Inaccurate Statistical Discrimination: An Identification Problem

Online Appendix

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Appendix D. Papers Included in Literature Survey

In this section, we list the citation for each paper included in the survey of the literature.

Abrevaya, J. and D. S. Hamermesh (2012): "Charity and Favoritism in the Field: Are Female Economists Nicer (to Each Other)?" *The Review of Economics and Statistics*, 94, 202–207.

Acemoglu, D. and J. Angrist (2001): "Consequences of Employment Protection? The Case of the Americans with Disabilities Act," *Journal of Political Economy*, 109, 915–957.

Agan, A. and S. Starr (2017): "Ban the Box, Criminal Records, and Racial Discrimination: A Field Experiment," *The Quarterly Journal of Economics*, 133, 191–235.

Alan, S., S. Ertac, and I. Mumcu (2018): "Gender Stereotypes in the Classroom and Effects on Achievement," *The Review of Economics and Statistics*, 100, 876–890.

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Alesina, A. and E. L. Ferrara (2014): "A Test of Racial Bias in Capital Sentencing," *The American Economic Review*, 104, 3397–3433.

Altonji, J. G. and C. R. Pierret (2001): "Employer Learning and Statistical Discrimination," *The Quarterly Journal of Economics*, 116, 313–350.

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Arai, M. and P. Skogman Thoursie (2009): "Renouncing Personal Names: An Empirical Examination of Surname Change and Earnings," *Journal of Labor Economics*, 27, 127–147.

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Ayres, I. and P. Siegelman (1995): "Race and Gender Discrimination in Bargaining for a New Car," *The American Economic Review*, 85, 304–321.

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Baldwin, M. and W. G. Johnson (1992): "Estimating the Employment Effects of Wage Discrimination," *The Review of Economics and Statistics*, 74, 446–455.

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Barcellos, S. H., L. S. Carvalho, and A. Lleras-Muney (2014): "Child Gender and Parental Investments In India: Are Boys and Girls Treated Differently?" *American Economic Journal: Applied Economics*, 6, 157–189.

Bartoš, V., M. Bauer, J. Chytilová, and F. Matějka (2016): "Attention Discrimination: Theory and Field Experiments with Monitoring Information Acquisition," *The American Economic Review*, 106, 1437–1475.

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Butcher, K. F., K. H. Park, and A. M. Piehl (2017): "Comparing Apples to Oranges: Differences in Women's and Men's Incarceration and Sentencing Outcomes," *Journal of Labor Economics*, 35, S201–S234.

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Case, A. and C. Paxson (2008): "Stature and Status: Height, Ability, and Labor Market Outcomes," *Journal of Political Economy*, 116, 499–532.

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Appendix E. Qualtrics Surveys

In this section, we include the Qualtrics survey used in the MTurk worker math trivia task, followed by the survey used in the MTurk employer hiring task. Survey block titles (not shown to participants) are in bold and underlined.

CHICAGO BOOTH

The University of Chicago Booth School of Business

Intro

Thank you for participating in this survey!

The survey has two parts. In the first part you will answer some very basic demographics questions. In the second part you will answer 50 multiple-choice math questions.

We are interested in determining how many of these math questions you can get right without any help. So please **do not** use a calculator or look up the answers online, but rather just do your best. The number of questions you answer correctly will not affect your payment in any way.

Demographics

Please answer the personal profile questions below:

What is your favorite color?

What is your favorite movie?

Do you prefer coffee or tea?

- ○ Tea

- Coffee

What is your age?

What is your gender?

- Female
- Male

What is your favorite subject in high school?

What is your favorite sport?

Math

Q1. What is the square root of 289?

- 17
- 19
- 15
- 21

Q2. 4-8*9/2 = ?

- -6
- -32
- -18
- -12

Q3. 3^5 = ?

- 243
- 405

- 729
- 81

Q4. 5*6*7 = ?

- 233
- 210
- 240
- 180

Q5. What is the reduced form of the fraction 70/42?

- 7/5
- 14/10
- 5/3
- 10/6

Q6. What is the cubic root of 64?

- 4
- 6
- 5
- 3

Q7. (4+5)/5 = ?

- 6.25
- 1
- 1.8
- 5

Q8. x+2 < 18/3. Which of the following is necessarily **false**?

- x > 4
- x < 3
- x > 3
- x < 4

Q9. x^5 * x^8 = ?

- x^11
- x^14
- x^13
- x^12

Q10. Which of the following is approximately equal to 0.833?

- 5/6
- 4/5
- 6/7
- 3/4

Q11. x=5, y=6, z=7, then what is xy/(z-4)?

- 8
- 10
- 6
- 4

Q12. Which of the following is the closest integer to 45/7?

- 6
- 5
- 7
- 8

Q13. Which of the following is an integer multiple of 9?

- 3618
- 3619
- 3617
- 3620

Q14. 10/5+34-4 = ?

- 32
- 34
- 30
- 36

Q15. (x-1)*(x^2-4)=0, then which of the following **cannot** be x?

- 2
- -2
- -1
- 1

Q16. What is the square root of 196?

- 12
- 13
- 15
- 14

Q17. 5-6/(18/9) = ?

- 2
- -2
- -0.5
- 0.5

Q18. (y+9)*(y^2-121)=0, then which of the following **cannot** be y?

- 11
- 9
- -9
- -11

Q19. Which of the following is an integer multiple of 11?

- 133
- 130
- 132
- 131

Q20. 5+6+7+8+9+10 = ?

- 45
- 51
- 42
- 48

Q21. What is the binary form of 7?

- 101
- 100
- 111
- 110

Q22. 35/7+1 = ?

- 6
- 4
- 7
- 5

Q23. 24/4/3 = ?

- 4
- 3
- 1
- 2

Q24. Which of the following in an integer multiple of 4?

- 66
- 62

- 56
- 74

Q25. Which of the following is **not** a prime number?

- 4
- 2
- 3
- 5

Q26. 2*3*4*5 = ?

- 720
- 24
- 240
- 120

Q27. 6^3=?

- 216
- 432
- 36
- 128

Q28. (4*2+7*8)/4=?

- 20
- 24
- 16
- 12

Q29. Which of the following is a prime number?

- 23
- 27
- 21

- 25

Q30. 16 < x+8 < 26. Which of the following could x be?

- 23
- 18
- 13
- 8

Q31. 45+3-1 = ?

- 48
- 46
- 47
- 49

Q32. x^6 + x^6 = ?

- x^12
- x^36
- (2x)^6
- 2x^6

Q33. Which of the following fractions cannot be further reduced?

- 7/35
- 46/2
- 3/5
- 3/6

Q34. Which of the following numbers has an integer square root?

- 40
- 48
- 32
- 36

Q35. 5*(7+3)+5-4 = ?

- 51
- 55
- 39
- 32

Q36. Which of the following is **not** a factor of 30?

- 3
- 5
- 2
- 4

Q37. x^6 / x^4 = ?

- x^24
- x^10
- x^2
- x^(2/3)

Q38. 56/8 = ?

- 6
- 5
- 7
- 8

Q39. 2^4 - 3^3 = ?

- 11
- 9
- -11
- -9

Q40. (18+19+20)/3 = ?

- 20
- 21
- 19
- 18

Q41. Twenty **cannot** be divided by which of the following?

- 5
- 3
- 2
- 4

Q42. 4+8+12+16 = ?

- 40
- 20
- 25
- 45

Q43. (x^5)^3 = ?

- 5x^3
- 3x^5
- x^15
- x^8

Q44. Which of the following is the correct factorization of 36?

- 4 * 9
- 2^2 * 3^2
- 4 * 3^2
- 2^2 * 9

Q45. 3^2*2 = ?

- 18
- 42

- 81
- 24

Q46. -2*(-3-8) = ?

- -14
- 14
- 22
- -22

Q47. Which of the following is an integer multiple of 5?

- 44
- 46
- 43
- 45

Q48. x^4 = 81. What is x?

- 9
- 20.5
- 3
- 6

Q49. 76/4 = ?

- 18
- 19
- 17
- 20

Q50. Which of the following is negative?

- 2^2
- (-2)^2
- (-2)^3

○ 2^3

Final

Thank you for your participation. In addition to your base payment, we may put a small bonus into your account sometime in the next few weeks. Who receives the bonus payment is determined by a different experiment that we are doing and is unrelated to how well you did in the task. Please just think of it as an additional appreciation for your efforts.

Powered by Qualtrics

CHICAGO BOOTH

The University of Chicago Booth School of Business

Introduction

Thank you for participating in this survey.

The survey has four parts. You will first answer some simple demographic questions. Then you will answer three sets of questions related to people's performance in math questions.

The survey will take approximately 20 minutes.

Please enter your M-Turk ID:

What is your gender?

- Male
- Female

What is your age?

Please indicate the highest level of education you have completed.

- Less than High School
- High School or equivalent
- Vocational/Technical School (2 year)

- ○ Some College
- ○ College Graduate (4 year)
- ○ Master's Degree (MS)
- ○ Doctoral Degree (PhD)
- ○ Professional Degree (MD, JD, etc.)
- ○ Other

Setup

We recently paid many people to answer 50 math questions each. Here are some examples of the types of math questions we asked:

Question 1: What is the square root of 289?
Choices: 15, 17, 19, 21

Question 2: 4-8*9/2 = ?
Choices: -6, -12, -18, -32

Question 3: What is the reduced form of the fraction 70/42?
Choices: 5/3, 10/6, 7/5, 14/10

Question 4: x^5 * x^8 = ?
Choices: x^11, x^12, x^13, x^14

Question 5: What is the binary form of 7?
Choices: 100, 101, 110, 111

On average, participants answered 36.95 out of 50 questions correctly.

Today, you are going to be an employer. You will hire one of the people who answered our math questions. The person you hire will be given a bonus (the wage that you choose to pay them) and in return you will receive money based on how many of the math questions they answered correctly.

Specifically, we are going to provide you with the profiles of 20 people (potential

Specifically, we are going to provide you with the profiles of 20 people (potential employees) who answered our math questions. For each of the 20 people that we present, you will indicate what is the highest wage (between 0 and 50 cents) you would be willing to pay that person. In return, you will be paid 1 cent for every question that the person you end up hiring answered correctly.

After you indicate the highest wage you would be willing to give to each employee, we will randomly draw a number between 0 and 50. If the wage you chose for the employee is equal to or higher than the randoly-drawn number, then that employee will receive the random number as a bonus, and you will receive a profit equal to the number of correct answers given by the individual minus the random number that was drawn. If the highest wage you were willing to pay the individual is lower than the random number, you will not hire the employee and neither you nor the employee will receive a bonus.

Let's walk through an example of how this works. Below is an example of a potential employee profile that you might see:

Country:	United States
Gender:	Female
Age:	63
Favorite High School Subject:	English
Favorite Sport:	Gymnastics
Favorite Color:	Sea Green
Favorite Movie:	Overboard
Prefers Coffee/Tea:	Tea

We will ask you the highest amount you would be willing to pay this employee. Let's imagine that you say you would be willing to pay this employee 40 cents.

We will then select a random number between 0 and 50. Let's say the randomly-selected number is 20. Because the highest wage you are willing to pay that person is more than 20, you will "hire" this person and they will receive 20 cents. You will then be paid based on the number of correct answers this person gave. If the person answered 30 questions correctly, you will be paid 10 cents (30-20). If the person answered 10 questions correctly, you will be paid -10 cents (10-20).

Imagine instead that the randomly-drawn number is 45. Then you will not "hire" the person and neither you nor the person will receive a bonus.

In today's task, you will actually only hire 1 person. After you decide the most you would be willing to pay to each of the 20 people we present, we will randomly select one profile to use as the actual hiring decision. We will then draw the random number between 0 and 50 and pay you the profit you've earned for that profile and pay the wage to the person whose profile you pick. We are going to automatically give you a $0.50 bonus in addition to what money you make with your hiring decision (so that there is no way you end up owing us any money after doing this task).

Just to make sure you understand, imagine you saw a profile and entered **43** as the highest amount you would be willing to pay. Now imagine the random number generated was **18** and the individual answered **10** questions correctly.

How many cents would you have to pay the individual?

How many cents would you be paid based on the individual's performance (before subtracting the wage you have to pay the individual)?

Suppose instead that you had reported **15** as the highest wage you would pay, and everything else stayed the same:

How many cents would you have to pay the individual?

How many cents would you be paid based on the individual's performance (before subtracting the wage you have to pay the individual)?

Hidden Generator

Required

You have completed ${lm://Field/1} of 20 required profiles.

Please indicate the **highest wage** you would be willing to pay this employee in the text box below.

Enter the highest wage you would be willing to pay this individual (between 0 and 50 cents):

Prediction

Thank you for completing part 2 of 4 of this survey. As promised, we will randomly select one profile and pay you your $0.50 bonus plus whatever money you make

based on the hiring of the randomly-selected profile.

For the third part of this survey, please answer the six questions below. Please remember that people answered **36.95** questions correctly on average.

On average, how many math questions out of 50 do you think **women** answered correctly?

On average, how many math questions out of 50 do you think **men** answered correctly?

On average, how many math questions out of 50 do you think **people from the United States** answered correctly?

On average, how many math questions out of 50 do you think **people from India** answered correctly?

On average, how many math questions out of 50 do you think **people below or at the age of 33** answered correctly?

On average, how many math questions out of 50 do you think **people above the age of 33** answered correctly?

Thank you for completing part 2 of 4 of this survey. As promised, we will randomly select one profile and pay you your $0.50 bonus plus whatever money you make based on the hiring of the randomly-selected profile.

For the third part of this survey, please answer the six questions below. Please remember that people answered **36.95** questions correctly on average.

You have the chance to earn a significant bonus if you answer these questions correctly. We will randomly pick one question and pay you $5 minus your deviation from the correct answer. For example, if your answer for the randomly picked question is 40 and the truth is 37, then you will get a $2 bonus. You cannot receive a negative bonus. So, please answer the questions as carefully as possible so that you can potentially win a large bonus.

On average, how many math questions out of 50

do you think **women** answered correctly?

On average, how many math questions out of 50 do you think **men** answered correctly?

On average, how many math questions out of 50 do you think **people from the United States** answered correctly?

On average, how many math questions out of 50 do you think **people from India** answered correctly?

On average, how many math questions out of 50 do you think **people below or at the age of 33** answered correctly?

On average, how many math questions out of 50 do you think **people above the age of 33** answered correctly?

Truth

Here are the correct answers for the 6 questions you have answered above. On average:

- Women got **35.28** questions right.
- Men got **38.32** questions right.
- People from the U.S. got **37.14** questions right.
- People from India got **36.58** questions right.
- People below or at the age of 33 got **37.10** questions right.
- People above the age of 33 got **36.79** questions right.

Now that you have learned those facts, we would like you to work on 10 more profiles.

As before, after you finish working on those 10 additional profiles, we will randomly select one profile and randomly select a number between 0 and 50. If your highest wage is more than the randomly-selected number, we will pay you the profit you've earned for that profile as a bonus and pay the wage to the person who answered the math questions.

Extra

You have completed ${lm://Field/1} of 10 additional profiles.

Please indicate the **highest wage** you would be willing to pay this employee in the text box below.

Enter the highest wage you would be willing to pay this individual (between 0 and 50 cents):

Final

Thank you for your participation. We will calculate your bonus based on the rules specified in each part above, and pay the bonus to your account within a week.

If you have any additional comments about this survey, please provide them below. (Optional)

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