

**CONTRACTS FOR AGENTS WITH BIASED BELIEFS: SOME THEORY AND  
AN EXPERIMENT  
ONLINE APPENDIX: EXPERIMENT INSTRUCTIONS**

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This section provides the instructions for a typical experimental session in chronological order. All instructions were read out loud and displayed on the computer screen. Subjects also received a paper version of the instructions. The instructions here are for a session where the treatment is administered first. Square brackets [] indicate a new “page” on the computer screen.

**Stage 1: Trivia Quiz**

[screen 1]

Welcome!

Thank you for participating in this study. Please read and sign the letter of consent.

Switch off your cell phones and other electronic devices, and put your personal belongings away.

Please do not speak with each other during the experiment. If you have questions at any point, please raise your hand and wait until I come over, to speak to me in private.

During this experiment you will have opportunities to earn or spend points. All your decisions and earnings will be recorded under the computer number (labxx). At the end of the experiment, the number of points associated with each computer number will be converted into US dollars.

For every two points that you earn you will receive \$0.01.

At the end of the experiment I will enter your earnings in a payment form, which you can then redeem at the bursar’s office at 25 West 4th Street (petty cash).

[screen 2]

Stage 1

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The experiment will be conducted in three stages. Instructions will be given along the way.

This is Stage 1. You will now be asked 10 trivia questions.

With each correct answer you earn 20 points.

Please click “Start” to begin the trivia quiz.

[quiz questions - 1 per screen, multiple choice answers (correct answer in italics)]

1. What is South America’s highest peak? Mt. Simón Bolívar; Mt. Ancohumá; *Mt. Aconcagua*; Mt. Pumasillo
2. John Adams and Thomas Jefferson, the 2nd and 3rd Presidents of the United States, both died on what day? October 30, 1801; March 4, 1809; January 25, 1840 *July 4, 1826*
3. The Italian village of Pompeii was destroyed in 79 AD by what type of natural disaster? Flood; Earthquake; *Volcano*; Wildfires
4. Jim Morrison (lead singer of The Doors), Elvis Presley, and Jimi Hendrix all died from what? Heart attack; Car accident; Suicide; *Drug overdose*
5. Which team won the first Super Bowl? *Green Bay Packers*; Baltimore Colts; New York Jets; Kansas City Chiefs
6. What actor holds the record for having been nominated most frequently for the “Best Actor” Academy Award (9 times)? Dustin Hoffman; *Spencer Tracy*; Paul Newman; Jack Nicholson
7. What is the largest species of whale? Sperm whale; *Blue whale*; Orca (Killer whale); Bowhead whale
8. Laudanum is a form of what drug? Chloral hydrate; Valium; *Opium*; Mescaline
9. Who was the first African American to win an Academy Award for best actress? Angela Bassett; Whoopi Goldberg; Jennifer Hudson; *Halle Berry*
10. What is the capital city of Germany? Bonn; Frankfurt; *Berlin*; Amsterdam

[score guess]

You answered all 10 questions.

Now please guess as accurately as possible how many of them you think you answered correctly.

You earn 100 points minus the square of the difference between your guess and your actual score. In other words, the further your guess is away from your actual score, the less points you earn, and the decrease is quadratic.

For example, if you have 7 right answers, but your guess is 4, you earn  $100-9=91$  points. If you guess 8, you earn  $100-1 = 99$  points.

## **Stage 2: Contracting Rounds**

[screen 1]

### Stage 2

You will now enter Stage 2 of the experiment. Stage 2 consists of two parts, each with 2 trial rounds and 15 paying rounds.

Imagine that you are participating in a job market. Based on the results of Stage 1, you will be divided into two groups (Group 1 and Group 2), and within each group some of you are going to be employers, and some of you are going to be employees.

Your role will be the same for the entire experiment. Employers and employees will only interact through the computer and never be in direct contact.

At the beginning of each round, each employer is paired up randomly with one employee from the same group. The employer is going to make a job offer, that is, (s)he offers the employee a certain amount of points for completing a job that consists of three "tasks". Each task has two possible outcomes, H(igh) and L(ow). If the outcome is H, then the employee makes a high number of points for the employer. If the outcome is L, then the employer earns less.

The employee does not have to accept the job offer. If (s)he does accept the offer, (s)he can increase the probability of getting high outcomes in the three tasks by investing some of his/her own points.

To show you how this works, we will go through a typical round, first from the employee's, then from the employer's perspective.

[screen 2]

### Stage 2

As an *employee* you start each round with a budget of 20 points. You first receive a job offer from your employer of that round. The employer makes a job offer to the employee by choosing two "wages": what (s)he pays for each task in which the outcome is H, and what (s)he pays for each task with outcome L.

You do not have to accept the offer. If you *reject* it, you receive an additional 100 points and the round ends.

If you want to *accept* the offer, you also have to decide whether you want to invest your budget in the job or not. By investing, you increase the probability of receiving a high outcome in each task.

Once you have accepted the offer and decided on your investment, the computer will determine the outcome of the job (that is, whether each of the three tasks had high or low outcomes).

Importantly, the probability of a high outcome depends not only on the investment, but also on your trivia score from Stage 1. Your trivia score decides how likely the high outcome is for each task, regardless of how much you invested in a given round.

If two employees make the same investment decision, the person with the higher score is more likely to get high outcomes.

Once the outcomes of the three tasks have been determined, you will receive the appropriate wage for each, and it will be added to your total points. If you did not invest, the 20 budget points are added to your total as well.

[Subjects are shown the employee decision screen and have time to familiarize themselves with it.]

[Four questions to test understanding; subjects can go back to the employee screen to answer them.]

1. Suppose an employee thinks his score is 5. What is the probability that the outcome of each task is H if he *does not* invest? (Answer: 0.25)
2. Suppose an employee thinks her score is 9. What is the probability that the outcome of each task is H if she *does* invest? (Answer: 0.95)
3. Suppose this employee does not invest. How often, approximately, can she expect that her outcome will be H? (round to whole number) (Answer: 2)
4. If her wages are  $X=200$  and  $Y=100$ , how much can she expect to earn (rounded to whole number)? (Note that these wages are an example - they are not actually possible in this experiment) (Answer: 520)

[screen 3]

## Stage 2

As an *employer* you make a job offer to the employee by choosing two "wages": what you pay for each task in which the outcome is H, and what you pay for each task with outcome L.

If the employee *rejects* the offer, you earn 0 points and the round ends.

If the employee *accepts* the offer, your earnings depend on the outcomes of the 3 tasks. In turn, the probability of outcome H in each task depends on the employee's  $\beta$  score and his/her investment.

To make it easier for you to choose the wage, you have access to the employee screen where you can test what your own wage offer looks like. Moreover, you can see the trivia scores and guesses of the employees in your group (although you will not get information about individual employees). Once your employee has decided, the computer will determine the outcomes of the three tasks. You will receive the earnings associated with them, minus the wage that you offered your employee for each.

[All subjects now see the employer screen.]

[screen 4]

After the employer and the employee made their decisions, they learn how many of the three tasks had outcome H or L, and how much they earned in this round; unless of course the offer was rejected (in which case the employee receives 120 points, the employer earns nothing).

This ends the round, and a new round begins.

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Please wait until the experimenter starts Part 1 of Stage 2.

[screen 5: group and role assignment]

You have been assigned to

Group [1/2]

For the remainder of this experiment, you are an

**[Employer/Employee].**

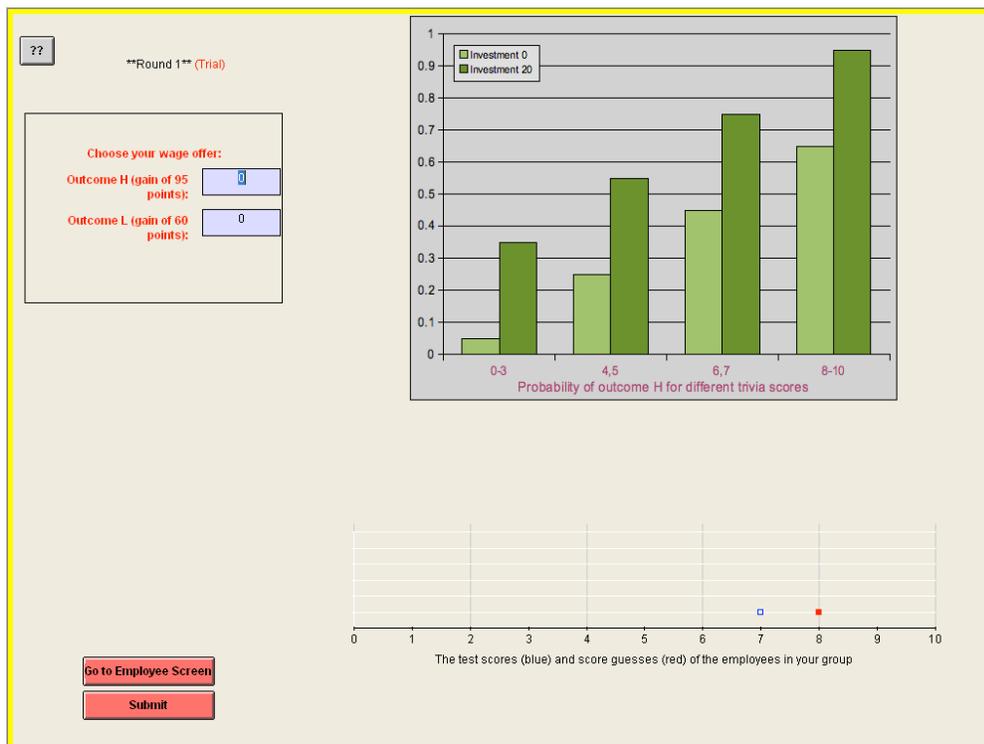
When you are ready, you will enter Part 1 of Stage 2, consisting of 2 trial rounds and 15 paying rounds.

In each round you will be randomly matched with one employee from your group.

Remember that you can use the help button for explanations.

Please click when you are ready to start.

[The 17 first rounds start. Below is the employer screen; note that in the experiment there are at least 4 agents shown in the graph of test scores and score guesses]



[employee screen]

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**\*\*Round 3\*\***

**Wage offer:**

**Outcome H:** 30

**Outcome L:** 52

Budget minus Investment: 0

Trivia Score Range	Probability of Outcome H
0-3	0.35
4,5	0.55
6,7	0.75
8-10	0.95

Your investment:  0 points  
 20 points  
 Reject the job offer

**Test**

**Submit**

[resolution screen - example employee]

**Result Round 3**

In this round you earned:

First task: outcome L -- wage:	52
Second task: outcome H -- wage:	30
Third task: outcome H -- wage:	30

Budget - Investment: 0

**Total: 112**

When you click OK, you will be matched with an Employer for the next round.

**OK**

[After 17 rounds, Part 2 of Stage 2 starts]

### Stage 2 - Part 2

You have completed the first part of Stage 2. In Part 2 there will be again 2 trial rounds and 15 paying rounds. You remain an [employer/employee] in group [1/2].

The only thing that changes from Part 1 is the score that determines the probability of outcome H. In Part 1, it was the trivia score from Stage 1.

In Part 2 it will be a number between 0 and 10 selected at random for each employee.

As an employee, you won't learn your own score, and as an employer you will not know your employee's score. But on the employee screen you can see a graphic display of the scores of all the employees in your group.

Please click when you are ready to start.

### Questionnaire

[there were some questions that are not used in the analysis. they are omitted here.]

[personal characteristics (multiple choice)]

- My gender
- Are you Spanish/Hispanic/Latino?
- Race (check all that apply): (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, White)

[final screen - payoffs]

Thank you! You have completed the experiment.

You earned [points from Stage 1, points from Stage 2, total points]

Total earnings in US\$ (incl. participation base compensation) [ total earnings]