The effect of preparation on gender differences in willingness to compete

Authors

Keana Richards, Dr. Gideon Nave, and Dr. Coren Apicella

Motivation

Although women have surpassed men in education outcomes such as college attendance and graduation rates[1], they are still underrepresented in top management positions in nearly all sectors[2] and a gender wage gap still persists[3]. Traditional economic variables account for some, but not all, of these disparities[3]. As such, additional explanations have been proposed, including gender differences in willingness to compete[4,5]. Previous research suggests that women are less willing to compete than men, even when they are equally, if not more, qualified[6]. A few factors, including women's relatively lower levels of confidence in their performance, were shown to partly explain this gender difference[7]. Since prior research has shown that confidence can improve with preparation and training[8-10], providing potential competitors with adequate opportunity to prepare before entering a competition may alleviate the gender gap in willingness to compete. The proposed study extends previous work where we replicated the gender difference in willingness to compete. Even though women were less willing to compete, they were more likely to prepare for the task compared to men. This finding also aligned with participants' perceptions of gender differences in preparation – that is, both men and women believed that women would prepare more for the task. Given the observed gender difference in preparation, we propose to further explore the effect of preparation on willingness to compete.

Overview

In the current experiment, we will examine how actual preparation before a task affects men and women's willingness to compete. N=1,100 participants from Amazon Mechanical Turk will be randomly assigned to one of two conditions: a control condition that does not include an opportunity to prepare and a fixed preparation condition where they are required to prepare for a set number of rounds. In the fixed preparation condition, participants will be required to complete one round of 6 problems from each multiplication table (12 total). Crucially, participants will be given the opportunity to practice/study *before* they make their decision to compete. We are interested in the effect of fixed preparation on the decision to compete, relative to the control condition.

Sampling Plan

Data collection for this project has not yet begun. We plan to recruit 1,100 participants on Amazon Mechanical Turk to complete a study examining "decision-making and performance." The participants will be guaranteed $1.50 for completing the survey, along with any bonuses they earn during the competition rounds. Men and women will be evenly assigned to both conditions.

Variables

Manipulated variables

Preparation condition: Participants will be randomly assigned to either a preparation condition, where they will be able to prepare before completing the task for a fixed number of rounds, or a control condition, where they will not have this opportunity to prepare, completing a filler task instead. We are interested in how being provided an opportunity to prepare for a task affects choice of a payment scheme.

Measured variables

Gender: Participants' gender will be coded as 1 if they indicate they are female, and 0 if they indicate they are male. Gender will be collected with basic demographic information at the beginning of the survey.

Willingness to compete: Participants' payment scheme choice will be coded as 0 if they choose the piece-rate payment scheme, and 1 if they choose the tournament payment scheme.

Preparedness: Participants in both conditions will be asked whether they wish they had more time to prepare for the multiplication task (yes or no).

Confidence: After completing the tasks, participants will be incentivized to guess their relative performance compared to all other participants that completed the task by indicating the decile of their score relative to other participants. If they answer correctly and confidence is randomly selected as the incentivized post-competition measure for a bonus, they will be awarded $.10.

Risk tolerance (self-reported): We will use the typical operationalization of risk aversion used in previous studies, where participants will respond to the question "How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?" on a 0-10 scale[11].

Perceptions of gender differences: After completing the task, participants will be asked questions about their expectations of gender differences in performance ("Do you think men or women in this study correctly solved more multiplication problems on average?"), willingness to prepare ("Do you think men or women in this study spent more time practicing/studying before completing the multiplication task?"), and willingness to compete ("Do you think men or women in this study chose the tournament payment option more often?"). Also, if they answer correctly and one of their responses is randomly selected as the incentivized post-competition measure for a bonus, they will be awarded $.10. An additional question about perceptions of general gender differences in willingness to prepare that will not be incentivized will be included after they respond to the first four questions: "For most tasks, do you think men or women generally prepare (i.e., practice and/or study) more?" This question will not be incentivized because we cannot attest to its overall accuracy.

Number of comprehension check questions incorrect: Participants will be asked a series of comprehension check questions to assess their understanding of the payment schemes, which must be answered correctly for them to be able to participate. We will count the number of problems that they answer incorrectly until they proceed.

Performance on the task: Participants' performance on the task will be based on the number of problems they answer correctly during the 2 minutes they are allotted.

Field-specific ability beliefs: We will ask participants how much they perceive success in math depends on ability versus effort through 6 questions (e.g., If you want to succeed in math, hard work alone just won't cut it; you need to have an innate gift or talent)[12] on a 1 (strongly disagree) to 7 (strongly agree) scale.

Fatigue: Participants will rate how fatigued and mentally exhausted[13] they feel on a 1 (strongly disagree) to 7 (strongly agree) scale.

Interest: Participants will indicate the degree to which they "enjoyed completing the multiplication task"[13] on a 1 (strongly disagree) to 7 (strongly agree) scale.

Performance on the fixed preparation rounds: We will record the number of problems participants' in the preparation condition answer correctly relative to the time they spend answering questions.

Performance on the extra preparation rounds: Participants' performance on the extra preparation rounds will be based on the number of problems they answer correctly relative to the amount of time they spent answering questions. Therefore, if participants choose to complete 2 rounds of extra preparation, we will record the total number of questions they complete divided by 4 minutes (since each extra preparation round will be 2 minutes). Participants who chose not to complete any extra preparation rounds will not be included in any analyses for this variable.

Number of optional preparation rounds chosen: Participants will choose how many rounds of extra preparation they will complete before completing the task (count from 0 to 5).

Time spent on filler task/practice task: We will record the total amount of time participants' spend answering questions for the filler and practice task, respectively.

Study Timeline:
1. Participants complete a series of exclusion questions. Exclusion criteria designated below.

2. After providing their MTurk ID and consent, participants will learn about the general structure of the multiplication task, where they multiply two numbers (with digits ranging from 1-12) for 2 minutes. Then, they will complete a series of comprehension check questions. They must answer all comprehension questions correctly to proceed; otherwise, they will repeat them until they answer them correctly.
3. Participants are randomly assigned to either the control condition or the preparation condition.
4. Participants in the preparation condition will be told about their ability to review their multiplication tables for numbers between 1-12 and complete practice problems, while participants in the control will be told they will complete a counting task
5. Participants in the preparation condition will complete one round of preparation per multiplication table while participants in the control condition will complete a filler task (a Captcha-style counting task) for the same number of rounds
6. Participants receive a 30-second break before proceeding
7. All participants proceed to learn more information about the two payment schemes and complete comprehension check questions to ensure they understand them, which they must pass to proceed onto the next section
8. Participants choose a payment scheme, where the order of the presentation of the tournament and piece-rate payment options will be randomized.
9. Participants in both conditions will choose to complete optional 2-minute rounds of practice (with a maximum of 5 rounds available). We will record the total number of questions they answer correctly in the time allotted as a measure of performance
10. Participants will complete the paid multiplication task and receive feedback about their absolute (but not relative) performance
11. Participants will answer the questions about risk tolerance, confidence, perceptions of gender differences, preparedness, field-specific ability beliefs, fatigue, and interest.
12. Payment: Participants will receive their guaranteed payment ($1.50) immediately after completing the study and their bonus payment will be calculated based on their performance and choice of a payment scheme, which will be sent to them within 3-5 business days. Participants will be randomly assigned to a participant within the same condition, since preparation will likely improve performance. If they chose the piece-rate payment scheme, they will be paid $.10 per problem solved correctly. If they chose the tournament payment scheme, they will be randomly matched with another participant that also chose this payment scheme and if they solved more problems than the other participant, will receive $.20 per problem. Otherwise, they will receive nothing. In the case of an uneven number of participants, we will randomly assign one participant to be matched against another participant that has already been selected for a pair. If there are ties, one of the participants will be randomly selected to receive payment for their performance. Additionally, for each participant, we will randomly select one of their four

guesses about their own performance and gender differences, and if they guess correctly for their designated question, will be paid an additional $.10.

How does preparation affect willingness to compete?
Hypotheses and analyses
<u>Primary Hypothesis I</u>
Women in the preparation condition will be significantly more likely to compete compared to women in the control condition (within the subsample of participants that identify "Female" as their gender)
Model: Two-proportions z-test
Predictor(s): Condition
Outcome: Willingness to compete

Inference Criteria

To control the false-discovery rate during hypothesis testing, we will use the Benjamini-Hochberg correction for the exploratory analyses. We will be using two-tailed tests during all hypothesis testing ($p < .05$).

Screening and data exclusion

The workers who opted into the study had to pass several screening questions to be included as participants in the paid portion of the study. Specifically, participants included in the study had to (i) be using a computer (rather than a phone or tablet), (ii) identify their nationality as American and live in the United States (to control for gender differences in competitiveness across cultures), and (iii) indicate that they were male or female (instead of responding "Other" when asked about their gender). Also, we excluded the second response for participants who had an identical IP address, MTurkID, and gender. Additionally, for participants who did not enter valid MTurkIDs but had the same IP address, we deleted the second response. If participants had the same IP address but a different MTurkID, both responses were included in the data.

Exploratory Analyses
1) Model: Logistic regression
a) Predictor(s): Gender, condition, gender*condition, risk tolerance, confidence
b) Outcome: Willingness to compete

2) Model: Linear regression
3) Predictor(s): Gender, performance on the task, condition, gender*condition
4) Outcome: Bonuses earned from multiplication task

5) Model 1: Chi-square goodness of fit test (collapsed across conditions) with perceptions of gender differences in performance as variable

6) Model 2: Chi-square goodness of fit test (collapsed across conditions) with perceptions of gender differences in willingness to compete as variable
7) Model 3: Chi-square goodness of fit test (collapsed across conditions) with perceptions of gender differences in general willingness to prepare as variable

8) Model: Linear regression
a) Predictor(s): Gender
b) Outcome: Performance on the task
c) Note: if the null hypothesis is rejected, performance will be included as a control variable in any models with gender included as a predictor

9) Model: Mediation with logistic regression
a) Predictor(s): Condition
b) Mediator: Confidence
c) Outcome: Willingness to compete

10) Model: Linear regression
a) Predictor(s): Condition
b) Outcome: Performance on the task

11) Model: Linear regression
a) Predictor(s): Condition
b) Outcome: Time spent on filler/practice task

12) Model: Poisson regression
a) Predictor(s): Gender, condition, field-specific ability beliefs, gender*field-specific ability beliefs
b) Outcome: Number of optional preparation rounds chosen

13) Model: Linear regression
a) Predictor(s): Interest, fatigue, gender, condition
b) Outcome: Performance on the extra preparation rounds

14) Model: Two-proportions z-test
a) Predictor(s): Gender
b) Outcome: Preparedness

15) Model: Mediation
a) Predictor(s): Gender
b) Mediator: Performance on the extra preparation rounds
c) Outcome: Bonuses earned from multiplication task

16) Model: Logistic regression
a) Predictor(s): Performance on the fixed preparation rounds

b) Outcome: Willingness to compete

17) Model: Linear regression
18) Predictor(s): Willingness to compete, gender, gender*willingness to compete
19) Outcome: Performance on the extra preparation rounds

References
1. Goldin, C., Katz, L. F., & Kuziemko, I. (2006). The Homecoming of American College Women: The Reversal of the College Gender Gap. *Journal of Economic Perspectives*, *20*(4), 133–156. https://doi.org/10.1257/jep.20.4.133
2. Bertrand, M., & Hallock, K. F. (2001). The Gender Gap in Top Corporate Jobs. *Industrial and Labor Relations Review*, *55*, 3–21.
3. Blau, F. D., & Kahn, L. M. (2017). The Gender Wage Gap: Extent, Trends, and Explanations. *Journal of Economic Literature*, *55*(3), 789–865. https://doi.org/10.1257/jel.20160995
4. Apicella, C. L., & Dreber, A. (2015). Sex Differences in Competitiveness: Hunter-Gatherer Women and Girls Compete Less in Gender-Neutral and Male-Centric Tasks. *Adaptive Human Behavior and Physiology, 1*(3), 247–269. https://doi.org/10.1007/s40750-014-0015-z
5. Croson, R., & Gneezy, U. (2009). Gender Differences in Preferences. *Journal of Economic Literature, 47*(2), 448–474. https://doi.org/10.1257/jel.47.2.448
6. Niederle, M., & Vesterlund, L. (2007). Do Women Shy Away From Competition? Do Men Compete Too Much? *The Quarterly Journal of Economics*, 1067–1101. Retrieved from https://web.stanford.edu/~niederle/Niederle.Vesterlund.QJE.2007.pdf
7. Niederle, M., & Vesterlund, L. (2011). Gender and Competition. *Annual Review of Economics, 3*, 601–630. https://doi.org/10.1016/j.labeco.2009.08.002
8. Schunk, D. H. (1981). Modeling and Attributional Effects on Children's Achievement: A Self-Efficacy Analysis. *Journal of Educational Psychology, 73*(1), 93–105.
9. Schunk, D. H. (1982). Progress Self-Monitoring: Effects on Children's Self-Efficacy and Achievement. *The Journal of Experimental Education, 51*(2), 89–93.
10. Gist, M. E., & Mitchell, T. R. (1992). Self-Efficacy: A Theoretical Analysis of Its Determinants and Malleability. *The Academy of Management Review, 17*(2), 183–211.
11. Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association, 9*(3), 522-550.
12. Leslie, S.J., Cimpian A., Meyer M., & Freeland E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. *Science, 347*(6219), 262–265.
13. Milyavskaya, M., Galla, B., Inzlicht, M., & Duckworth, A. (2018, October 26). *More effort, less fatigue: How interest increases effort and reduces mental fatigue*. Retrieved from http://dx.doi.org/10.31234/osf.io/8npfx