Would I Lie to You?
Project selection with biased advice

Online Appendix

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A Discussion of risk aversion

We now confirm that the sign of the comparative statics in Proposition 1 remain unchanged when agents are risk-averse but the incentive supporting the equilibrium is weaker in that the incentive for a type to falsely report High is stronger. Let utility over wealth w be given by $u(w)$, with $u' > 0$, $u'' < 0$ and $u(0) = 0$. Thus the consumer is risk-averse. Define $A(t)$ as the probability a manager's recommended project is accepted when all other managers use threshold t. This probability depends on how many other managers recommend acceptance, assuming each project is accepted with equal probability if more than one is recommended. We now rederive the condition in line (4), omitting terms that result in the focal manager's project being rejected in favor of another's project since $u(0) = 0$.

$$\begin{aligned} A(l)u(l) &\leq F(l)^{n-1}\big(A(l)(1-r)u(h) + F(l)^n(A(l)(1-r)u(h) + ...)\big) \\ &= F(l)^{n-1}\sum_{j=0}^{\infty}(F(l)^n)^j A(l)(1-r)u(h) \\ &= \left(\frac{F(l)^{n-1}}{1-F(l)^n}\right)A(l)(1-r)u(h) \end{aligned}$$

Canceling $A(l)$ from each side and performing the same algebraic manipulations leading up to line (4) gives

$$0 \leq \frac{u(h)r^{n-1}}{\sum_{j=0}^{n-1} r^j} - u(l) \equiv IC'(l,h,r,n). \tag{4'}$$

[*]Author order determined using the American Economic Association's Author Randomization Tool.

Since $u' > 0$, it is immediate that the signs of all comparative statics on IC' equal that on IC. We now show that the incentive to comply with the equilibrium strategy is weaker given risk aversion than risk neutrality in the following sense.

Proposition 1 *Whenever a risk neutral agent is indifferent to defecting a risk averse manager strictly prefers to defect.*

Proof From line (4) we have the identity

$$l + IC_1 = \frac{hr^{n-1}}{\sum_{j=0}^{n-1} r^j}.$$

That is, a risk neutral player would be indifferent between receiving h with some probability and receiving $l + IC_1$ for sure. But then for a risk averse player

$$u\left(l + IC_1\right) = u\left(\frac{hr^{n-1}}{\sum_{j=0}^{n-1} r^j}\right) > \left(\frac{r^{n-1}}{\sum_{j=0}^{n-1} r^j}\right) u(h),$$

where the right hand side of the inequality is the expected utility from sending the High message (see line (4)), which is less than the utility from receiving $l + IC_1$ for sure. ■

B Proofs

B.1 Proposition 1

Proof Existence follows from the discussion above. The results on h and l are immediate. The result on n follows since the numerator decreases and the denominator increases in n. Finally for r, using the quotient rule it must be shown that

$$(n-1)r^{n-2}\sum_{j=0}^{n-1} r^j > r^{n-1}\frac{d}{dr}\left(\sum_{j=0}^{n-1} r^j\right) \iff (n-1)\sum_{j=0}^{n-1} r^j > r\sum_{j=0}^{n-2}(j+1)r^j = \sum_{i=1}^{n-1} ir^i,$$

which holds since $n-1 \geq i$ for all $i \in \{1, ..., n-1\}$. ■

B.2 Proposition 2

Proof Part(i). The symmetry of the equilibrim of Proposition 1 implies that each agent has a $\frac{1}{n}$ probability of "winning," that is, having their project selected. Note this might not occur in the first period but since we have assumed there is no time discounting this does not affect payoffs. Next, since the equilibrium is truth telling this implies an agent whose project is accepted will receive payoff h, and thus each agent's ex-ante payoff is $\frac{h}{n}$. In comparison, in the babbling equilibrium one player is randomly selected as the winner in the first period, and so an agent's ex ante payoff is $\frac{rl+(1-r)h}{n} < \frac{h}{n}$. Finally, the DM's payoff is h in the truth telling equilibrium and $rl + (1-r)h$ in the babbling equilibrium, and thus the former Pareto dominates the latter on an ex-ante basis.

Part (ii). Suppose a player has learned their type is h. Then we claim this player receives a lower payoff in the babbling equilibrium than in the truth telling equilibrium. This follows since in the former case all agents report high and so each is accepted with probability $\frac{1}{n}$, whereas in the latter case there is positive probability that at least one agent reports low, implying the high type's probability of acceptance exceeds $\frac{1}{n}$. If instead a player learns their type is l this player also receives a lower payoff in the babbling equilibrium than in the truth telling equilibrium. The type l player's payoff in the babbling equilibrium is $\frac{l}{n}$, and note this is less than l's payoff from deviating in the truth telling equilibrium by reporting high, since in that case the probability of acceptance exceeds $\frac{1}{n}$ (there is positive probability than not all other players are reporting high). Thus l's babbling payoff is less than l's payoff from deviating from the truth telling equilibrium, which in turn is less than l's payoff from equilibrium play in the truth telling equilibrium (by the incentive compatability condition found in line (1)).

Part (iii). In the truth telling equilibrium an agent's payoff is h with probability $\frac{1}{n}$ and it is 0 with probability $\frac{n-1}{n}$, whereas for the DM it is h with probability 1. We can represent these respectively by the CDFs

$$F_{agent}(x) = \begin{cases} 0 & \text{if } x < 0 \\ \frac{n-1}{n} & \text{if } x \in [0, h) \\ 1 & \text{if } x \geq h \end{cases} \quad \text{and} \quad F_{DM}(x) = \begin{cases} 0 & \text{if } x < h \\ 1 & \text{if } x \geq h \end{cases}$$

In contrast, in the babbling equilibrium the distribution of payoffs are given by

$$G_{agent}(x) = \begin{cases} 0 & \text{if } x < 0 \\ \frac{n-1}{n} & \text{if } x \in [0, l) \\ \frac{n-1}{n} + \frac{l}{n} & \text{if } x \in [l, h) \\ 1 & \text{if } x \geq h \end{cases} \quad \text{and} \quad G_{DM}(x) = \begin{cases} 0 & \text{if } x < l \\ r & \text{if } x \in [l, h) \\ 1 & \text{if } x \geq h \end{cases}$$

Since $F_{agent}(x) \leq G_{agent}(x)$ and $F_{DM}(x) \leq G_{DM}(x)$ for all x with these inequalities strict for some x the claim on FOSD is established. ■

B.3 Proposition 3

Proof Since $IC_2 = 0$ is necessary for the mixed strategy equilibrium and $IC_2 < IC$ for $\rho < 1$, it follows that the mixed strategy equilibrium does not exist if $IC \leq 0$. We now claim that when $IC > 0$ there exists a unique $\rho \in (0, 1)$ that solves line (5), from which the proposition follows. The observation that IC_2 coincides with IC when replacing r with $r\rho$ in the latter, and the previously established fact that IC is increasing in r, implies that IC_2 is increasing in ρ. Next, by inspection it is clear that $IC_2 = -l$ when $\rho = 0$. Then by the continuity of IC_2 in ρ it follows there is a unique ρ solving line (5).

Next, the equivalence of IC_2 with IC (replacing r with $r\rho$) implies IC_2 inherits IC's properties, namely IC_2 is increasing in r, ρ, and h while decreasing in l and n. It then follows that the ρ that solves line (5) is increasing in l and n, and decreasing in h and r. ■

C Supporting Tables

Table C.1: Summary Statistics: Experiment 1

Variable	Obs.	Mean	Std. Dev.	Min	Max
Gender	297	0.36	0.49	0	2
Etnicithy	297	0.48	0.50	0	1
RiskTolerance	297	0.39	0.49	0	1
CareerStage	297	0.57	0.50	0	1
CareerOrientation	297	0.43	0.50	0	1

Notes. Gender takes the value of 0 if woman, 1 man and 2 non-binary. We have two non-binary observations and 64% of the sample are women. Ethnicity takes the value of 1 if white and 0 otherwise. Risk tolerance takes the value of 1 if the agent choose the most risky lottery in the Eckel-Grossman risk aversion test and 0 otherwise. Career stage takes the value 1 if the student is junior or more and 0 otherwise. Career orientation takes value 1 if the chosen career is oriented towards science and 0 if it is oriented towards arts.

Table C.2: Summary Statistics: Experiment 2

Variable	Obs.	Mean	Std. Dev.	Min	Max
Gender	154	0.41	0.52	0	2
Ethnicity	154	0.53	0.50	0	1
RiskTolerance	154	0.36	0.48	0	1
CareerStage	154	0.40	0.49	0	1
CareerOrientation	154	0.51	0.50	0	1

Notes. Gender takes the value of 0 if woman, 1 man and 2 non-binary. We have one non-binary observation and 59% of the sample are women. Ethnicity takes the value of 1 if white and 0 otherwise. Risk tolerance takes the value of 1 if the agent choose the most risky lottery in the Eckel-Grossman risk aversion test and 0 otherwise. Career stage takes the value 1 if the student is junior or more and 0 otherwise. Career orientation takes value 1 if the chosen career is oriented towards science and 0 if it is oriented towards arts.

Table C.3: Regressions of Truth-telling Beliefs, Experiment 1

	Varying r		Varying l		Varying n			
					l=2		l=3.5	
	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8
$r = 0.6$	-0.347***	-0.272***						
	(0.05)	(0.06)						
$r = 0.75$	-0.294***	-0.258***						
	(0.04)	(0.05)						
$l = 3.5$			-0.113***	-0.088**				
			(0.04)	(0.04)				
$l = 5$			-0.2989***	-0.326***				
			(0.05)	(0.04)				
$n = 3$					-0.286***	-0.337***	-0.160***	-0.085**
					(0.04)	(0.05)	(0.04)	(0.04)
Constant	0.802***	0.892***	0.802***	0.734***	0.802***	0.650***	0.689***	0.918***
	(0.02)	(0.06)	(0.02)	(0.06)	(0.02)	(0.07)	(0.03)	(0.06)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Obs.	237	237	331	331	235	235	167	167
R_2	0.2444	0.3201	0.1281	0.2653	0.1781	0.2624	0.0900	0.2842

Notes. (* p-value<0.1; ** p-value<0.05; *** p-value<0.01) The dependent variable is the beliefs agents have on the other players truthfully reporting after receiving a bad quality project. Linear regressions with robust standard errors. The self-reported beliefs take values from 0 to 100. This variable divided by 100 is our dependent variable. Odd columns include individual controls of age, ethnicity, career orientation, year at the university and risk tolerance.

Table C.4: Regressions of Truth-telling Beliefs, Experiment 2

	Varying r		Varying l		Varying n			
					l=2		l=3.5	
	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8
$r = 0.6$	-0.181**	-1.126						
	(0.08)	(0.08)						
$l = 3.5$			-0.024	-0.028				
			(0.05)	(0.06)				
$n = 3$					-0.183**	-0.200**	-0.091	-0.085
					(0.08)	(0.08)	(0.07)	(0.07)
Constant	0.624***	0.936***	0.737***	0.757***	1.001***	1.365***	0.882***	0.785***
	(0.06)	(0.21)	(0.15)	(0.24)	(0.21)	(0.24)	(0.20)	(0.22)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Period	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1041	1041	1491	1491	1673	1673	1598	1598
Clusters	54	54	52	52	60	60	64	64
R_2	0.0793	0.1682	0.0530	0.0972	0.0885	0.1953	0.0805	0.1312

Notes. (* p-value<0.1; ** p-value<0.05; *** p-value<0.01) The dependent variable is the beliefs agents have on the other players truthfully reporting after receiving a bad quality project. Linear regressions with clustered standard errors by subject. The self-reported beliefs take values from 0 to 100. This variable divided by 100 is our dependent variable. Odd columns include individual controls of age, ethnicity, career orientation, year at the university and risk tolerance.

Table C.5: Regressions of Truth-telling by Low Project Probability, Experiment 2

	model 1	model 2	model 3	model 4
$r = 0.6$	-1.416***	-1.447***	-1.646***	-1.713***
	(0.38)	(0.38)	(0.40)	(0.40)
Constant	-1.839***	-1.393**	-3.241***	-2.703***
	(0.53)	(0.64)	(0.99)	(1.00)
Controls	No	No	Yes	Yes
Period	No	Yes	No	Yes
Obs.	1041	1041	1041	1041
Clusters	54	54	54	54
Pseudo R_2	0.0712	0.0826	0.1912	0.2023

Notes. (* p-value<0.1; ** p-value<0.05; *** p-value<0.01) Logit regressions with error clustered by subject. The dependent variable is the truth-telling probability conditional on receiving a low project.

Table C.6: Regressions of Truth-telling by Low Project Value, Experiment 2

	model 1	model 2	model 3	model 4
$l = 3.5$	-0.123	-0.142	-0.406*	-0.422*
	(0.28)	(0.28)	(0.23)	(0.23)
Constant	1.238	1.611*	0.983	1.397
	(0.83)	(0.89)	(0.88)	(0.88)
Controls	No	No	Yes	Yes
Period	No	Yes	No	Yes
Obs.	1491	1491	1491	1491
Clusters	52	52	52	52
Pseudo R_2	0.0015	0.0115	0.1248	0.1310

Notes. (* p-value<0.1; ** p-value<0.05; *** p-value<0.01) Logit regressions with error clustered by subject. The dependent variable is the truth-telling probability conditional on receiving a bad project.

Table C.7: Regressions of Truth-telling by Number of Advisors, Experiment 2

	Low Payment=2				Low Payment=3.5			
	model 1	model 2	model 3	model 4	model 5	model 6	model 7	model 8
3 *Agents*	-0.925**	-0.935**	-0.981**	-0.990**	-1.005***	-1.005***	-0.807**	-0.811**
	(0.44)	(0.44)	(0.47)	(0.47)	(0.37)	(0.37)	(0.33)	(0.33)
Constant	2.841**	2.874**	2.441	2.511	2.818***	3.360***	2.485**	3.051***
	(1.13)	(1.17)	(1.54)	(1.58)	(0.98)	(0.95)	(1.02)	(1.00)
Controls	No	No	Yes	Yes	No	No	Yes	Yes
Period	No	Yes	No	Yes	No	Yes	No	Yes
Obs.	1673	1673	1673	1673	1598	1598	1598	1598
Clusters	60	60	60	60	64	64	64	64
Pseudo R_2	0.0360	0.0396	0.0827	0.0859	0.0433	0.0525	0.0683	0.0774

Notes. (* p-value<0.1; ** p-value<0.05; *** p-value<0.01) Logit regressions with error clustered by subject. The dependent variable is the truth-telling probability conditional on receiving a low project.

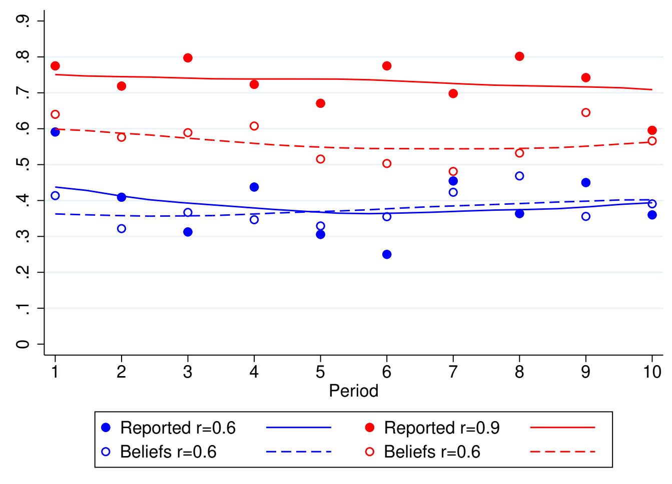
Table C.8: Treshold and Optimistic/Pessimistic Proportions

Variable	Treshold	Optimistic	Pessimistic
By rounds			
$r = 0.9$, $l = 2$, $h = 10$, $n = 2$	27.77	77.5%	22.4%
$r = 0.6$, $l = 2$, $h = 10$, $n = 2$	41.66	46.6%	53.4%
$r = 0.9$, $l = 3.5$, $h = 10$, $n = 2$	59.82	52.2%	47.8%
$r = 0.9$, $l = 2$, $h = 10$, $n = 3$	71.15	19.3%	80.7%
By agents			
$r = 0.9$, $l = 2$, $h = 10$, $n = 2$	27.77	90.6%	9.4%
$r = 0.6$, $l = 2$, $h = 10$, $n = 2$	41.66	58.1%	41.9%
$r = 0.9$, $l = 3.5$, $h = 10$, $n = 2$	59.82	54.26%	45.7
$r = 0.9$, $l = 2$, $h = 10$, $n = 3$	71.15	29.5	70.5
	Median	Optimistic	Pessimistic
By rounds			
$r = 0.9$, $l = 2$, $h = 10$, $n = 2$	55.8	52%	48%
$r = 0.6$, $l = 2$, $h = 10$, $n = 2$	39.5	54.6%	45.4%
$r = 0.9$, $l = 3.5$, $h = 10$, $n = 2$	58.1	52.2%	47.8%
$r = 0.9$, $l = 2$, $h = 10$, $n = 3$	41.0	48.9%	51.1%
By agents			
$r = 0.9$, $l = 2$, $h = 10$, $n = 2$	59.5	57.3%	42.7%
$r = 0.6$, $l = 2$, $h = 10$, $n = 2$	41.7	58.1%	41.9%
$r = 0.9$, $l = 3.5$, $h = 10$, $n = 2$	58.6	55.3%	44.7%
$r = 0.9$, $l = 2$, $h = 10$, $n = 3$	49.9	45.5%	54.5%

Notes. We have the proportion of optimistic and pessimistic participants by round and by agents using the threshold defined on equation 5 and using the median belief for each treatment.

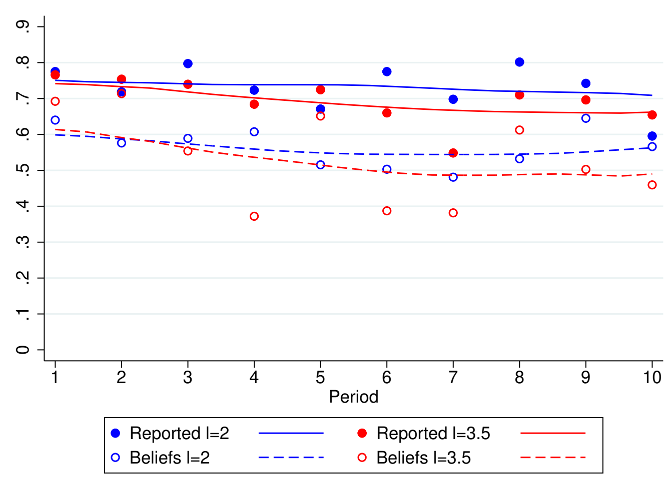
D Supporting Figures

Figure D.1: Truth-telling over time, Experiment 2, Varying r



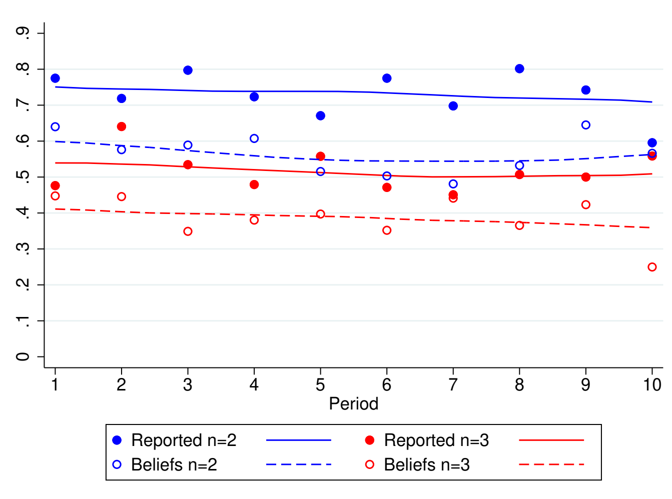
Notes. Plots of the mean truthful reporting and beliefs over time varying the probability to receive a low quality project (r).

Figure D.2: Truth-telling over time, Experiment 2, Varying l



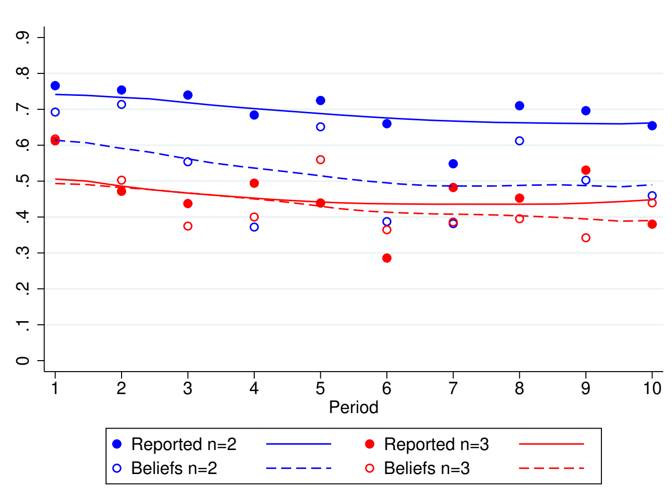
Notes. Plots of the mean truthful reporting and beliefs over time varying the payment of the low quality project (l).

Figure D.3: Truth-telling over time, Experiment 2, Varying n with $l = 2$



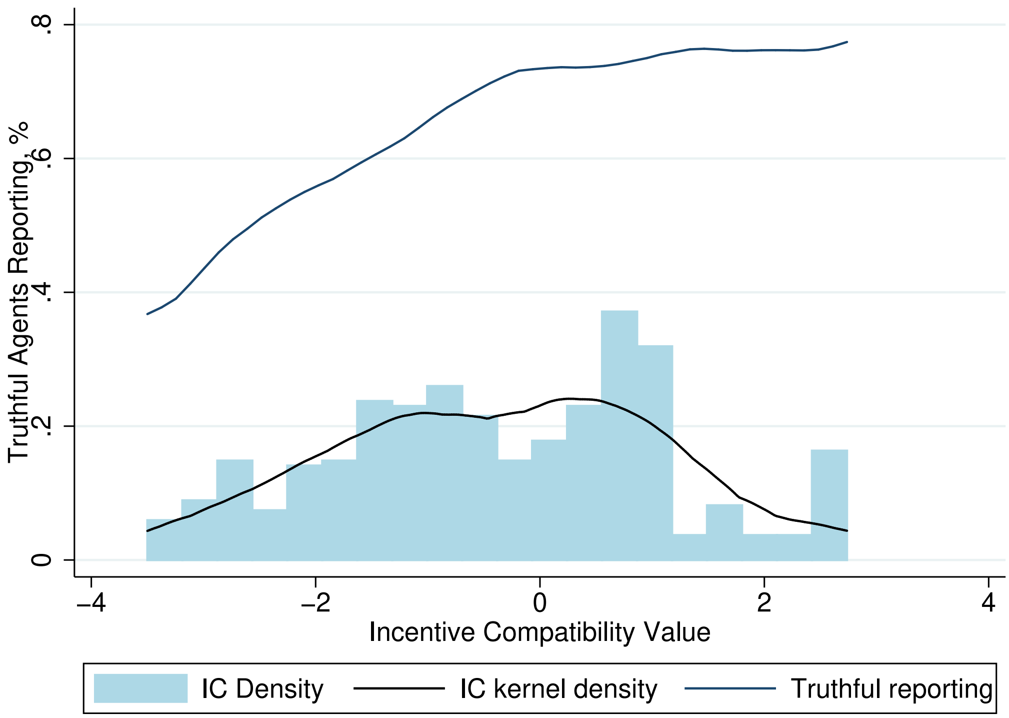
Notes. Plots of the mean truthful reporting and beliefs over time varying the number of agents (n) when the payment of the low quality project is 2.

Figure D.4: Truth-telling over time, Experiment 2, Varying n with $l = 3.5$



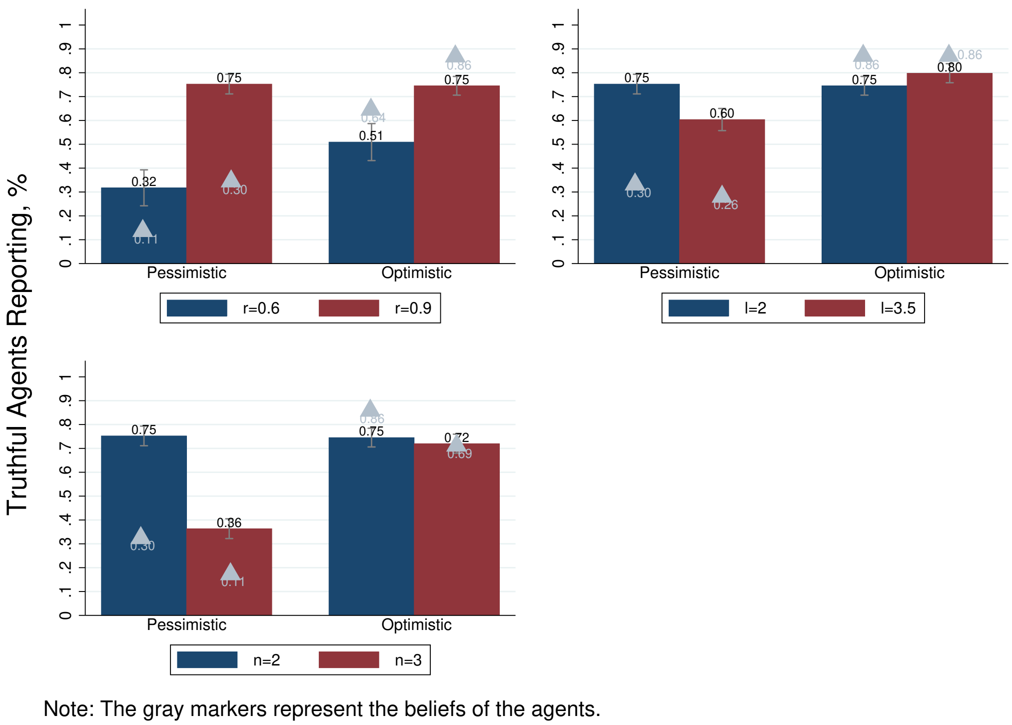
Notes. Plots of the mean truthful reporting and beliefs over time varying the number of agents (n) when the payment of the low quality project is 3.5.

Figure D.5: Truth-telling and IC constraints given beliefs by agent



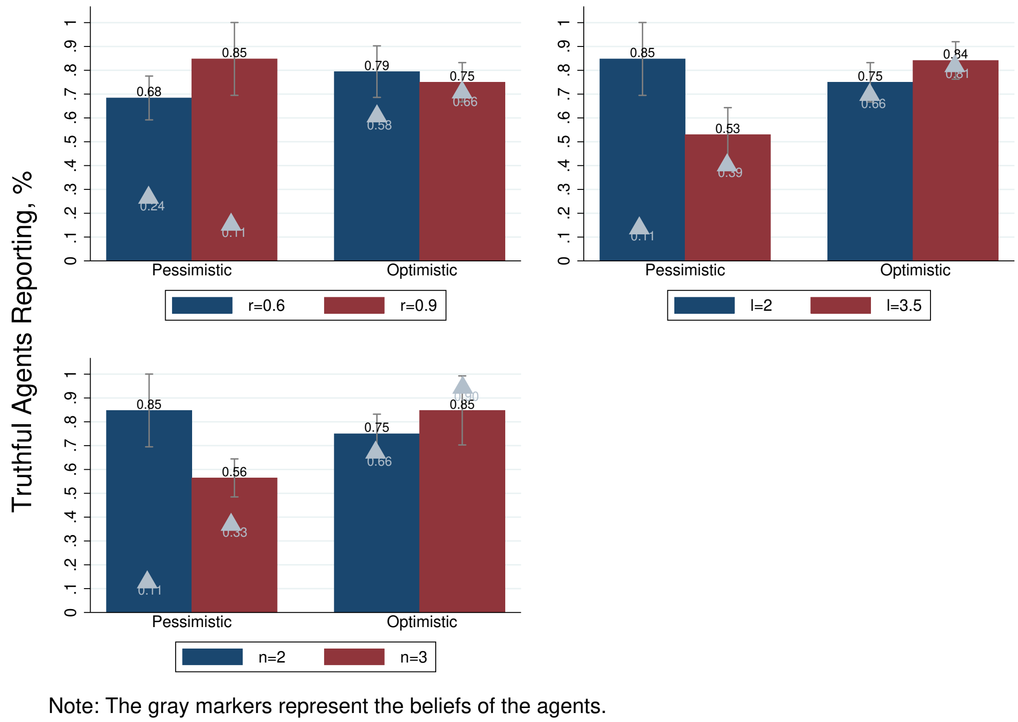
Notes. Plots of the mean truthful reporting in all the experiments by the average incentive compatibility of the agents.

Figure D.6: Truth-telling using Mixed Strategy using Median Split



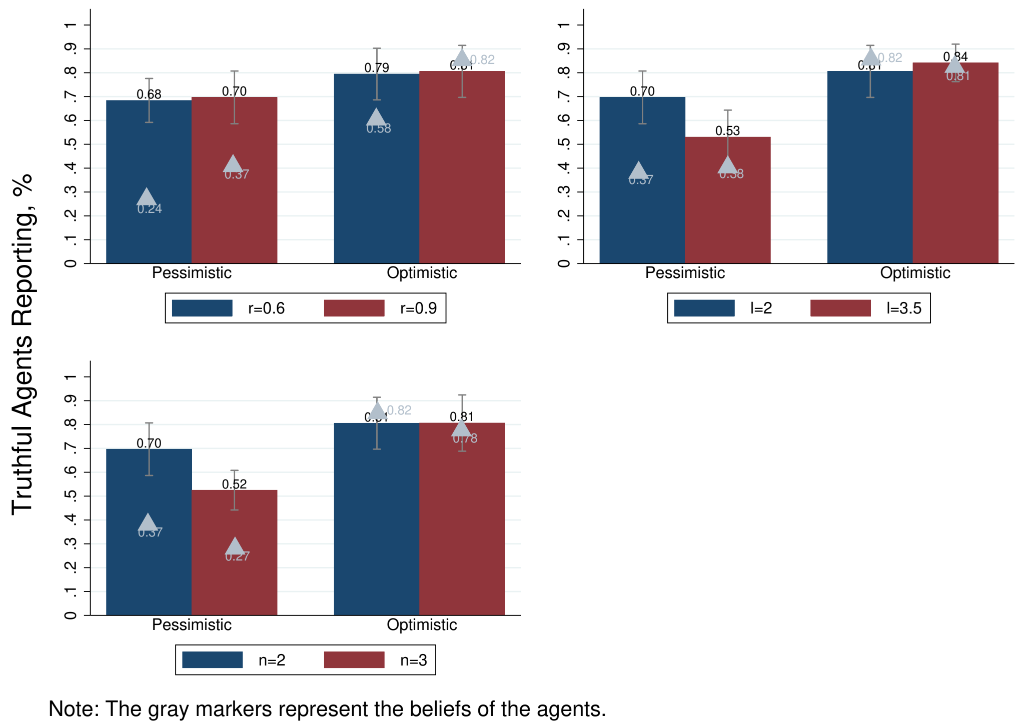
Notes. Plots of the mean truthful reporting in all the experiments using a median split by observation.

Figure D.7: Truth-telling using Mixed Strategy by Agent



Notes. Plots of the mean truthful reporting in all the experiments using the predicted threshold by agent.

Figure D.8: Truth-telling using Mixed Strategy using the Median Split by Agent



Notes. Plots of the mean truthful reporting in all the experiments using a median split by agent.

E Experimental Instructions, Experiment 2 Baseline

General Information

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

All payoffs during the experiment are denominated in US Dollars. Upon completion of the experiment, you will be paid your earnings privately, in cash. The exact amount you receive will be determined during the experiment and will depend on your decisions and the decisions of others.

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

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

Description of Blocks, Rounds and Groups

This experiment will consist of ten blocks, and each block will consist of at least one round. We will cover the number of rounds in greater detail later in the instructions.

In each block, you will be in a three-person group with two other participants. The participants you are grouped with will be the same for all rounds of that block.

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

You will be informed of your role (A or B) prior to the beginning of the first round of block 1, and your role will not change during the experiment.

At the beginning of each new block, you will be randomly re-matched with two new group members, again with two B participants and an A participant. Although your role will not change, B participants will receive new random numbers (i.e. B1 and B2). Therefore, B participants will always play the role of B participants, but may be either B1 or B2, depending on the block. A participants will keep their role as A participant.

Description of the Decision Task

In round 1 of every block, each B participant will be assigned a randomly determined project. We will cover this random assignment in greater detail shortly. This project will either be High Quality or Low Quality, and only the B participant will know their project's quality. B participants will not know the project quality of the other B participant, and A participants will not know either project quality. After seeing their quality, each B participant will then use the buttons on their screen to send a message to the A participant in the group about their project quality. The B participant may choose either the "High Quality" or "Low Quality" message, regardless of the project they actually received.

Once both B participants have sent their messages, the messages will be shown to the A participant. After seeing both messages, but not the actual project qualities, the A participant may select the project of either B participant (but not both), or may reject both projects.

If both projects are rejected in round 1, the group will proceed to round 2, in which each B participant will be given a new randomly determined project and will then send a new message as in round 1. After seeing both messages, the A participant will again decide whether to accept either project or reject both (advancing to round 3, and so on).

The block will end when a project has been selected by the A participant. Once all groups have concluded, participants will see the results from the block and advance to the next block after being re-matched.

Description of the Project Assignment

In any round, each B participant has a 10% chance of receiving a High Quality project, and a 90% chance of receiving a Low Quality project. In other words, there is a one in ten chance of receiving a High Quality project for each B participant, and a nine in ten chance of receiving the Low Quality project.

The chance is drawn separately for each B participant in each round. This means that, for example, the project received by B1 will not affect the project received by B2 in any way. Note that in any round, it is possible for one B participant, both B participants, or no B participant to receive a High Quality project. Lastly, the project received by a B participant in a round will not affect the project received in any following rounds.

Are there any questions about the project assignment before we proceed?

Description of Payoffs

Within each block, payoffs for each group member will be determined by the project that is selected by the A participant. A High Quality project is worth \$20 in total, while a Low Quality project is worth \$4. The project's value will be divided equally between the A participant and the B participant who received the project. The B participant whose project was not chosen will earn nothing for that block.

If, for example the A participant selects B1's project, then both the A and B1 participants will receive half of the value of the project (\$10 each for a High Quality project, and \$2 each for Low Quality), while the B2 participant will receive no payoff for the block.

Upon completing the game, one block will be randomly drawn to count for your payment today. Specifically, after you have concluded all ten blocks, the computer will randomly draw one block to count towards your payment. Your payment will simply be your earnings from the randomly chosen block.

Feedback

At the end of each round, each group member will see the results from the current round, as well as all prior rounds for their group at the bottom of the screen. Specifically, each B participant will see the project they received in each round and the message they sent to the A participant in each round. They will also see if their project was selected in a round, if the other B participant's project was selected, or if no project was selected.

The A participants will see the messages sent by each B participant in each round, and which project, if any, they accepted in a round.

At the end of each block, all participants will also see their earnings from the block.

Summary of the Decision Task

In summary, each B participant will begin each round with either a High Quality project (with 10% chance) or a Low Quality project (with 90% chance) and will send a message to the A participant regarding this quality. Each B participant will only know the quality of their own project, and the A participant will not know the quality of either project. After seeing the messages from the B participants, the A participant may choose at most one of the two projects (in which case the game will end), or reject both projects. If both projects are rejected, the group will advance to the next round and repeat this process.

Once a project is selected, the block concludes and the value of the selected project will be divided equally between the A participant and the B participant who received the project. This will be \$10 each for a High Quality and \$2 each for a Low Quality project. The B participant whose project was not selected will earn nothing from the block.

Once all groups conclude each block, you will advance to the next block until all ten blocks have ended. Your payment from the game will be your payoffs from one block, selected at random.

Following the game, but before learning which block will count towards your payment, all participants will complete a brief series of post-experiment questionnaires before being paid privately, after which time they will be free to leave the lab.