Experience, learning and the detection of deception

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Interactions and trust

In interactions where trust/cooperation is required to achieve potential gains,one party may use opportunities to **deceive** other party causing it loss.

Receivers of information can gain being able to distinguish trustworthy information, or their senders, from opportunistic or deceptive ones.

Valid indicators of deception?

Evidence in psychology and economics

Primary assumption:
deceivers may be **observably distinguishable** from honest individuals

Psychology (early) and **Economics** (emerging) literature point to physical, tonal or verbal cues such as

dilation of pupils,
higher blinking rate or voice pitch,
increased use of negative statements etc.

potentially indicating deception.

A receiver of information could benefit from being able to interpret such cues

Evidence in psychology and economics

Just as the **ability to deceive** may be advantageous,
so should be the **ability to detect it**

The literature has shown humans tending to be poor at deception detection overall, often performing at levels consistent with random decision making

Individuals facing potential deception may be unaware of cues,
or unable to use these advantageously

DePaulo, B., Lindsay, J., Malone, B., Muhlenbruck, L., Charlton, K. and Cooper, H. (2003): Cues to Deception, Psychological Bulletin, 129, 74-118
George, J., Marett, K., Burgoon, J., Crews, J., Cao, J., Lin, M. and Biros, D. (2004): Training to Detect Deception: An Experimental Investigation, Proc.of the Ann. Hawaii Inter. Conf. on System Sciences
Wang, J., Spezio, M., and Camerer, C. (2010): Pinocchio's Pupil: Using Eyetracking and Pupil Dilation to Understand Truth Telling and Deception in Sender Receiver Games, Am. Econ. Review, 100, 984-1007
Hausfeld, J., von Hesler K. and Goldlücke, S. (2020): Strategic Gaze: An Interactive Eye-Tracking Study, Experimental Economics, 24, 177-205

Possible factors impacting detection accuracy:

Humans learning from experience, in turn, experience can enable learning and reduce detection error

Our **goal** is to observe
this **effect of experience** on detection accuracy in
a **high-stakes**, **quasi-naturalistic** environment

Data - To tell the truth

Game of cross-questioning

145 episodes

429 sessions

3 main components of a game
1 **Host**,
4 **Judges** (2 Males, 2 Females)
3 **Contestants**

A regular session

Host - constant for an episode

Judges - 2 males, 2 females, constant for an episode

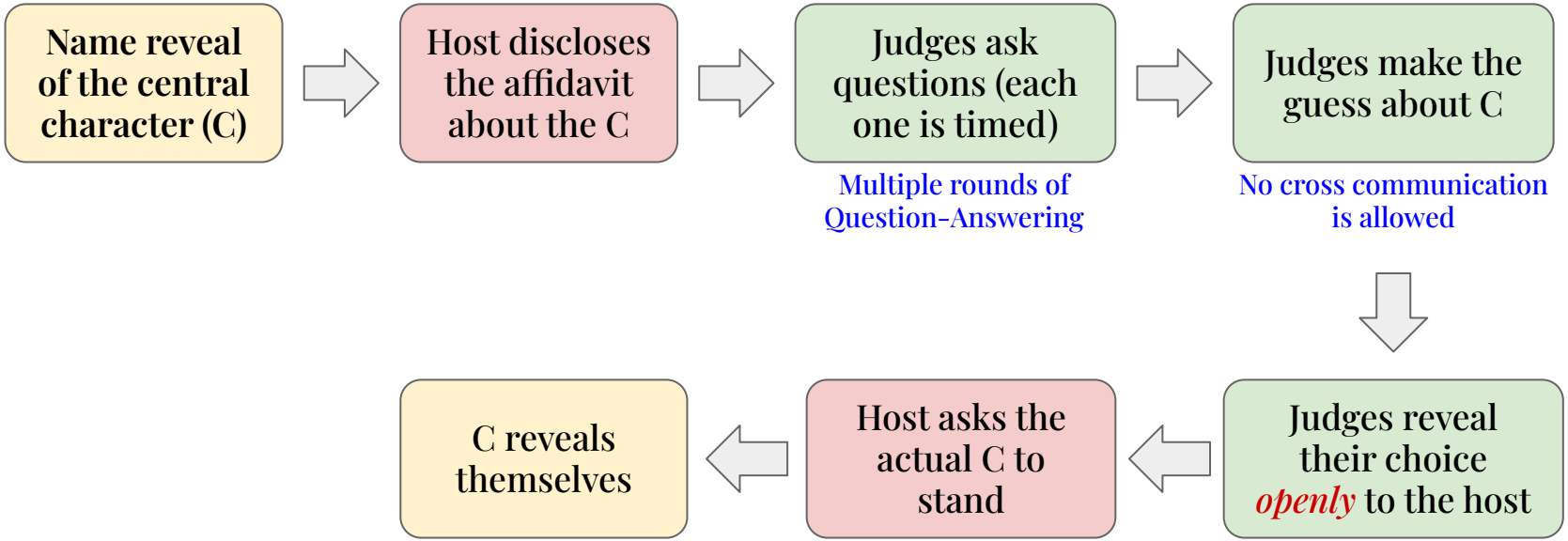
Viewership of the show were fans or potential fans of the celebrities who appeared as judges

Challengers - 3 challengers per session; 1 Central Character, 2 Imposters

The challengers as a group got $250, to be divided equally, for every judge making a mistake in identification

The central character - **"nothing, but the truth"**

Flow of a regular session



Variables

Target: Judge decision outcome (*deceived/not deceived, binary*)

Features:

Judge specific data
Judge decision, Appearance numbers (in days/ by session), Age, Gender, Peer Judge Effects

Challenger specific data
Total number of challengers, Gender

Data - irregularities

Different Host - 4 episodes, 11 sessions

A single judge recused himself/herself due to prior acquaintance with a challenger - 17 episodes, 17 sessions

there was never any instance in which more than 1 judge recused

3 couples (1 male and 1 female) as challengers - 4 episodes, 4 sessions. There were 2 central characters, from a single couple. The other couples were the impostors

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Experience and performance improvement

In any session, a judgement is either *correct* or *incorrect*

Dependent variable - judge decision

Independent variable - number of sessions

We study if the *probability* of being deceived or the error rate declines with experience,
i.e., the number of appearances or sessions

Experience and performance improvement

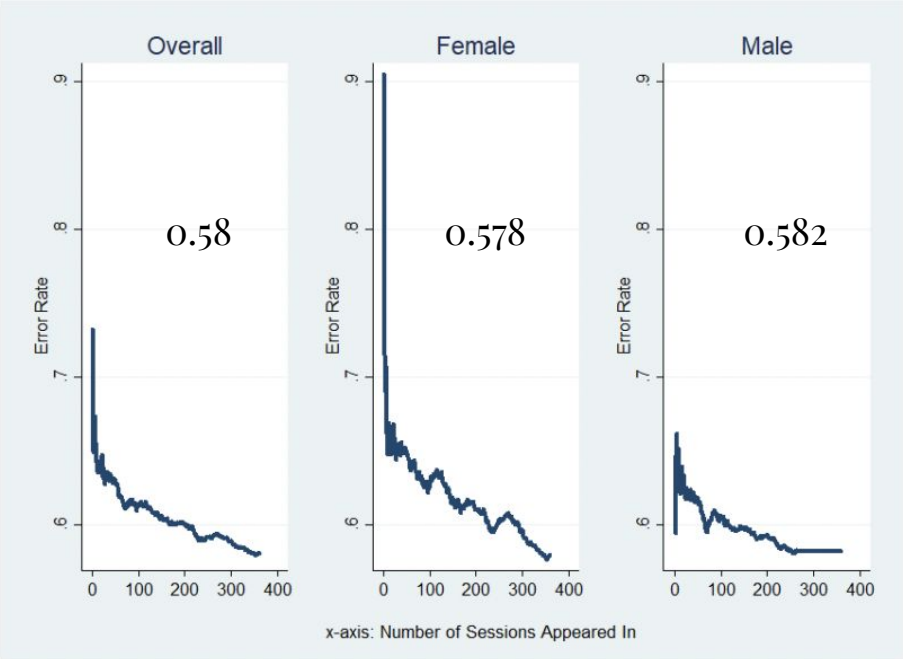
56 judges

21 females

35 males

Half the judges appeared in 6 or less sessions,

7 judges appeared in 40 or more



Mean Error Rates

Model

$$y_{i,t} = \alpha_1 + \beta_1 t + \mathbf{z}_i \boldsymbol{\gamma_1} + \mathbf{p}_{\sigma_{i,t}} \boldsymbol{\pi_1} + \mathbf{w}_{e_{i,t}} \boldsymbol{\delta_1} + \mathbf{q}_{\sigma_{i,t}}^{e_{i,t}} \boldsymbol{\theta_1} + u_{i,t}^1$$

- $y_{i,t}$: outcome for judge i in his or her t-th appearance
- $\mathbf{z}_i \boldsymbol{\gamma_1}$: invariant features of i
- $\mathbf{p}_{\sigma_{i,t}} \boldsymbol{\pi_1}$: $\sigma_{i,t}$ denotes the session corresponding to i's t-th appearance; comprises characteristics of $\sigma_{i,t}$
- $\mathbf{w}_{e_{i,t}} \boldsymbol{\delta_1}$: $e_{i,t}$ denote the episode containing $\sigma_{i,t}$; $We_{i,t}$ includes features specific to $e_{i,t}$
- $\mathbf{q}_{\sigma_{i,t}}^{e_{i,t}} \boldsymbol{\theta_1}$: incorporates two characteristics of the peer judges who participate in $e_{i,t}$ along with judge i

All regression models implement cluster correction, with clustering at the level of the judge

Our Results

We estimate this partial likelihood model by *pooled probit*

Appearance Number is significant and negative, for males, females, as well as the overall sample, indicating that **experience reduces error**

Performance is positively influenced by **Performance in First Episode**, indicating that innate ability affects error

Our Results

Gender is significant,
suggesting male judges had lower error in detection

Higher the **Number of Female Challengers**,
higher was error

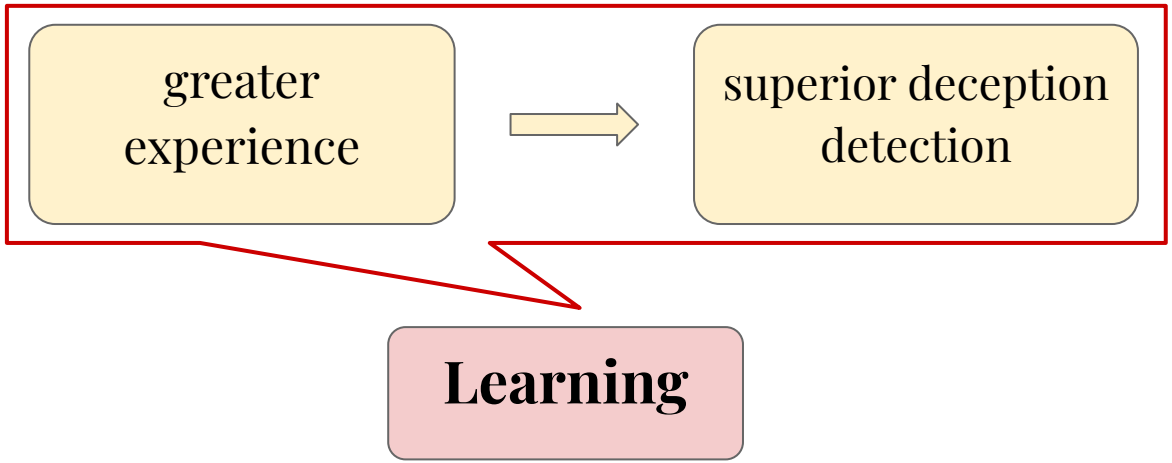
The variable is significant in the full sample and the female sub-sample,
while significance is at the 10% level for the male sub-sample
Females may sometimes be more successful at deception

Our Results

Higher **age of a judge** when first appearing on the show was correlated with higher error, though not for male judges

And a **non-standard host** reduced performance, but only for males

Selection Bias



more experience ⇒ better understanding, recognition of habitual cues, and their links to deceptive behavior producing superior judgement

Selection Bias

Possibility of some **non-random selection mechanism** determining *participation*

Judges of higher **innate ability**, or more **fame**, or wrt to **age** being selected more often, leading to **positive correlation** between experience and innate ability

Learning **survives** as an explanation after either econometrically controlling for selection bias, or eliminating its possibility?

Selection Bias

The test for selection bias comprises
estimating selection equation using pooled probit,
calculating the *Inverse Mill's ratio* for each judge and episode

$$s_{i,e} = \alpha_2 + \beta_2 x_{i,e} + \mathbf{z}_i \boldsymbol{\gamma_2} + \dot{\mathbf{p}}_e \boldsymbol{\pi_2} + \mathbf{w}_e \boldsymbol{\delta_2} + \dot{\mathbf{q}}^e \boldsymbol{\theta_2} + \phi h_{i,e} + \psi_2 e_2 + \ldots + \psi_{145} e_{145} + u_{i,e}^2$$

Selection Bias - Results

Absence of non-random selection

Appearance Number remains significant and negative

Performance in First Episode, Gender and **Number of Female Challengers** remain significant, and with the same signs

Host is no longer significant for the male sub-sample

Selection Bias - Results

Positive association between experience and performance is **robust** to controlling for selection bias

Judges with higher innate ability being consistently chosen more often as episodes pass, **does not appear to have any force in our sample**

Presence of learning performance **improves** as experience accumulates because judges have *more personal data* on decision making in analogous situations

Learning over the episode of first appearance

Any evidence for performance improvement? **Pooled probit!**

First appearance episodes

7 judges had only **2 sessions**

remaining **49 judges** had **3 sessions**

161 observations ⇨ 160 observations!

(One judge recused once in the first episode of appearance)

Learning over the episode of first appearance

Significant **improvement** in performance over the course of judges' first episodes of appearance for full sample, female sub-sample

(Not eligible for male sub-sample)

Total Number of Challengers is significant for the full sample and the female sub-sample

(An increase in the number of challengers leading to increased error)

No gender effects were detected

Average intra-episode learning

Performance improvement over the course of an average episode, considering all appearance episodes together - **pooled OLS!**

Improvement in performance over the course of an average episode observed
(Full sample significant at the 10% level, weak evidence of performance improvement, intra-episode learning)

Performance in First Episode (that those with higher innate ability) have higher average session performance

No gender effects were detected

Concluding Remarks

The need to **identify** deceptive or opportunistic individuals may arise in many economic situations

Existing evidence is somewhat bleak and suggests humans are **not necessarily highly skilled** at deception detection

Experience may be a factor favoring improved detection as conjectured

We pursue this hypothesis through an analysis of data constructed from events in a TV game show. **Our evidence suggests support for the hypothesis**

Future Prospects

A question that remains unanswered in our investigation is
what it is that is learnt

No isolation of **particular cues** that individuals may be learning through experience

Our examination is conducted in a domain of **face-to-face oral communication**

Additionally, each judge, while an independent decision maker,
was **always in the company** of other judges in the show

Acknowledgement

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Thanks!

Discussion?