Lying Aversion and Vague Communication: An Experimental Study

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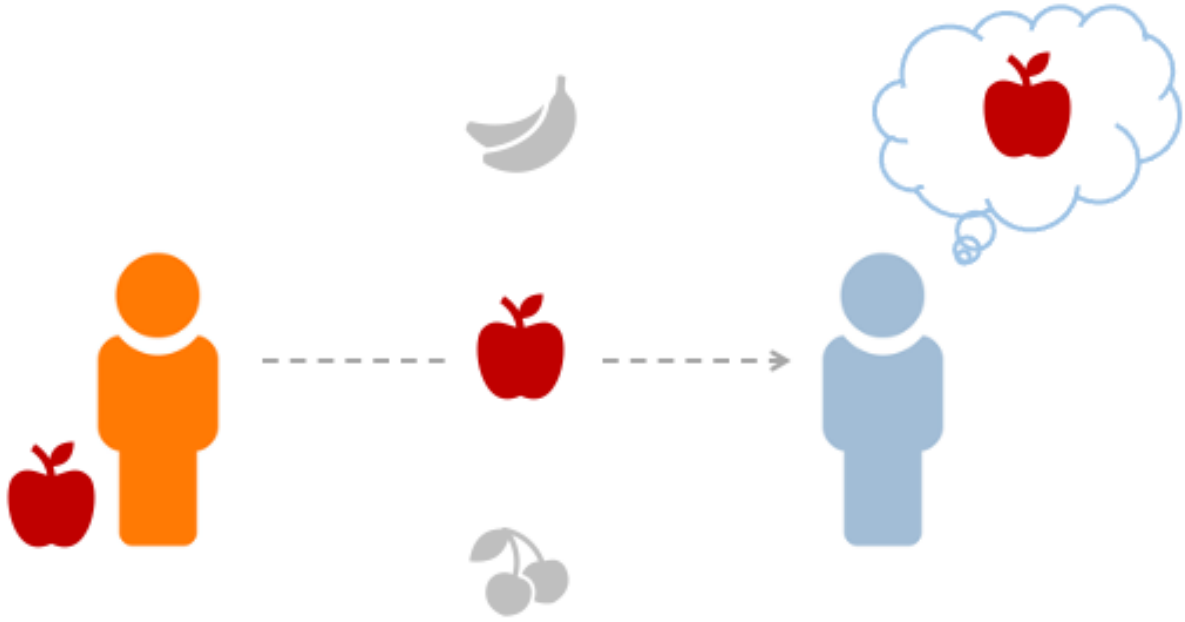
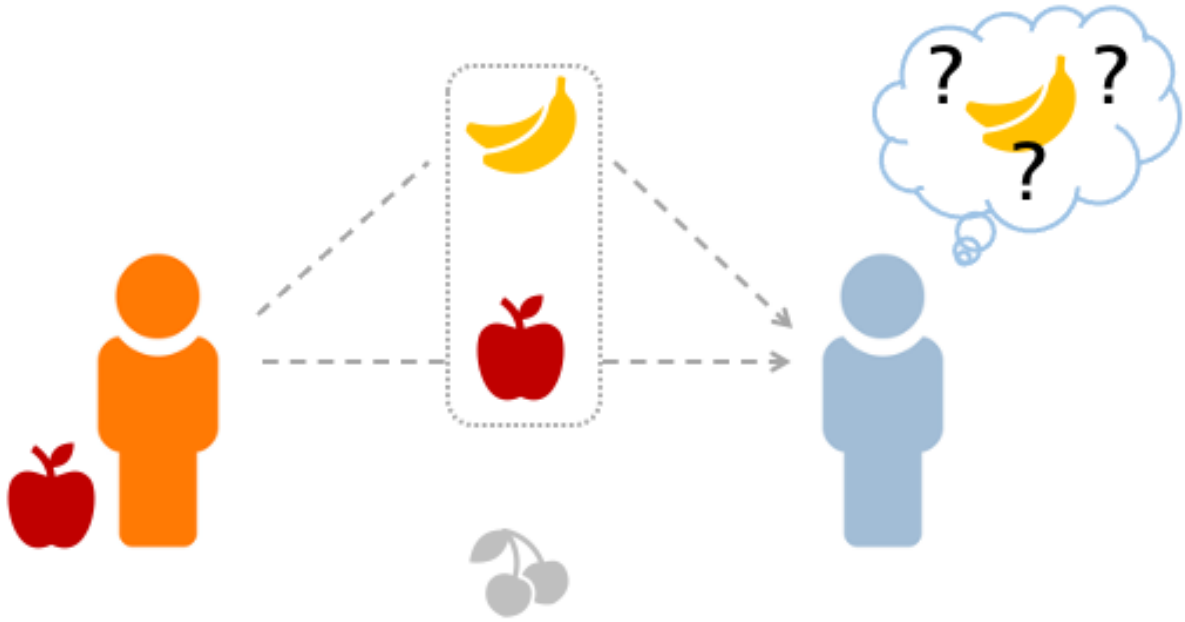
Vague communication

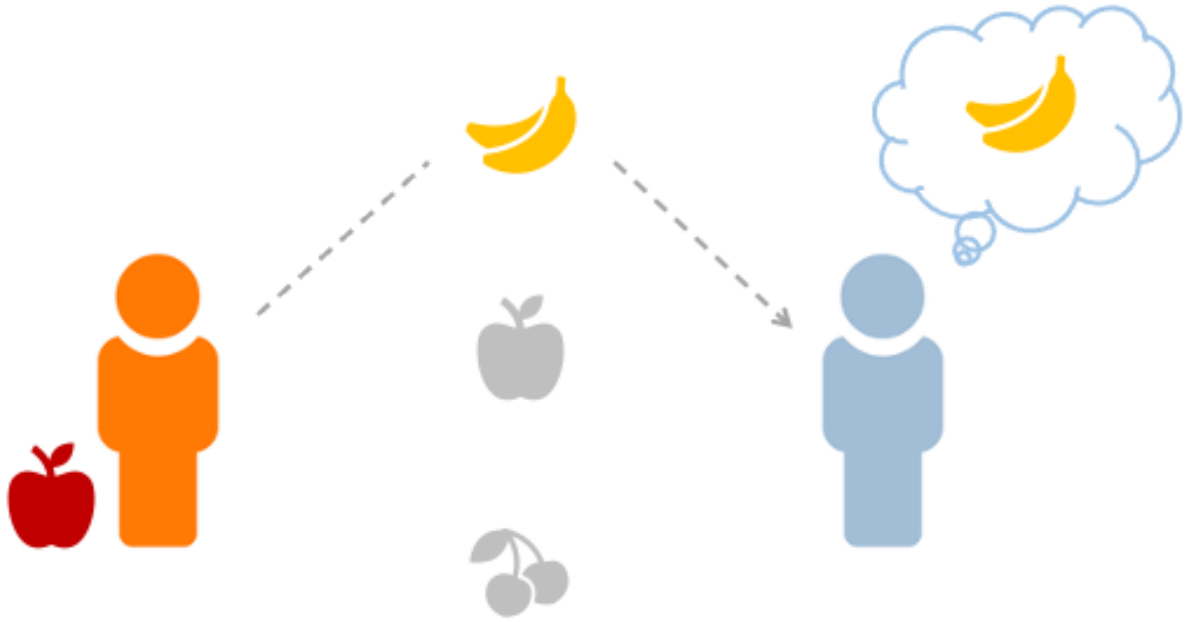
Vague communication



Vague communication



Vague communication



Motivation

- Why and when should one use a vague message over a blatant lie?
- Many applications: disclosure game, public-good provision game, ...
- Need to consider both strategic and behavioral aspects
  - Belief about the state of the world
  - Belief about how honest the sender is
  - Attitude toward different method or degree of misleading behavior

Preview of the results

- We present a model of information transmission with vague messages and lying costs (guilt/reputation).
- We test the theoretical predictions through an online experiment.

1. The use of vague messages arises endogenously from the lying aversion.
2. Many people prefer to be vague and truthful.
3. Some people do not use vague messages even when they lose potential monetary gain.

Literature

- Signaling game: Crawford and Sobel (ECMA 1982)
- Rolling-a-die: Fischbacher and Föllmi-Heusi (JEEA 2013)
  - Abeler, Nosenzo, and Raymond (ECMA 2019)
  - Gneezy, Kajackaite, and Sobel (AER 2018)
  - Khalmetski and Sliwka (AEJ Micro 2019)

▸ Rolling-a-die

Model

- A population of agents and one audience
- Each individual agent observes the state of the world i
- $i \overset{i.i.d.}{\sim} \mathit{Unif}[\Omega]$ where $\Omega = \{1, 2, \ldots, 10\}$
- The agent sends a message J after observing i.
- A message J is a non-empty subset of Ω.
  - A message J is truthful if $i \in J$, and is a lie otherwise.
  - A message is called precise if it is a singleton set, and vague otherwise.
- The agent's utility can be written by:

  $U =$ monetary payoff $- \mathbb{1}(i \notin J) \cdot$ internal guilt $+ \gamma \cdot$ ext. reputation

- One shot; no repeated interaction

Experiment design: precise vs vague

- Online experiment
  - Zoom meetings for the instructions
  - Qualtrics for the main experiment
- Subjects first observe a random number between 1-10 on their web browser
- Subjects report the number to the experimenter by clicking boxes on screen.
- Two stages: within-subject analysis
  - Precise: can select only one box at a time
  - Vague: can select multiple boxes at a time
- Randomized order of the two stages

Experiment design: precise vs vague

Stage 1

What number did you observe? You may select **a set of numbers** by clicking multiple numbers. After you submit your selection, the computer will randomly choose one from the set of numbers you selected.

1	2	3	4	5	6	7	8	9	10

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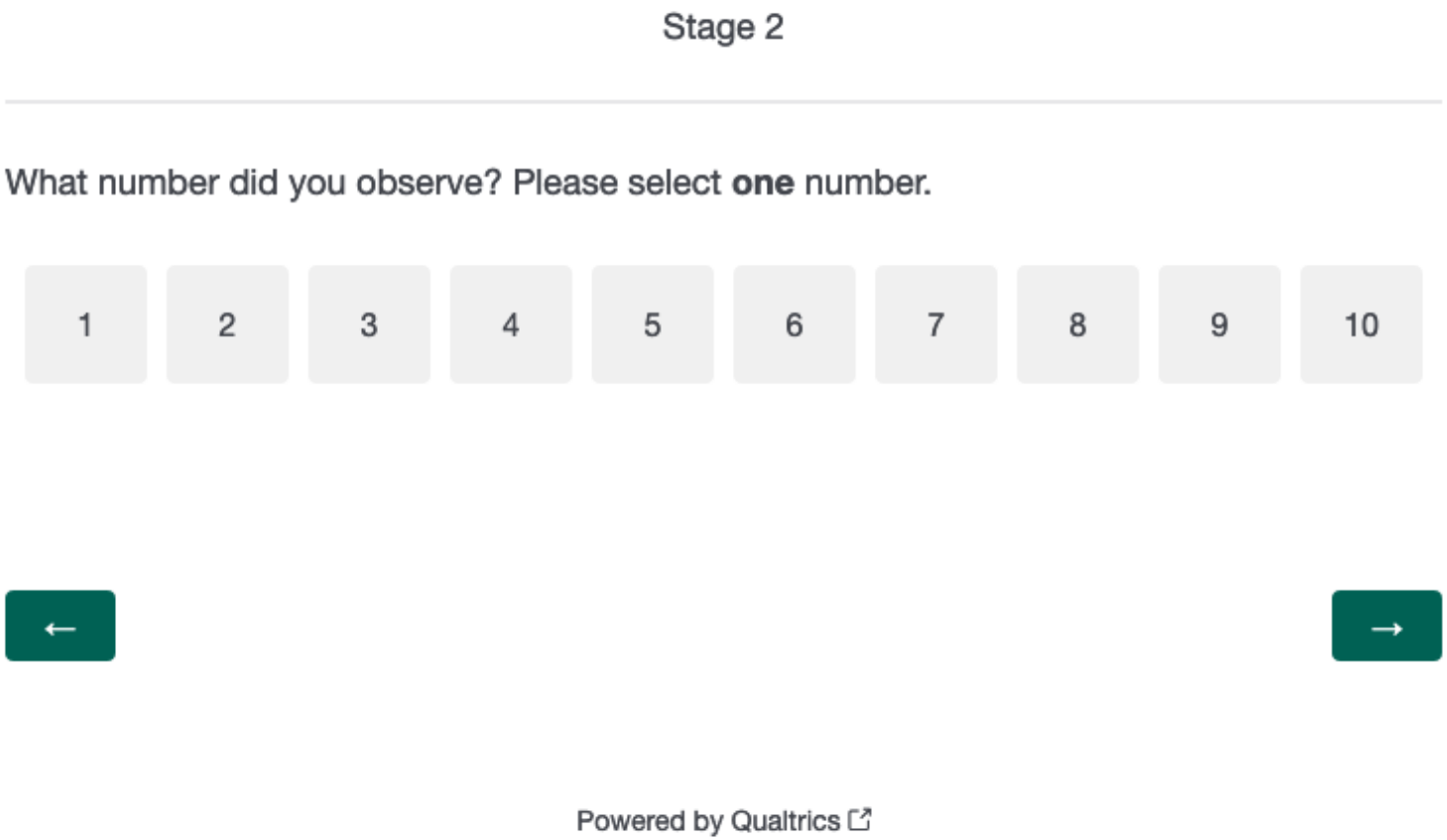
Powered by Qualtrics

Experiment design: precise vs vague



Experiment design: treatments

	Identifiable & Unobs.	Anonymous & Obs.
Precise	IP	AP
Vague	IV	AV

- Anonymity of agents: between-subject analysis
  - Identifiable: real name, student ID, video on
  - Anonymous: screen name, no student ID, video off
- Observability of the true state

Data Summary

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

- 69 subjects recruited.
- 4 Anonymous sessions and 7 Identifiable sessions, with the average size of 8.3 and 5.1 participants in each session
- Each session lasted approximately 30 minutes.

Result 1: IP-AP

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 1 (IP-AP).

Under the precise (restricted) communication,

i. *agents earn more monetary payoff on average in the anonymous environment:* $earning_{IP} \leq earning_{AP}$
   - *Under the precise (restricted) communication, participants reported higher in the anonymous environment.*
   - *The one-sided t-test is not very significant: p-value = 0.388*

Result 2: AV

Hypothesis 2.

In the Anonymous & Vague environment,

i. *all truth-tellers uses optimal vague messages:* $\{i, x^*, x^* + 1, ...10\}$

- *44.4% (12 of 27) of truth-tellers used OVM;*
- *18.5% (5 of 27) used a pair of the true observation and 10;*
- *33.3% (9 of 27) used a precise message*

ii. *no message contains a number less than the true observation*

- *only 1 out of 33 participant included a number less than the true observation in the message*

iii. *no precise message except* $\{10\}$ *is truthful.*

- *all precise messages (except* $\{10\}$*) were truthful*

Result 3: AP-AV

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 3 (AP-AV).

In the anonymous environment,

i. *more agents lie when the communication is restricted (precise):* $lie_{AP} \geq lie_{AV}$
   - *more participants lied when the communication is restricted (p-value = 0.006)*

Result 3: AP-AV

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 3 (AP-AV).

In the anonymous environment,

ii. *an agent who is truthful in AP is also truthful in AV conditional on the same observation*

- *all participants who were truthful in AP remained truthful in AV*

Result 3: AP-AV

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 3 (AP-AV).

In the anonymous environment,

iii. *some agents who lie in AP switch to truth-telling in AV conditional on the same observation*

- *6 out of 12 liars in AP switches to truthful and vague messages in AV despite lower expected monetary payoff*

Result 3: AP-AV

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 3 (AP-AV).

In the anonymous environment,

iv. *agents earn more monetary payoff on average when the communication is not restricted (vague): earning$_{AP} \leq$ earning$_{AV}$*
   - *participants reported higher on average when the communication is not restricted (p-value = 0.005)*

Result 4: Vague communication

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 4.

In both the IV and the AV environment, people use vague messages.

- In the IV environment, 25 out of 36 participants (69.4%) used a vague message.
- In the AV environment, 18 out of 33 participants (54.5%) used a vague message.
- More people use vague messages in IV, and the size of the vague message is also larger in IV.

Result 5-1: IV-AV

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 5.

i. *Under the vague (unrestricted) communication, agents earn more monetary payoff on average in the anonymous environment:* $earning_{IV} \leq earning_{AV}$

- The result supports Hypothesis 5-1.
- However, the one-sided t-test is inconclusive with a p-value of 0.415.

Result 5-2: IP-IV

	Average Report		Lie			
	Precise	Vague	Precise	Vague	Size	N
Identifiable	6.556	8.208			3.72	36
Anonymous	6.788	8.285	12 (36.36%)	6 (18.18%)	3.06	33

Hypothesis 5.

ii. *In the identifiable environment, agents earn more monetary payoff on average when the communication is not restricted (vague): earning$_{IP} \leq$ earning$_{IV}$*

- The result supports Hypothesis 5-2.
- The one-sided t-test is significant with a p-value of 0.010.

Concluding remarks

- The use of vague messages endogenously arises from the lying aversion.
- Overall, participants reported much higher on average when the vague communication is allowed.
- Some portion of the observed aversion for monetary-payoff-maximization in previous experiments could be attributed to the restriction on the message space.
- The vagueness of a message only costs the reputation and does not affect the internal cost of lying.
- Analogous to the “warm glow” giving: as long as they can signal that their goodwill, no extra cost seems necessary.

Concluding remarks

- The existence of precise truth-tellers in the anonymous environment
- A possible alternative: the existence of another motivation for truth-telling
- A concern for accuracy or a concern for the self-image of good intention?

Work in progress

- Likelihood estimation for the lying probability in the identifiable environments
- A possible concern for a meta-game: are the precise and the vague treatments independent?
  1. a logit regression:

$$\text{lie}_{AV} = \begin{cases} 1 & \text{if } \beta_0 + \beta_1 \theta_{AV} + \beta_2 \theta_{AP} + \beta_3 \text{lie}_{AP} + \epsilon > 0 \\ 0 & \text{otherwise.} \end{cases}$$

  2. order of the precise / vague treatments
- Better characterization of the equilibria in the identifiable environments

Thank you!

For more information, please visit https://kehkuansun.github.io
or email me at sun.k@wustl.edu.

Rolling-a-die experiment

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