Discrimination from Below: Experimental Evidence from Ethiopia

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Motivation

- Women are under-represented in senior management globally
- Raises concerns about both gender equity and lost productivity
- Understudied in developing country labor markets, especially among white-collar workers

Discrimination from Below

- Success in leadership depends on subordinates following advice and direction
- Could discrimination by *subordinates* make female leaders less effective?

Primary Research Question

Even if women and men are equally skilled and have similar leadership styles, does a differential response to women as leaders or managers reduce their performance?

- Is this taste-based or statistical discrimination?
- Can ability signals mitigate this effect?

Overview of Experiment

- Lab-in-the-field experiment: Subjects randomly matched to an unseen leader
- Cross-randomize leader **gender** and information on leader's **ability**
- Key strength: male and female leaders are **otherwise identical**
- Questions:
  - Are subjects less likely to follow advice from female leaders?
  - Source of discrimination: Statistical discrimination or taste-based?

Preview of results

- Female leaders face discrimination from below
  - Subjects are 10% less likely to follow the same guidance when provided by a woman rather than a man
  - Reduces performance of female-led subjects by .33 σ
- With ability information, the gender gap reverses: subjects are *more* likely to follow female leaders
  - Returns to ability signals are much higher for women
  - This implies statistical discrimination

Application of a standard theory of discrimination

- Each manager has some ability $\theta \sim N(\bar{\theta}_g, \sigma_g^2)$
- Simplified, employees follow the manager if:

$$f(\tilde{E}(\theta|g)) > c(g)$$

where:

  - $g \in \{\mathbf{m}ale\ manager, \mathbf{f}emale\ manager\}$
  - f is a payoff that depends on the employee's beliefs

- First argument captures statistical discrimination
- Second argument captures taste-based discrimination

Summary of theoretical results

- Employees follow the manager if:

$$f(\tilde{E}(\theta|g)) > c(g)$$

- Both taste-based and statistical discrimination generate a gender gap
- Effects of information that the leader is high-ability
  - Taste-based discrimination only: signal can reduce but *cannot reverse* the gender gap
  - Statistical discrimination: Bayesian updating, normally distributed beliefs $\implies$ signal again cannot reverse gender gap
  - Reversal consistent with the same signal *interpreted differently*

Sample

- Adama Science and Technology University (ASTU) in Adama, Ethiopia
- ASTU is one of the oldest and largest public universities in Ethiopia

  - Human resources data on the universe of full-time ASTU administrative employees
  - Lab and resume experiment samples: Employees with BA or higher

▸ Summary Statistics

Overview of design

1. Subject is randomly matched to a leader
2. Signaling Game - 10 rounds (adapted from **?**)

Table: 2X2 design

Male leader & Control	Female leader & Control
Male leader & Ability signal	Female leader & Ability signal

Signaling game

- Goal: explore responses to leadership in a problem with a clear correct answer that is difficult to guess
- Subject submits a number 1 through 5 to a computer
- Response is random, probabilities are unknown, expected payoff varies
- Most initially select 3, but the expected payoff is higher when selecting 4 or 5

▸ Game Details

Team leaders

- Leaders were trained and could practice before playing
- Subjects never see leaders
- Prior to playing, subjects observe leader's play and result
- In **pre-scripted** messages, leader:
  - Advises subject to play "strategically" by playing 5
  - Provides explanations as to why 3 does not yield the highest expected payoff

Leader gender treatment: Gender salience

- Subjects are assigned only one leader (never asked to compare genders)
- In Amharic, all grammar is gendered: verbs are conjugated according to the gender of the subject
- Randomly used a different gendered pseudonym for each subject
  - Drawn from a large household survey (n=12,687) in Ethiopia
  - Used each time the leader was mentioned
- In subsample (n=102) asked to recall leader gender at end of study, 95.1% recalled correctly

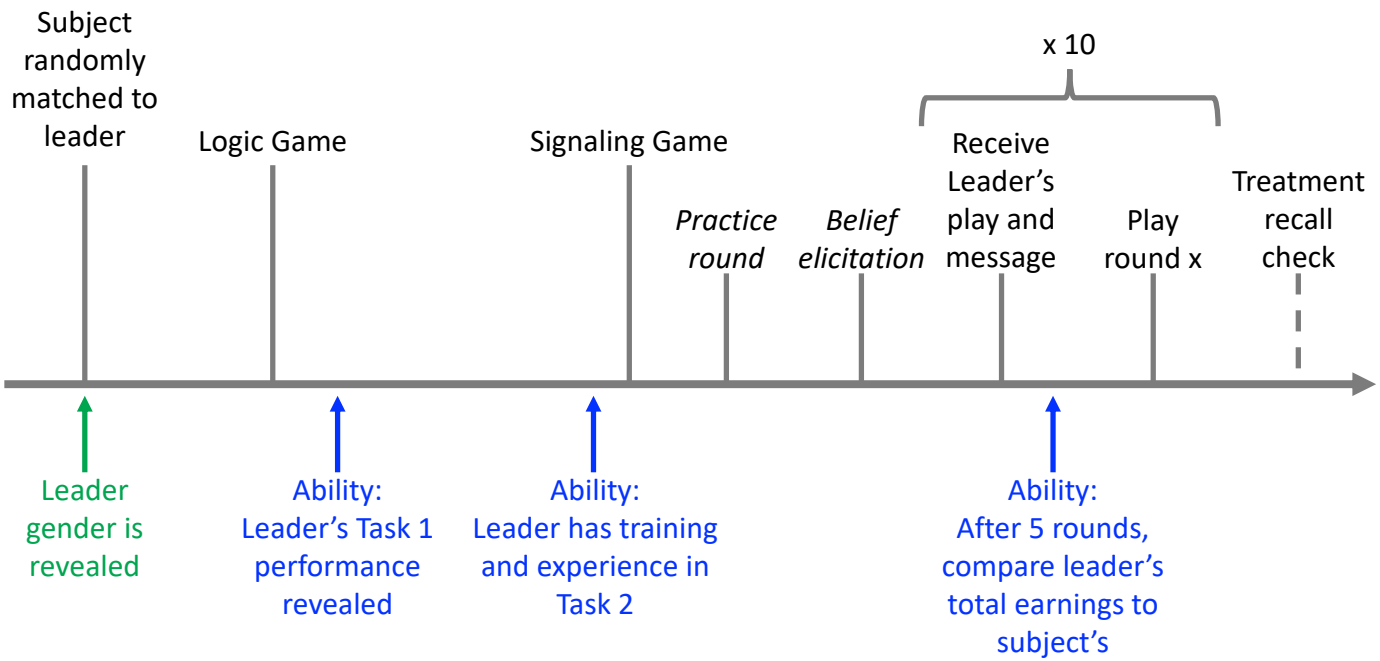
▸ Pseudonym Balance

Ability signal

- Subject learned leader's performance on an initial logic game
- Subject told leader had training and experience playing signaling game
- After 5 rounds, enumerator added up the leader's total earnings and compared to subject's total earnings up to that point

▸ Logic Game

Experiment timeline



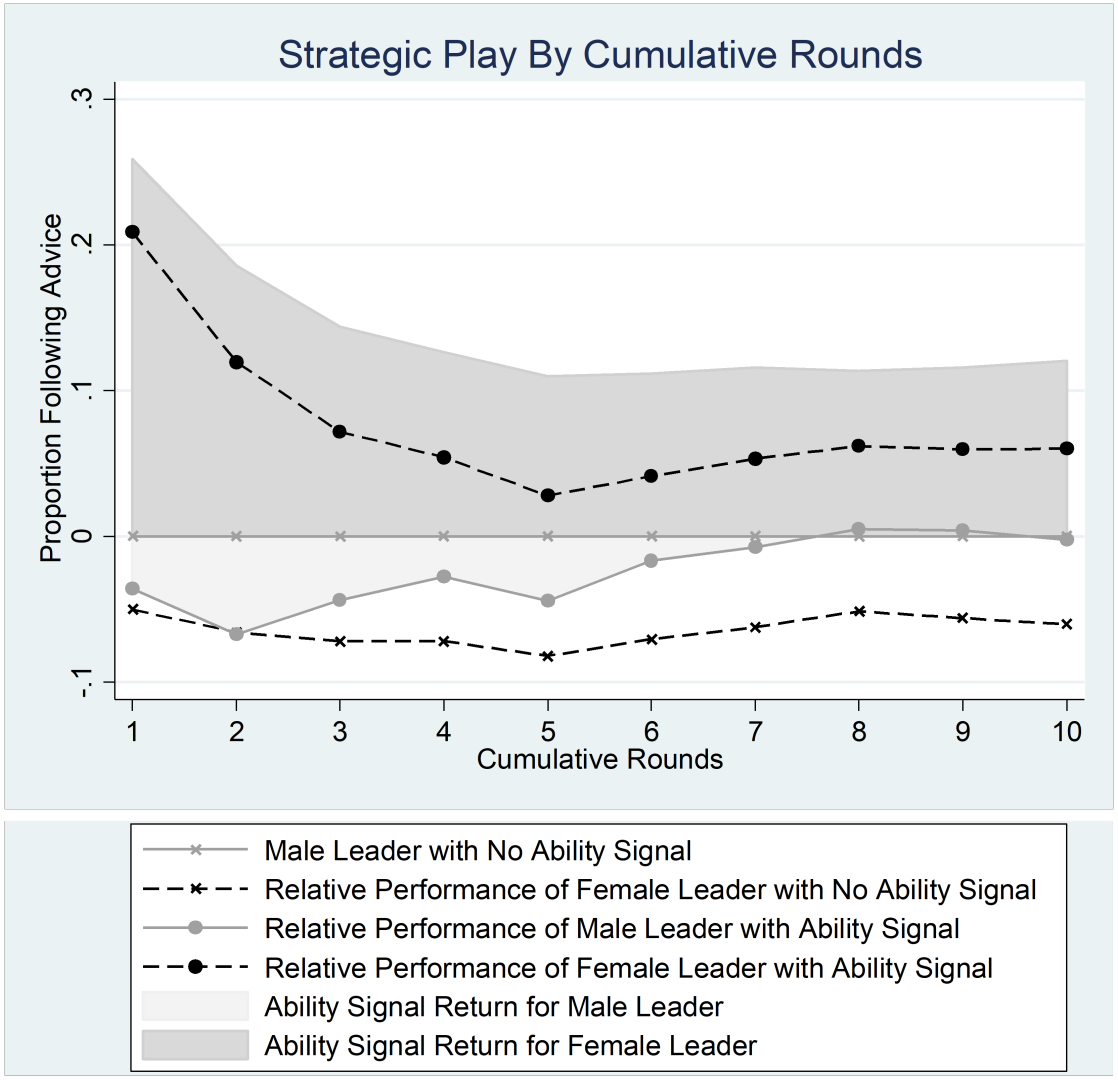
Hypotheses

- Estimating equation:

$$R_{ir} = \alpha + \beta_1 Fem\_Lead_i + \beta_2 Ability_i + \beta_3 Fem\_Lead_i \times Ability_{ir} + \epsilon_{ir}$$

- Hypotheses:
  - $\beta_1 < 0$: Less likely to follow female leader's advice (no ability info)
  - $\beta_2 > 0$: Ability signal increases likelihood of following male leader's advice
  - $\beta_3 > 0$: Ability signal reduces gender gap in following advice
  - All of the above consistent with both taste-based and statistical discrimination
- Also of interest:
  - $\beta_1 + \beta_3$: Gender gap conditional on ability information
    - Recall, taste-based discrimination implies $\beta_1 + \beta_3 <= 0$

Leader gender and ability effects



Leader gender and ability effects

Dependent Variable:	Strategic Play		
	(1) Round 1	(2) Rounds 1-5	(3) All Rounds
(β_1) Fem. Leader	-0.0502	-0.0822**	-0.0604*
	(0.0810)	(0.0391)	(0.0344)
(β_2) Ability	-0.0361	-0.0443	-0.00234
	(0.0783)	(0.0393)	(0.0343)
(β_3) Fem. leader $\times$ Ability	0.295***	0.154***	0.123***
	(0.112)	(0.0542)	(0.0472)
Covariates	X	X	X
Day FE	X	X	X
Round FE		X	X
Practice round	X	X	X
Observations	301	1505	3010
Control group mean	0.479	0.614	0.618
$\beta_1 + \beta_3$	0.245***	0.0722*	0.0624*
P-val.: $\beta_1 + \beta_3$	0.00153	0.0571	0.0569

Standard errors in parentheses, clustered at subject level. Strategic play is defined as playing 4 or 5. Practice Round is an indicator for whether the subject played strategically in a practice round prior to any advice from the leader. Covariates are subject's gender, ln(salary), level of employment, years of education, an indicator for having a masters degree, and tenure. Day FE are fixed effects referring to the day the subject participated in the experiment. Round FE are fixed effects referring to the ten rounds of the game. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

▸ Robustness: Beliefs

Resume evaluation

I. Personal Information

Name: ----------
Sex: [Randomly Determined: Female/Male]
Birthdate: 21/07/1984

Personal Summary:

I am an outgoing, ambitious, and confident individual, whose passion for the HR sector is equally matched by my experience in it. For the previous 6 years, my primary role at ----- has been to provide HR support, guidance, advice, and services to all company staff. This has taught me to translate corporate goals into human resource development programs, as well as given me extensive knowledge of HR administration, principles, practices, and laws. I have experience sourcing candidates, overseeing hiring processes, and resolving employee relations issues. This has given me experience interacting with many different types of people and I have developed strong interpersonal skills for resolving conflicts. I am always looking for ways to improve systems in human resources, consistently complete tasks to their natural end, work well under pressure and deadlines, and adapt to changing environments.

II. Work Experience

Title: Employee and Labor Relations Consultant in Human Resources

Evidence for discrimination

	(1) Competence	(2) Likeability	(3) Likelihood of Hire	(4) Log Salary Offer
Female Resume	-0.0933	-0.0337	-0.172	-0.115**
	(0.122)	(0.111)	(0.140)	(0.0534)
Observations	225	225	225	225

Robust standard errors in parentheses. Competence, Likeability, and Likelihood to Hire were asked using a Likert Scale, increasing from 1 to 5. Log Salary Offer is the log of the salary the subject suggested as an offer to the candidate in Birr. Female Resume is an indicator for the resume belonging to a randomly assigned female candidate. Regression specifications include the resume version, and subject's gender, ln(salary), level of employment, years of education, an indicator for having a masters degree, and tenure as covariates. $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Contributions

- Well-identified evidence of discrimination from below, an understudied form of discrimination
  - Large literature on how leadership styles differ among men and women (**?**)
  - Challenge is holding leadership ability constant $\Longrightarrow$ incentivized lab setting is ideal
- Evidence on source of labor market discrimination in a developing country
  - Gender parity in many domains has been a key part of global development goals
  - Variation in gender norms / disparities around the world $\Longrightarrow$ magnitude and source of gender discrimination likely differ across different settings

Implications of statistical discrimination from below

- Discrimination from below generates a gender gap in team performance
- Suggests that female managers are less likely to be promoted, even by an unbiased employer (following Coate & Loury (1993))
- Women in higher-level positions will be positively selected

Discussion

- In explaining gender gaps in management, discrimination from below has different policy implications than supply side differences
  - Equalizing human capital attainment and "leaning in" may not be sufficient
  - Improving gender attitudes may also not be sufficient—must change beliefs
- Suggests interventions at the employer level (e.g., providing additional information about female manager's qualifications, accounting for discrimination in promotion decisions)
- Credible signals of ability are likely to have higher returns for women

References I

Application of a standard theory of discrimination

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- If the expected payoff is greater than distaste for the manager's gender, the employee will follow the manager

Proposition

Employees are less likely to follow female managers if $c(f) > c(m)$, if $\bar{\theta}_f < \bar{\theta}_m$, or both.

The role of ability signals

- Let s be a noisy signal of ability: $s = \theta + u$
  where u is independent of θ and distributed $u \sim N(0, \eta^2)$
- Under Bayesian updating:

$$\tilde{E}(\theta|s, g) = \lambda_g \bar{\theta}_g + (1 - \lambda_g)s$$

  where $\lambda_g = \frac{\eta^2}{\sigma_g^2}$
- Consider a high signal $s \geq \theta_g \ \forall g$:
  - $\tilde{E}(\theta|s, g) \geq \tilde{E}(\theta|g)$ so the expected payoff from following the manager increases

Ability signals under taste-based discrimination

- Now, condition for following the manger is:

$$f(\tilde{E}(\theta|s,g)) > c(g)$$

- Higher expected payoff makes taste-based discrimination more costly

Proposition

Under only taste-based discrimination, ability signals will reduce but cannot reverse the gender gap in following the manager.

Ability signals under statistical discrimination

- The gender gap in beliefs will reverse if:

$$\frac{\lambda_f}{\lambda_m} < \frac{s - \bar{\theta}_m}{s - \bar{\theta}_f}$$

- Note however that a reversal is not possible if $s = \bar{\theta}_m$
  - Under normality assumptions, a signal indicating that a female manager is equal to the average male manager can reduce, but cannot reverse, the gender gap in following the manager.

Proposition

When $s = \bar{\theta}_m$, a reversal in the gender gap implies that the same signal is **interpreted differently** *for men and women.*

Institutional data: Summary statistics

	(1) Total	(2) Male	(3) Female	(4) Diff.
Female	0.56			
	(0.50)			
Tenure	8.00	7.61	8.31	-0.71*
	(5.55)	(5.95)	(5.20)	
Years of education	12.87	13.04	12.73	0.31*
	(3.01)	(3.23)	(2.83)	
BA or higher	0.30	0.38	0.23	0.14***
	(0.46)	(0.48)	(0.42)	
MA or higher	0.02	0.04	0.01	0.03***
	(0.15)	(0.20)	(0.09)	
Salary	2354.62	2629.83	2135.97	493.85***
	(1536.24)	(1878.60)	(1151.46)	
Salary—BA or higher	3613.11	3681.16	3525.79	155.37
	(1624.55)	(1769.13)	(4161.84)	
Observations	1685	746	939	1685

Standard deviations in parentheses. Female is an indicator for the subject being female, Tenure is the number of years the subject has been employed by the University, Years of education are based on the subject's highest education level completed, BA or higher is an indicator for whether the subject holds a Bachelors degree, MA or higher is an indicator for whether the subject holds a Masters degree, and salary is the subject's monthly salary reported in Ethiopian Birr. Salary—BA or higher is the

Overview of signaling game

Player 1:

Type A				Type B		
A	In	Out		B	In	Out
1	168	444		1	276	568
2	150	426		2	330	606
3	132	408		3	352	628
4	56	182		4	334	610
5	-188	-38		5	316	592

Player 2:

	Type A	Type B
In	500	200
Out	250	250

- Player 1 is either type A or type B (p = .50)
- Player 1 wants Player 2 to play OUT

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Player 2:

	Type A	Type B
In	500	200
Out	250	250

- Player 1 is either type A or type B (p = .50)
- Player 1 wants Player 2 to play OUT
- Naive best response for Type B: 3
- Eureka: Type B can signal type by choosing 5, which is strictly dominated for A

Overview of signaling game

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Type A				Type B		
A	In	Out		B	In	Out
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5	-188	-38		5	316	592

Computer

	Type A	Type B
In	500	200
Out	250	250

- Player 2 is played by a "computer"
- Everyone plays as Type B, but computer believes it is 50-50

Computer's behavior

- Leaders and subjects played against a computer
- Computer drew from the distribution of actual responses to different plays by undergraduates in **?** (based on 1,928 observations)
- Information to subjects:
  "Though you are playing a computer, the computer has been programed to mimic how real life university students have played this game, and so the computer does not always respond in the same way to a given number"

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Balance on pseudonym characteristics

	(1) Amhara	(2) Oromo	(3) Age	(4) Grade	(5) Orthodox
Female leader only (F)	-0.0188	-0.00914	0.670	0.219	-0.0220
	(0.0554)	(0.0708)	(2.365)	(0.263)	(0.0700)
Ability signal only (A)	-0.0537	-0.0104	-0.932	0.145	-0.0689
	(0.0568)	(0.0697)	(2.278)	(0.227)	(0.0665)
Female leader × Ability (FA)	-0.0265	0.00721	-0.409	0.160	-0.0477
	(0.0597)	(0.0754)	(2.517)	(0.270)	(0.0712)
Day FE	Yes	Yes	Yes	Yes	Yes
Observations	304	304	304	304	304
p-val: F = A	0.544	0.985	0.444	0.781	0.466
p-val: A = FA	0.658	0.807	0.816	0.956	0.743
p-val: F = FA	0.900	0.826	0.648	0.848	0.700

Robust standard errors in parentheses. Pseudonym characteristics are assigned based on the characteristics of actual individuals with a given name, drawn from a listing exercise conducted for another study in Ethiopia. The ethnicities, Amhara and Oromo, and religion, Orthodox Christian, are equal to 1 if there was at least one individual with the relevant characteristic. Age and grade represent the average age and educational attainment of all individuals with a given name. Day FE are fixed effects referring to the day the subject participated in the experiment. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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Randomization balance

	(1) Fem. subject	(2) ln(Salary)	(3) Level	(4) Years Ed.	(5) MA or higher	(6) Job tenure
Female leader only (F)	0.0173	-0.0213	-0.145	0.00175	0.00848	238.2
	(0.0817)	(0.0634)	(0.446)	(0.0813)	(0.0401)	(328.3)
Ability signal only (A)	-0.0189	-0.00813	0.151	0.0556	0.0354	71.63
	(0.0803)	(0.0597)	(0.424)	(0.0865)	(0.0427)	(335.7)
Female leader × Ability (FA)	-0.0383	-0.00636	-0.149	0.117	0.0587	-276.9
	(0.0840)	(0.0610)	(0.420)	(0.100)	(0.0494)	(342.2)
Day FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	304	304	304	304	304	304
p-val: F = A	0.649	0.839	0.510	0.535	0.535	0.586
p-val: A = FA	0.812	0.977	0.481	0.554	0.650	0.268
p-val: F = FA	0.503	0.821	0.994	0.251	0.312	0.0959
Sample Mean	0.484	8.092	13.45	16.17	0.0822	3020.7

Robust standard errors in parentheses. All dependent variables refer to subject characteristics taken from institutional data. Fem. subject is an indicator for the being female, ln(Salary) is the log of annual salary, Level refers to internal categorization of the seniority and skill of a position, Years Ed. is the number of years of education reported, MA or higher is an indicator of whether the subject holds a Masters degree or higher, and Job tenure is the number of days of employment with the university. Day FE are fixed effects referring to the day the subject participated in the experiment. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

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Logic game

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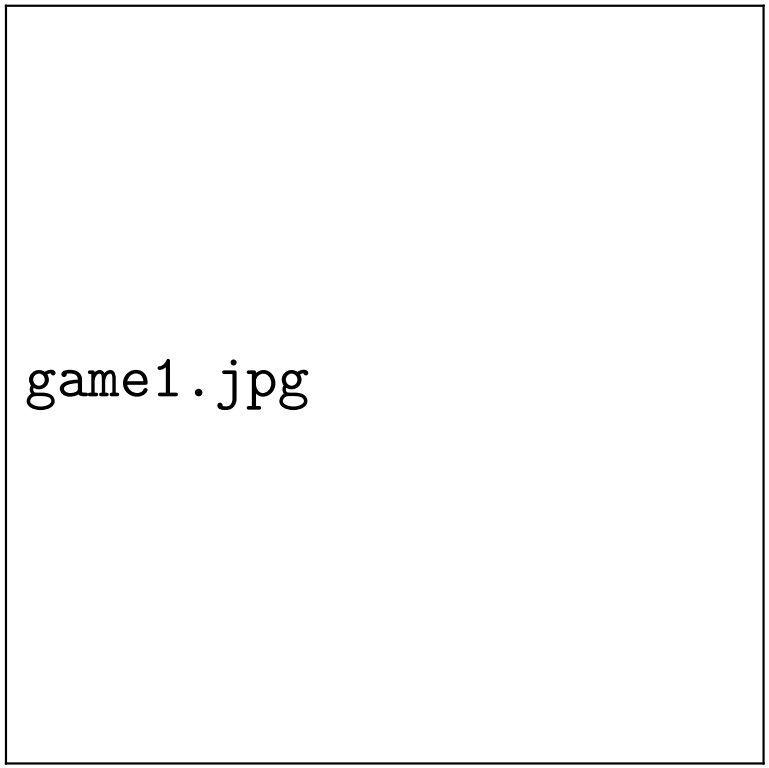

- "Tower of Hanoi": move 4 disks from one stack to another under strict set of rules
- Minimum possible moves: 15
- Leaders were shown how to complete in 15 moves and allowed to practice

Biased signals by gender

- Instead, let s be a function of g, gender

$$s = \theta - \gamma_g + u$$

  where $\gamma_f > \gamma_m$
- For a given level of ability, females produce a lower signal
- Then we have:

$$\tilde{E}(\theta|s, g) = \lambda\bar{\theta}_g + (1 - \lambda)(s + \gamma_g)$$

Proposition

If the signal mean differs by gender, then it is possible for the signal s to reverse the baseline gender gap in beliefs about ability.

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Leader gender and expectations

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