

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)**

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

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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

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
- 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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Hypotheses and Survey Design

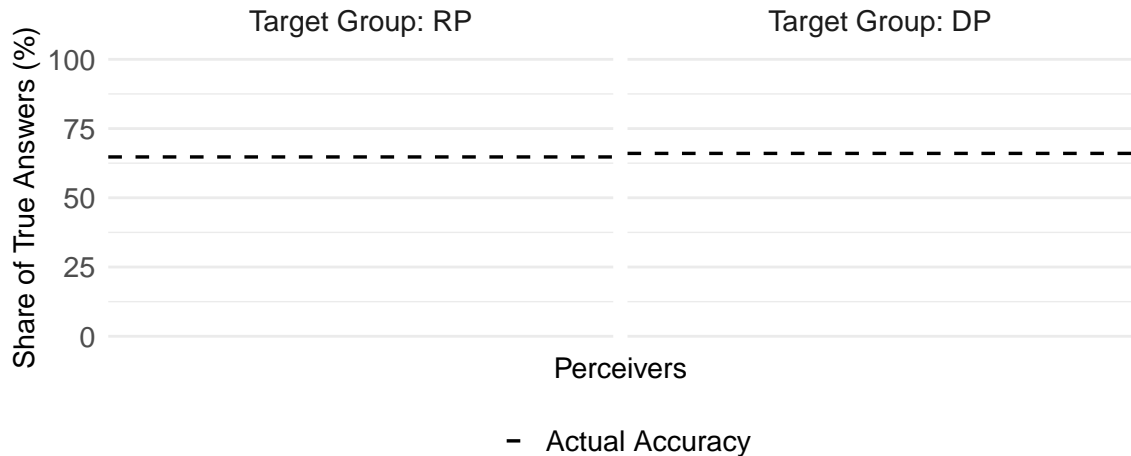
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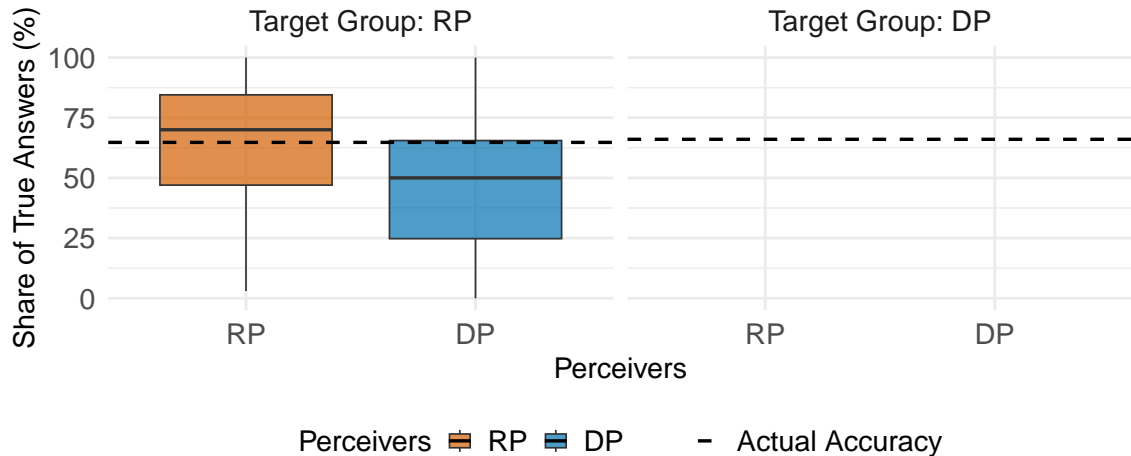
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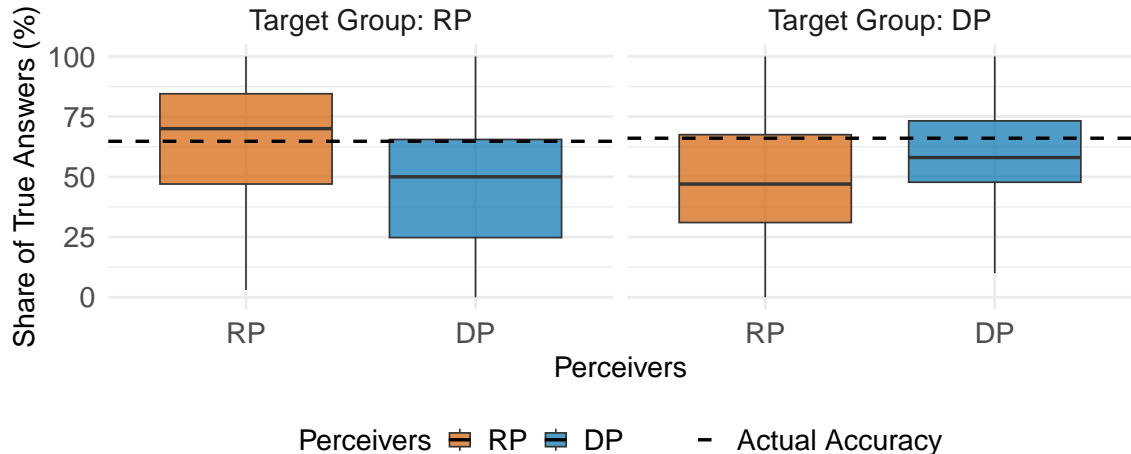
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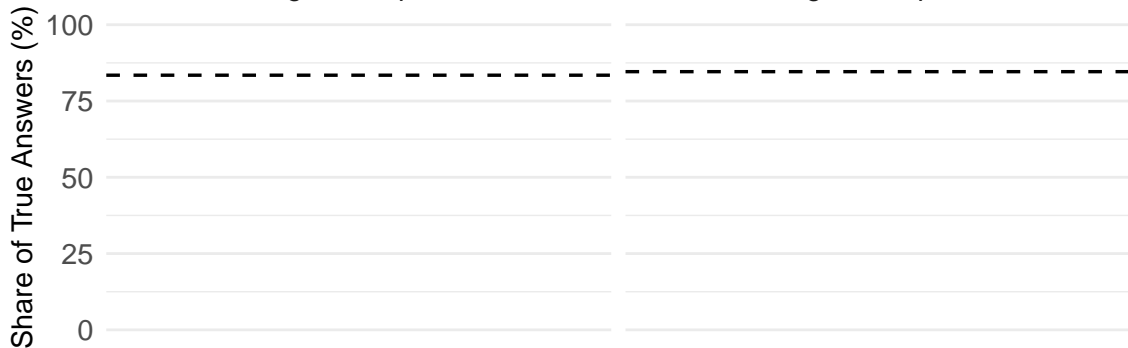


Fact 5: New Zealand is in the Middle East?

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

Target Group: RP

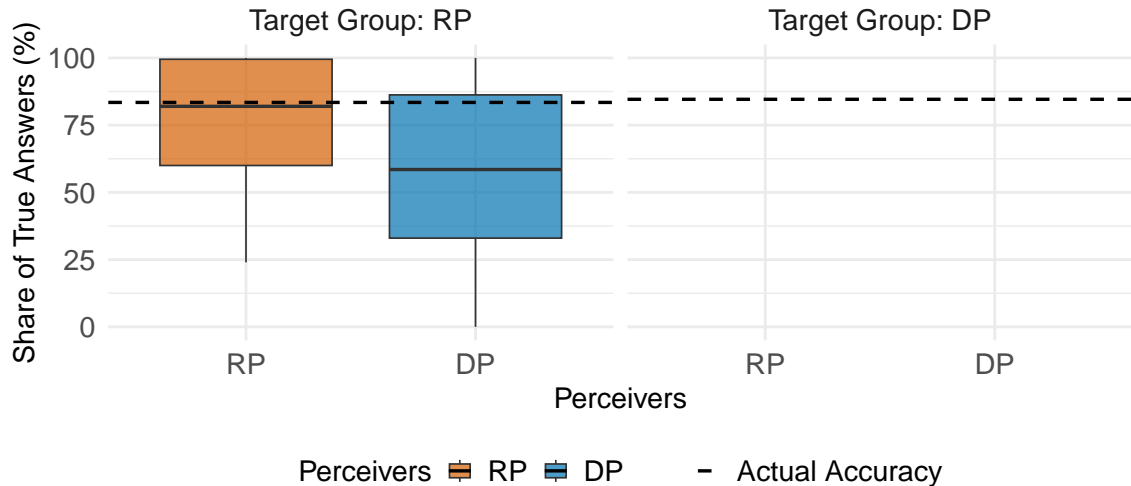
Target Group: DP



— Actual Accuracy

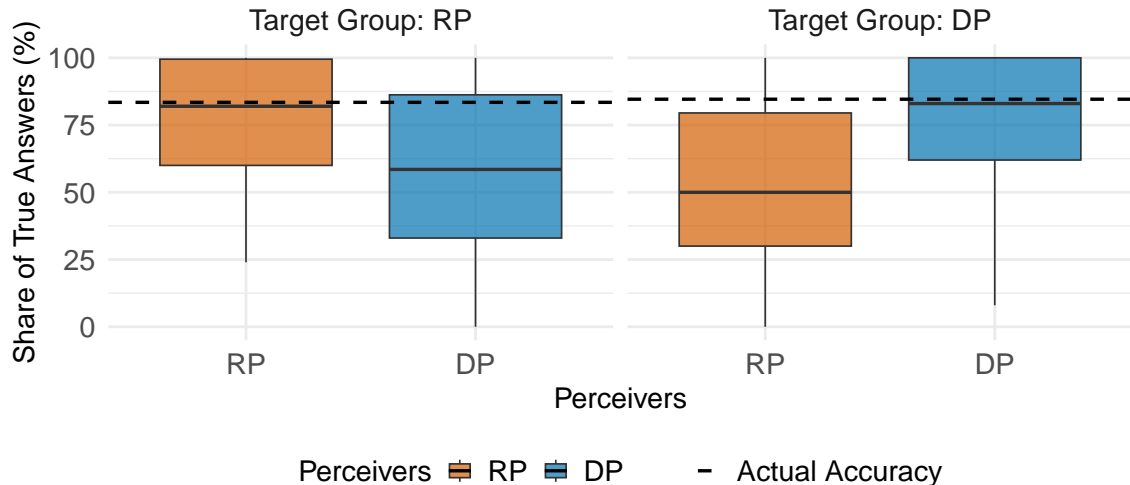
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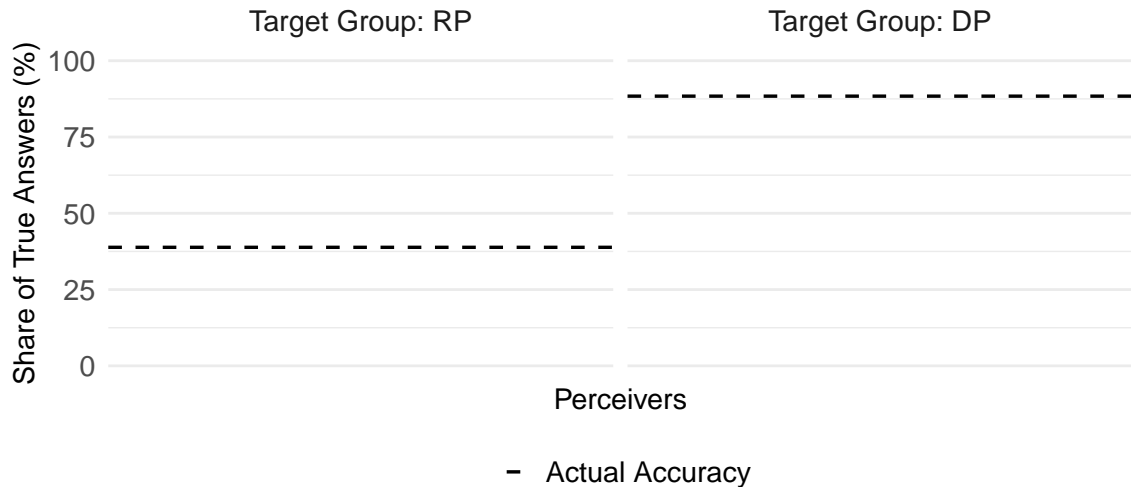
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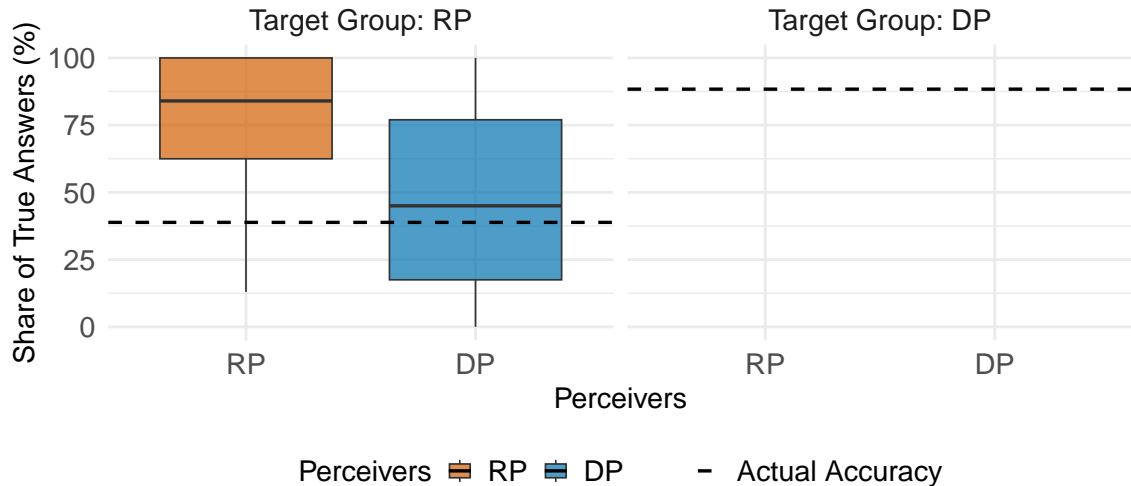
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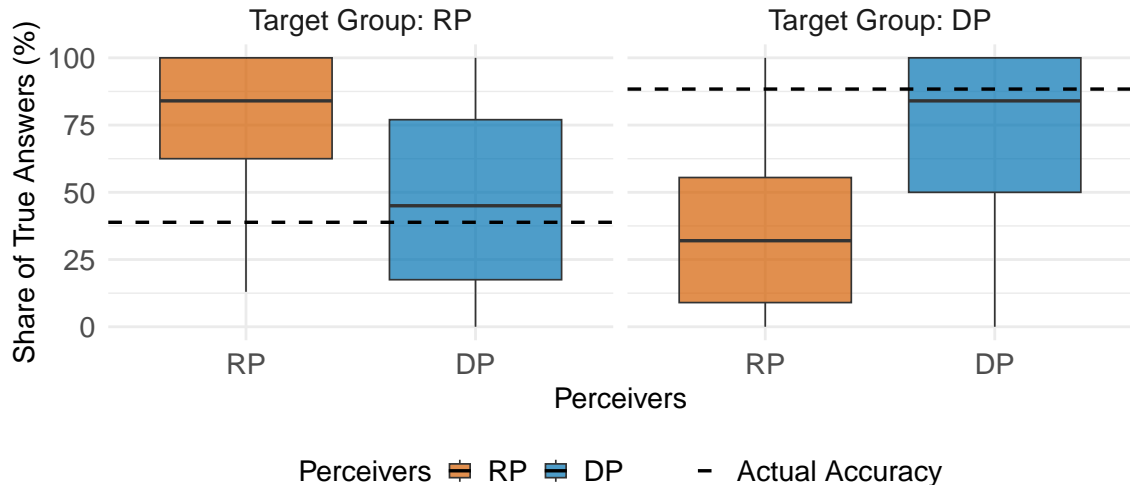
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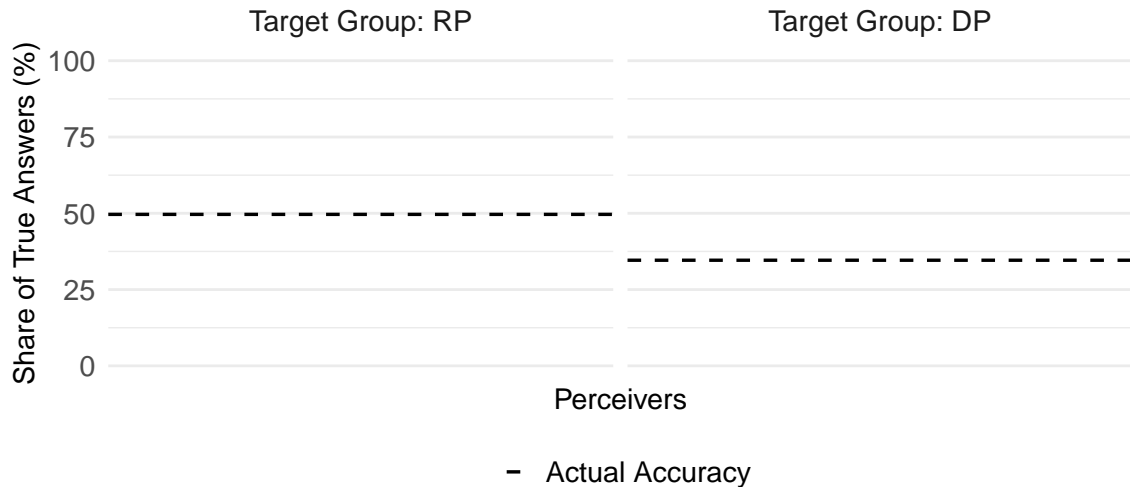
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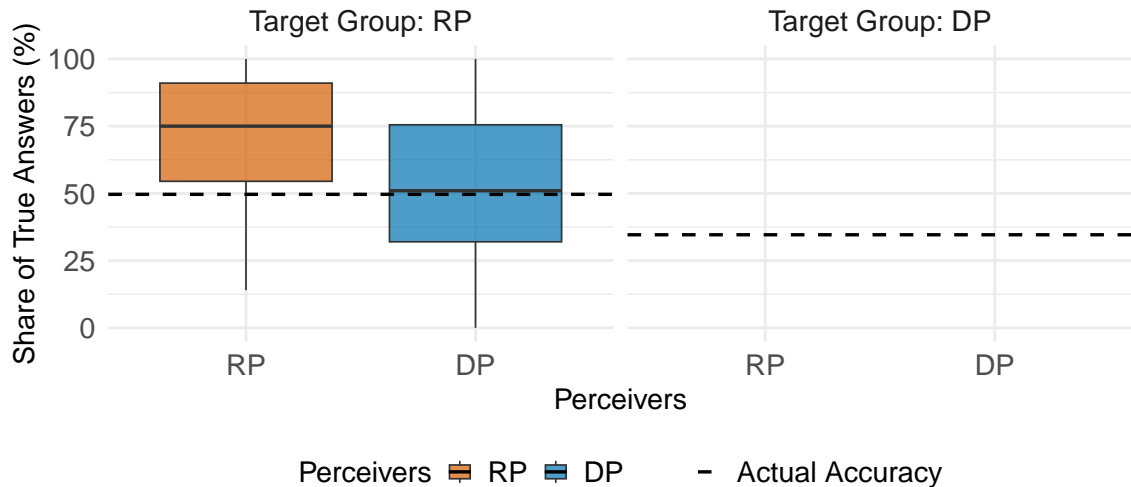
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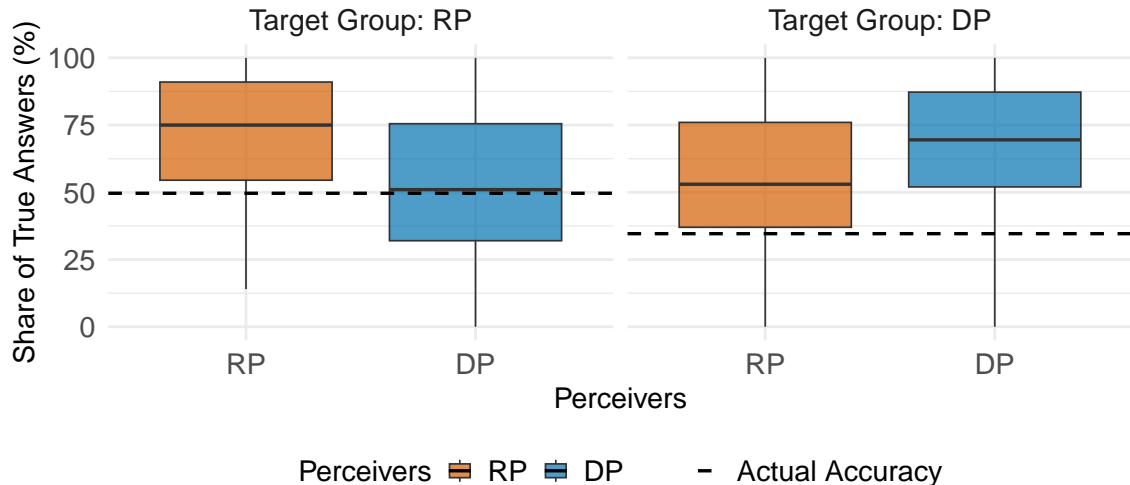
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More Systematic Approach for Average Disbelief

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

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- Suppose $g(i) = RP$ (fix perceiver = Republican Party supporters)
- $\alpha_1 < 0$ iff i perceives DP's knowledge as lower than RP's for each task k

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- Perceiver-based Disbelief (given target)

$$p_{i,g(i),k}^{g'(i)} = \alpha_2 \mathbb{1}_{g \neq g'} + \eta_{g'} + \mu_k + \varepsilon_{i,g',k}$$

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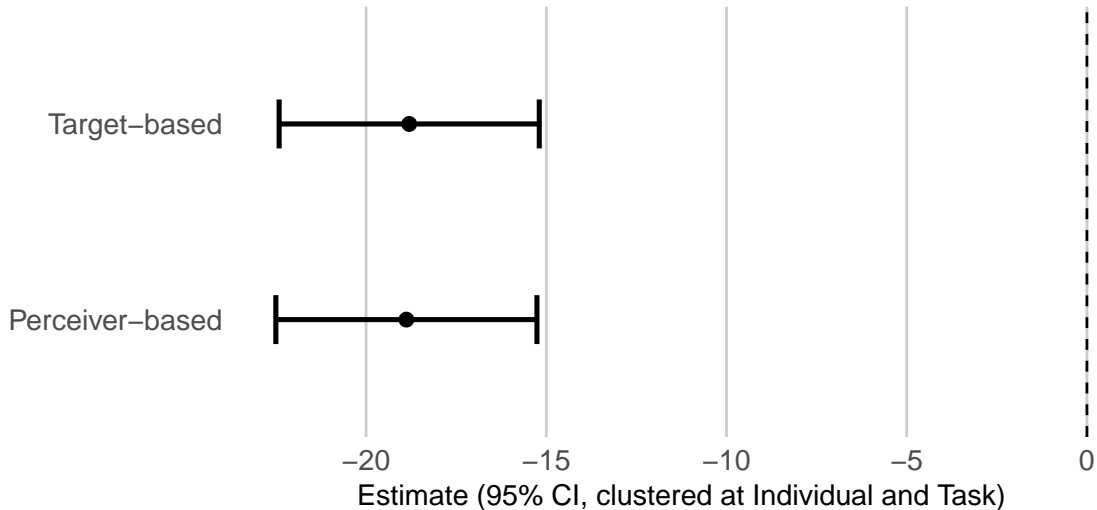
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- Suppose $g'(i) = RP$ (fix target = Republican Party supporters)
- $\alpha_2 < 0$ iff RP's knowledge for each task k is perceived lower by DP than RP

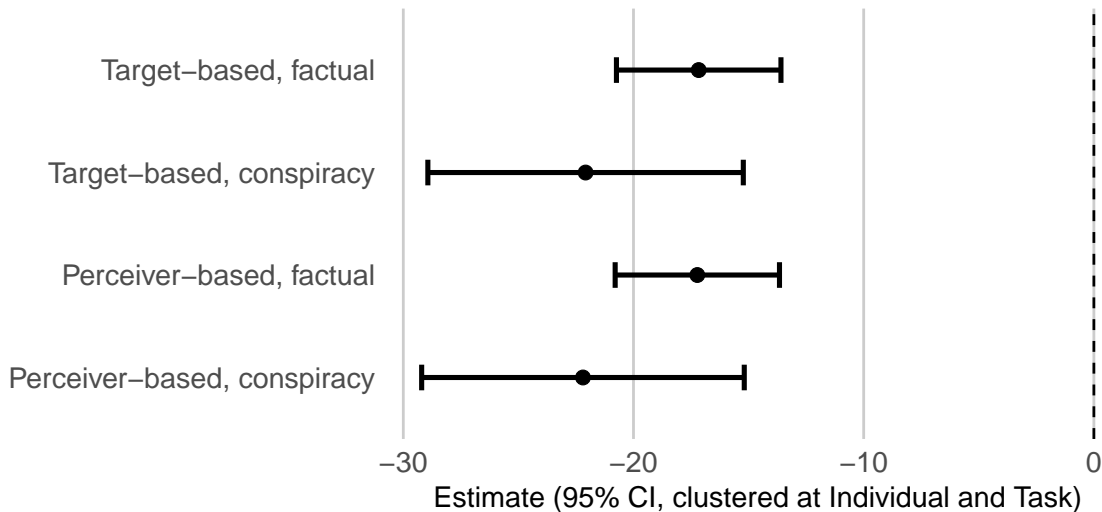
Average Disbelief is about 20 pt

Disbelief in Out-group Knowledge



Disbelief is Larger for Conspiracy Theory Questions

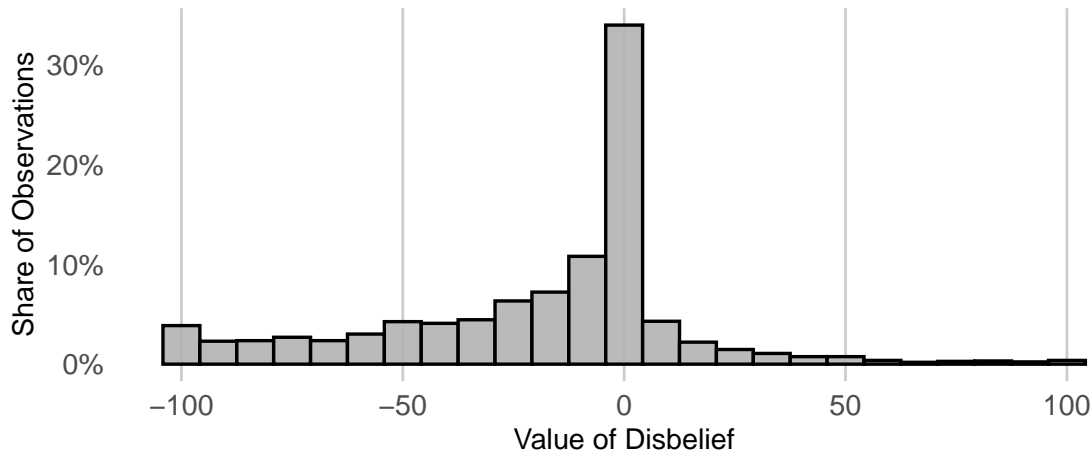
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Heterogeneity in Disbelief

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

Distribution of Disbelief



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

Study 2: Survey Structure (N=301)

1. Demographic questions

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 - In-group signal: tells that in-groups know the correct answers
 - Out-group signal: tells that out-groups know the correct answers

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5. Questions about affective polarization (Appendix)

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 - "According to previous surveys, the majority of RP says False"
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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: $y_{i,k}^J \equiv \mathbb{1}\{J_{i,k}^1 - J_{i,k}^0 > 0\}$; mean= 0.163

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

Measurement of Belief Updating

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

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

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

- $\mu_{i,k}^0$: Confidence towards Correct answers before signals

$$\mu_{i,k}^0 = \begin{cases} \frac{a_{i,k}^0}{100} & \text{if } J_{i,k}^0 = 1 \\ 1 - \frac{a_{i,k}^0}{100} & \text{if } J_{i,k}^0 = 0 \end{cases}$$

where $a_{i,k}^0 \in [0, 100]$ is confidence level for their answer

- $\mu_{i,k}^1$: 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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	Dep. Var.: Belief Updating	
	Judgement	Confidence
In-group Signal	0.033 (0.011)	0.074 (0.035)
Obs.	903	903
Task FEs	✓	✓
Dep. Var Mean	0.163	0.470

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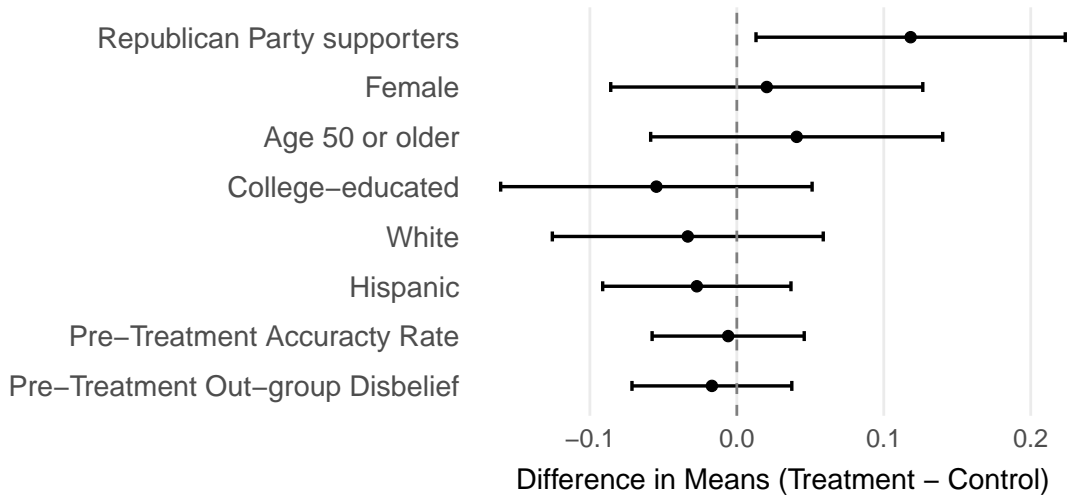
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- See if Treatment reduces in-group bias in belief updating

Balanced Test across Control and Treated



No In-group Bias in Treated Group?

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

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- **Run separately for Control and Treated**

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- 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

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	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

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In-group Signal	0.055 (0.025)	0.012 (0.010)	0.108 0.036	
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	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 \times 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 (0.025)	0.105 (0.037)
Treatment	0.019 (0.034)	0.061 (0.034)
In-group Signal \times T	-0.041 (0.030)	-0.064 (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

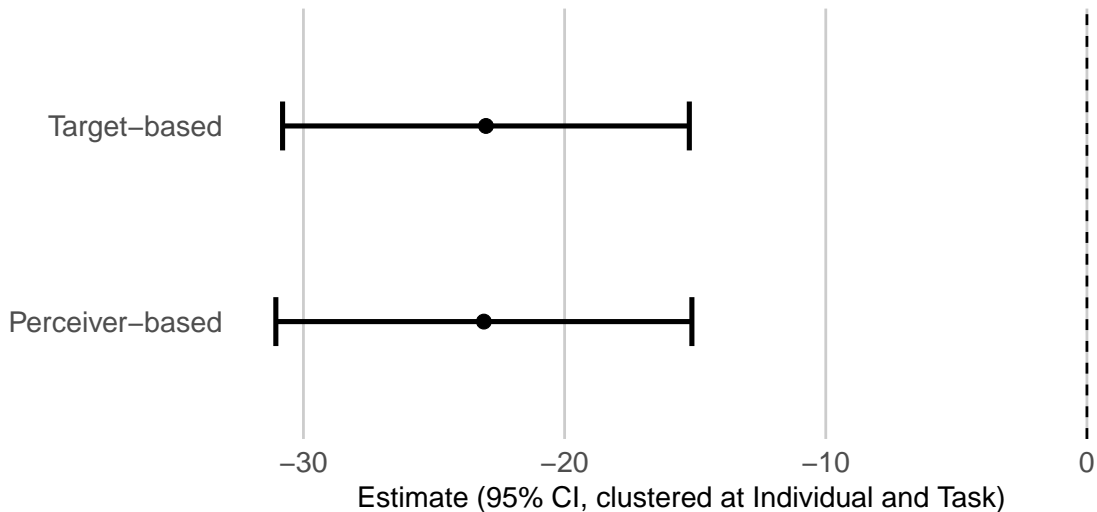
Appendix: Disbelief in Study 2

Appendix: Affective Polarization

Appendix Disbelief on All Facts

Average Disbelief is about 20 pt also in Study 2

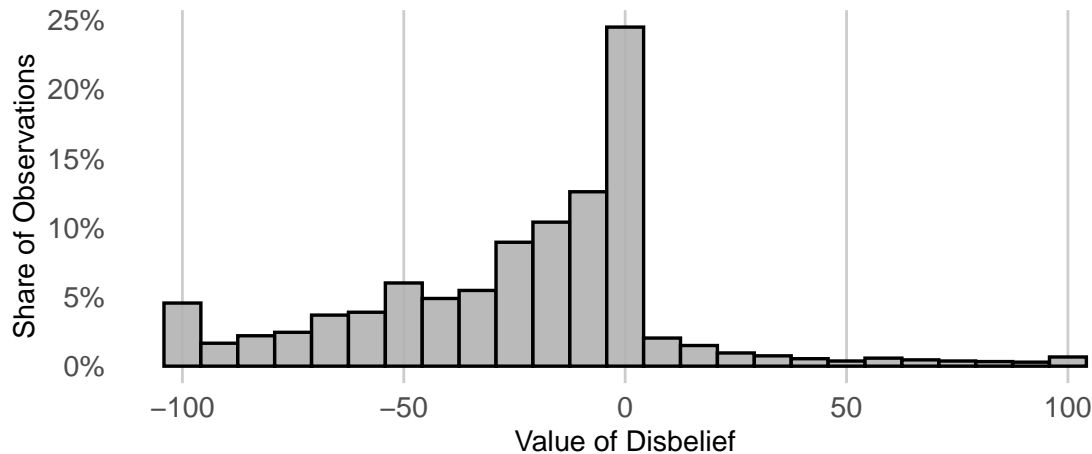
Disbelief in Out-group Knowledge



Heterogeneity in Disbelief in Study 2

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

Distribution of Disbelief



Today's Plan

Appendix: Disbelief in Study 2

Appendix: Affective Polarization

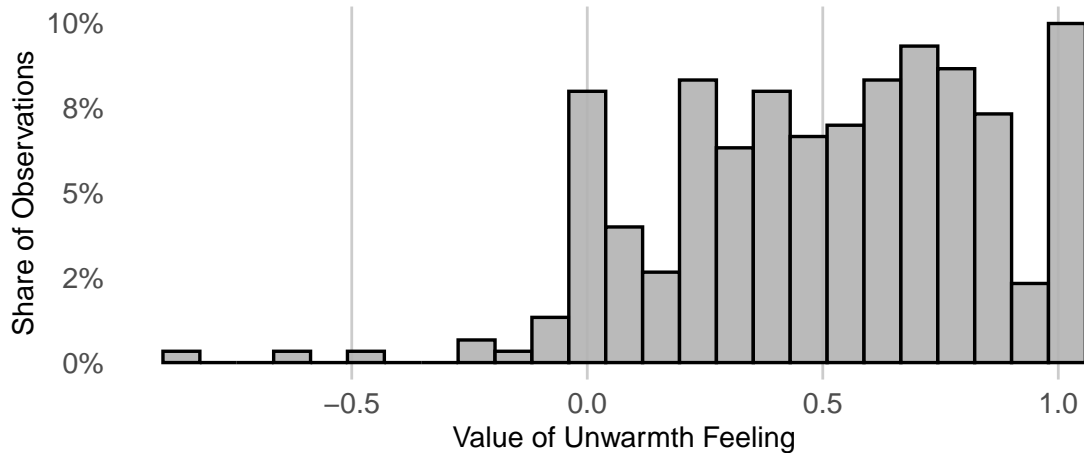
Appendix Disbelief on All Facts

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

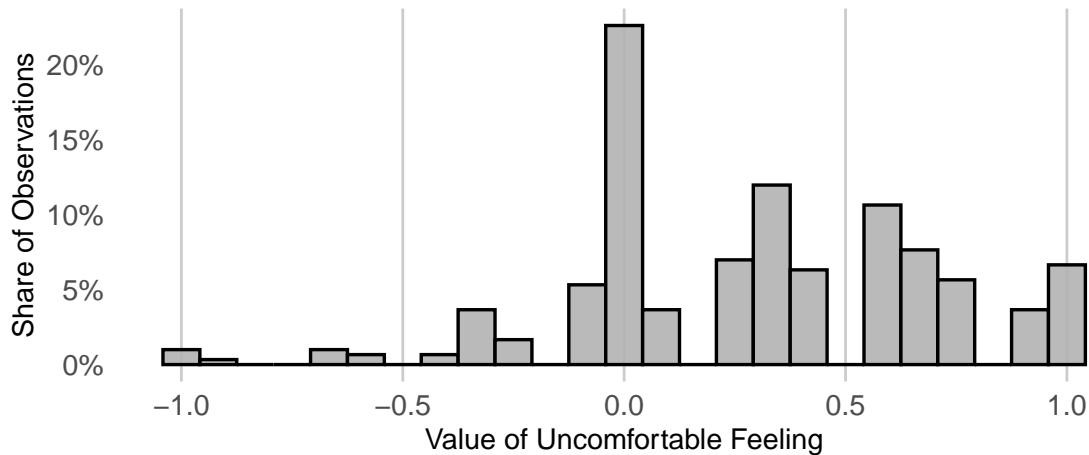
Unwarmth Feeling to Out-group (mean=0.507)

Distribution of Affective Polarization Measure



Uncomfortable Feeling to Out-group (mean=0.292)

Distribution of Affective Polarization Measure



No Detectable Effect on Affective Polarization

Table: Treatment Effects on Affective Polarization

	Dep. Var.: Affective Polarization	
	Unwarmth Feeling	Uncomfortable
Treatment	-0.040 (0.039)	-0.019 (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

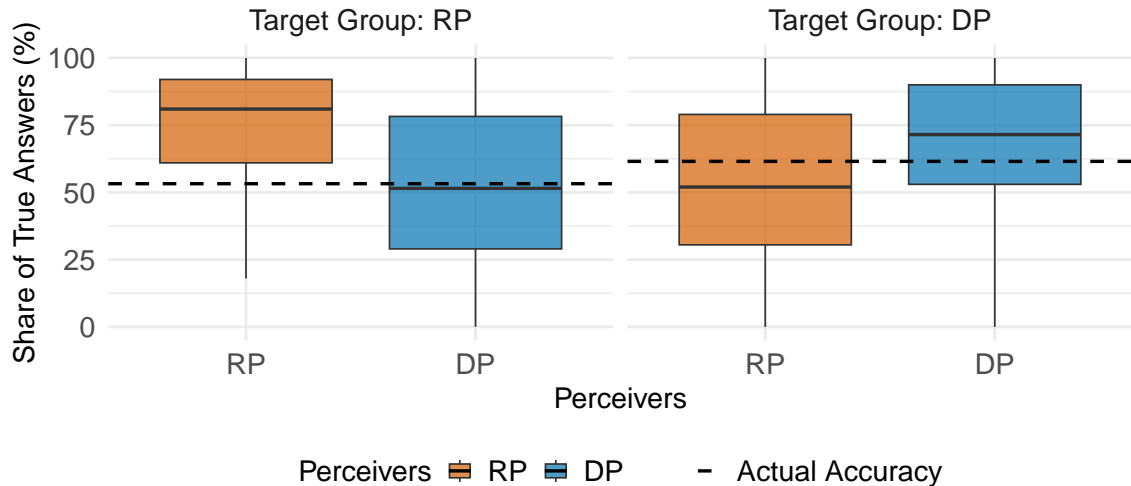
Today's Plan

Appendix: Disbelief in Study 2

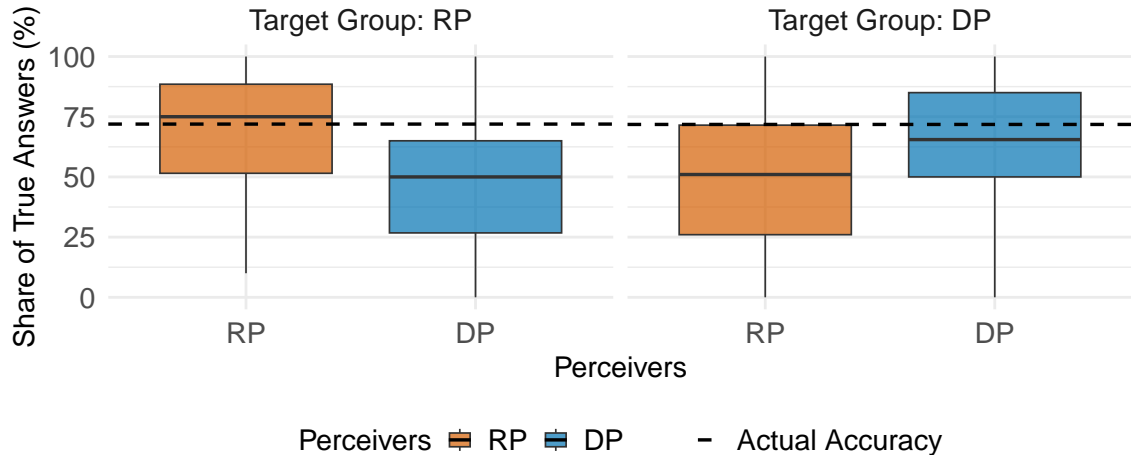
Appendix: Affective Polarization

Appendix Disbelief on All Facts

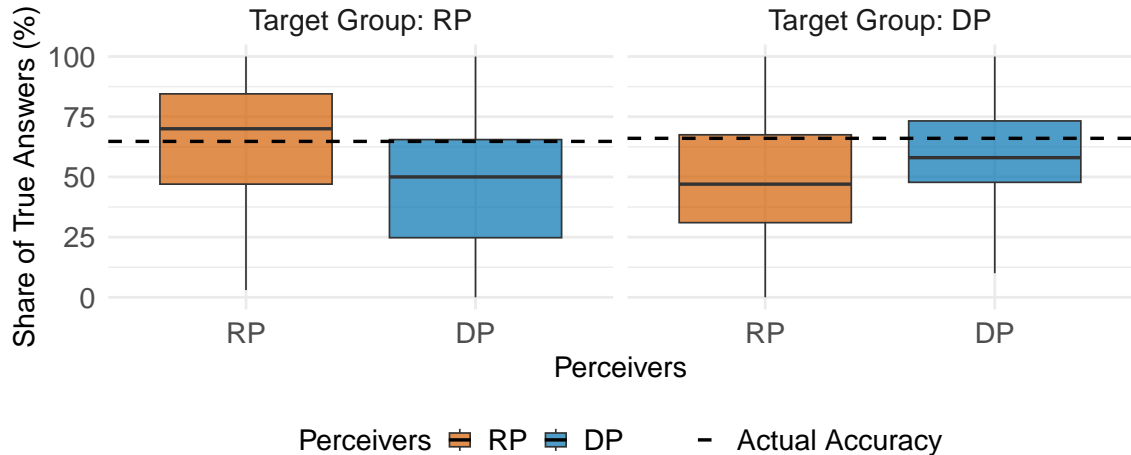
Fact 1 : The term of office of the Senate is 4 years.



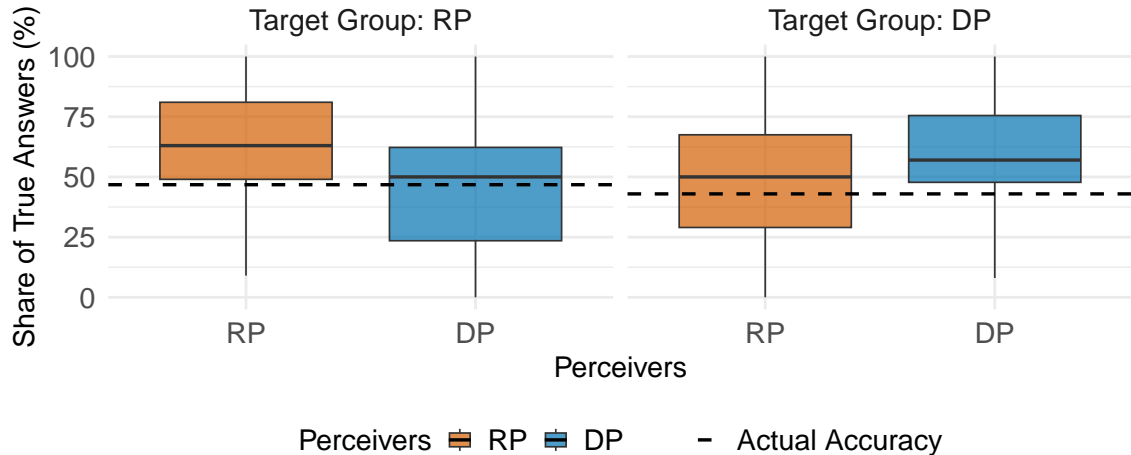
Fact 2 : To revise the constitution, approval of more than three-fourth of state legislatures is required.



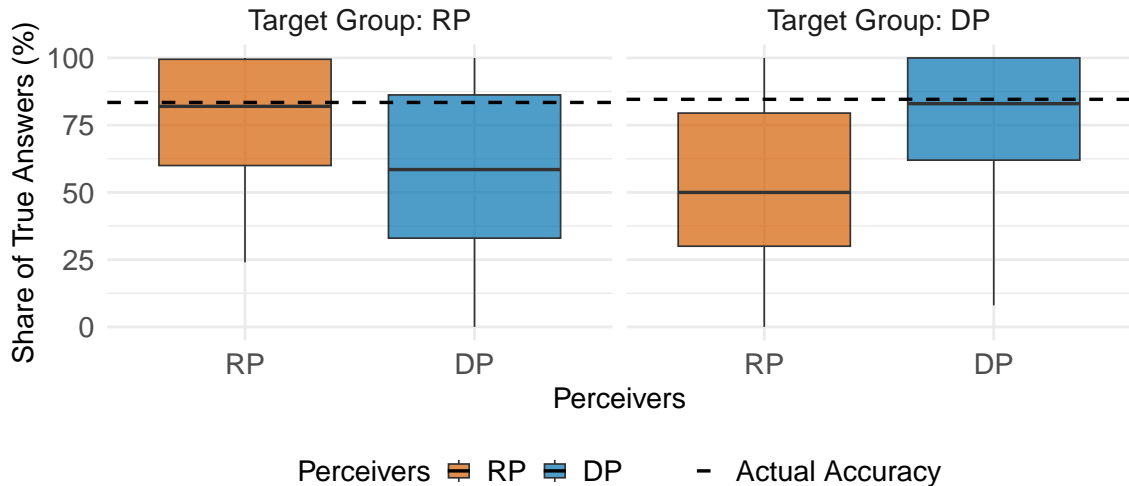
Fact 3 : The country's nominal GDP growth rate in the previous year was lower than 7%.



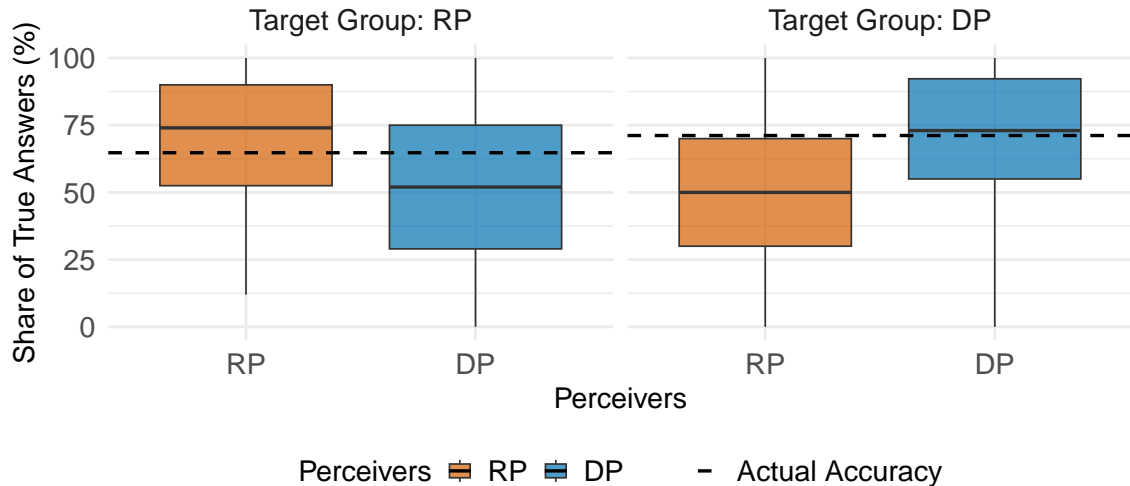
Fact 4 : For every 100 working-age Americans, about 40 are aged 65 or older



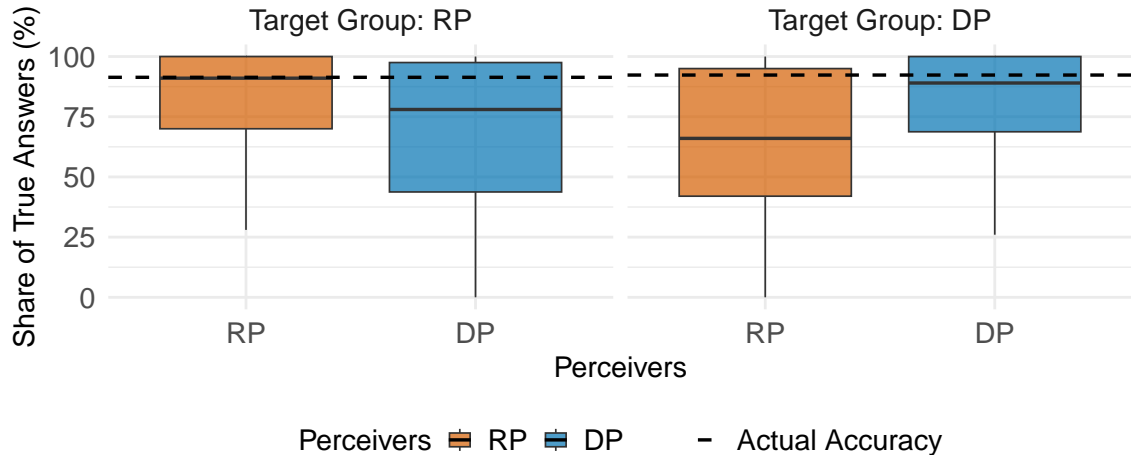
Fact 5 : New Zealand is a country located in the Middle East.



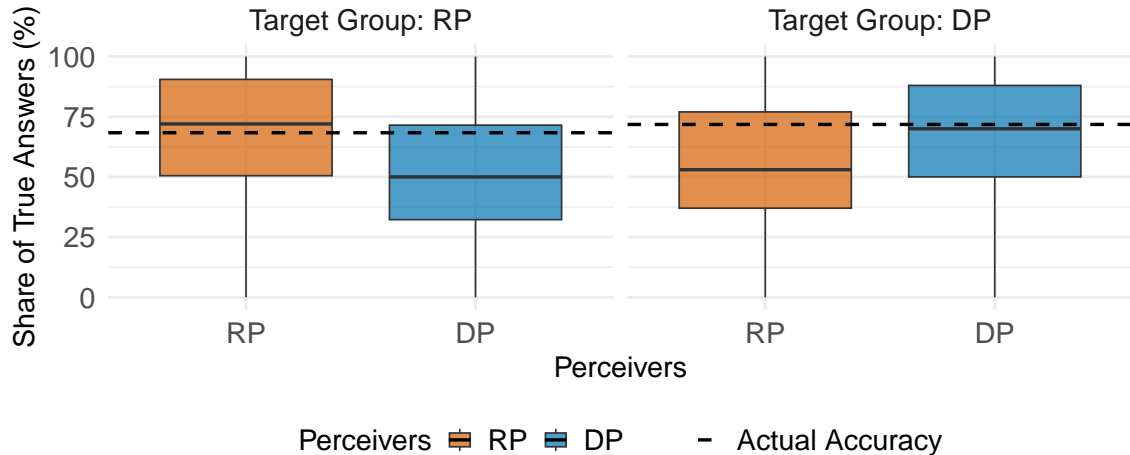
Fact 6 : iPhone was invented before 2000.



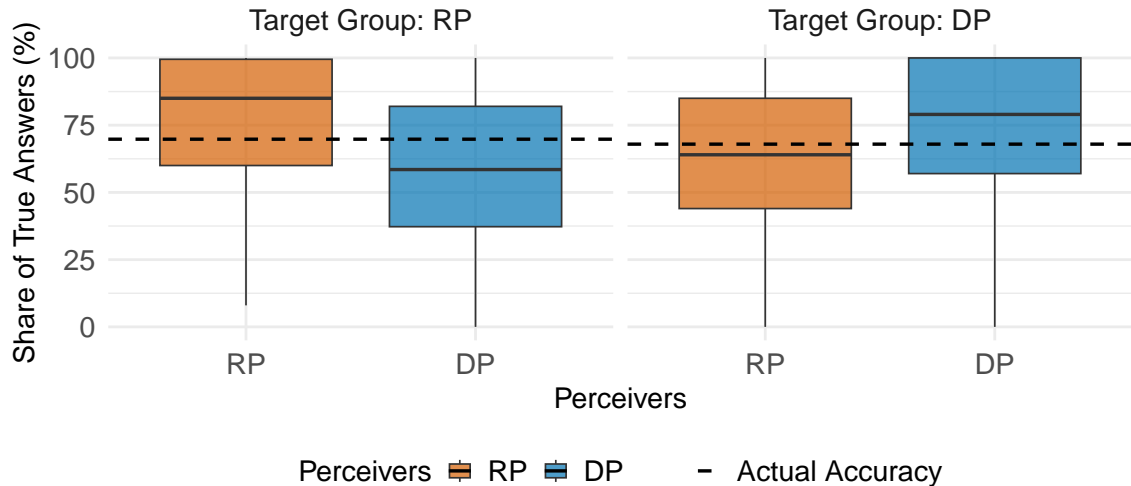
Fact 7 : It is stipulated by law that one must be at least 21 years old to drink alcohol.



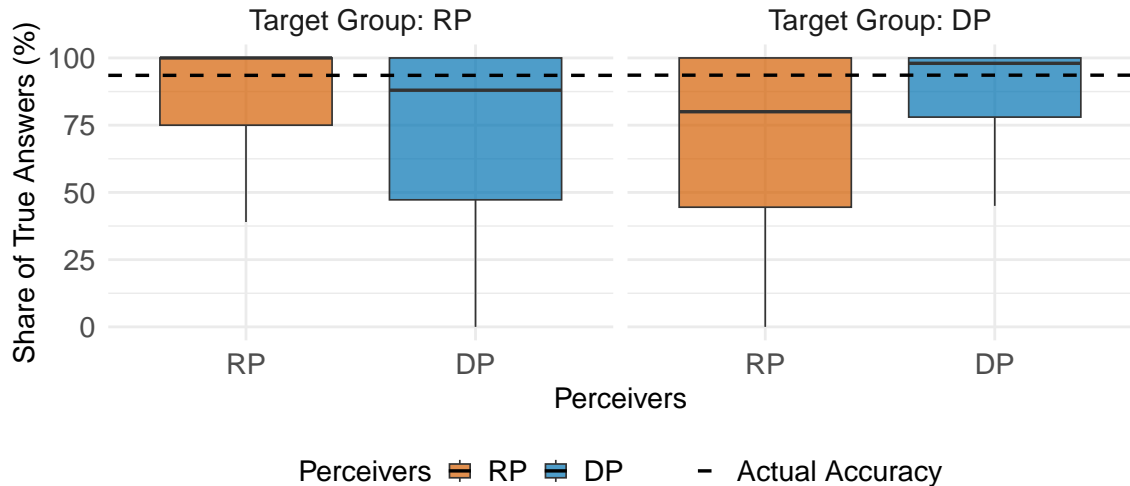
Fact 8 : The highest mountain in the United States is Denali (formerly known as Mt. McKinley).



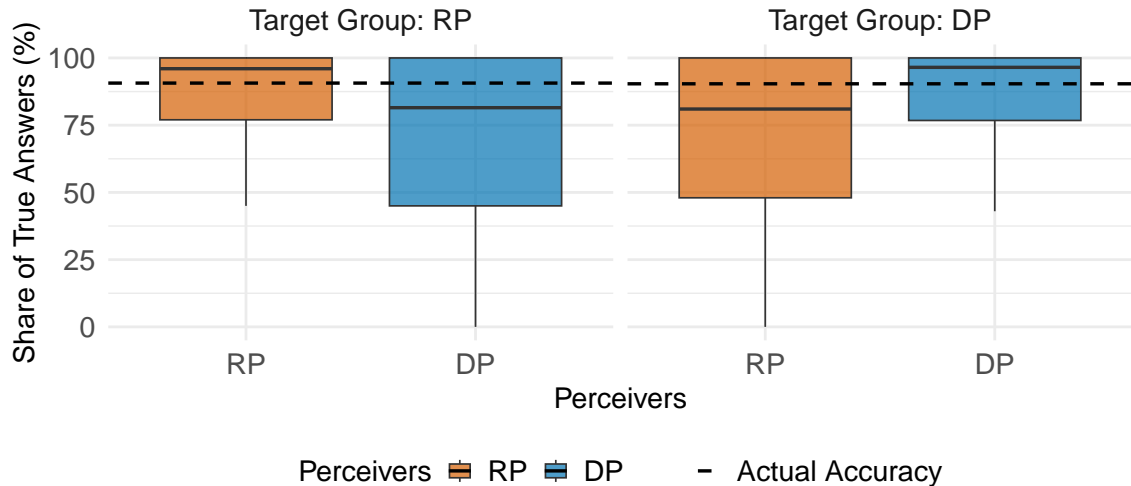
Fact 9 : The largest state in the United States is Alaska



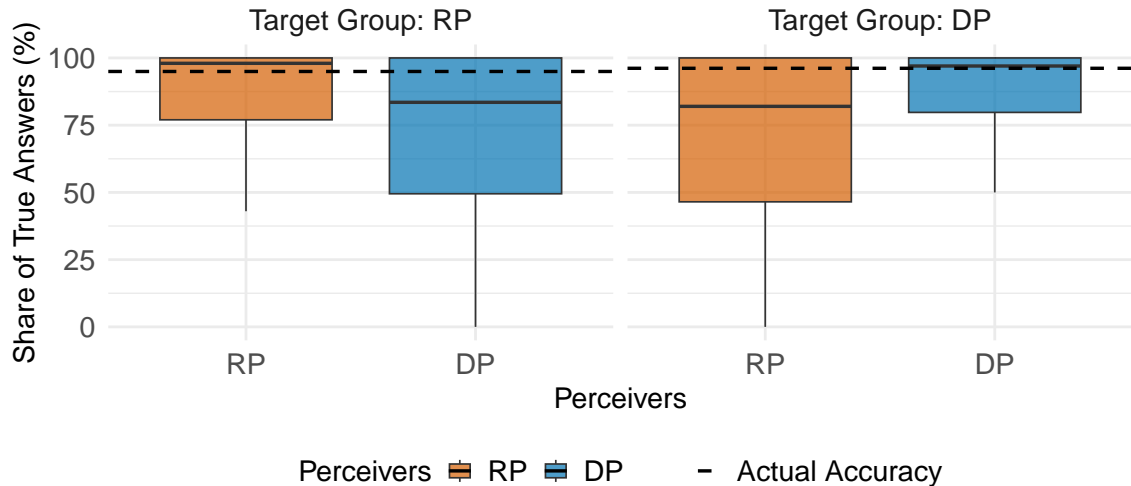
Fact 10 : The number of states in the United States is 50.



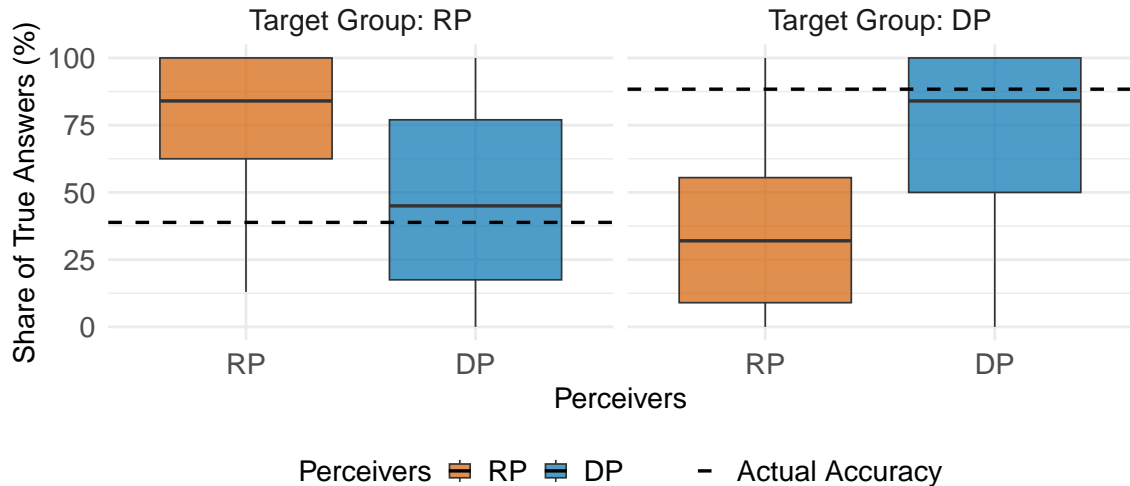
Fact 11 : The capital of the United States is the New York City.



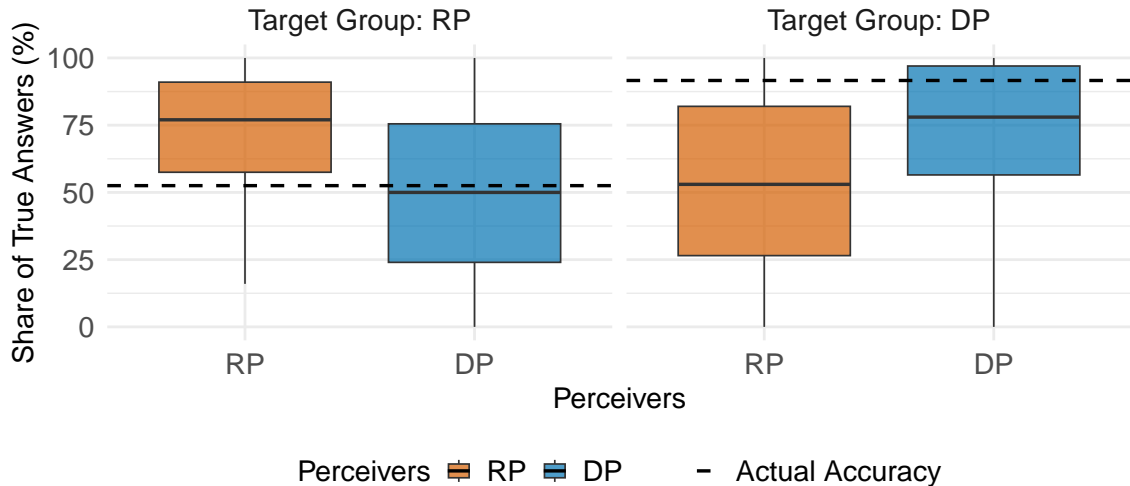
Fact 12 : The first President of the United State is George Washinton



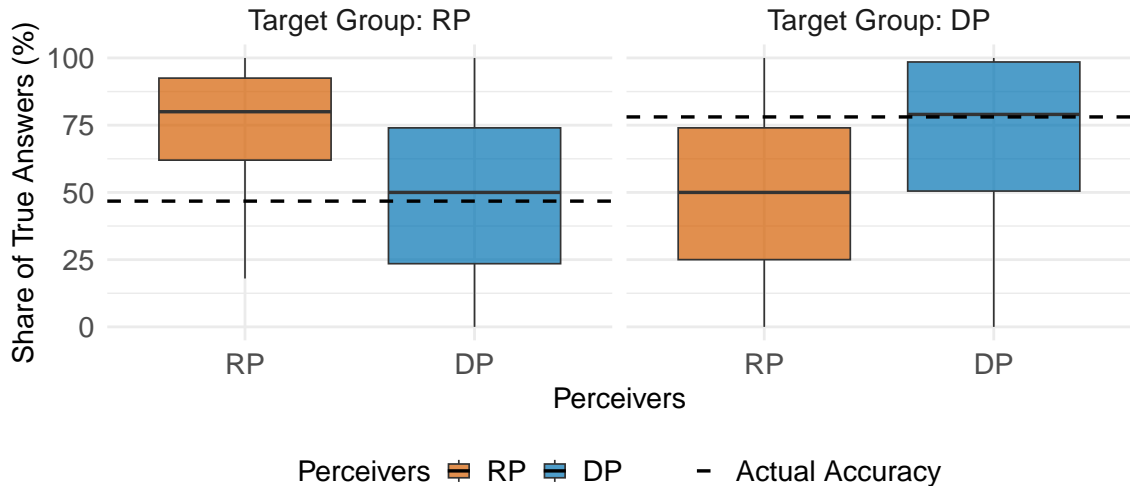
Fact 13 : The 2020 presidential election was stolen from Donald Trump.



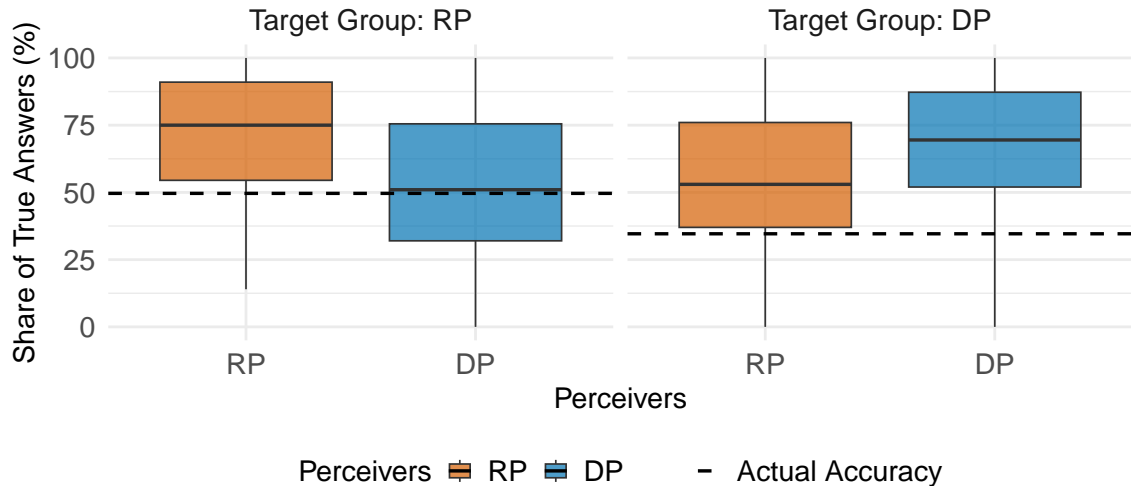
Fact 14 : Climate change is a hoax created to push socialist policies and de



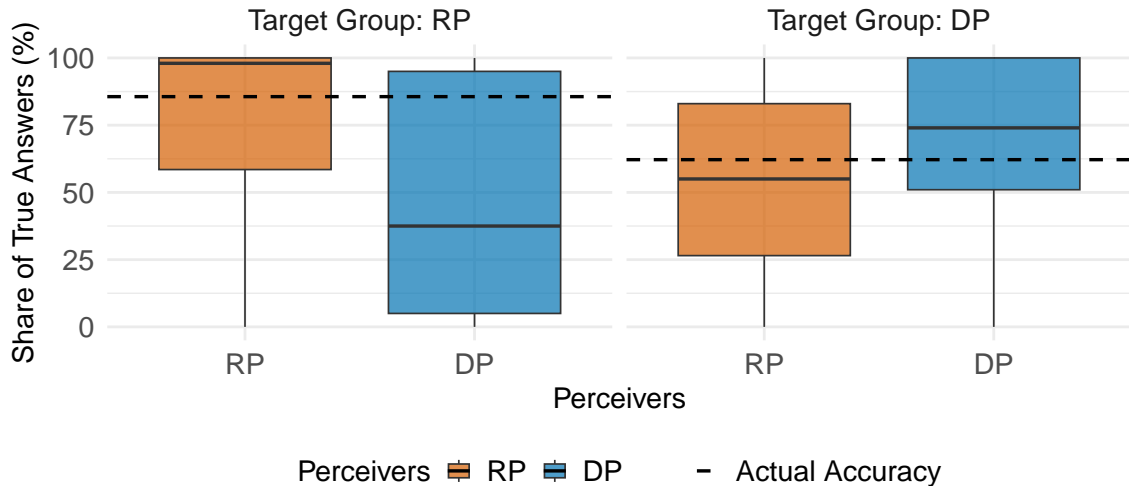
Fact 15 : The COVID-19 pandemic was exaggerated—or even planned—to cor



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

