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Response presentation on “Sensitivity Analysis for Causal Mediation through Text: an Application to Political Polarization”

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Outline

1. Feedback
2. Main contributions
3. Sensibility of Data
4. Key assumptions check
5. Mediator robustness
6. Improvements

Feedback

Presentation style

- Motivation
- Slide structure
- Support material (Graphs, Tables…)

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Feedback

Analysis of the paper

- Amount of information
- Explanation of key theories
- Interpretation of results
- Future research

Main contributions

1. Introduce **a sensitivity analysis for mediation** when the information on the mediator is observed for only one group in an experiment.

- No text data for the control group
- Because no meaningful relationship is identified, the mediation sensitivity procedure is not needed.
- Other contributions: marketing applications, power analysis

Main contributions

2. Demonstrate the difficulty of **using unsupervised text models** for performing a causal analysis

- Problem: These unsupervised text models do not perform well and need domain knowledge
- Reason: Small size of the data

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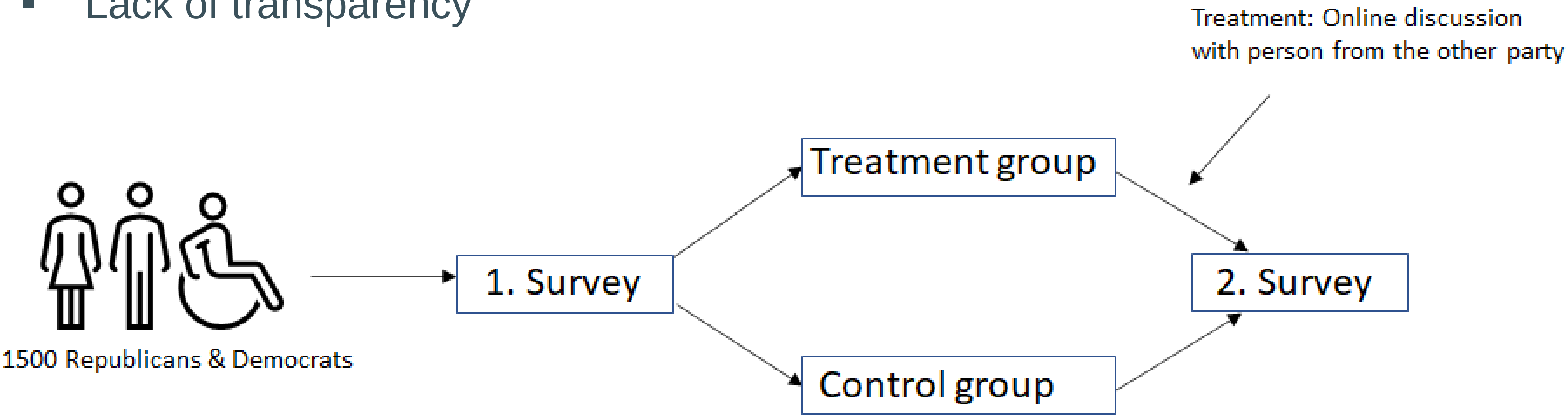
Sensibility of Data

- Lack of transparency

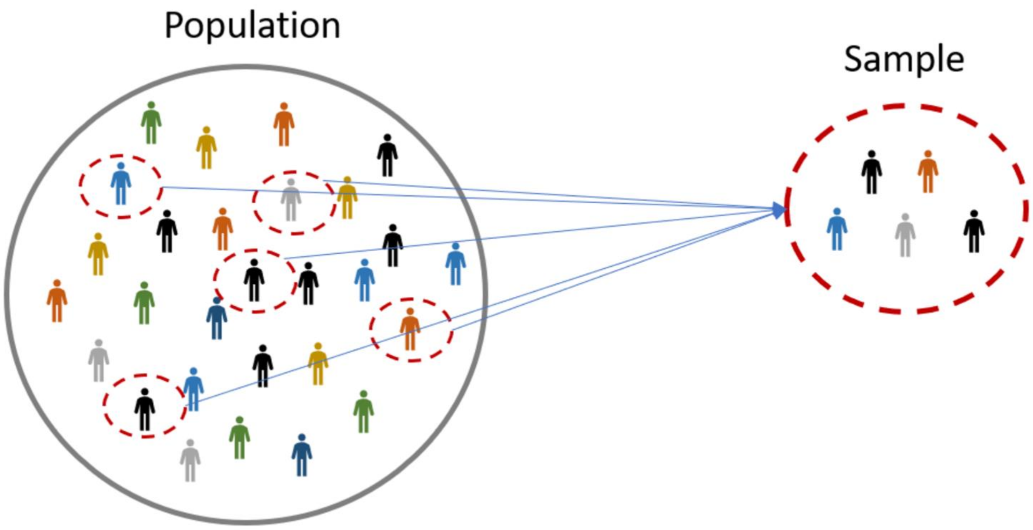


Sensibility of Data

- Problems with survey data:
  1. Response bias (Paulhus 1991)
  2. Experimenter bias (Innes and Fraser 1971)
  3. Attrition bias (Nunan et al. 2018)

Sensibility of Data

- Small sample size



Sensibility of Data

- Data Preprocessing
  - Making all words lower case
  - Removing standard stop-words
  - Dropping words that appear in fewer than 1% documents

  Possible extensions:

  - Stemming (e.g. running → run)
  - Lemmatization (e.g. ran → run)
  - Text normalization (e.g. btw → by the way)

Key Assumptions Check

1. Stable Unit Treatment Value Assumption (SUTVA)

1) The potential outcomes for any unit do not vary with the treatments assigned to other units.

2) For each unit, there are no different forms or versions of each treatment level, which lead to different potential outcomes.

Key Assumptions Check

2. Conditional independence or unconfoundedness

- Treatment is assigned independent of the potential outcome

$$Y_i(0), Y_i(1) \perp\!\!\!\perp T_i | X_i$$

Additional assumptions regarding cross-world quantities $M_i(1)$ and $Y_i(0, M_i(1))$:

- Conditional independence of the treatment
- Conditional independence of the mediators

Key Assumptions Check

3. Positivity

- Ensures that every observation has a strictly positive chance of being in the treatment group or control group

  For all i, $0<\Pr(T_i = 1|X=x)<1$

- Positivity is testable

Key Assumptions Check

- A randomized experiment guarantees that conditional independence and positivity hold
  - But given the existing data from the experiment, the authors cannot rely on the randomization to identify causal effects
- Solution: Rely on prior work that identifies politeness or civility as a key feature in producing persuasive text
  - But politeness is probably not a good mediator

Key Assumptions Check

4. Additional assumption

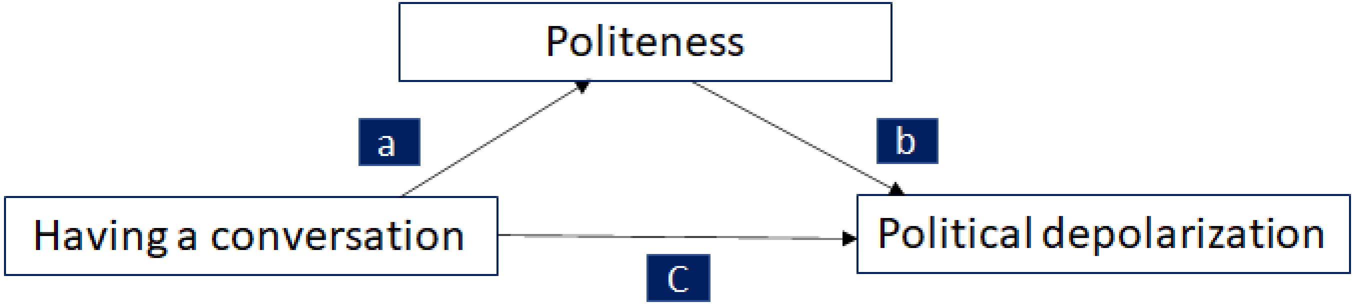
- $p(Y|M)$ is the same for $T = 1$ and $T = 0$
- This assumption becomes testable only by changing the underlying research questions.

Key Assumptions Check

5. Summary measures of the text might need some changes in assumptions

- This requires replacing the existing assumptions with ones that include the summarization procedure.

Mediator robustness



- a and b: Indirect effect of treatment on outcome through the mediator
- c: Direct treatment-outcome effect

Mediator robustness

- Politeness as a weak mediator

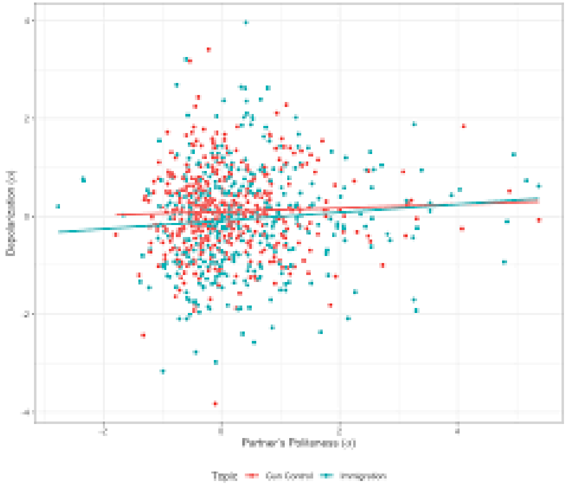


Figure 1: Depolarization and partner politeness (Tierney and Volfovsky 2021)

	All	Dem	Rep
	(1)	(2)	(3)
Politeness	0.069*	0.119*	0.002
	(0.035)	(0.046)	(0.052)
Constant	0.160	0.565	−0.294
	(0.215)	(0.288)	(0.312)
Observations	819	408	411

Table 1: Results from regressing depolarization on partner politeness and demographic control variables (Tierney and Volfovsky 2021)

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Mediator robustness

- Formalize language as constitutive variable (Keith et al. 2021)

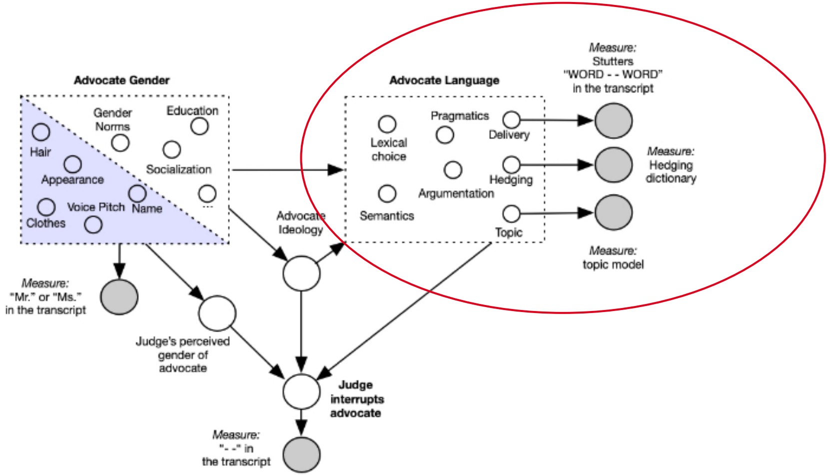

Figure 2: Constitutive causal diagram for gendered interruption in U.S. Supreme Court oral arguments

Mediator robustness

Further problems:

- Violation of ignorability of the mediator (Imai et al. 2010)
- Dependence between social group perception and language perception (Keith et al. 2021)

Improvements

- Summary statistics for data
- Larger dataset or adjust research question
- Extend the data pre-processing
- Other mediators

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