Not Learning from Others & Learning in the Household

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Not Learning from Others

Motivation: Two ways we often learn new information

(1) Through personal efforts and experiences, e.g.:
- Try out new restaurants
- Experiment with a novel technology
- Track performance of own investments

(2) Receiving information from others, e.g.:
- Conversations with others
- Observing their outcomes
- Reading about their experiences

Efficient learning requires combining information from these sources.

This paper: Tests the standard assumption in economics that equivalent pieces of information are weighted equally regardless of source

Social learning experiments in India (BDL lab) and US/UK (Prolific)

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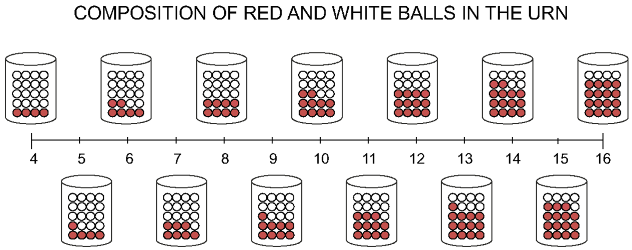
  (4) Observe treatment: directly observe partner drawing signals

Related literature

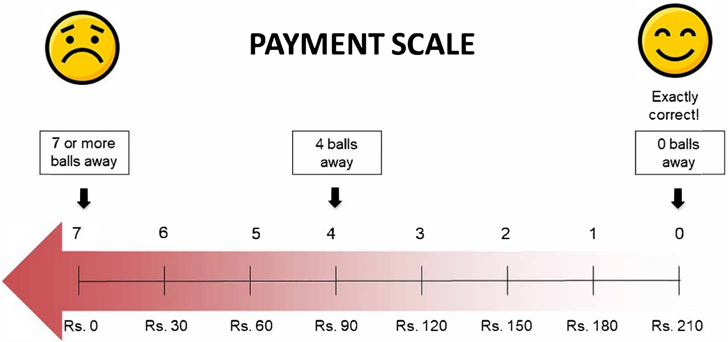
- **Social learning** → Provide evidence of a potentially powerful barrier to social learning
  - Field: Barriers to information seeking and diffusion
    Mobius et al. '15; Chandrasekhar et al. '18; Banerjee et al. '18; BenYishay and Mobarak, '19
  - Lab: People don't account for correlation structure, underreact to others' *actions*
    Enke and Zimmermann, 2019; Weizsäcker '10; Angrisani et al. '18
- **Learning from experience** → Role of taking some action to uncover information
  - Field: Beliefs and economic decisions powerfully shaped by personal experiences
    Malmendier and Nagel, '16; D'Acunto et al., '21
  - Reinforcement learning / Learning from experience vs. observation or description
    Nisbett and Ross, '80; Camerer and Ho, '99; Barron and Erev, '03; Hertwig et al., '04; Merlo and Schotter, '03; Simonsohn et al. '08; Miller and Maniadis '12
- **Ownership Effects** → Effect of 'owning' information
  - Owning a good increases people's valuation for it and causes people to react more to information about it Knetsch '89; Kahneman et al., '90; Hartzmark et al., '21

Experimental task: guess number of red balls in urn of 20 balls



- Common prior: # red balls between 4 and 16 (equal prob)
- Each round: draw two sets of $n \in \{1, 5, 9\}$ balls (with replacement)

Aligned incentives: each person paid equally for <u>same</u> randomly chosen guess



- Randomly-matched partners
- Both paid for the <u>same</u> randomly chosen guess
  $\rightarrow$ incentives aligned
- Can calculate risk-neutral Bayesian guess
  $\Rightarrow$ How we calculate this

Nature of task, complexity, and comprehension

- Key features of this design
  - Can create common prior + aligned incentives $\Rightarrow$ no strategic motives
  - Can precisely vary each person's info + calculate risk-neutral Bayesian's guesses

- Broad design considerations for designing the task:
  - Simple enough to be well understood by sample with relatively low education
  - Yet sufficient complexity to allow some 'wiggle room'

- Requires few assumptions
  - Participants do not need to be Bayesian
  - Do not assume that participants report mean/median of their belief distribution
  - Instead, simply test for equal sensitivity to "own" vs. "others" signals

- Clear prediction from standard model: equal sensitivity to own and others' signals

Three experiments using this task across two settings

- **Two lab experiments with strangers** in Chennai, India
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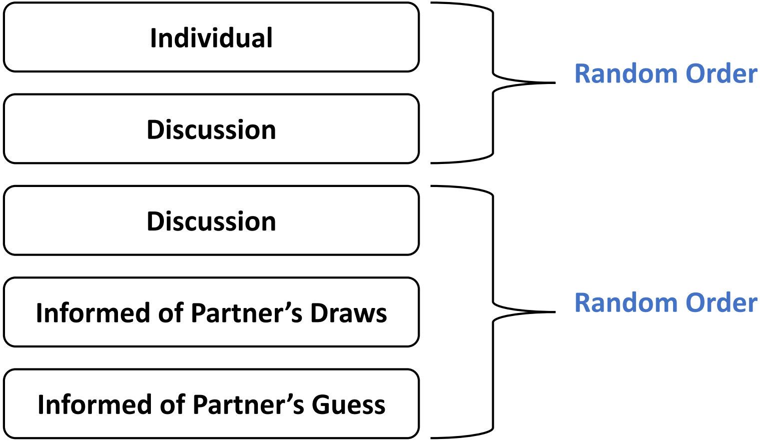
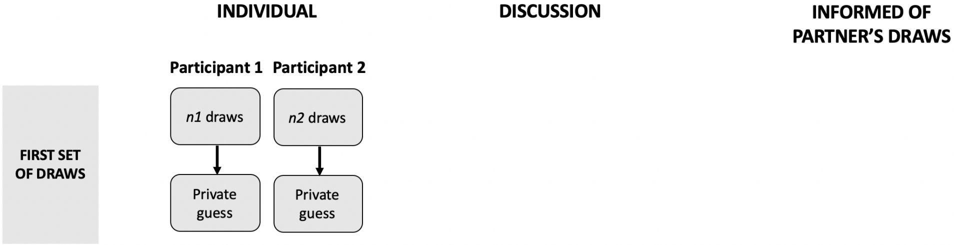
Will now walk you through core design used in Experiment 1

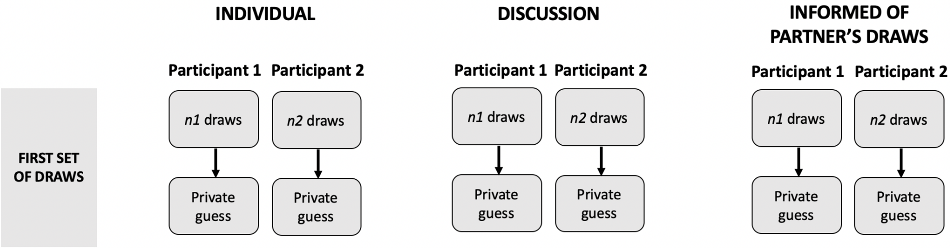
- Experiments 2 and 3 are simpler

Randomly-matched pair plays five rounds, in randomized order



INDIVIDUAL	DISCUSSION	INFORMED OF PARTNER'S DRAWS


INDIVIDUAL
DISCUSSION
INFORMED OF PARTNER'S DRAWS
Participant 1
Participant 2
FIRST SET OF DRAWS
n1 draws
n2 draws
Private guess
Private guess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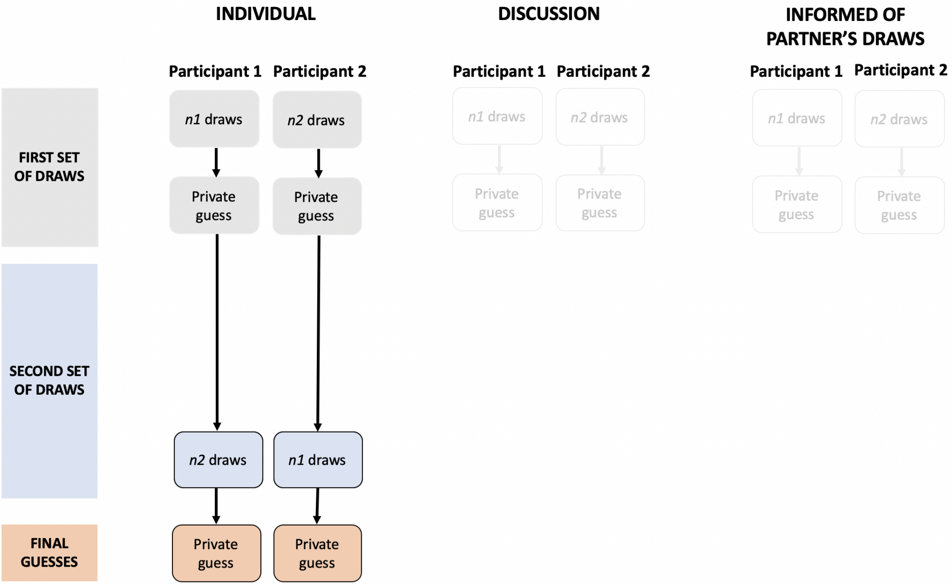
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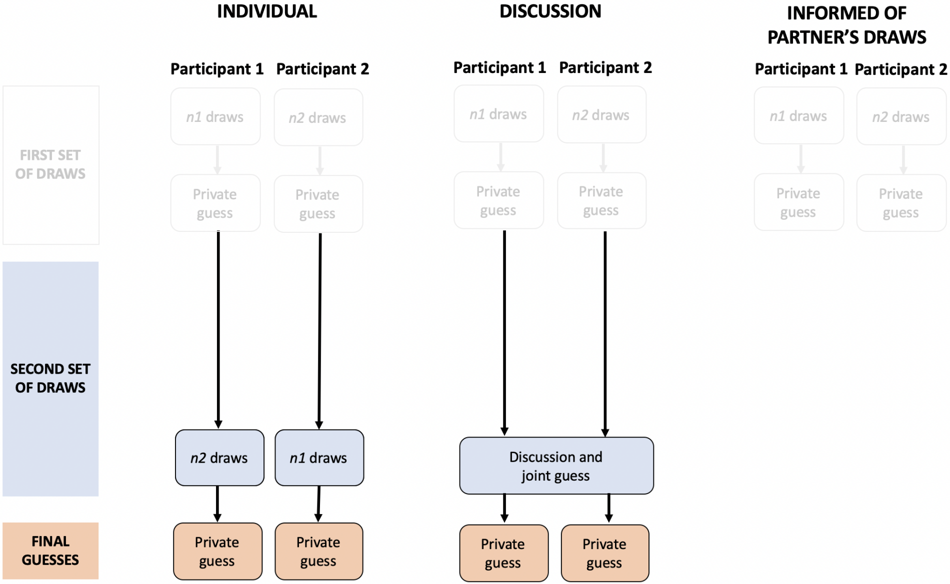
Private guess
n1 draws
n2 draws
Private guess
Private guess
SECOND SET OF DRAWS
n2 draws
n1 draws
FINAL GUESSES
Private guess
Private guess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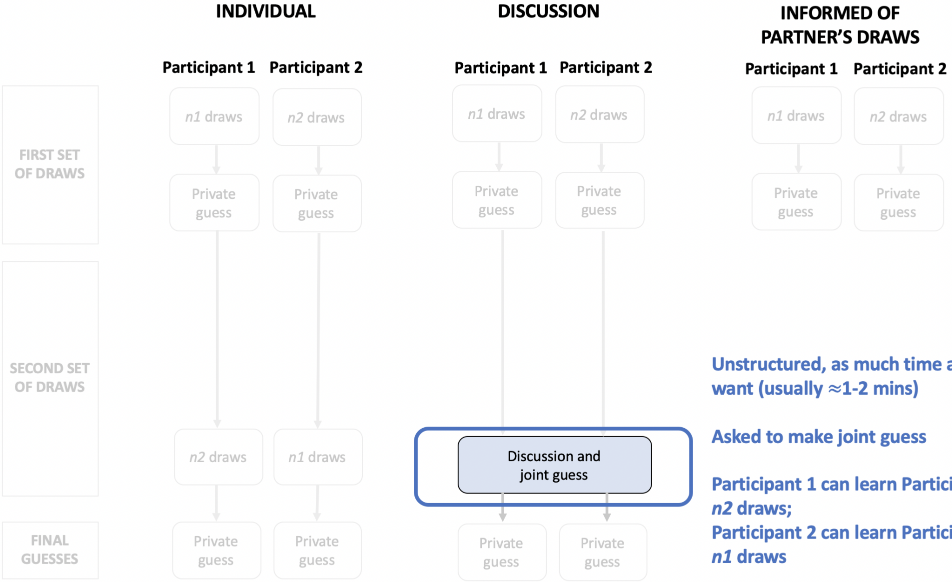
FINAL GUESSES
n1 draws
n2 draws
Private guess
Discussion and joint guess



Unstructured, as much time as they want (usually ≈1-2 mins)

Asked to make joint guess

Participant 1 can learn Participant 2's *n2* draws;
Participant 2 can learn Participant 1's *n1* draws

INDIVIDUAL DISCUSSION

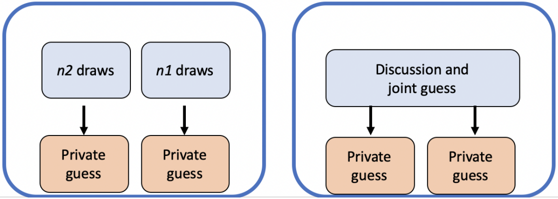
FIRST SET OF DRAWS

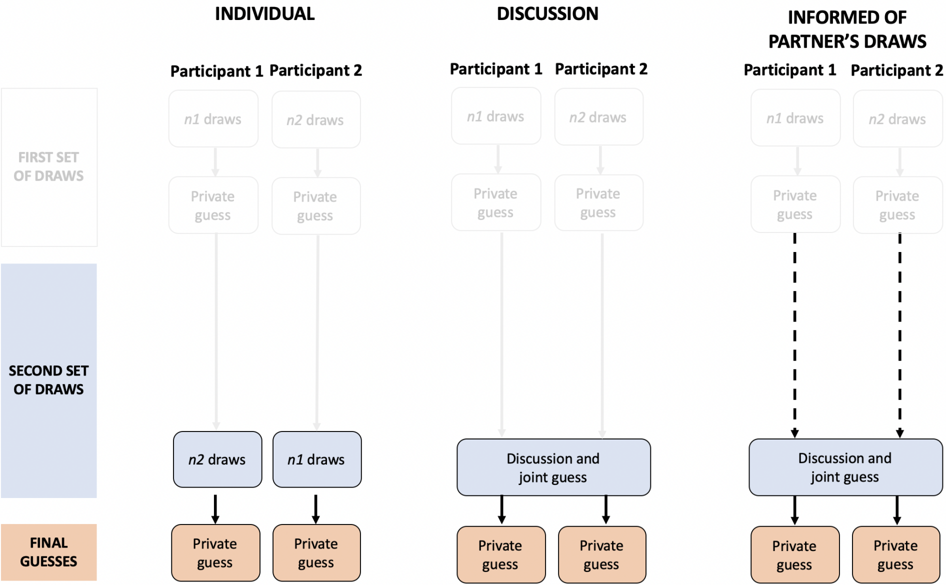
Individual vs. Discussion rounds:

Is info uncovered yourself weighted differently than info *potentially* learned via a discussion with your partner?

SECOND SET OF DRAWS

FINAL GUESSES

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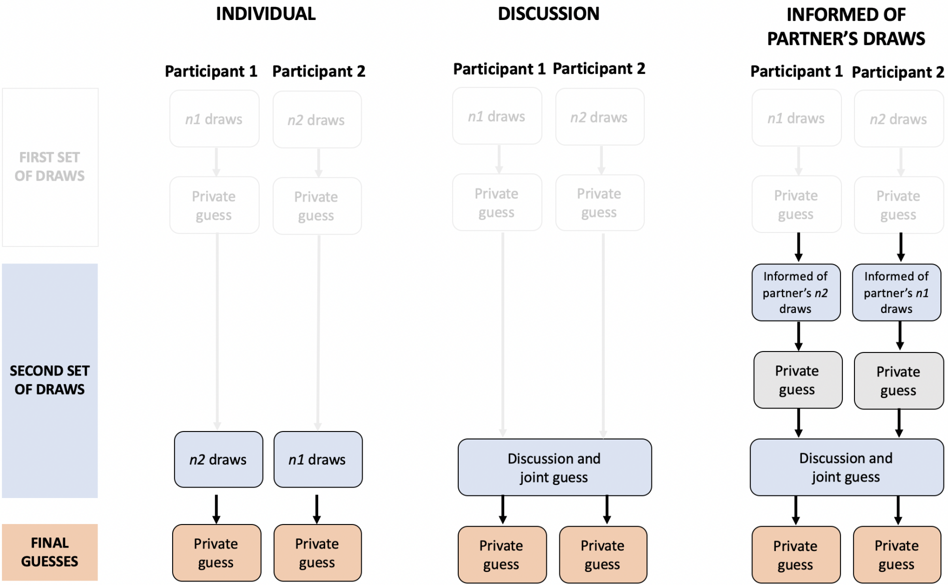

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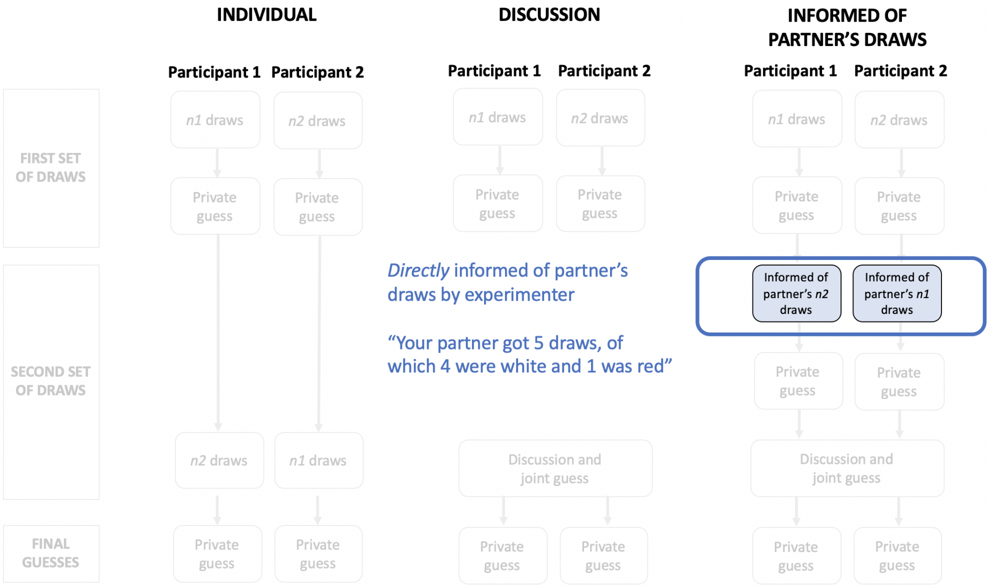
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SECOND SET OF DRAWS
FINAL GUESSES
n1 draws
n2 draws
Private guess
n2 draws
n1 draws
Directly informed of partner's draws by experimenter
"Your partner got 5 draws, of which 4 were white and 1 was red"
Discussion and joint guess
Informed of partner's n2 draws
Informed of partner's n1 draws
Private guess

INDIVIDUAL

INFORMED OF PARTNER'S DRAWS

Individual vs. Informed of Partner's Draws rounds:

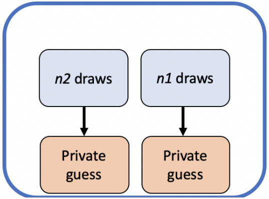
Is info uncovered yourself weighted differently than info uncovered by your partner but *perfectly* shared with you?

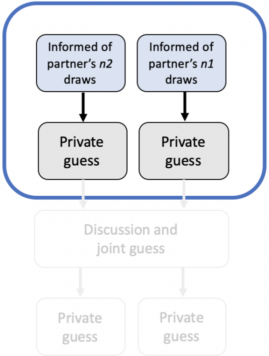
Note: no joint deliberation, no communication frictions

FIRST SET OF DRAWS

SECOND SET OF DRAWS

FINAL GUESSES



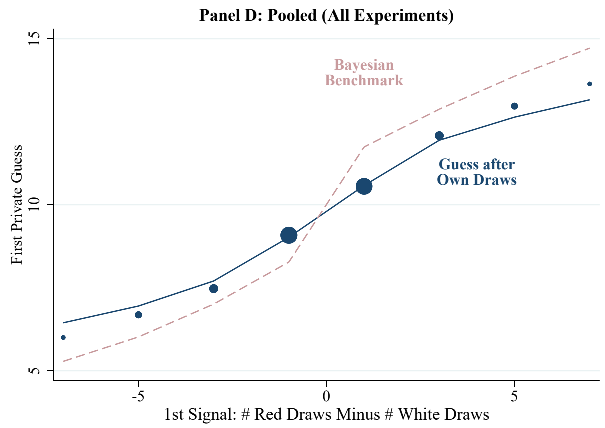


Three empirical approaches lead to very similar conclusions

- **Non-parametric**: Plot average guesses as function of signals (net red draws)
  - By source of information (own draws vs. partner's draws)
- **Reduced-form**: Linear regressions of guesses on signals
  - By source of information
- **Structural**: Quasi-Bayesian updating (not today)
  - Weights on signals allowed to differ by source of information

Note: Always comparing responsiveness to second set of draws

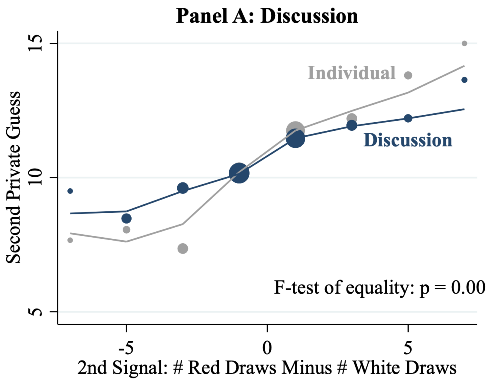
Individual round



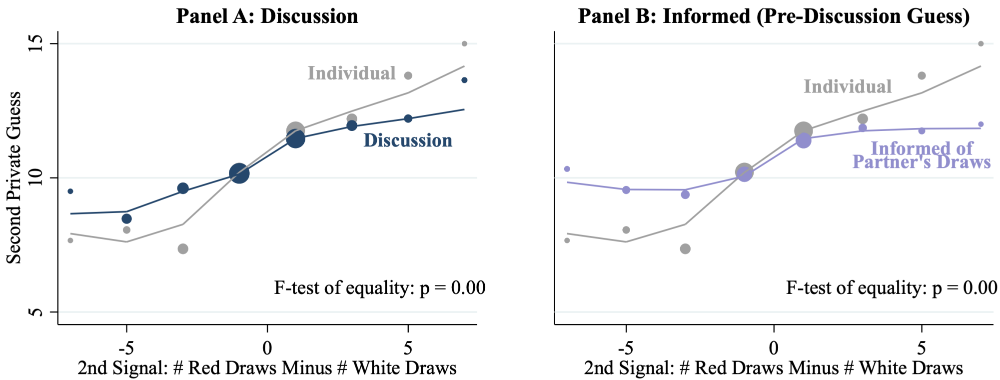
- Guesses as a function of "net red draws", i.e. red minus white draws
- On average, fairly close to risk-neutral Bayesian
- We will compare guesses in the treatment rounds to those in the Individual round.

Experiment 1
Non-parametric results

Guesses less sensitive to partner's signals than to own...

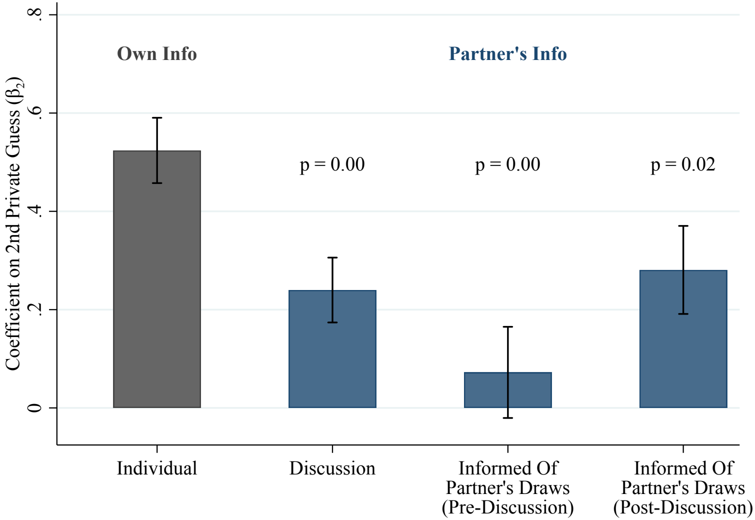


…even when directly informed of them by experimenter!



Experiment 1
Reduced-form analysis

People are at least 50% less sensitive to their partner's info



Ruling out confounds

- **Confusion and errors in probabilistic reasoning**
  - Don't require people to be Bayesian. Simply test if treat info equally *across* treatments.
  - Comprehension scores are excellent; no heterogeneity in effect by comprehension
- **Order effects**
  - Always compare weights on second info. Order of own and spouse's info thus held fixed
  - Recency effects, base-rate neglect therefore cannot explain our results.
- **Risk aversion**
  - Risk aversion might make people guess more conservatively overall
  - But it should not affect how people treat own vs. others' info.
- **Differences in actual or perceived ability**
  - Even if you think you are better at the game, you should use your own vs. other's information the same once you know it.

Ruling out confounds

- Confusion and errors in probabilistic reasoning
- Order effects
- Risk aversion
- Differences in actual or perceived ability

- **Mistrust** of the experimenter
  - Might put less weight on info that is not seen with own eyes
- **Competitiveness/rivalry**
  - Aligned monetary incentives
  - Competitive person might conceal info but should themselves *use* all available info
  - But, haven't (yet) ruled out this form of rivalry: I guess differently to you because I particularly like being right when you are wrong

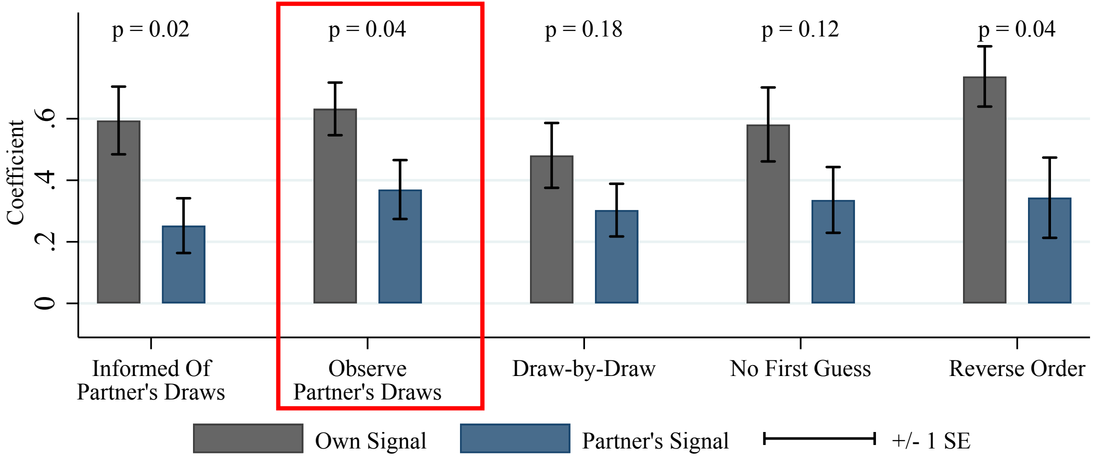
Experiment 2: address confounds, explore the limits of these effects

- **Two lab experiments** with strangers in Chennai, India
  - Experiment 1: establishes main findings
  - **Experiment 2: addresses confounds and explores mechanisms**
- **Online experiment with strangers** in US and UK
- **Lab experiment with married couples** in Chennai

Experiment 2

- **Informed** round repeated from above design
- **Observe** round: key new treatment in which participant watches partner draw their signals (sitting right next to each other!)
- Also includes other variations on Informed round aimed at ruling out confounds related to presentation of information
- **Caveat:** Limited power as this experiment stopped well short of target sample size (146 out of 400 pairs) due to pandemic-induced shutdown

Underweighting even when you watch other person draw their signals!



Experiment 3: Large-scale online experiment on Prolific (n=4,489)

- Replicate main findings in a higher numeracy sample from a different cultural context (US + UK)
- Simpler experimental design
  - Entirely between-subjects design
  - Randomized order of receiving own vs. others' signals
- Use more precise control in online setting to unpack mechanisms:
  - Is purely labeling some information as 'yours' enough?
  - If not, is it about different visual salience and presentation of information?
  - Or needing to take some action / exert effort to uncover info to feel 'ownership'?
- Note: Did not expect identical effect size due to online format, less sense of 'other', different sample, etc. (Gupta et al., '22)

Experiment 3: Three main treatments

1. **Informed:** click a button to draw own balls one by one; see a summary of partner's draws
2. **Observe:** click a button to draw own balls one by one; watch partner's draws appear one by one
3. **Labels Only:** watch own draws appear one by one; watch partner's draws appear one by one
   - Only difference is label ("your draws" vs. "your partner's draws")

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1 vs 2: isolate effect of visual salience / presentation
2 vs 3: isolate effect of (taking action to generate) ownership

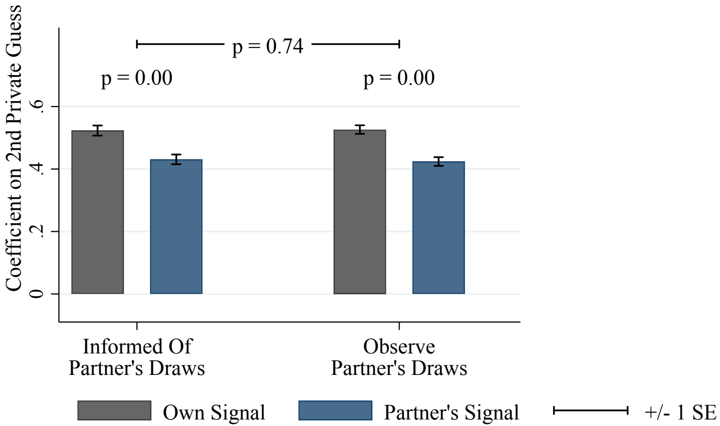
Drawing 'own' marbles online

Game 1

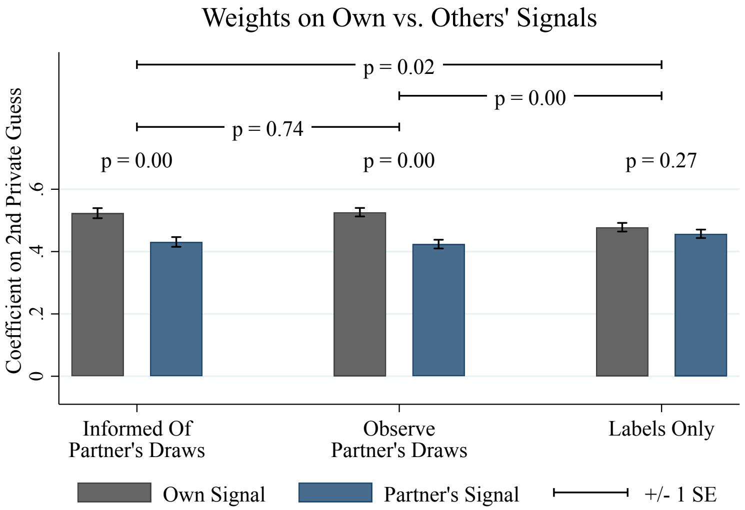
Draw **your** first marble

Drawing ‘own’ marbles online

Underweighting others' signals when you click to draw your own signals...



...but not when the difference is purely labeling



Experiment 3: Additional findings

- Similar effect even when partner's draws are perfectly recalled (does not operate wholly through through memory) results
- Lack of awareness of bias:
  - 77% reported using own and partner's draws equally in making guesses
  - But these individuals were just as insensitive to their partner's signals
- No effect of:
  - Rivalry (whether partner also guesses) results
  - Doubling the monetary stakes results

Summary

- People are less sensitive to information gathered by someone else compared to equally-relevant information gathered themselves
  - Whether they learn others' info through discussion, via a third party, or even seen with their own eyes
  - In different cultural contexts with populations with very different education levels
  - In a fairly simple experimental setup
- Rule out distrust, visual salience or presentation, overconfidence, confusion etc.
- Conclude that people have a bias against information generated by others
- Can interpret as an 'ownership effect' over information
  - Hartzmark et al. (2021): People react more to info about goods they own
  - We suggest notion of ownership may extend to information itself

Discussion

- Potentially far-reaching barrier to social learning
  - May underlie other documented cases of incomplete social learning, e.g.:
  - Information cascade experiments (Weizsäcker, 2010)
  - Farmers learning less from neighbors' plots (Foster and Rosenzweig, 1995)
  - Central bankers sensitivity to personal experience (Malmendier et al., 2021)
- Need for more evidence from natural field settings and with higher stakes
  - Low sensitivity to others' info might sometimes be a good heuristic
- Open questions:
  - What types of actions generate a sense of ownership over info in natural settings?
  - What types of contexts and relationships help or hinder learning from others?

Learning in the Household

Motivation - 1

- Social learning *within* the household
    - Members have access to independent info + many opportunities to share
    - Household models assume full information pooling
    - Except: Strategic motives can inhibit information flow (Ashraf et al. 2014, 2020)

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- Social learning *within* the household
  - Members have access to independent info + many opportunities to share
  - Household models assume full information pooling
  - Except: Strategic motives can inhibit information flow (Ashraf et al. 2014, 2020)
- In many situations, spouses have common objectives
  - Invest money wisely, send child to a good school, consult a competent doctor
  - Making good decisions here requires spouses to pool information
- Little evidence on:
  - How well spouses learn from each other
  - What factors inhibit learning

Motivation - 2

- Our previous experiments involved having the opportunity to learn from a stranger
- How might this change in the context of actual social relationships?
  - Higher trust and higher cost of repeatedly ignoring spouse's information
  - Hierarchy, norms, domains of expertise etc. might affect learning

Related literature

- **Information frictions in the household**
  - Strategic hiding or mistrust of information
    Ashraf et al. '14, '20; Ambler '15; Apedo-Amah et al. '20; Ashraf et al. '21
  - Intra-household spillovers of info interventions
    Hoff et al., '17; Lowe & Mckelway '19; Ashraf et al. '20; Fehr et al. '22;
- **Role of gender in sharing and listening to information/ideas**
  Coffman '14; Beaman & Dillon '18; BenYishay et al. '20; Coffman et al. '21 ; Isaksson '18...

Experimental Design

- We recruit 400 married couples to visit our lab in Chennai, India
    - Given local context, all married couples are male-female pairs
- Couples play Experiment 1 from Not Learning from Others
- We compare their behavior with men and women playing with strangers (re-analyzing data from Experiment 1)
- Men and women are equally good at the task + equally overconfident regarding it
    - Not a gender-stereotyped task (Coffman '14)

Sample

	Couples		Non-Couples	
	Husbands	Wives	Men	Women
Married	1.00	1.00	0.56	0.85
Years married | Married	12.33	12.23	13.00	15.09
	(8.47)	(8.45)	(7.65)	(8.66)
Age	36.46	31.86	34.92	34.39
	(9.10)	(8.34)	(8.69)	(8.48)
Highest grade attended	7.86	8.11	7.77	7.26
	(3.31)	(3.29)	(3.54)	(3.44)
Reads Tamil	0.86	0.83	0.77	0.75
Multiplied correctly	0.48	0.33	0.52	0.36
Works (at least 1 day/week)	1.00	0.42	1.00	0.54
Daily work hours | Works	8.23	5.56	7.93	4.40
	(2.74)	(3.61)	(3.18)	(3.65)
Days working per week | Works	5.73	5.90	5.27	5.75
	(1.05)	(1.15)	(1.26)	(1.31)
Daily earnings | Works	571.41	279.72	577.38	281.64
	(269.33)	(195.59)	(299.94)	(210.39)
N	400	400	250	250

- 400 married couples
- Similar recruitment procedures, similar demographics to Experiment 1 ('Non-Couples')
- Ideally, would have recruited couples but randomized to play with spouse versus stranger. But recruiting couples is slow and would have greatly increased cost.

Reminder of design

Individual

Discussion

Random Order

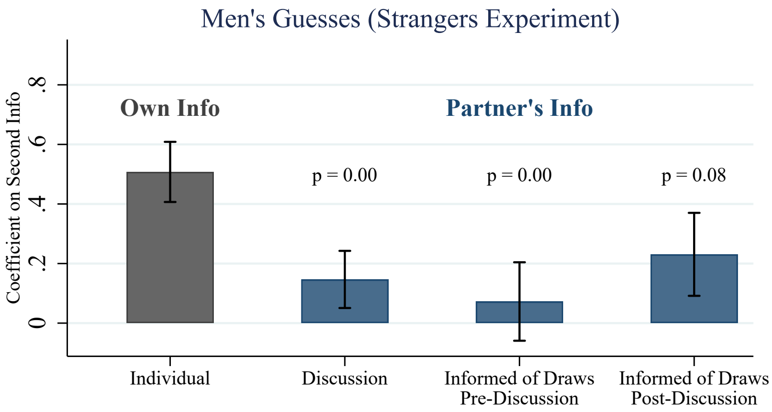
Discussion

Informed of Partner's Draws

Informed of Partner's Guess

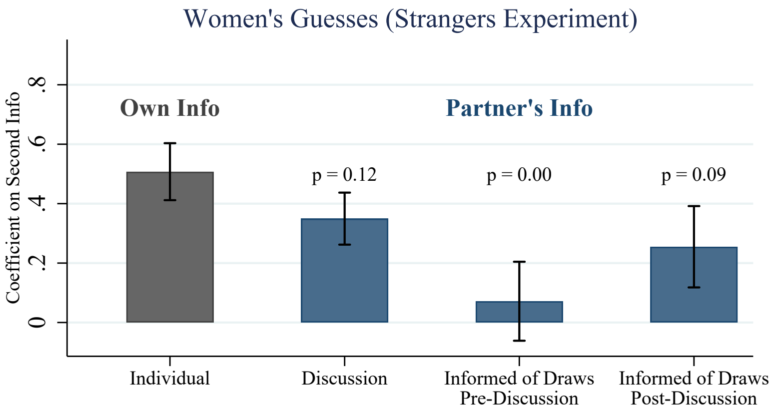
Random Order

Experiment 1: Men underweight strangers' information



Cannot reject equal underweighting by men and women, and across same and mixed-gender pairs Same v. mixed-gender pairs

Experiment 1: Women similarly underweight strangers' information



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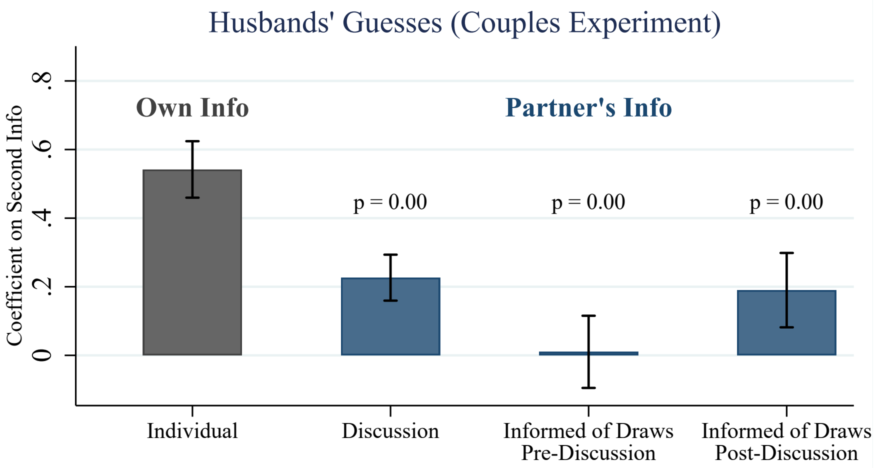
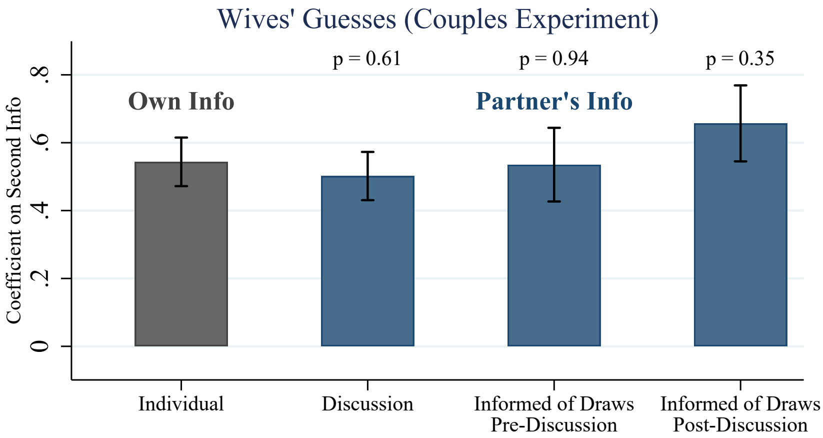
Husbands discount their wife's info



But wives treat own and husbands' info the same



Difference between husbands and wives is statistically significant (p=0.04)

Why do wives place equal weight on their husband's info?

- Not gender differences per se: men and women treat strangers similarly.
  - In both same- and mixed-gender pairs of strangers

- Gap not explained away by controlling for individual-level observables such as relative age, competence, beliefs about competence, or marital status

- Implies the asymmetry is generated by the marital context itself

- We explore heterogeneity by features of marital context:
  1. **Index of Husband's Decision-Making Power:** average *both* spouses' answers on who makes decisions in various domains
  2. **Index of Husband's Relative Ability:** differences in perceived ability of husband, comprehension and first-guess performance

Husband's decision-making power & relative ability predict weight on his info

	(1)	(2)	(3)
Husband's Signal	0.54***	0.56***	0.56***
	(0.08)	(0.07)	(0.07)
Wife's Signal	0.36***	0.32***	0.33***
	(0.07)	(0.07)	(0.07)
H's X HHDM Index	0.06*		0.05
	(0.03)		(0.03)
W's X HHDM Index	-0.05		-0.03
	(0.03)		(0.03)
H's X Ability Index		0.07*	0.06
		(0.04)	(0.04)
W's X Ability Index		-0.13***	-0.13***
		(0.04)	(0.04)
Constant	10.22***	10.21***	10.21***
	(0.18)	(0.17)	(0.17)
N	2,400	2,400	2,400
p-value: HHDM Interactions Equal	0.035		0.090
p-value: Ability Interactions Equal		0.001	0.002

- More weight placed (by both spouses) on info of spouse who makes more decisions at home
- And who is seen as higher ability at the task
- Suggests habits or norms of deference and decision-making power also affect weight placed on *information*

Summary

- In our study context, men largely ignore their wife's information while women equally weight their own and their husband's information
- Gender difference in social learning *only* in the household
  - No difference when learning from strangers
- Implies that wives face a force which countervails the general tendency to underweight others' info
  - Norms and habits of deference (related to household decision-making)
  - Incorrect beliefs that their husbands are better than they actually are
  - Another possibility: differences in sense of identity (what counts as me/mine)

Discussion

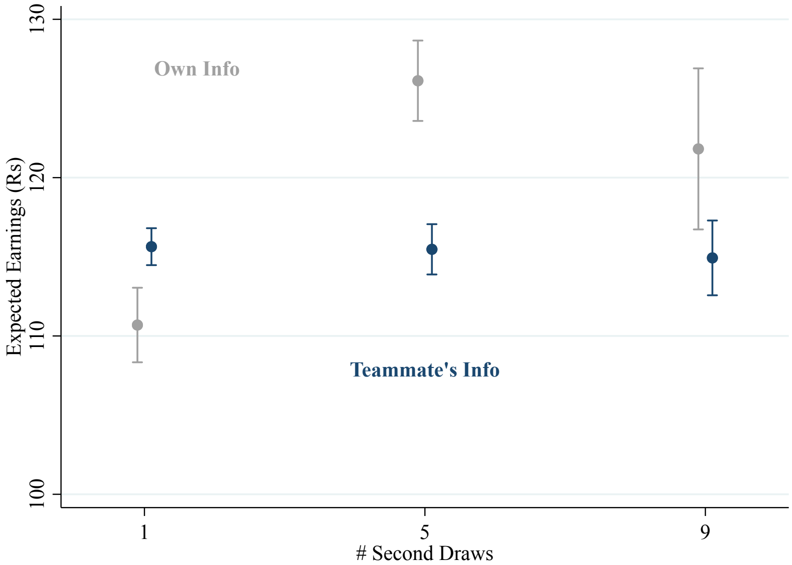
- Tentative ‘policy’ implications (for similar cultural contexts):
  - Households may not pool information, even when they have incentives to do so
  - Women might make better decisions when aggregating household info would help
  - Worse decisions when husbands decide but wives have some relevant info
  - Higher pass-through of info from husbands to wives than vice-versa (also in Fehr et al., ’22)

- Open questions:
  - Documenting belief dispersion within the household
  - Studying intra-household learning in natural field settings with higher stakes
  - In domains where gender stereotypes regarding expertise exist
  - Studying learning in other types of relationships, e.g. elders and youth, friends, kin, co-workers, managers and employees, etc.

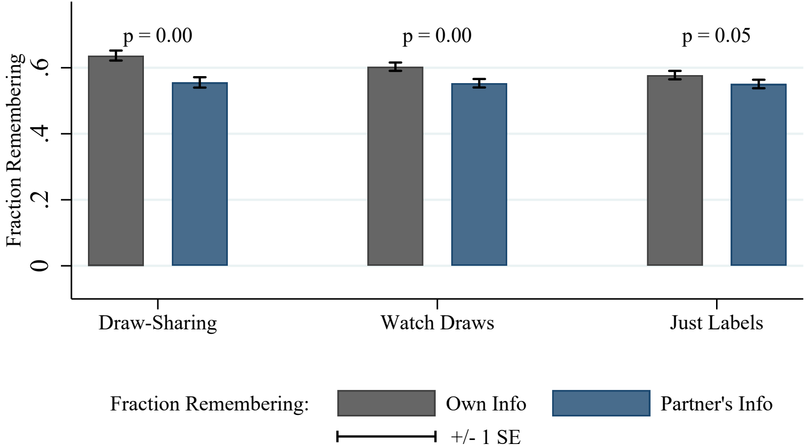
Thank you!

Guesses earn less when second info collected by another

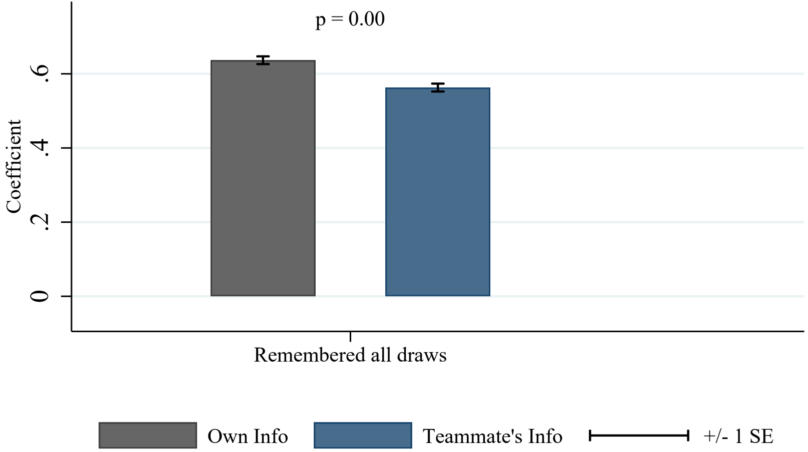
Back



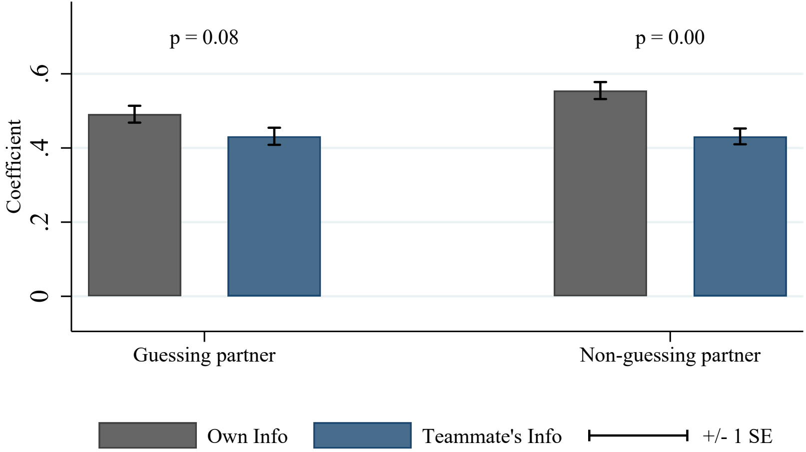
Clicking to draw affects memory...



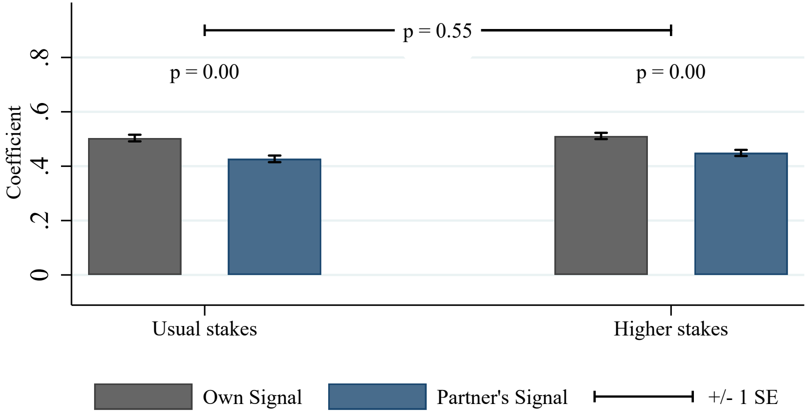
But memory not the whole story Back



Ruling out rivalry: behavior persists when other person not guessing Back



2x higher stakes makes no difference Back



Reduced-Form Specification

Examine how private guesses depend on the ‘second info’ by treatment:

$$
\begin{aligned}
\mathit{Guess}_{ir} = \alpha &+ \beta_1 \cdot \mathit{First\ Info}_{ir} + \beta_2 \cdot \mathit{Second\ Info}_{ir} \\
&+ \beta_{3,1} \cdot \mathit{Second\ Info}_{ir} \cdot \mathbb{1}(\text{Discussion})_{ir} \\
&+ \beta_{3,2} \cdot \mathit{Second\ Info}_{ir} \cdot \mathbb{1}(\text{Draw-sharing pre-discussion})_{ir} \\
&+ \beta_{3,3} \cdot \mathit{Second\ Info}_{ir} \cdot \mathbb{1}(\text{Draw-sharing post-discussion})_{ir} + \epsilon_{ir},
\end{aligned}
$$

where:

$$
\begin{aligned}
\mathit{First\ Info}_{ir} &= \text{Red minus White draws in first set of signals} \\
\mathit{Second\ Info}_{ir} &= \text{Red minus White draws in second set of signals}
\end{aligned}
$$

Reduced-Form Specification

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$$\begin{aligned} \textit{Guess}_{ir} = \alpha &+ \beta_1 \cdot \textit{First Info}_{ir} + \beta_2 \cdot \textit{Second Info}_{ir} \\ &+ \beta_{3,1} \cdot \textit{Second Info}_{ir} \cdot \mathbb{1}(\text{Discussion})_{ir} \\ &+ \beta_{3,2} \cdot \textit{Second Info}_{ir} \cdot \mathbb{1}(\text{Draw-sharing pre-discussion})_{ir} \\ &+ \beta_{3,3} \cdot \textit{Second Info}_{ir} \cdot \mathbb{1}(\text{Draw-sharing post-discussion})_{ir} + \epsilon_{ir}, \end{aligned}$$

where:

$$\begin{aligned} \textit{First Info}_{ir} &= \text{Red minus White draws in first set of signals} \\ \textit{Second Info}_{ir} &= \text{Red minus White draws in second set of signals} \end{aligned}$$

Key hypothesis: $\beta_{3,1} = \beta_{3,2} = \beta_{3,3} = 0$ (equal weight on own and spouse's signals)

Other results from mechanisms experiment

- None of the following eliminate underweighting of others' info:
  (1) Draw by draw: informed of other's information ball by ball
  (2) No first guess: Do not elicit first guess after seeing own private draws
  (3) Reverse order: Learn partner's info before receiving own draws
  (4) Stakes: Randomizing 50% higher stakes has no effect

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Experiment 1 (Strangers): Mixed-gender vs. Same-gender pairs

	Pooled (1)	Men (2)	Women (3)
β_1: First Info	0.51***	0.51***	0.49***
	(0.05)	(0.07)	(0.07)
β_2: Second Info	0.51***	0.53***	0.48***
	(0.06)	(0.10)	(0.10)
$\beta_{3,1}$: Second Info X Discussion	-0.29***	-0.39***	-0.19
	(0.08)	(0.13)	(0.12)
$\beta_{3,2}$: Second Info X Discussion X Same-Gender Pair	0.06	0.06	0.06
	(0.07)	(0.10)	(0.11)
α: Constant	10.71***	10.73***	10.69***
	(0.13)	(0.19)	(0.19)
Observations	1500	750	750
Includes Info X Order FEs	Yes	Yes	Yes

- For Discussion round only, can compare same-gender and mixed-gender pairs of strangers
- No significant differences depending on same vs mixed-gender team, for either men or women (but somewhat limited power)

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Why do couples and strangers behave differently?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Own Net Red	0.49***	0.52***	0.48***	0.52***	0.55***	0.50***	0.32***	0.50***
	(0.04)	(0.05)	(0.04)	(0.04)	(0.07)	(0.06)	(0.07)	(0.09)
Teammate's Net Red	0.24***	0.20***	0.25***	0.20***	0.13	0.26***	0.10	-0.05
	(0.04)	(0.05)	(0.04)	(0.05)	(0.07)	(0.06)	(0.08)	(0.10)
Teammate's Net Red X Guesser Is Husband In Couple	0.07	0.04	0.09	0.07	0.12*	0.09	0.07	0.10
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
Teammate's Net Red X Guesser Is Woman	0.09	0.09	0.11	0.08	0.09	0.10	0.10	0.10
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Teammate's Net Red X Guesser Is Wife In Couple	0.14*	0.17**	0.14**	0.14**	0.16**	0.14*	0.13*	0.20***
	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.06)
Teammate's Net Red X Guesser Is Older		0.08						0.09
		(0.05)						(0.05)
Teammate's Net Red X Guesser Thinks Sole HHDM			-0.08					-0.06
			(0.04)					(0.04)
Teammate's Net Red X Teammate Better				0.07				0.06
				(0.04)				(0.04)
Teammate's Net Red X Guesser Thinks Teammate Better					0.10			0.10
					(0.06)			(0.06)
Teammate's Net Red X Guesser Is Married						-0.04		-0.03
						(0.06)		(0.07)
Teammate's Net Red X Guesser Comprehension index							0.14*	0.15*
							(0.06)	(0.06)
Constant	10.67***	10.67***	10.67***	10.66***	10.66***	10.67***	10.66***	10.66***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
N	5200	5200	5200	5200	5200	5200	5200	5200

- Not explained away by observables such as relative age, ability, confidence
- Being married vs. single *per se* does not significantly explain behavior
- But married women behave differently *when paired with their spouse*