Gender differences in competition and task choice

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Gender differences in economic success

• Glass ceiling effect
• Women have a higher attrition rate in e.g. academia.
• Gender wage gap...

Theories so far:
• Discrimination
• Difference in preferences (over outcomes), abilities
Women and men may differ in their propensity to compete, select into competitions, hard tasks.

When ability is not the most important determinant in the decision to select into different environments, can environments be changed to increase diversity?

What are the costs of changes in institutions to enhance diversity?
Questions

Are there gender differences on a level playing field (experiments)?

May competitive attitudes cause a gender difference?
- Boys spend much of their time at competitive games
- Girls select activities with no winner and no clear end-point
- Difference increases through puberty
- More men than women describe themselves as competitive

Are differences in willingness to compete robust to performance controls and monetary compensation?

Are women more prone to select a non-competitive piece rate over a competitive tournament compensation? What may explain such a difference?


Laboratory experiments

To study questions of gender differences in performance and preference for performing in tournament: use Experiments:

• Control self selection issues
• Measure performance.
• No issue of discrimination, or believed discrimination
• No issue of “career concerns” or “time commitment”.

Experiments: Leveled playing fields: do we still find gender differences?
Performance in competitive environments: Gender differences
with Uri Gneezy and Aldo Rustichini, QJE 2003

Do women and men differ in their propensity to perform in competitive environments?

Do women and men that perform similarly in non-competitive environments differ as soon as the environment is competitive?
Experiment

Participants:
• Technion undergraduate students. (Degree in Engineering)
• Each session: 3 women and 3 men.
• Each treatment: 10 groups of 6 participants each. Hence in each treatment 30 women and 30 men.
• 384 participants in 64 experimental sessions.
• Always different participants in different treatment: (Between subject design.)
• Payment: Participants receive 20 NIS show up fee. (4NIS=1$).

The Task:
• Solving Mazes. (http://games.yahoo.com/games/maze.html)

After all participants solved one maze of level 2, the final part of the instructions were distributed.
Mazes on the internet
Piece rate scheme: Noncompetitive

3 women and 3 men (from the Technion) solve mazes for 15 minutes receive 2 shekels for each solved maze. Participants do not know how much the others earned. A total of 30 men and 30 women participate.
Non competitive: Piece Rate

Average Male: 11.23   Female: 9.73.  (p= 0.2023)
Competitive Pay / Tournament

- 3 Women and 3 Men solve mazes for 15 min.
- The person that solves the most mazes receives 12 shekels for each maze solved. Others receive nothing.
- Winner remains anonymous

Results:
- **Significant Increase in Performance**
  - Tournament average: 12.95
  - Piece Rate average: 10.48
- p-values of WMW-test: 0.007 significant differences.
Competitive Pay / Tournament

Tournament: Men: 15, Women: 10.8 (p= <.01)
Piece Rate: M: 11.23 (p<.01) W: 9.73: (p= 0.62).
No gender difference in non-competitive incentive scheme, but large gender difference in competitive environments.

Gender gap in mean performance in mixed tournaments of 4.2 is significantly larger than the gender gap of 1.5 in the piece rate performance.
Are all men / women equally affected?

• How do these average experiences translate to behavior within each group?
• Consider for each treatment performance quintiles: Rank participants according to their performance (without forgetting their gender).

• First quintile: 20 percent participants that solved the most mazes.
• Second quintile: the next 20 percent best participants. …

• For each treatment consider for each quintile the proportion of women in this quintile.
Proportion of Women in each Performance Quintile

Proportion of Women

Quintile 1: Best, … 5: Worst

Piece Rate
Mixed T.
• **Consider cumulative graph:** For each decile: Consider the proportion of women among the participants whose performance ranks them higher than this decile.

**Proportion of Women above each Percentile**

![Graph showing the proportion of women above each percentile.]
Results so far

Tournaments result in a significant increase in the gender gap in mean performance as compared to the piece rate.

Reasons for this gender gap: Tournament incentives
- do not increase mean performance of women.
- significantly increase mean performance of men.

**WHY?**
Why do women not compete?
Why do women not compete?

- Women can’t perform higher
- Women do not like to compete at all
- Women do not like to compete against men
- Women do not like to perform when payment is uncertain
Difference between tournament and piece rate:
• Payment depends on the performance of the other participants.
• Payment is uncertain.

Is the gender gap in mean performance in tournaments driven by the uncertainty only, through gender differences in risk-aversion?

Big Debate: Possible Gender differences on Risk-Aversion.
• Byrnes, Miller and Schafer (1999), Eckel and Grossman (2008): If anything, women are more risk-averse.
To discern effect of risk aversion, need to consider incentives where the payment is uncertain, though independent of the performance of others.

**Treatment 3: Random Pay**

*Group*: 3 Men and 3 Women: Solve mazes for 15 minutes. At the end: One person is chosen randomly and receives 12 shekels for each maze she or he has solved. Other participants receive no payment additional to show-up fee.
Mean for males: 11.83, for females: 10.33. WMW p: 0.165. Difference is not significant.

Random Pay versus Piece Rate: Differences not significant for men (0.65) and women (0.61).
Random Pay versus Tournaments: Difference is significant for men (0.01) but not for women (0.63).
Women do not like to compete

Single sex tournaments
6 Women, or 6 men solve mazes for 15 min. The person that solves the most mazes receives 12 shekels for each maze solved. Others receive nothing.

Women compete and perform highly, they are not different from men who compete in single sex tournaments
Men in single-sex tournaments look like men in mixed tournaments: Men are not strongly affected by the fact that they do not compete against women.


**Are Women Competitive?**

*Women in Single-sex Tournaments Versus women in non competitive environments*

- Single-sex tournaments: 12.6
- Random pay: 10.33 (p-value two-sided: 0.0469)
- Piece Rate: 9.73: (p-value two-sided: 0.0148)

Women react strongly to tournament incentives in single-sex groups.
Mixed Tournaments 10.8  p-value of WMW (two sided) is 0.1025.

However this does not imply that women are as apt as men in competing. Therefore we:
• Compare distributions of men and women in single sex tournaments.
• Compare gender gaps in mean performance across all incentive schemes.
Women versus Men in single-sex tournaments

Men: 14.3  Women: 12.6  WMW test: p-value 0.1346, the difference is not significant.
Gender gap in mean performance:
• Mixed Tournament: 4.2
• Single sex tournament: 1.7
• Piece Rate: 1.5
• Random pay: 1.5

Moving from mixed to single sex tournaments significantly reduces the gender gap in mean performance:
Repeat our bootstrap procedure, and find p-value of 0.082, hence the reduction in the gender gap is significant.

However no significant difference in the gender difference in performance when moving from single-sex tournaments to piece rate (0.459) and random pay (0.535).
Are all men / women equally affected?

- Consider for each quintile the proportion of men and women.
- For the single-sex tournaments, we pool the observations of men and women and take quintiles of the overall distribution.
Proportion of Women above each Percentile

![Graph showing the proportion of women above each percentile for different types of employment.](image_url)
• Women do not compete against men.
• Women competing against women respond to competition as much as men do.
At some tasks: Women who perform as well as men, do not perform as well in mixed competitive environments.

In single sex environments: Women perform as well as men.

Some women perform well even when competing against men.

How does performance in competitions translate to a preference to perform in competitions?
“Do women shy away from competition?”

Want to observe selection into competitive environments.

• Performance differences
• Taste for Competition
  – Psychic costs or benefits
  – Nurture and/or Nature (gains and losses from competing)
• Beliefs about relative performance
  – Overconfidence of men.
• Risk attitudes.
  – women may be more risk averse than men
• Feedback aversion
  – Men respond more to positive feedback compared to negative feedback
  – Mobius, Niederle, Niehaus and Rosenblat (in progress)
Experimental Design

80 students from U. of Pittsburgh and CMU

- Groups of 2 women and 2 men perform a real task multiple times under different compensations (given as experiment progresses)
- Performance of others not known until end of experiment
- No mention of gender

Want to observe selection into competitive environments. To observe selection into tournaments: Need task with little gender difference in performance.

Add up 5 two-digit numbers floor 5 mn: Performance is the number of correct answers.

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<tr>
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<td>35</td>
<td>28</td>
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Benchmark Performances

**Task 1- Piece Rate:**
50 cents per correctly solved problem.
Participants receive no feedback.

**Task 2 – Tournament:**
Groups of 2 men and 2 women (gender not mentioned)
The participant who solves the most (correct) problems in the group receives $ 2 per correct problem.
Other participants receive no payment.
Participants receive no feedback.
Piece Rate and Tournament Performance

Piece Rate

Averages: PR: W: 10.15 M: 10.68 Not sign

Tournament

Averages: T: W: 11.8 M: 12.1 Not sign
Probability to win the tournament

20 groups (tournaments):

11 won by women, 9 by men.

Unconditional probability of winning:

W: 24%. M: 26%

Conditional on performance, p.o.w. is:

<table>
<thead>
<tr>
<th></th>
<th>W</th>
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<tr>
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<td>1.8</td>
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<td>26.6</td>
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<td>M</td>
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<td>1.8</td>
<td>5.6</td>
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<td>26.6</td>
<td>47.7</td>
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<td>96.3</td>
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Choice between tournament and piece rate

Goal:
(i) Choice:
• depends on beliefs over the other players’ performance
• Does not depend on other players’ choices.
(ii) If choose tournament: compete against players who are in a tournament
(iii) Be able to predict money maximizing choices.

Choice of a participant cannot impose externalities on any other participant.
Task 3 Choice

Choose compensation scheme for the next 5-minute addition task:

- **Piece Rate**: 50 cents for each correctly solved problem
- **Tournament**: Performance is compared to task-2 tournament performance of the other participants.
  If the participant has the highest performance she or he receives $2 for each correct answer, otherwise no payment.
Predicted Choices

In Task 3: participants decide whether to perform under a piece rate or under a tournament.

Given task 2 tournament performance:
• 30% of women and 30% of men could gain from entering the tournament.
• With indifference: 40% of women and 45% of men

Who enters?

35% of Women and 73% of Men
Does performance predict entry?

Proportion of participants that enter the tournament for each performance quartile

Performance does not predict entry for Women, weakly for Men

Significant gender difference in entry
Role of Beliefs

Tournament decision is driven by *relative* performance, participants only know absolute performance.

Is the decision driven by participants’ beliefs about their relative performance?
Belief Elicitation

After all decisions are made, but *before* participants receive any feedback
We ask participants to guess their rank for
  Task 1 Piece Rate
  Task 2 tournament
Receive $1 if guess is correct.

Two issues
  – Are there gender differences in elicited beliefs?
  – Can such differences explain the tournament-entry gap?
Beliefs on Tournament Performance

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<tr>
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<th>Women</th>
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<td>wrong</td>
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<tr>
<td>2</td>
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<td>1</td>
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<tr>
<td>Total</td>
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Men’s guess: different from optimal and actual  
Women’s guess: different from actual and (weakly) optimal (p=0.1).  
Men are different from women in their belief formation.
Beliefs on Tournament Performance

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<tr>
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<td>1</td>
<td>1</td>
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Men’s guess: different from optimal and actual
Women’s guess: different from actual and (weakly) optimal (p=0.1).

Men are different from women in their belief formation.
Why do women shy away from competition?

Can the overconfidence of men (compared to women) account for the gender difference in tournament entry?
Beliefs and tournament entry

For both, women and men, better beliefs predict more entry into the tournament.

Conditional on beliefs, women enter the tournament significantly less than men.
Why do Women Shy away from Competitions?

Additional treatments show that gender differences cannot be fully accounted for by gender differences in risk attitudes, aversion to general feedback.

Women decide not to enter tournaments because of

– Lack of confidence in one’s ability
– Psychic costs of performing once more or in tournaments
– Only somewhat: Aversion to feedback about tournament performance and Risk aversion.
Task 4: Submitting Piece-Rate Performance

Choose payment for task-1 piece-rate performance

– Piece Rate:
  • 50 cents for each correctly solved problem

– Tournament:
  • Compare performance to piece-rate performance of other group members
  • Receives $2 per correct answer if participant has the highest piece-rate performance, otherwise no payment
## Probit of Tournament-Entry Decision (Task 3)

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<th>Coefficient</th>
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<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
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<tr>
<td>Female</td>
<td>-0.379</td>
<td>-0.278</td>
<td>-0.162</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.05)</td>
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<tr>
<td>Tournament</td>
<td>0.015</td>
<td>-0.002</td>
<td>-0.009</td>
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<tr>
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<td>(0.39)</td>
<td>(0.90)</td>
<td>(0.42)</td>
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<tr>
<td>Tournament – Piece Rate</td>
<td>0.008</td>
<td>-0.001</td>
<td>0.011</td>
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<tr>
<td></td>
<td>(0.72)</td>
<td>(0.94)</td>
<td>(0.44)</td>
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<tr>
<td>Guessed Tournament Rank</td>
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<td>-0.181</td>
<td>-0.120</td>
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<tr>
<td></td>
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<td>(0.01)</td>
<td>(0.01)</td>
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<tr>
<td>Submitting the Piece Rate</td>
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<td>0.258</td>
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<td>(0.012)</td>
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Marginal effects evaluated at a man with T=13, PR=12, G_TR=1, submits to tournament

- Beliefs, risk and feedback aversion account for 57% of original gender gap
- Women remain 16 percentage points less likely to compete
- Women appear to shy away from competition
Gender and Competition

Women may perform less well in mixed competitive environments.

Even for tasks where women perform as well as men in mixed competitive environments, women, when given a choice, do not select into these environments.

Men and women appear to have different attitudes towards competition.

High performing women enter the tournament too little. Few women *enter* the competition and few women *win* the competition.