI treatment I additionally disclose the task commitment for a same piece-rate payment (randomly selected for each pair). I also display shares for tasks and earnings (automatically computed). Participants can modify the allocation by moving the slider. A dynamic graph updates with the spectator's decision.

Figure C.3: Counting-zeros task example



Notes: This screenshot exemplifies the counting-zeros task. The table displayed shows a random sequence of 1s and 0s. The participant is shown the table and asked how many 0s are there in the table. The correct answer for this table is 24.

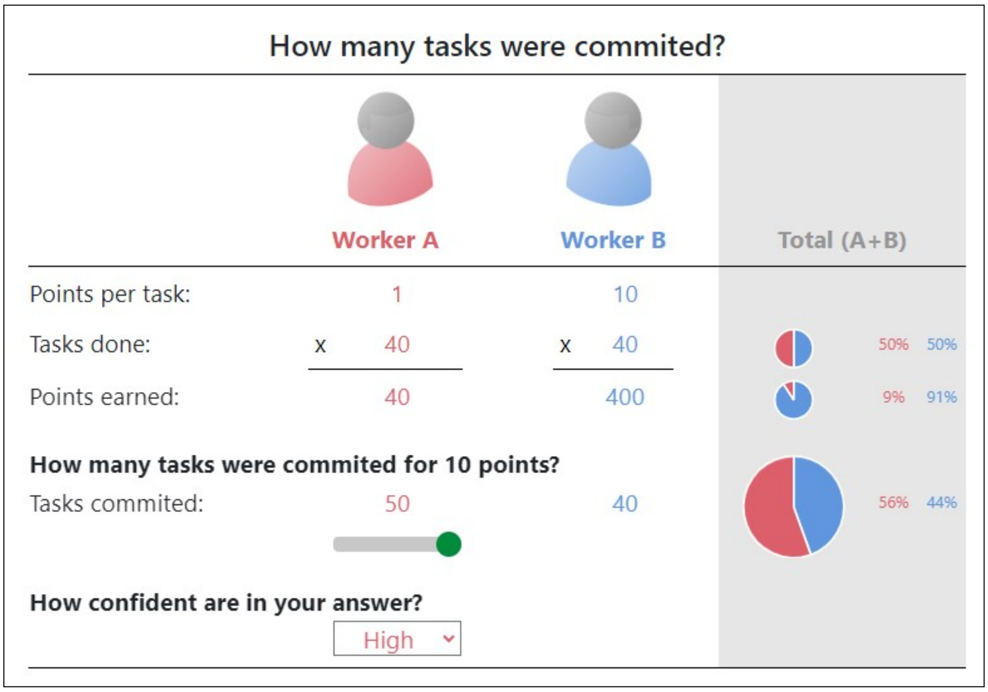
Participants who succesfully complete the task are presented with the information and asked to remake their decision for the scenario they guessed as the real one. The remake decision is made at the end of the first stage. Except for the provided information, the decision is made equally to previous decisions.

Belief elicitation. See Figure C.4 for a screenshot of the belief elicitation. Participants guess one worker's task commitment for the non-assigned piece-rate. The worker is randomly selected in each scenario. Guesses are made with a slider and aided by a dynamic graph. There is no time limit, but a pop-up window appears 1 minute after the scenario is presented.

Second stage. I run two surveys: one is incentivized and the other one is non-incentivized.

Incentivized survey. I include the twelve items from Raven's Standard Progressive Matrices (SPM) test (Raven, 1936, 2000). Figure C.5 exemplifies it. Each item is a 3x3 matrix with a missing cell in the bottom right corner. Participants are asked to select the missing cell out of eight choices provided. Participants receive the test instructions before it begins. I require participants to answer a small set of comprehension questions. These refer to time allocation,

Figure C.4: Belief elicitation screen example



Notes: This screenshot exemplifies the information displayed and belief elicitation screen. The figure shows a pair of workers. In all treatment conditions I provide information about piece-rate payment, tasks completed, and initial earnings for each worker. I also display shares for tasks and earnings (automatically computed). Participants are randomly shown task commitments for one piece-rate value and asked to guess for the worker assigned the other piece-rate. Participants can modify the guess by moving the slider. A dynamic graph updates with the spectator's decision.

number of correct options per item and an illustrative item (previously used in the instructions). The test only begins after all comprehension questions are correctly answered.

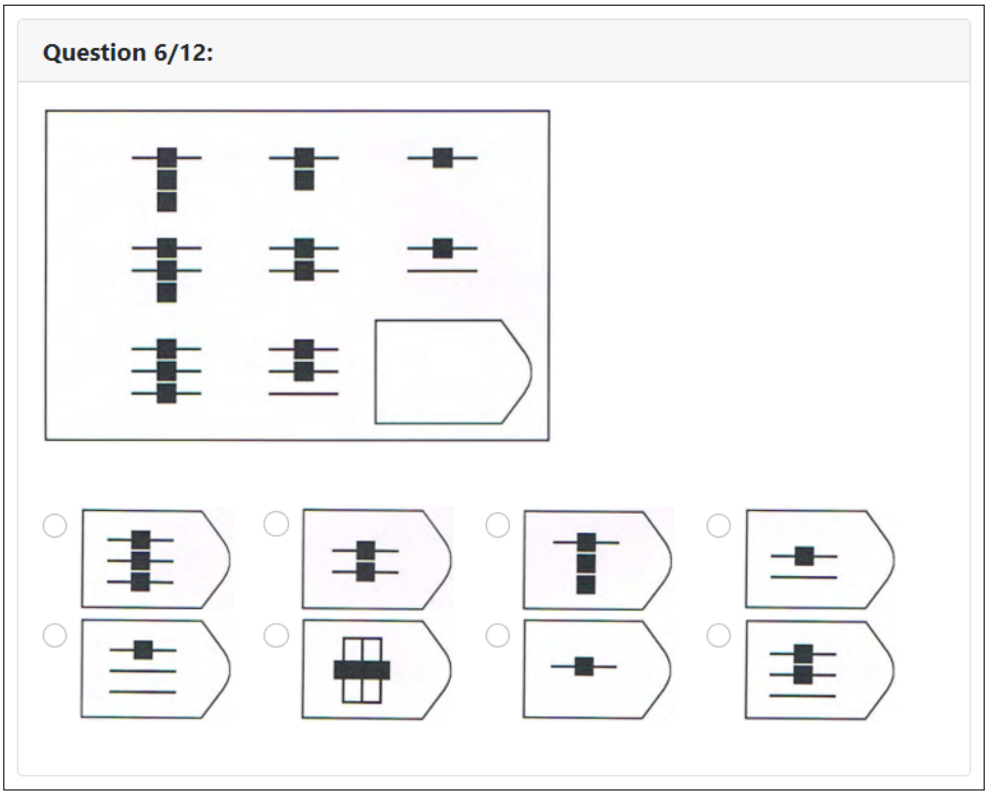
The test is presented in increasing difficulty order. Participants are able to navigate back and forth throughout the test to review and modify their answers. The test lasts up to 6 minutes. All unanswered items are considered incorrect. I incentivize performance by rewarding if correct four randomly picked items.

Non-incentivized survey. I ask participant a small set of questions. These questions concern age, gender, educational background, neighborhood of residence, household size and assets, and canteen consumption. There is no time limit to respond this survey.

After the surveys are completed, participants are thanked and dismissed.

Reward details. At the beggining of the experiment I inform participants that they will all receive rewards. I present three prize baskets, which are on display to see. Each prize basket has escalating prizes and are detailed. I explain that the basket each will obtain depends on

Figure C.5: Raven's Standard Progressive Matrices test example



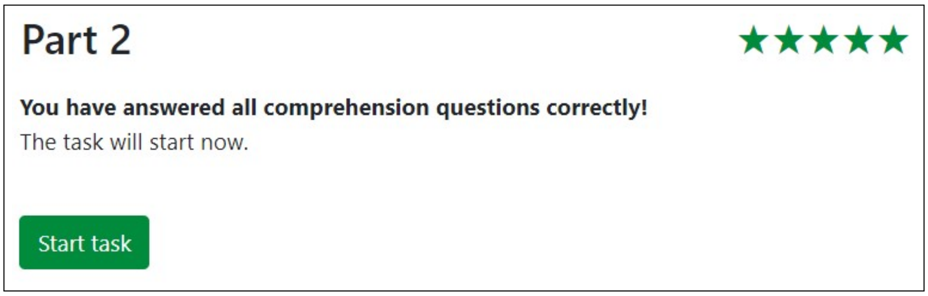
Notes: This screenshot exemplifies Raven's Standard Progressive Matrices (SPM) test. The upper image shows a 3x3 matrix with a missing cell. The task is to guess the image that corresponds to the missing cell. Only one out of the eight possible choices depicted below the matrix is correct. This is item number 6 of the SPM test. The correct answer is choice 5.

how much '*stars*' each accumulates throughout the session.

Participats accumulate '*stars*' in several screens of the experiment. The distribution decisions and non-incentivized survey yield a fix number of '*stars*' for completion. The belief elicitation and the incentivized survey yield '*stars*' depending on response accuracy. The instructions preceding each part of the experiment clearly state how '*stars*' are awarded. The total number of '*stars*' is displayed on the top right corner in each screen of the experiment.

At the end of the experiment, participants are informed how many '*stars*' they earned and which prize basket they obtain. Rewards are delivered in sealed bags anonymously, based on computer's number.

Figure C.6: Screenshots displaying accumulated stars



Notes: This screenshot exemplifies how stars are shown in each screen. Stars are colored in green and always displayed in the top right corner. After a star is earned, a screen pops-up displaying the number of stars earned during 5 seconds.

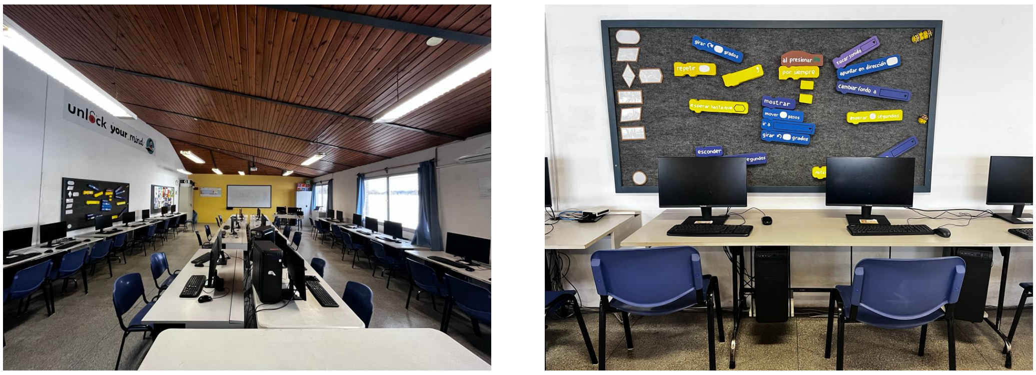
C.2 Implementation

I recruited 198 students from a private school in Montevideo on September 2023. Participation was available for all students from 5th grade to 9th grade.

The data recollection was run across four weekdays, in the school's computer lab during regular computing hours. The logistics were arranged in coordination with the school's principal board and the computing team coordination. I use the infrastructure of the school's computer lab, comprising 30 computers. With every class having under 28 students enrolled, I had no problem fitting all participants in the lab.

Figure C.7: Computer lab used

(a) Room **(b) Computer setup**



Notes: These figures show the school's computer lab, where all sessions took place. Figure (a) shows the room from the entrance. Figure (b) shows the computer setups.

I requested approval by the parents of involved students. The school delivered a consent form containing information on the project, with an explicit endorsement. No specific details on the tasks or aim of the research was communicated. Children were also instructed that their participation was voluntary.

I offered participants prize baskets containing canteen products. All participants received a reward worth 75 UYP ($\sim$ 2.00 USD) for participation and could earn products worth up to 265 UYP ($\sim$ 7.00 USD). I set the expected time to complete the study to 30 minutes, below the average computing class duration. The study was fully conducted in Spanish.

C.3 Results

The study was completed in 10 sessions throughout four days. Each session consisted of an entire group. Each grade consists of two groups. Sessions were run during computing class and lasted its whole duration.

All parents and students agreed to participate in the study. Attendance to the school was almost complete (see Table C.1). All attending students during computing class participated in the activity. Average value of the prize basket reward was 113 Uruguayan Pesos ($\sim$ 3.00 USD).

Table C.1: School attendance

Grade	Group	Absent (1)	Attendance (2)
5th	East	4	.826
5th	West	2	.920
6th	North	3	.875
6th	South	2	.920
7th	North	2	.905
7th	South	4	.826
8th	North	0	1.000
8th	South	2	.920
9th	North	0	1.000
9th	South	1	.929
5th-9th	**All**	**20**	**.908**

Notes: This table reports school attendance the day each group participated in the study. There are two groups per grade, labelled by the cardinal direction of the classroom. Column (1) reports number of absentees in each group. Column (2) reports the attendance rate for each group.

Table C.2 compares characteristics of our sample with Montevidean population based on data from the 2022 Uruguayan Household Survey. In short, spectators come from households with higher income per capita than the population. The sample is part of a reduced group of households with low material limitations.

Table C.2: Sample characteristics

	Spectators (1)	Population (2)	Difference (3)
Panel A. Individuals			
Male	.563	.515	.048
			(.037)
All education in school	.753	-	-
New to school	.056	-	-
Daily canteen expenditure	.87	-	-
Panel B. Households			
Cars: 2+	.929	.092	.837***
			(.019)
Rooms: 5+	.697	.233	.464***
			(.034)
Income per capita: 1000+	.970	.270	.700***
			(.016)
Under the poverty line	.000	.195	-.194***
			(.009)

Notes: This table reports statistics for the spectator sample and the population. The population sample covers all inidividuals in the same age bracket living in the same city. Panel A refers to individual characteristics. Panel B refers to household characteristics. Rows 5 to 7 show household shares. Row 5 refers to total number of cars in the individual's home. Row 6 refers to total number of rooms (excluding bathrooms and kitchen) in the individual's home. Row 7 and 8 include non-parametrics estimates for the spectator sample based in data from the 2022 Uruguayan Household Survey. All income are expressed in 2023 United States Dollars (USD). Columns (1) and (2) show mean shares. Column (3) shows differences between spectators and general population. Robust standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

D Worker phase

D.1 Procedures

The worker phase consists of the commitment and completion of letter-to-number encryption tasks. Figure D.1 exemplifies one task. Participants are explained how the encryption works and are asked to complete 3 encryptions, as trial. Afterwards, participants are asked to commit to a number of encryptions for each of two piece-rate payments: low (0.05 British Pounds, $\sim$ 0.06 USD), or high (0.50 British Pounds, $\sim$ 0.60 USD). Each participant is randomly assigned to one of the two piece-rate payments and has to follow-up on their commitment for that piece-rate.

Task presentation. I present a '*word*', formed by letters. Every letter has a 3-digit number assigned, displayed in a separate encryption table. Worker's task is to submit the '*code*' assigned to the '*word*'. Workers can only proceed to the next '*word*' if the encryption is done correctly. There is no limited time or opportunities to answer. Once the correct '*code*' is supplied, the workers can proceed to a new '*word*' and encryption table.

Figure D.1: Letter-to-number encryption task example

T	C	R	G	O	K	I	A	P	N	B	V	Z
879	978	054	397	129	170	402	361	328	195	807	785	354

X	W	U	F	S	H	M	E	L	Q	D	J	Y
385	438	218	435	812	157	873	389	573	392	720	214	158

'word': XR

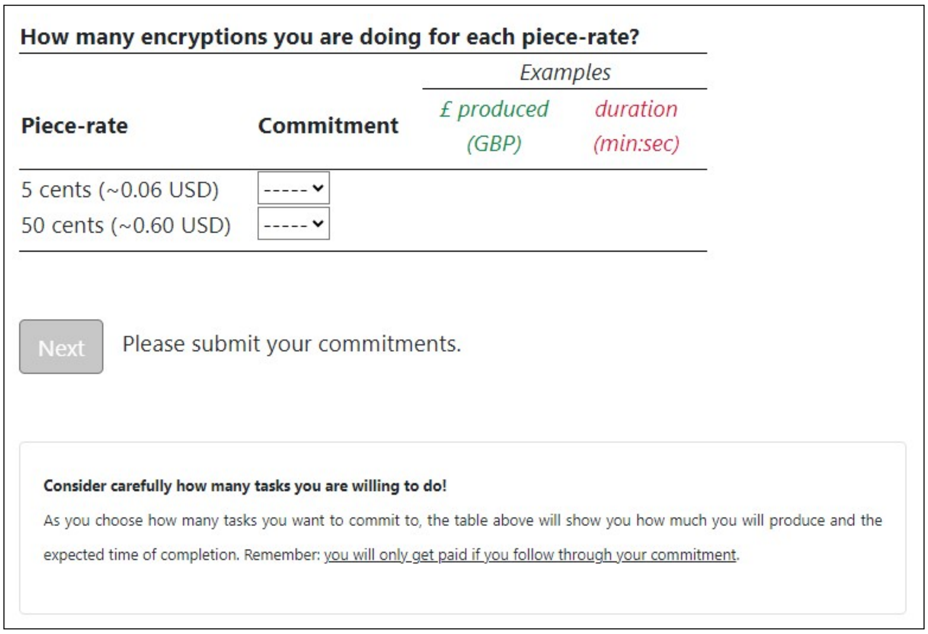
Enter the 'code' | Submit

Notes: This screenshot exemplifies the letter-to-number encryption task. The encryption tables are depicted above. The table displays all letters of the English alphabet in random order. Each letter is allocated a 3-digit number. The assigned '*word*' and a filling blank for the '*code*' are depicted below. The 'code' is formed by all digits, with no space between them. Each round the '*word*' and encryption table are randomly chosen. The encryption table changes both the letter order and the numbers assigned to each letter. In this example, the '*word*' is XR and the '*code*' is 385054.

The encryptions take longer as participants advance. The first five encryption '*words*' have one letter. Every five encryptions one letter is added to the '*word*'. I inform participants about the increasing length of the '*word*' and exemplify it.

Task commitment. I inform participants about two possible piece-rate for each encryption succesfully completed: low piece-rate (0.05 British Pounds, ∼ 0.06 USD), or high piece-rate (0.50 British Pounds, ∼ 0.60 USD). I ask participants to commit to how many tasks they will complete under each piece-rate. The minimum number of tasks is 5, the maximum is 50. I ask participants to carefully consider their commitments, and inform them that they need to follow-up on their commitment to receive the payment.

Figure D.2: Task commitment



Notes: This screenshot shows the explanation and form to commit tasks for each piece-rate payment. The last columns automatically generate estimates of money produced and total duration for the corresponding commitment.

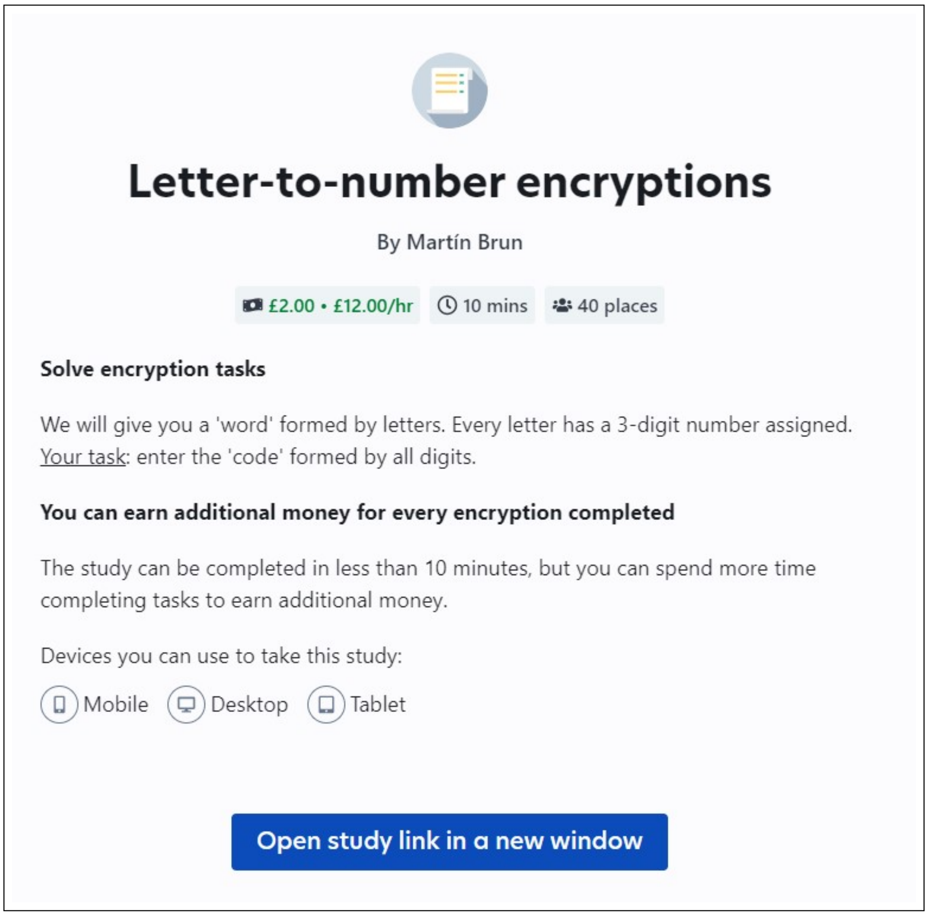
Task completion. The resulting piece-rate is randomly assigned. Participants are required to follow-up on their commitment to obtain the base payment.

Reward details. I inform participants their final payoff can be influenced by a third-party. I restrict information about when, how, why, and who is involved in the income allocation. Workers earn a 2 British Pound (∼2.50 USD) base payment and can earn bonus payment based on their performance.

D.2 Implementation

I recruited 40 participants in *Prolific* on August 2023. Figure D.3 depicts the study description in *Prolific*. I offered a 2 British Pound (∼2.50 USD) base payment for completing the study and the possibility of earning additional money.[24] I set the expected time to complete the study to 10 minutes. Participation was available only to workers residing in the United States.

Figure D.3: Prolific study description



Notes: This screenshot shows the information displayed to participants when entering the study in Prolific. The button at the bottom links to the experiment.

[24] *Prolific* works with British Pounds. Participants with sufficient experience in the platform are used to it. Still, I display an approximation for United States Dollars (USD) for the sake of clarity.

D.3 Results

The study was completed in less than 2 hours.[25] Median time to complete the study was 8 minutes and 32 seconds. Average payment to participants (including bonus payment) was 7.13 British Pounds ($\sim$ 8.55 USD). Total cost was around 285 British Pounds ($\sim$ 340 USD).

Table D.1: Sample characteristics

	Mean (1)	Min (2)	Max (3)
Panel A. Demographic			
Male	.47	.00	1.00
White	.53	.00	1.00
Age	36.89	20	76
Born in U.S.	.75	.00	1.00
Citizen from U.S.	.80	.00	1.00
Panel B. Performance			
Total approvals in Prolific	937	5	3,105
Time to complete task (seconds)	786	220	2,808
Total earnings from task	7.13	2.25	27.00

Notes: This table describes sample characteristics. Column (1) shows means. Column (2) shows minimum values. Column (3) shows maximum values.

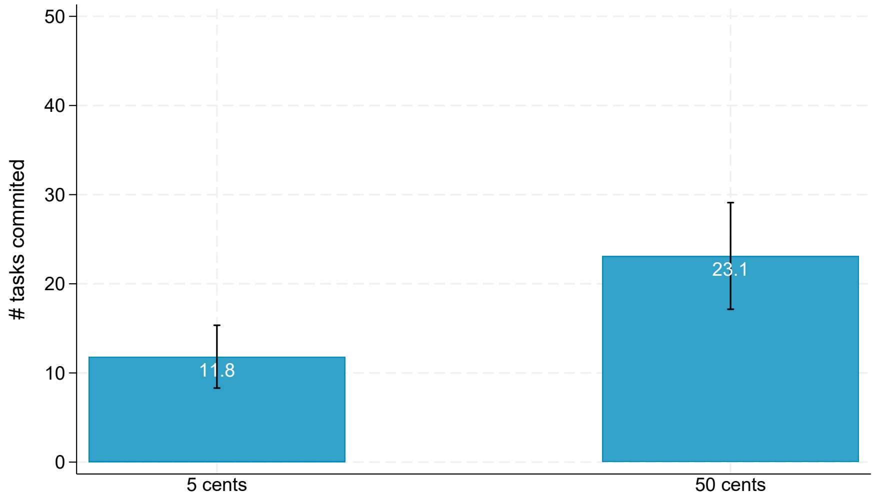
Participants completed an average of 15.9 tasks (SD = 14.5).

Basic assumptions. Figure D.4 shows the mean task commitment for each piece-rate payment. Commitments for all piece-rate payments are statistically different from 5 and from 50 (see columns 2 and 3 in Table D.2 for details). Results are in line with the basic assumptions about worker's behavior.

Implications. To explore commitment differences by piece-rate payments, I rank commitments within each piece-rate payment and compare the number of task commited in each ranking position. Figure D.5 depicts the results. There are workers committing the minimum and maximum number of tasks for all piece-rate payments. In those regions, commitments by piece-rate payments converge to the same number of tasks. For intermediate number of tasks, commitments are larger for the high piece-rate payment.

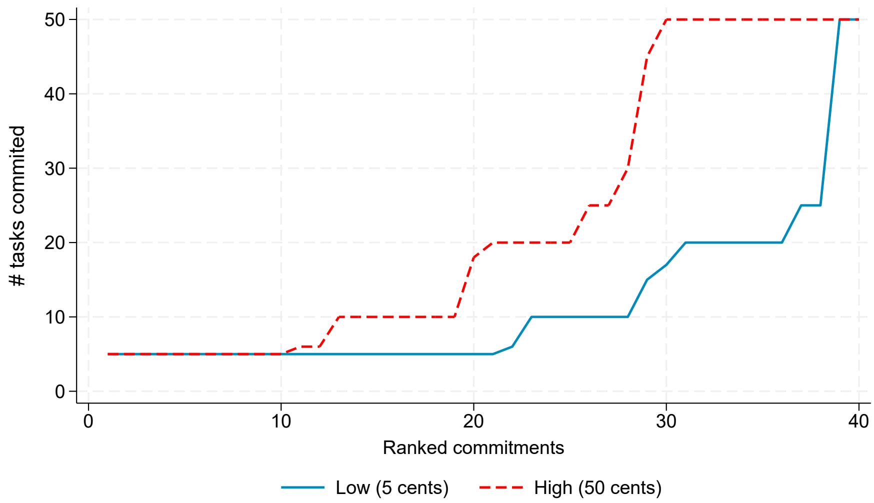
[25] I launched the experiment at 12:00 EDT (09:00 PDT). The last participant completed the study at 13:07 EDT (10:07 PDT). EDT is Eastern Daylight Time (e.g., used in New York City), and PDT is Pacific Daylight Time (e.g., used in Los Angeles).

Figure D.4: Commitment by piece-rate payment



Notes: This figure plots mean task commitments for each piece-rate payment. 95% confidence interval is plotted as bars.

Figure D.5: Commitment ranking by piece-rate payment



Notes: This figure plots ordered task commitments for each piece-rate payment. Commitments are ranked within piece-rate payment (similar to a percentile). For example, rank 20 is the median task commitment for each piece-rate payment.

Column 4 in Table D.2 shows the differences for task compared to the high piece-rate payment. Commitments increase with the piece-rate payment. Raw differences are statistically significant.

We test the differences between task commitment by piece-rate payments using a regression. Results are shown in Table D.3. We run regressions comparing task commitment between low and high piece-rate payments. Commitments increase with the piece-rate payment. Differences are statistically significant for all specifications.

Table D.2: T-tests on commitments by piece-rate payment

	Mean	vs. 0	vs. 50	vs. High
	(1)	(2)	(3)	(4)
Low	11.8	-	-	-11.3***
		[.000]	[.000]	[.002]
High	23.1	-	-	
		[.000]	[.000]	

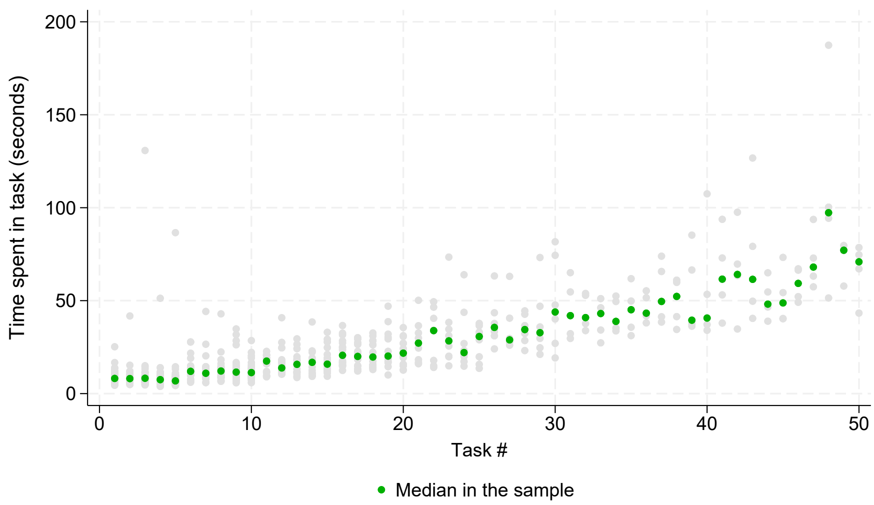
Notes: These tables describe participant's commitments for different piece-rate payments. Column (1) show mean commitment per piece-rate payment. Columns (2) and (3) show p-values on the differences with the minimum commitment (0 encryptions) and the maximum commitment (50 encryptions), respectively. Column (4) show differences with the High piece-rate payment (50 cents). p-values are reported in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D.3: Piece-rate payments drawn

	(1)	(2)
High	11.3***	11.3***
	(2.4)	(3.3)
Individual FE	No	Yes
Observations	80	80
R^2	.122	.787

Notes: This table reports the coefficients for high piece-rate payment on task commitment. The dependent variable is the number of tasks committed. The independet variable is a dummy variable for 'high' piece-rate payment. Low piece-rate payment is 5 cents. High piece-rate payment is 50 cents. Each column reports estimates from a linear model. Standard errors clusterized at individual level are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure D.6: Time spent per task



Notes: This figure plots time spent (in seconds) per task by all participants. Median time spent is plotted in green. One outlier is excluded from the plot: more than 600 seconds for task #19.