Disbelief, Belief Updating, and Polarization

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- This paper: Roles of **Disbeliefs in out-group knowledge** in **belief updating**

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   - Existence of **Disbelief in out-group knowledge**
2. Do people **overweigh in-group judgments** when evaluating what is true?
   - Existence of **In-group bias in belief updating**
3. Can **correcting disbelief reduce in-group bias in belief updating?**
   - Yes

Surveys

- US and South Korea (today: only US)
- Two surveys
  - Study 1 (N=295): Document disbelief in out-group knowledge
  - Study 2 (N=301):
    - Document in-group bias in belief updating
    - Experiment if correcting disbelief reduces the in-group bias
- Recruit participants through PureSpectrum, an online survey panel provider
- **Today: PILOT (July 2025), not Real (planned soon)**

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Hypotheses: Disbelief in out-group knowledge

- H1: Target-based Disbelief
  - RP supporters believe that RP supporters are more knowledgeable
  - DP supporters believe that DP supporters are more knowledgeable

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  - RP supporters believe that RP supporters are more knowledgeable
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- H2: Perceiver-based Disbelief
  - RP supporters are seen as more knowledgeable by RP than DP
  - DP supporters are seen as more knowledgeable by DP than RP

Study 1: Survey Structure (N=295)

- Ask to evaluate 16 factual questions:
  - political (4), non-political (4), conspiracy theory (8)
- Examples
  - ”New Zealand is located in the Middle East.”
  - ”The country’s GDP growth rate in the previous year was lower than 7%.”
  - ”The Republican administration initiated the Iraq war for oil interests.”
  - ”The 2020 presidential election was stolen from Donald Trump.”
- Ask to give confidence level $a_{i,k} \in [0, 100]$
- Then, for each question, ask to estimate the accuracy rates for two groups
  - Republican supporters (R), Democrat supporters (D)

Q26 Please judge whether the sentence is true or false: **New Zealand is located in the Middle East.**

- True (1)
- False (2)

Q27 We would like you to estimate how confident you are in the accuracy of your answer to the true-or-false question. For example, if you believe there is a 50% chance that your answer is correct, please choose 50. If you are completely confident that your answer is correct, please choose 100.

	0	10	20	30	40	50	60	70	80	90	100
Accuracy of your answer ()											

Q28 Next, we would like you to estimate **the percentage of people in each of the following groups who correctly judge whether the statement is true or false**. For example, if everyone in group X makes the correct judgement, the percentage of group X would be 100%.

	0	10	20	30	40	50	60	70	80	90	100
Republican Party supporters ()											
Democratic Party supporters ()											

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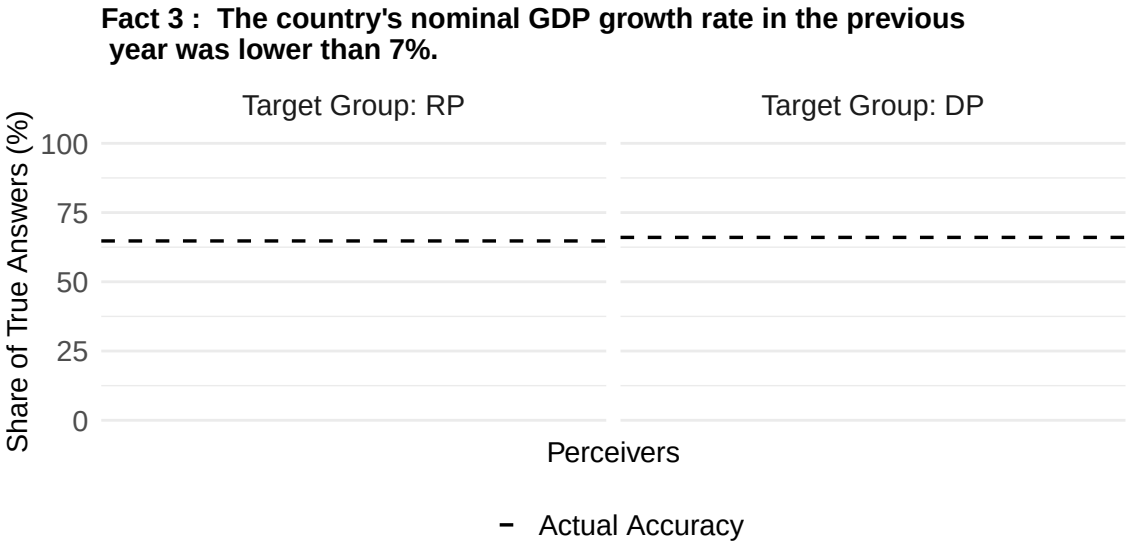
Fact 3: GDP growth rate is less than 7%



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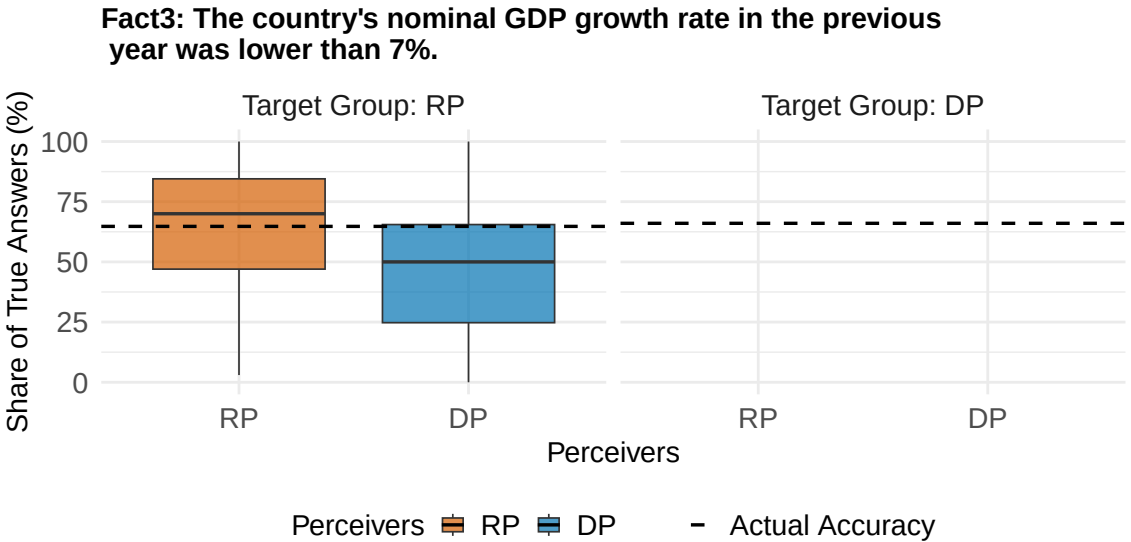

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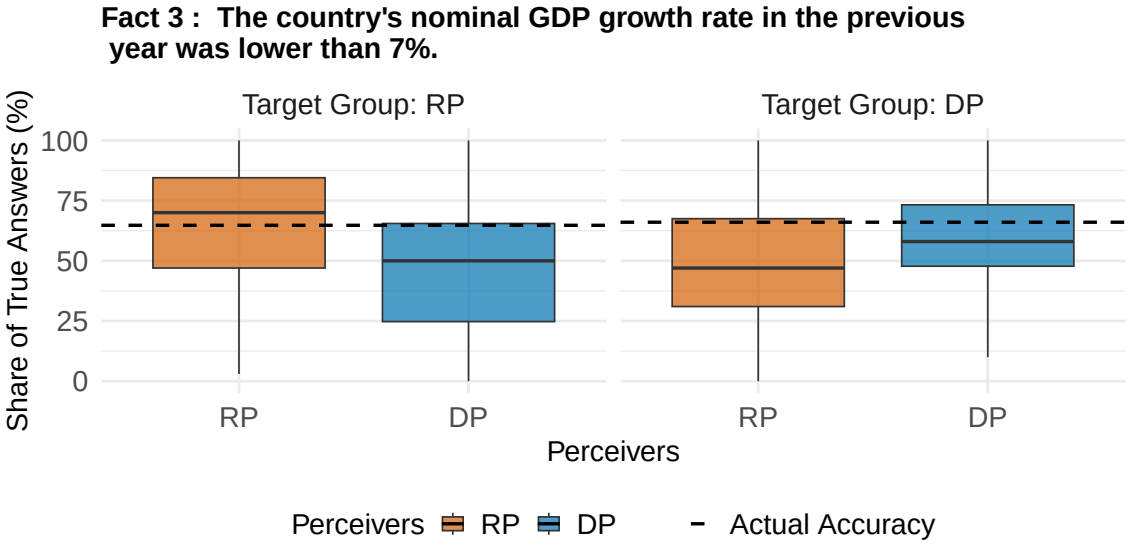

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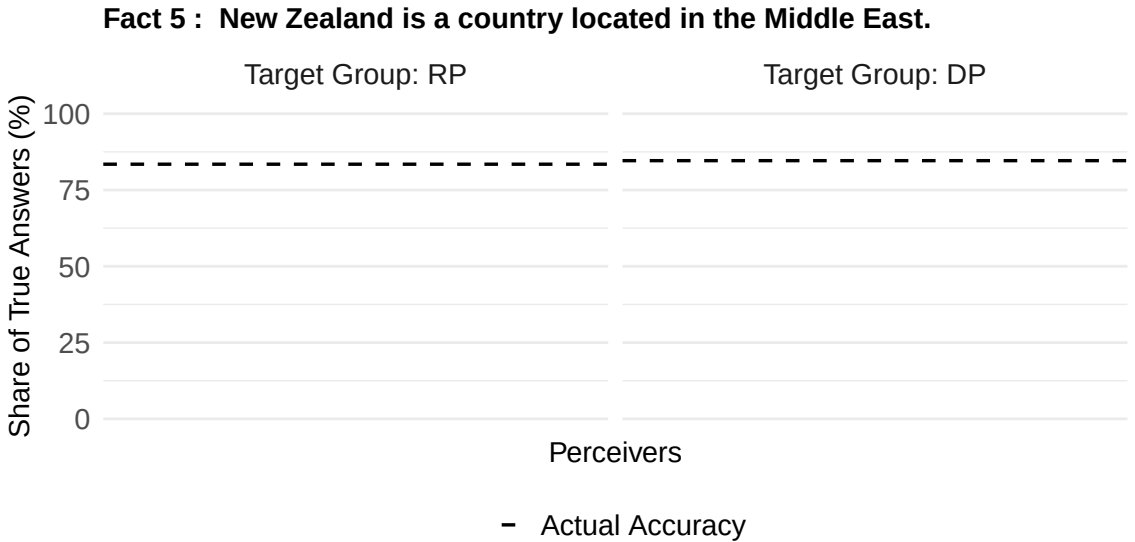

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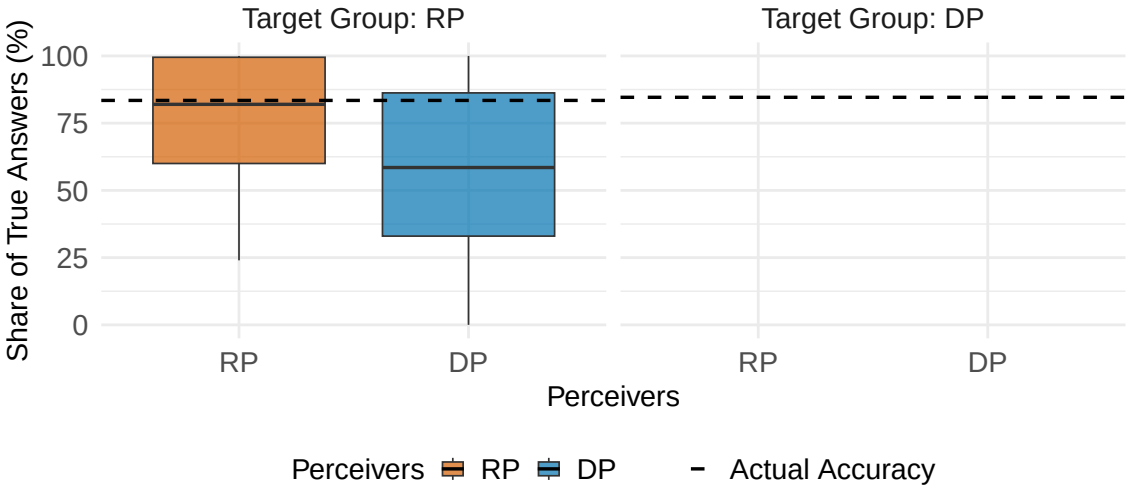

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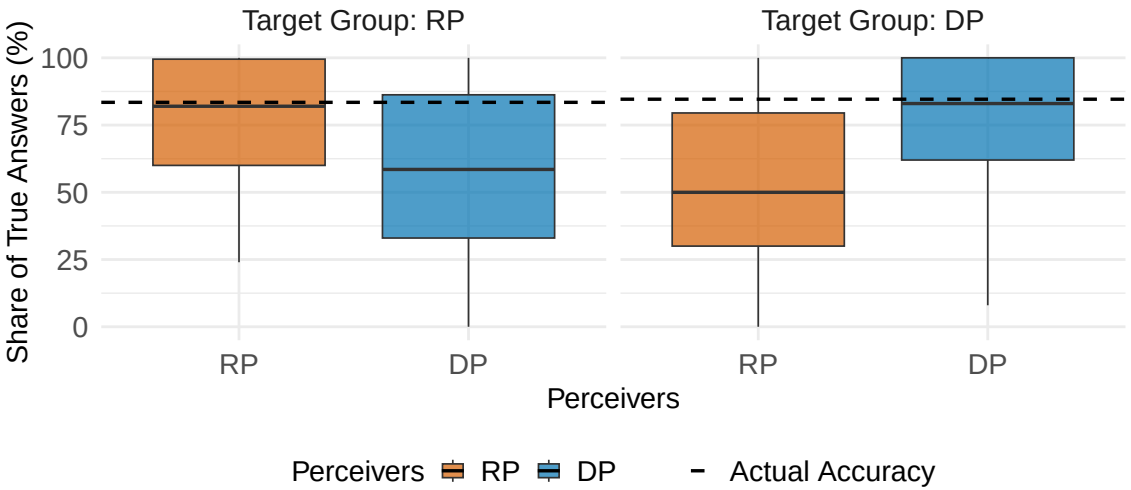

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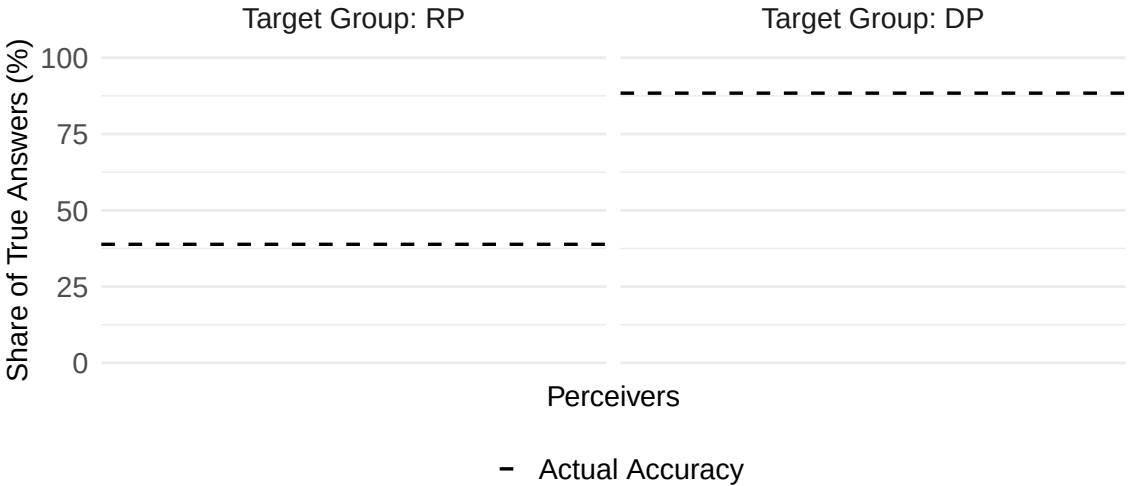

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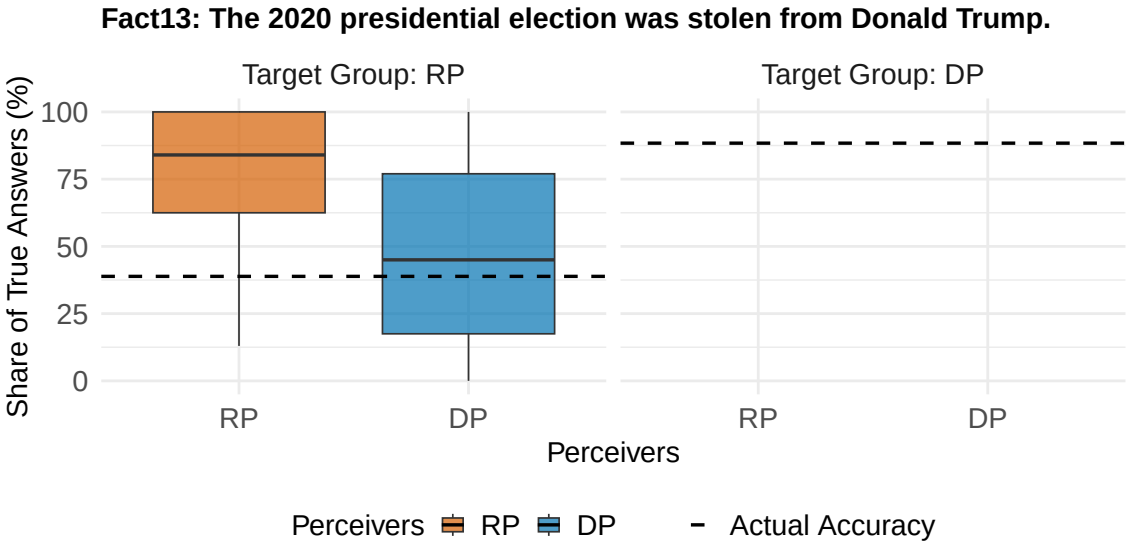

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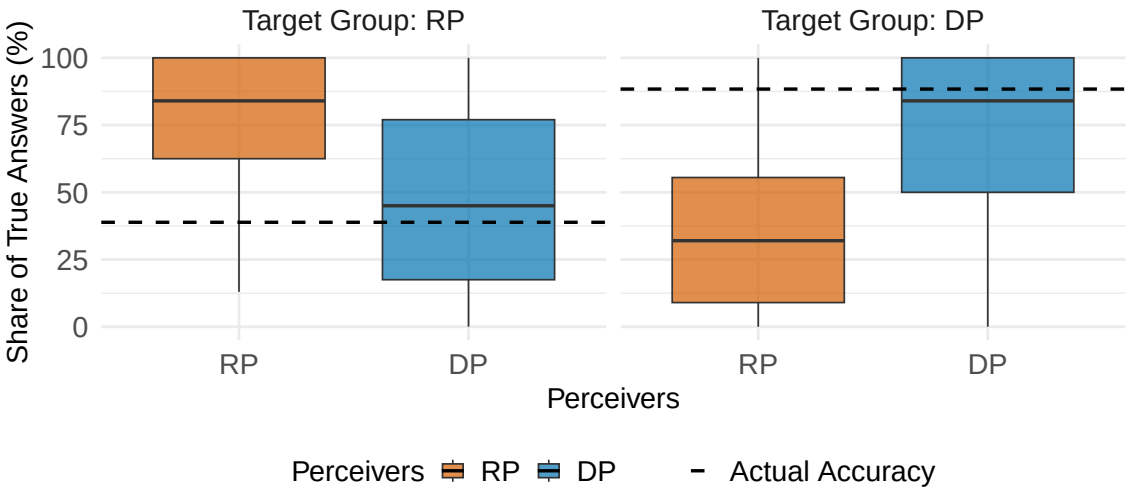

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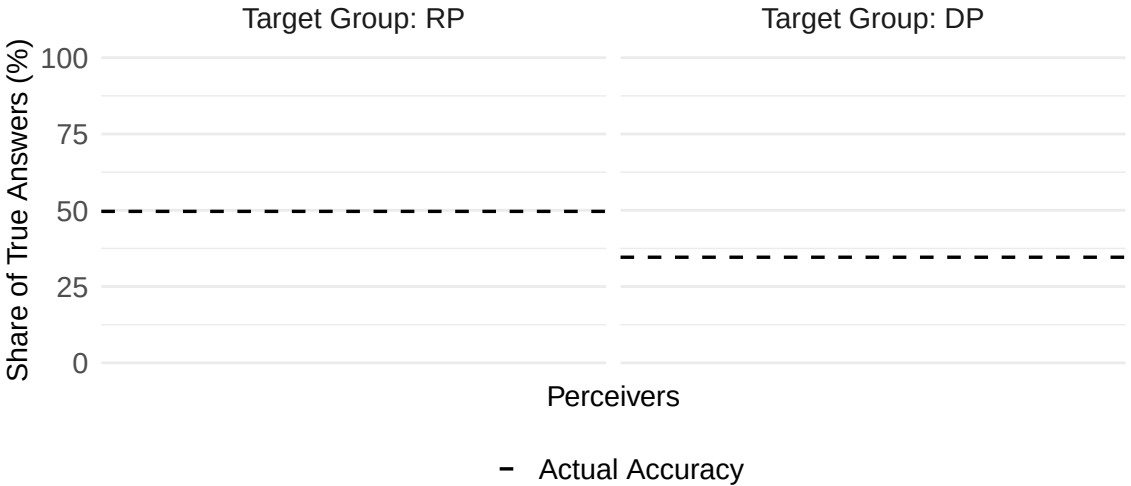

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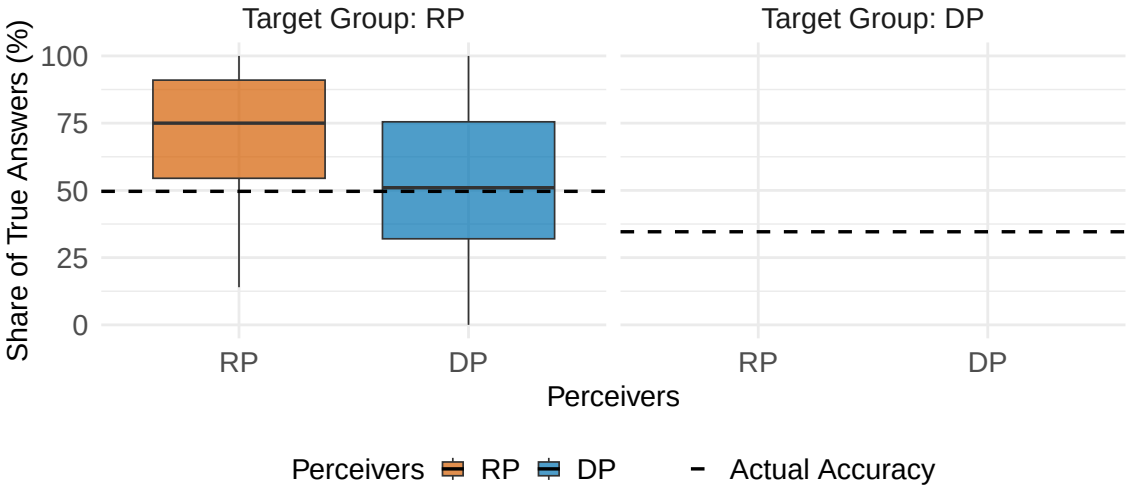

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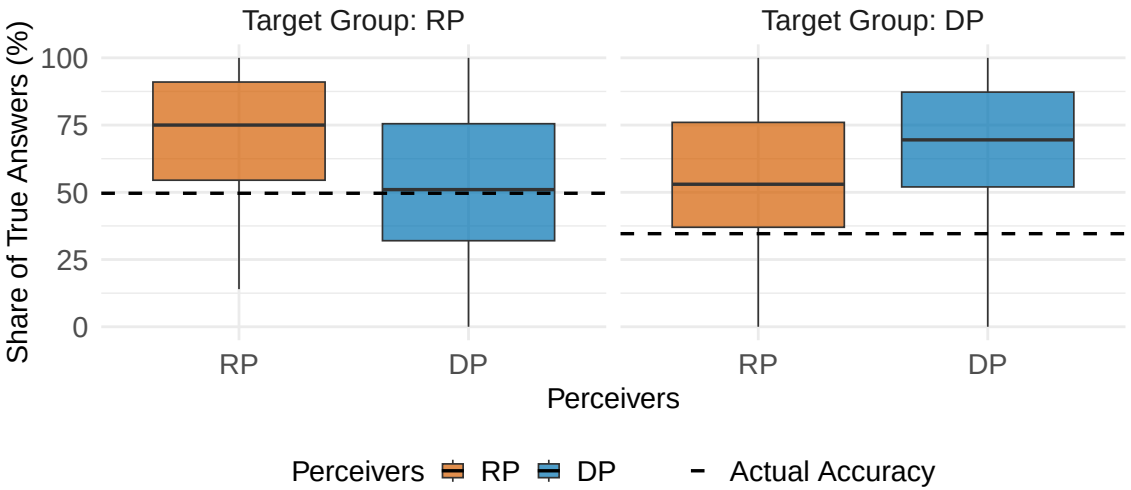

More Systematic Approach for Average Disbelief

- $p^{g'(i)}_{i,g(i),k}$: Accuracy rate of group $g'(i)$ in task k perceived by i in $g(i)$

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- Target-based Disbelief (given perceiver)

$$p_{i,g(i),k}^{g'(i)} = \alpha_1 \mathbb{1}_{g \neq g'} + \eta_g + \mu_k + \varepsilon_{i,g',k}$$

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  - $\alpha_1 < 0$ iff i perceives DP's knowledge as lower than RP's for each task k

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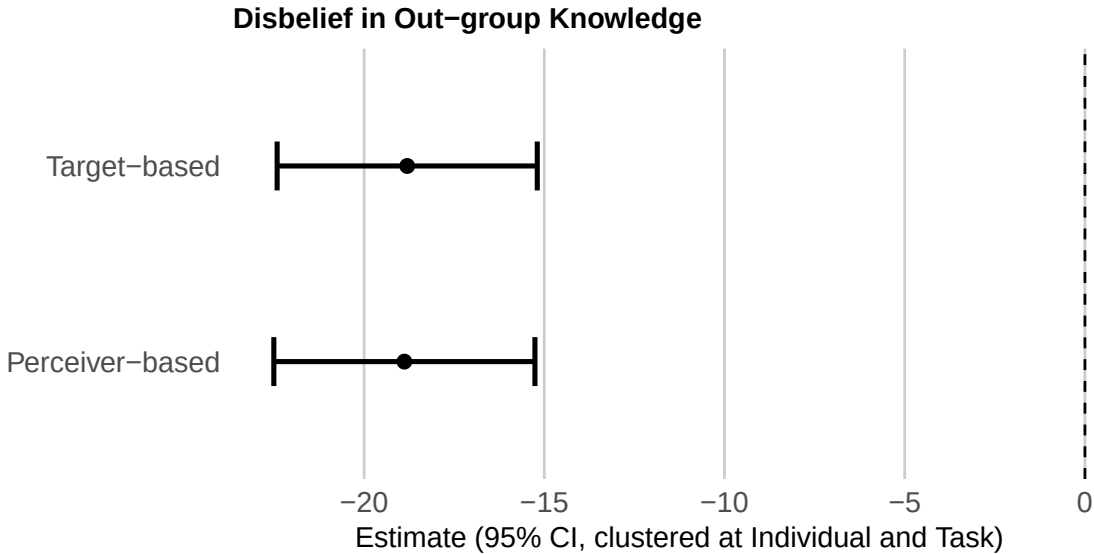
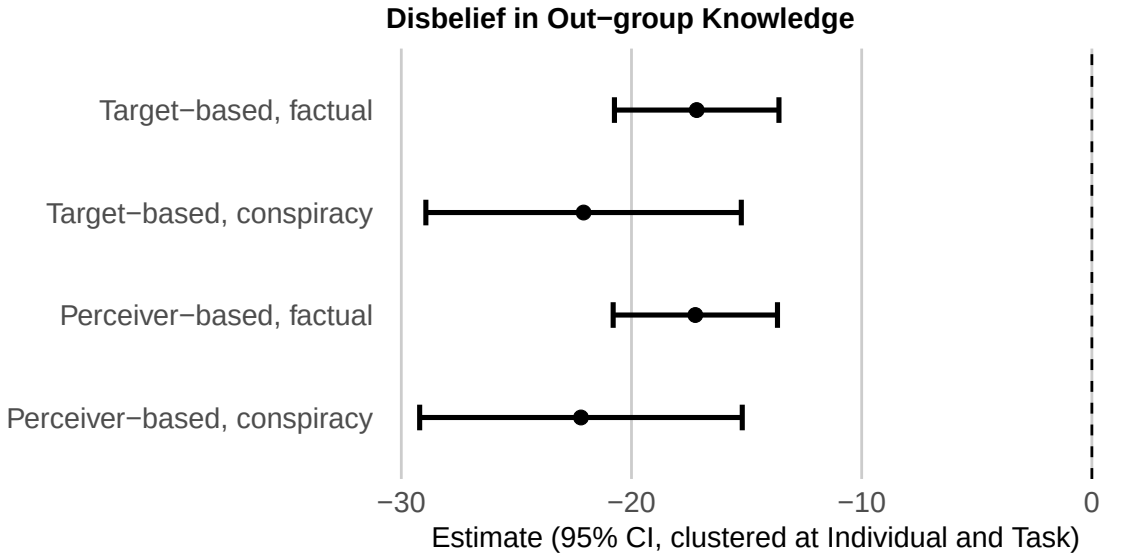
Average Disbelief is about 20 pt

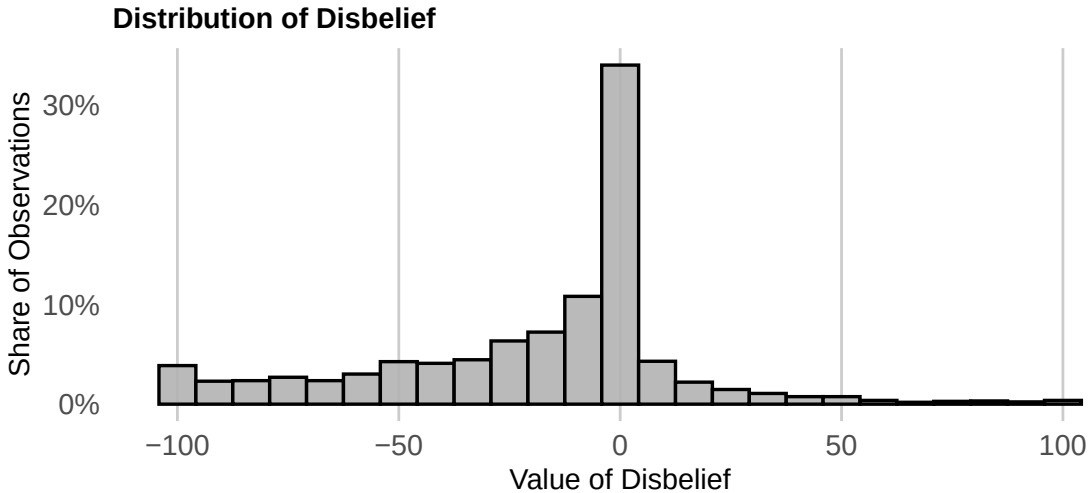


Disbelief is Larger for Conspiracy Theory Questions



Heterogeneity in Disbelief

Define out-group disbelief by $q_{i,k} = p^{g'(i)}_{i,g(i),k} - p^{g(i)}_{i,g(i),k}$



Summary of Study 1

Existence of disbelief about out-group knowledge

- Both partisans are equally knowledgeable in non-conspiracy items
- However, there are about 20 points of disbelief in out-group knowledge

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Given the baseline results in Study 1, Study 2

- Documents **in-group bias in belief updating**
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Given the baseline results in Study 1, Study 2

- Documents **in-group bias in belief updating**
  - e.g., R overweighs the opinion of R over that of D
- Runs experiments if correcting **disbelief** reduces the **in-group bias**
  - Study 1 already shows R and D are equally knowledgeable
  - Treatment = telling the fact above

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4. Post-treatment judgement questions with signals (details in the next slide)
   - In-group signal: tells that in-groups know the correct answers
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5. Questions about affective polarization (Appendix)

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What we want: See how they update their beliefs (judgement & confidence)

Measurement of Belief Updating

For individual i and task k, construct the following two types of dummy variables

1. Correct Judgement: $y^J_{i,k} \equiv \mathbb{1}\{ J^1_{i,k} - J^0_{i,k} > 0\}$; mean$= 0.163$

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   - $J^0_{i,k}$: Correctness before signals ($J^0_{i,k} = 1$ if Correct and $= 0$ if Wrong)
   - $J^1_{i,k}$: Correctness after signals

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2. Confidence towards Correct Answer: $y^\mu_{i,k} \equiv \mathbb{1}\{\mu^1_{i,k} - \mu^0_{i,k} > 0\}$; mean$= 0.470$
   - $\mu^0_{i,k}$: Confidence towards Correct answers before signals

$$\mu^0_{i,k} = \begin{cases} \frac{a^0_{i,k}}{100} & \text{if } J^0_{i,k} = 1 \\ 1 - \frac{a^0_{i,k}}{100} & \text{if } J^0_{i,k} = 0 \end{cases}$$

     where $a^0_{i,k} \in [0, 100]$ is confidence level for their answer
   - $\mu^1_{i,k}$: Confidence towards Correct answers after signals

In-group Signals Shift Beliefs More Toward the Truth?

Specification: (i: indiv., k: task)

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- $y_{i,k}$: measure of belief updating
- $\mathbb{1}\{\text{In-group Signal}\}_{i,k}$: dummy if signal is about in-group's answer
  - e.g.) If R, "The majority of R says this is T..." is an in-group signal
- η_k: Task (question) fixed effects

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***Table:* In-group Bias in Belief Updating**

	Dep. Var.: Belief Updating	
	Judgement	Confidence
In-group Signal		
Obs.	903	903
Task FEs	✓	✓
Dep. Var Mean	0.163	0.470

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	(0.011)	(0.035)
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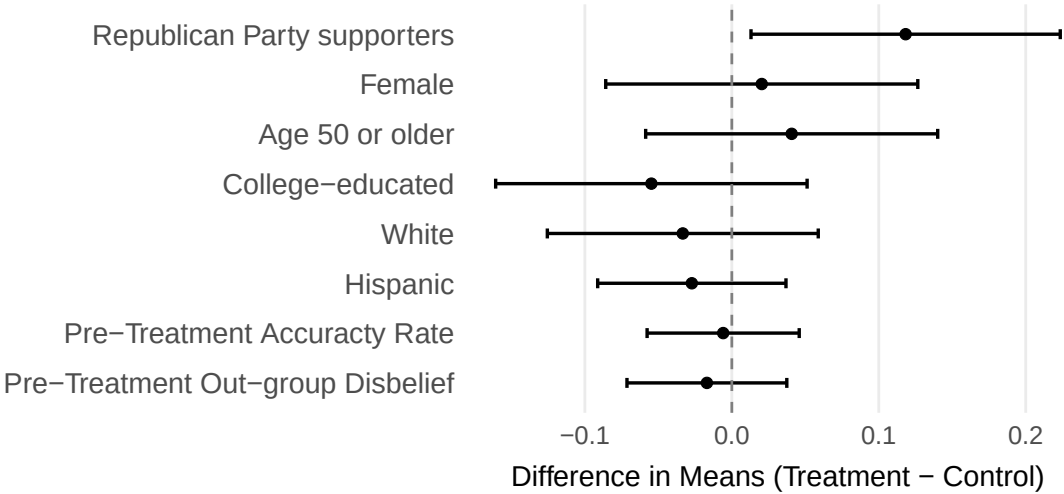
- See if Treatment reduces in-group bias in belief updating

Balanced Test across Control and Treated



No In-group Bias in Treated Group?

- Specification: (i: indiv., k: factual task).

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- **Run separately for Control and Treated**

No In-group Bias in Treated Group?

- Specification: (i: indiv., k: factual task).

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- **Run separately for Control and Treated**

	Dep. Var.: Belief Updating			
	Judgement		Confidence	
	Control	Treated	Control	Treated
In-group Signal				
Obs.	453	450	453	450
Task FEs	✓	✓	✓	✓
Dep. Var Mean	0.163	0.162	0.455	0.484

No In-group Bias in Treated Group?

- Specification: (i: indiv., k: factual task).

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- **Run separately for Control and Treated**

	Dep. Var.: Belief Updating			
	Judgement		Confidence	
	Control	Treated	Control	Treated
In-group Signal	0.055			
	(0.025)			
Obs.	453	450	453	450
Task FEs	✓	✓	✓	✓
Dep. Var Mean	0.163	0.162	0.455	0.484

No In-group Bias in Treated Group!

- Specification: (i: indiv., k: factual task).

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- **Run separately for Control and Treated**

	Dep. Var.: Belief Updating			
	Judgement		Confidence	
	Control	Treated	Control	Treated
In-group Signal	0.055	0.012		
	(0.025)	(0.010)		
Obs.	453	450	453	450
Task FEs	✓	✓	✓	✓
Dep. Var Mean	0.163	0.162	0.455	0.484

No In-group Bias in Treated Group!

- Specification: (i: indiv., k: factual task).

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- **Run separately for Control and Treated**

	Dep. Var.: Belief Updating			
	Judgement		Confidence	
	Control	Treated	Control	Treated
In-group Signal	0.055	0.012	0.108	
	(0.025)	(0.010)	0.036	
Obs.	453	450	453	450
Task FEs	✓	✓	✓	✓
Dep. Var Mean	0.163	0.162	0.455	0.484

No In-group Bias in Treated Group!

- Specification: (i: indiv., k: factual task).

$$y_{i,k} = \beta \mathbb{1}\{\text{In-group Signal}\}_{i,k} + \eta_k + \varepsilon_{i,k}$$

- **Run separately for Control and Treated**

	Dep. Var.: Belief Updating			
	Judgement		Confidence	
	Control	Treated	Control	Treated
In-group Signal	0.055	0.012	0.108	0.042
	(0.025)	(0.010)	0.036	0.034
Obs.	453	450	453	450
Task FEs	✓	✓	✓	✓
Dep. Var Mean	0.163	0.162	0.455	0.484

Correcting Disbelief Reduces In-group Bias

Specification: (i: indiv., k: factual task). Interaction

Correcting Disbelief Reduces In-group Bias

Specification: (i: indiv., k: factual task). Interaction

	Judgement	Confidence
In-group Signal		
Treatment		
In-group Signal × T		
Obs.	903	903
Task FEs	✓	✓
Dep. Var Mean	0.163	0.470
Min Det. Effect	0.073	0.102

Correcting Disbelief Reduces In-group Bias

Specification: (i: indiv., k: factual task). Interaction

	Judgement	Confidence
In-group Signal	0.054	
	(0.025)	
Treatment	0.019	
	(0.034	
In-group Signal $\times$ T	-0.041	
	(0.030)	
Obs.	903	903
Task FEs	✓	✓
Dep. Var Mean	0.163	0.470
Min Det. Effect	0.073	0.102

Correcting Disbelief Reduces In-group Bias

Specification: (i: indiv., k: factual task). Interaction

	Judgement	Confidence
In-group Signal	0.054	0.105
	(0.025)	(0.037)
Treatment	0.019	0.061
	(0.034	(0.034)
In-group Signal $\times$ T	-0.041	-0.064
	(0.030)	(0.007)
Obs.	903	903
Task FEs	✓	✓
Dep. Var Mean	0.163	0.470
Min Det. Effect	0.073	0.102

Today's Plan

Study 1. Baseline Evidence of Disbelief
- Hypotheses and Survey Design
- Disbelief on Out-group's Knowledge

Study 2. Experiment
- Hypotheses and Survey Design
- In-group Bias in Belief Updating
- Effects of Correcting Disbelief on In-group Bias

Conclusion

Conclusion

- **Widespread disbelief about out-group knowledge** for factual questions
- **In-group bias in belief updating**
- Correcting the disbelief can reduce the in-group bias

Conclusion

- **Widespread disbelief about out-group knowledge** for factual questions
- **In-group bias in belief updating**
- Correcting the disbelief can reduce the in-group bias

Next Steps

- Compute MDE, Effective sample size
- IRB, Pre-registration
- Actual survey (sometime in August)
- More countries?

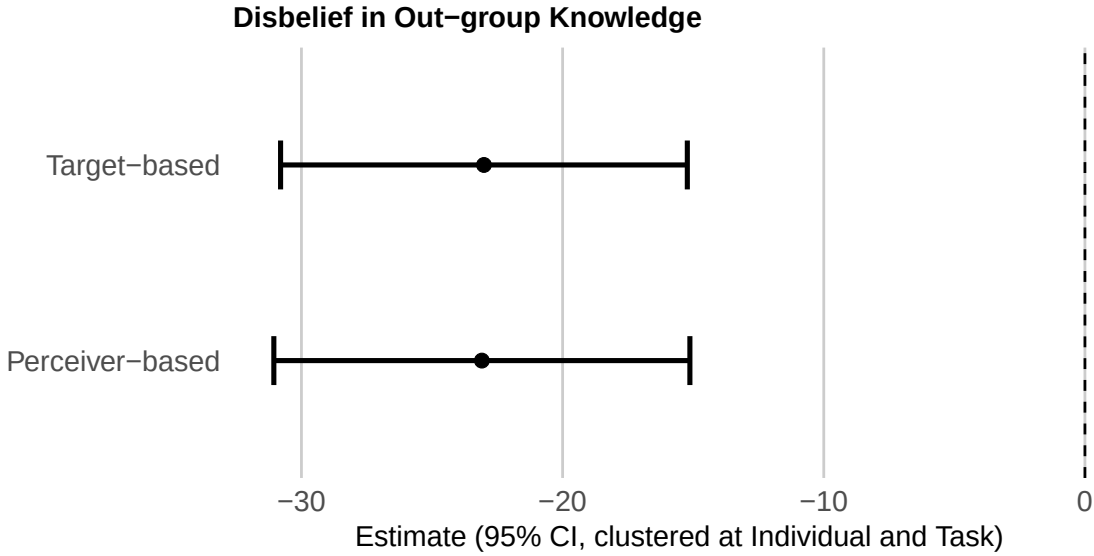
Today's Plan

Appendix: Disbelief in Study 2

Appendix: Affective Polarization

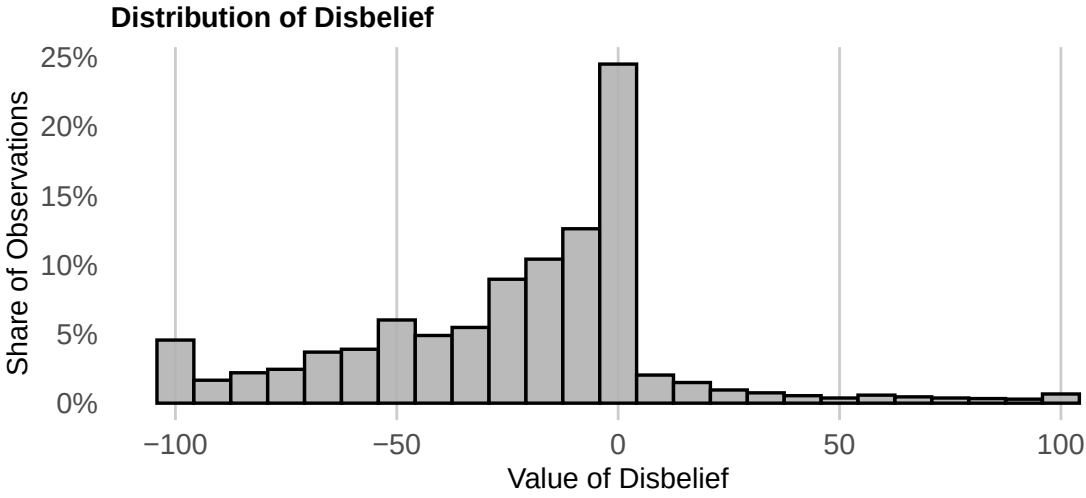
Appendix: Disbelief on All Facts

Average Disbelief is about 20 pt also in Study 2



Heterogeneity in Disbelief in Study 2

Define out-group disbelief by $q_{i,k} = p^{g'(i)}_{i,g(i),k} - p^{g(i)}_{i,g(i),k}$



Today's Plan

Appendix: Disbelief in Study 2

Appendix: Affective Polarization

Appendix: Disbelief on All Facts

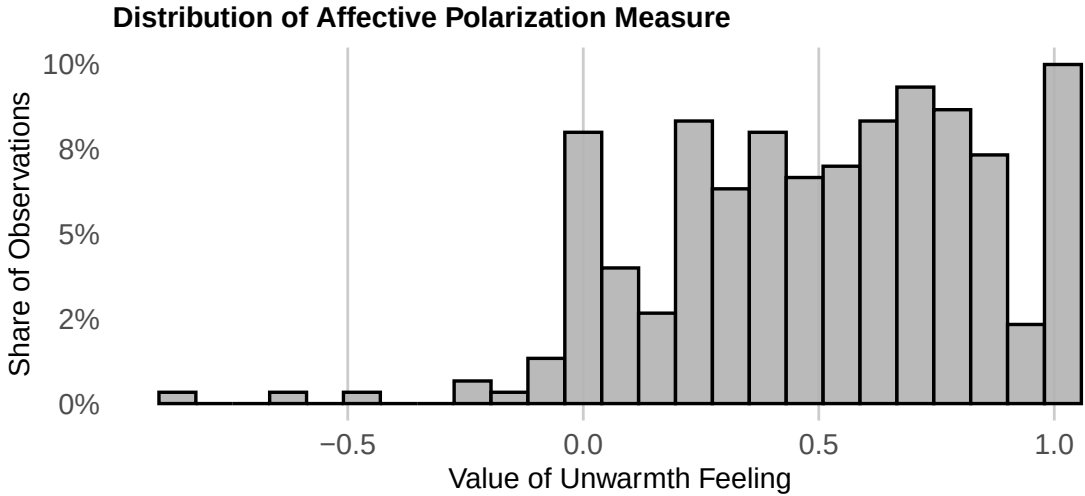
Measure of Affective Polarization

- Ask the following questions in the end

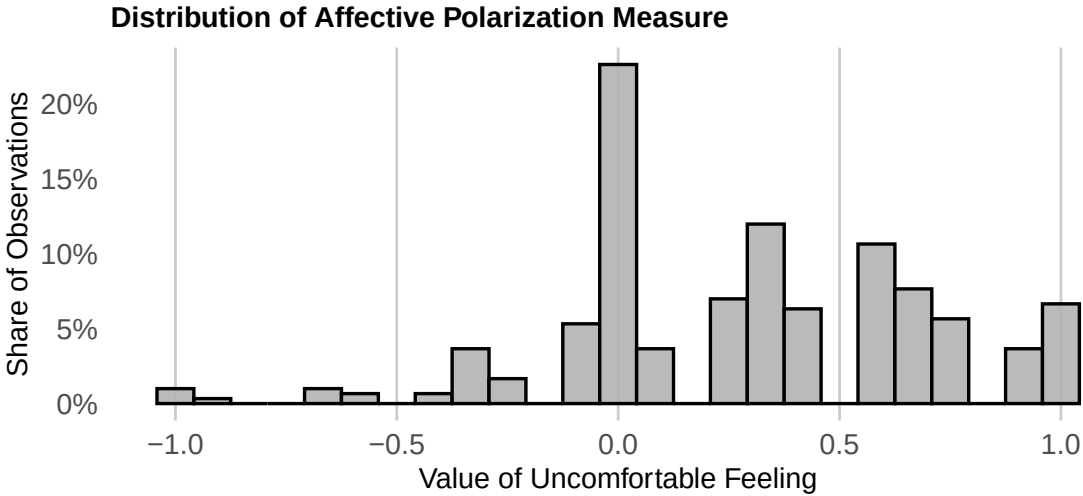
1. Warmth against people with certain partisanship
2. Uncomfortableness against people with a certain partisanship
   - Colleagues, friend, child's spouse

- Compute relative negative measure against the out-group
- Convert into the $[-1, 1]$ range

Unwarmth Feeling to Out-group (mean=0.507)



Uncomfortable Feeling to Out-group (mean=0.292)



No Detectable Effect on Affective Polarization

***Table:* Treatment Effects on Affective Polarization**

	Dep. Var.: Affective Polarization	
	Unwarmth Feeling	Uncomfortable
Treatment	-0.040	-0.019
	(0.039)	(0.047)
Obs.	301	301
Dep. Var Mean	0.507	0.292
Dep. Var σ	0.339	0.408
MDE	0.109	0.132

Our current sample size is too small

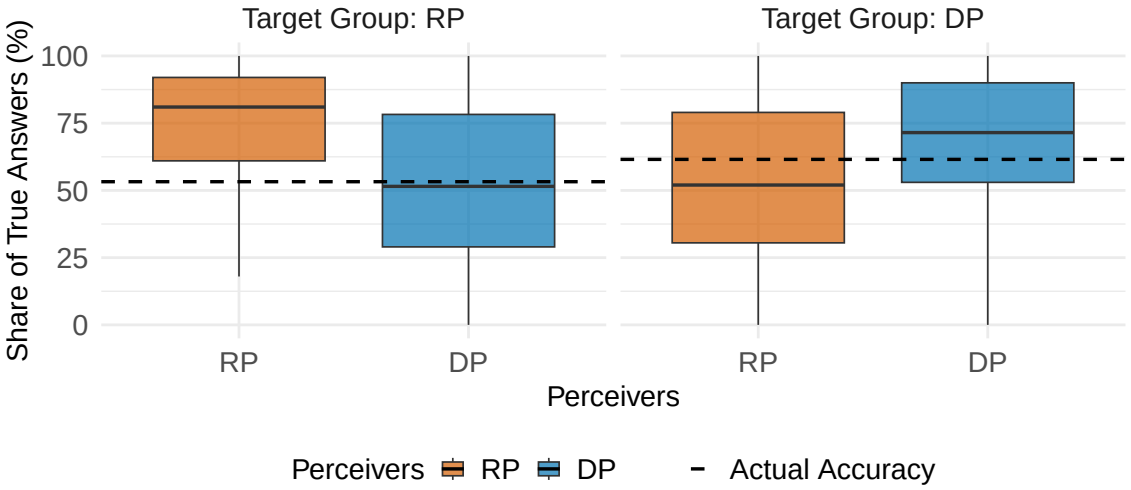
Today's Plan

Appendix: Disbelief in Study 2

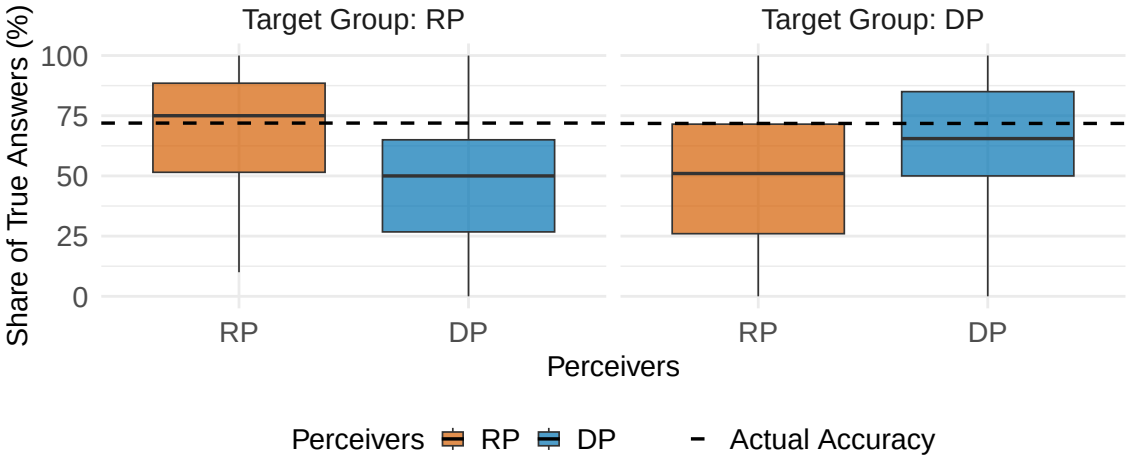
Appendix: Affective Polarization

Appendix: Disbelief on All Facts

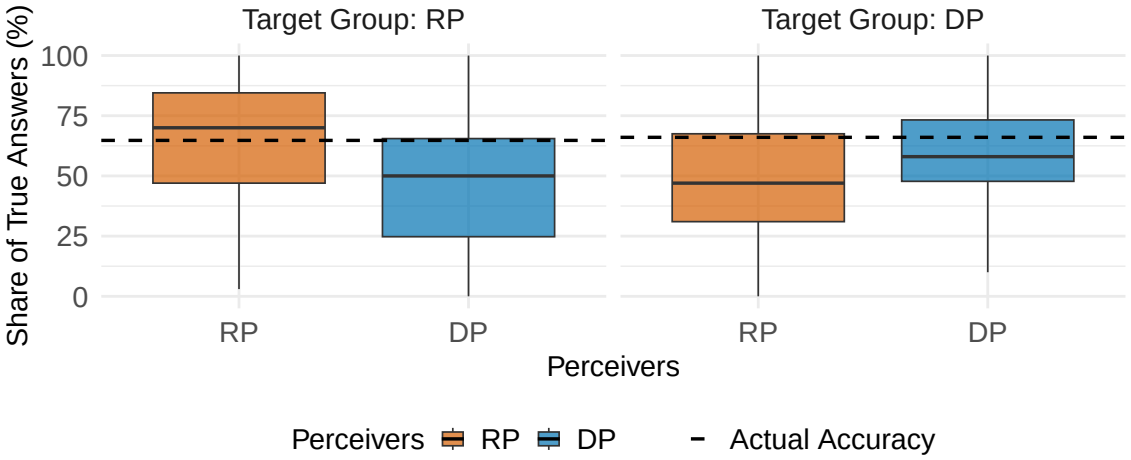
Fact 1 : The term of office of the Senate is 4 years.



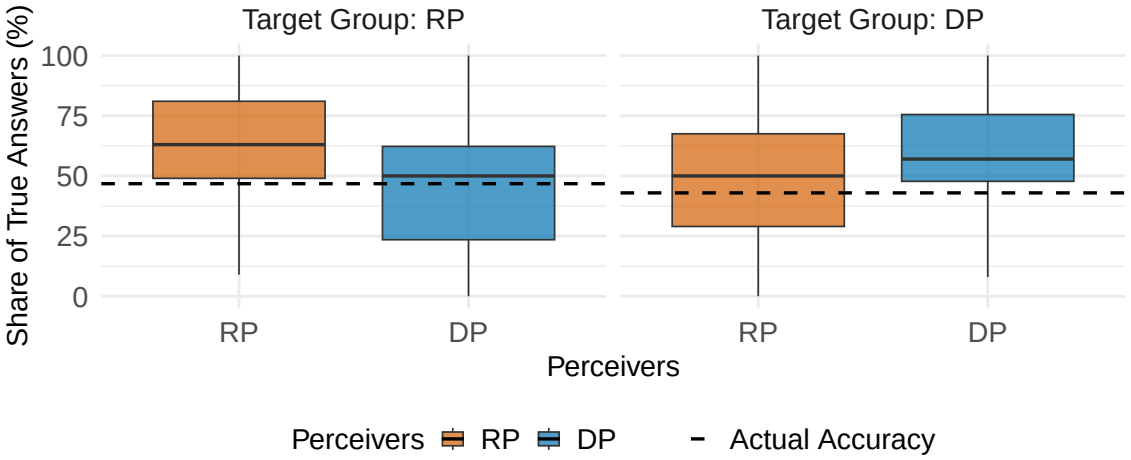
Fact 2 : To revise the constitution, approval of more than three−fourth of state legislatures is required.



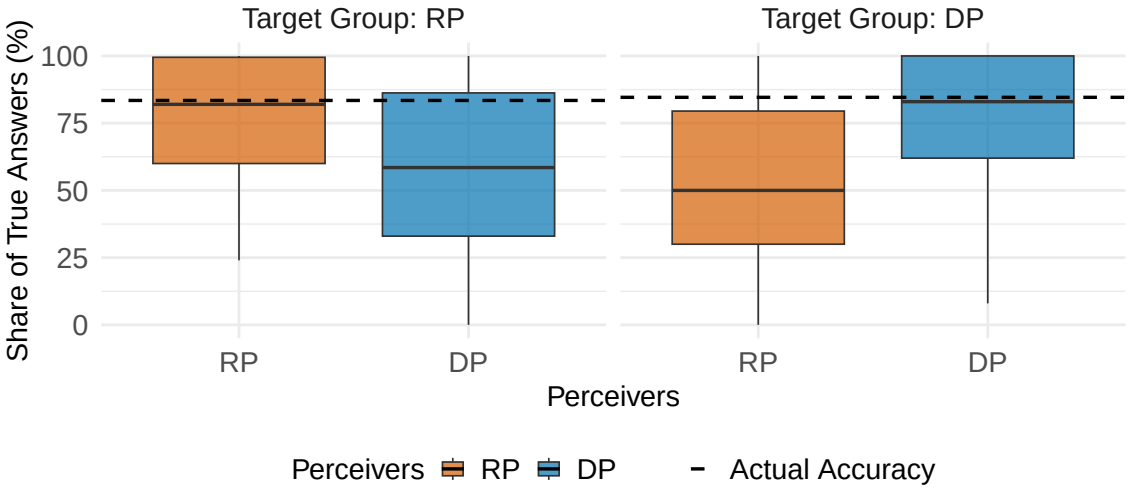
Fact 3 : The country's nominal GDP growth rate in the previous year was lower than 7%.



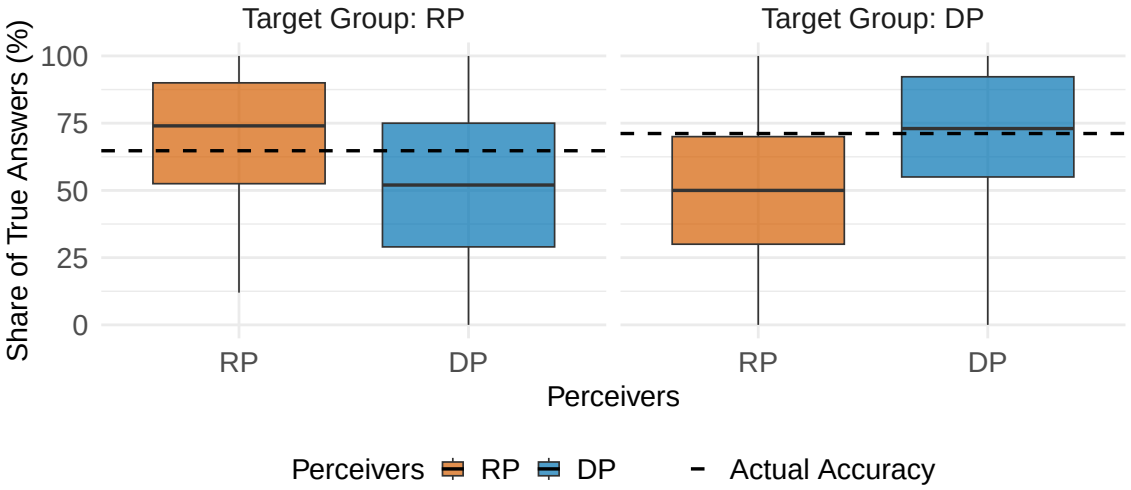
Fact 4 : For every 100 working−age Americans, about 40 are aged 65 or older



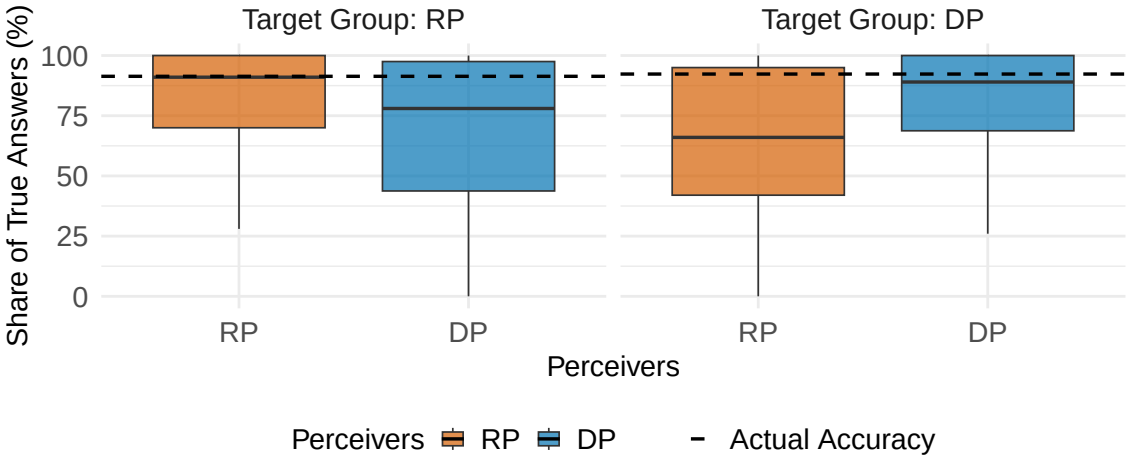
Fact 5 : New Zealand is a country located in the Middle East.



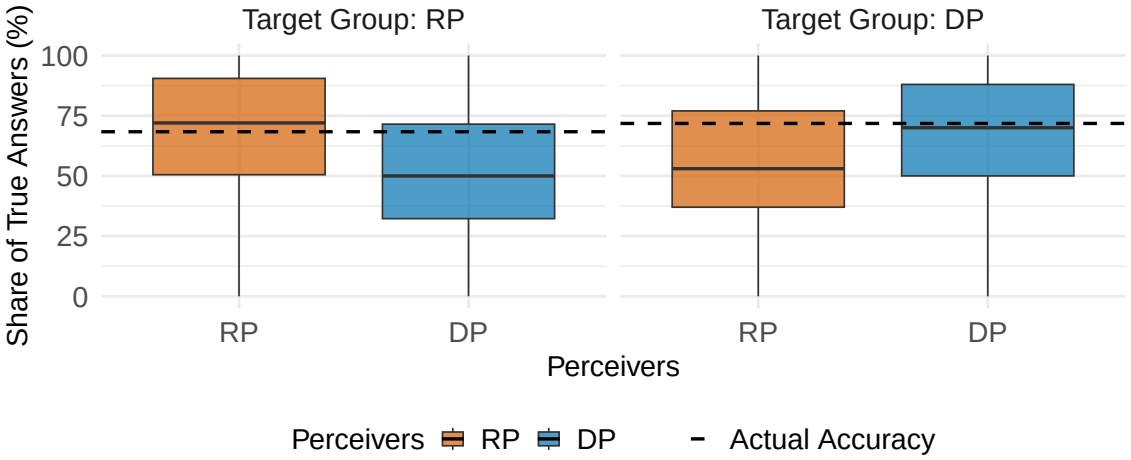
Fact 6 : iPhone was invented before 2000.



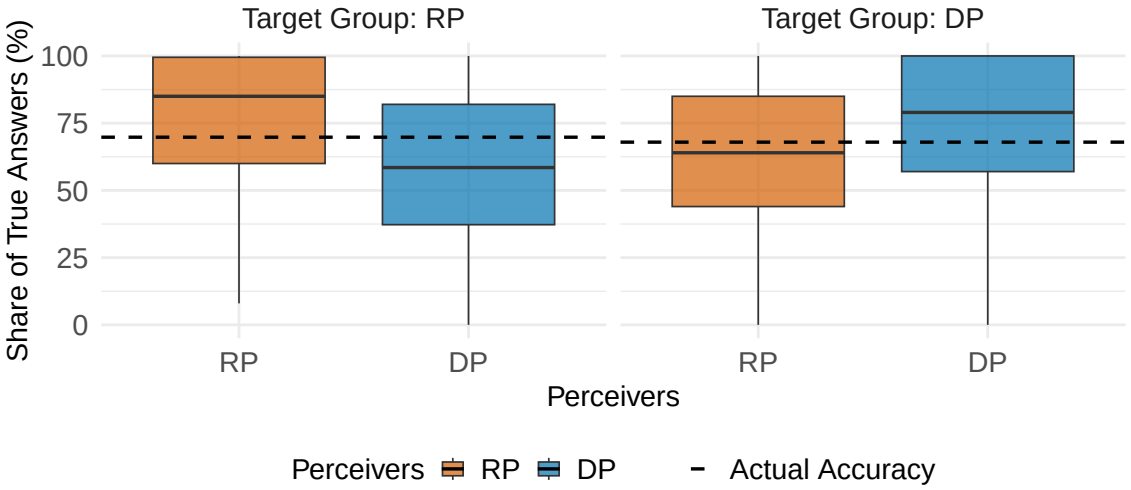
Fact 7 : It is stipulated by law that one must be at least 21 years old to drink alcohol.



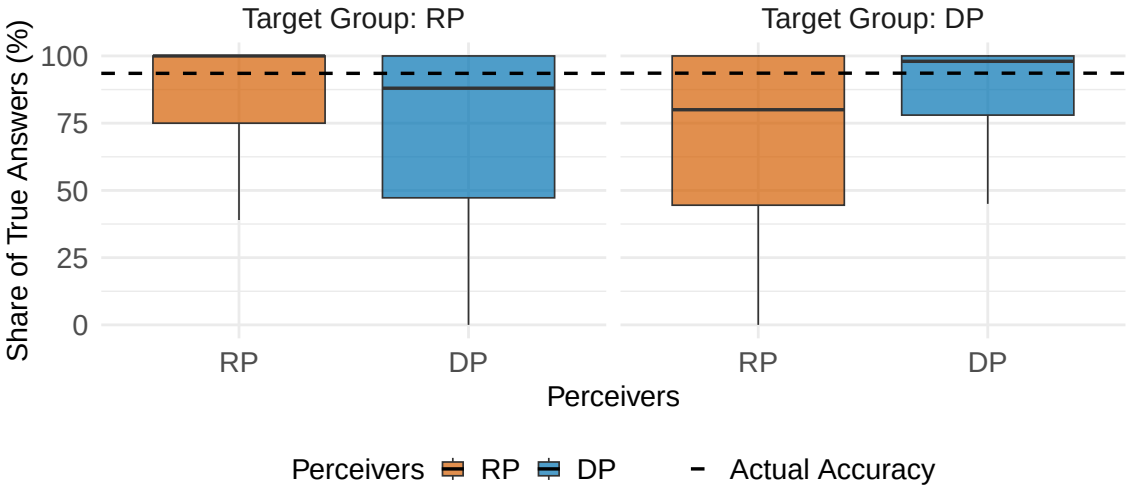
Fact 8 : The highest mountain in the United States is Denali (formerly known as Mt. McKinley).



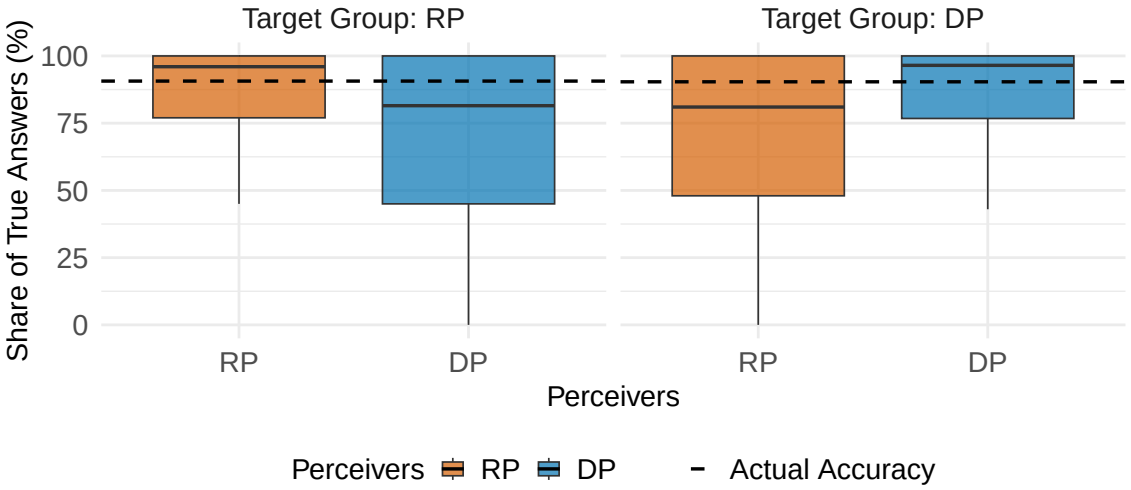
Fact 9 : The largest state in the United States is Alaska



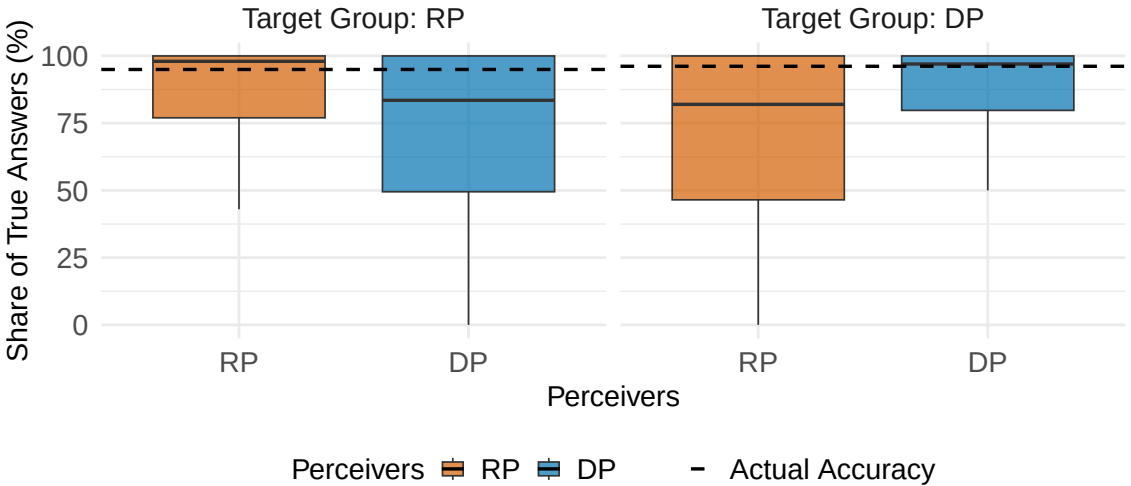
Fact 10 : The number of states in the United States is 50.



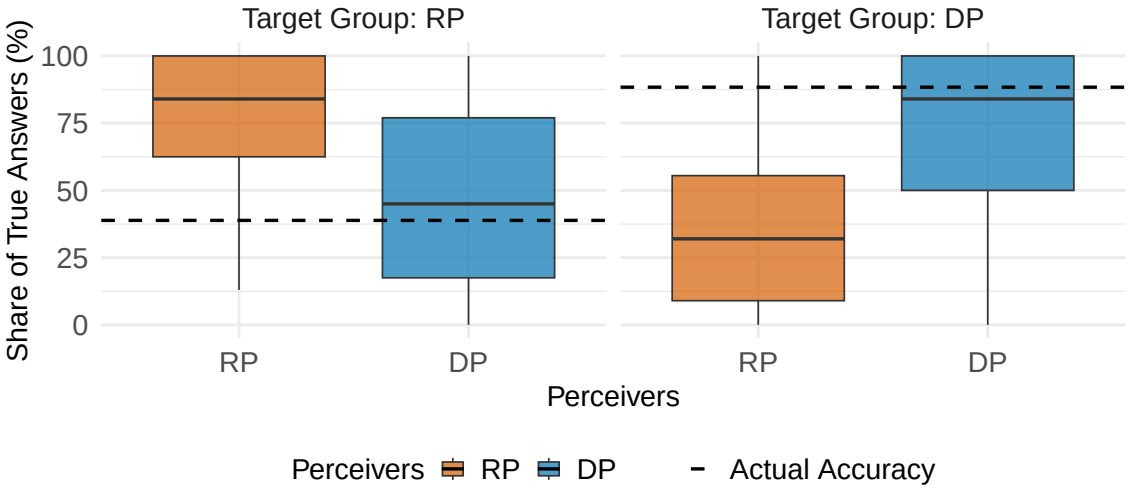
Fact 11 : The capital of the United States is the New York City.



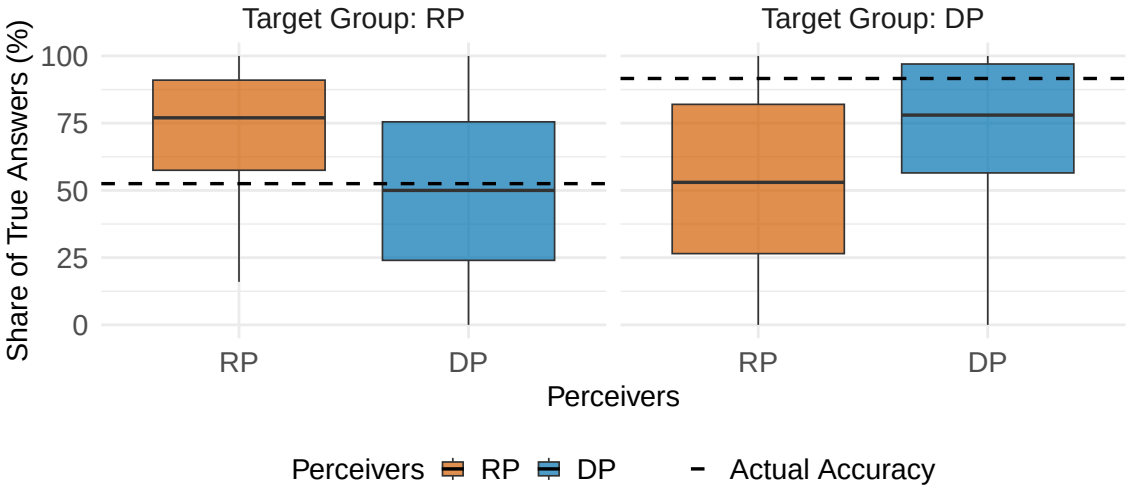
Fact 12 : The first President of the United State is George Washinton



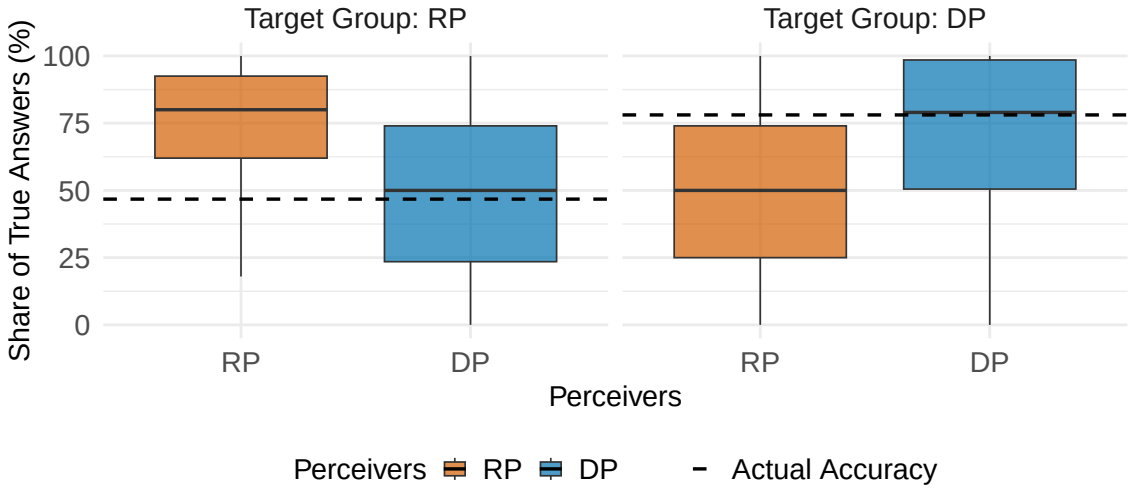
Fact 13 : The 2020 presidential election was stolen from Donald Trump.



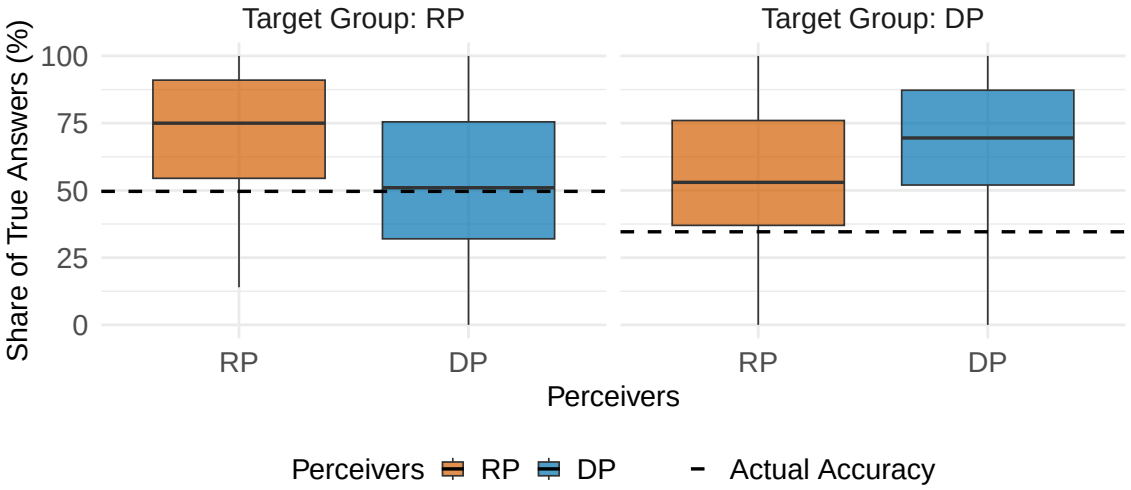
Fact 14 : Climate change is a hoax created to push socialist policies and des



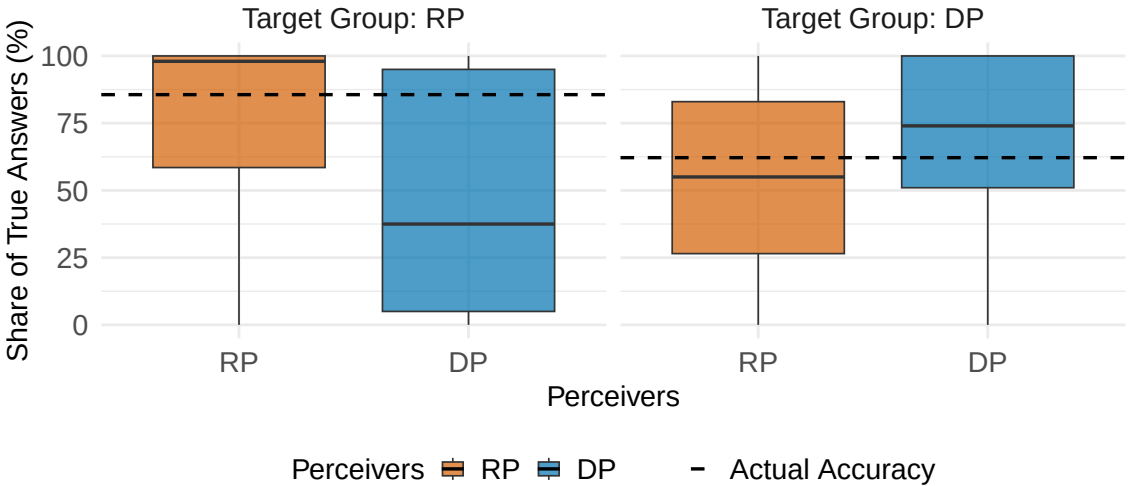
Fact 15 : The COVID−19 pandemic was exaggerated−or even planned−to cor



Fact 16 : The Iraq War was driven by oil interests.



Fact 17 : The Republicans stole the 2024 presidential election.



Fact 18 : The CIA flooded Black communities with crack cocaine in the 1980