Three New Methodologies for Voting Rights Litigation

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December 11, 2014

New Method ①: Improving Ecological Inference

- Predicting individual ethnicity by combining (via Bayes rule)
  1. Census surname list
  2. Geocoded voter file
  3. Other attributes from voter file: age, gender, party ID, turnout etc.

- Empirical validation based on the Florida voter file:

	Whites		Blacks		Latinos	
Predictors	False Neg.	False Pos.	FN	FP	FN	FP
Name	.043	.574	.850	.010	.289	.034
Name, Precinct	.058	.322	.386	.028	.210	.037
Name, Precinct, Other	.057	.294	.310	.030	.227	.035

Predicting Turnout by Racial Groups

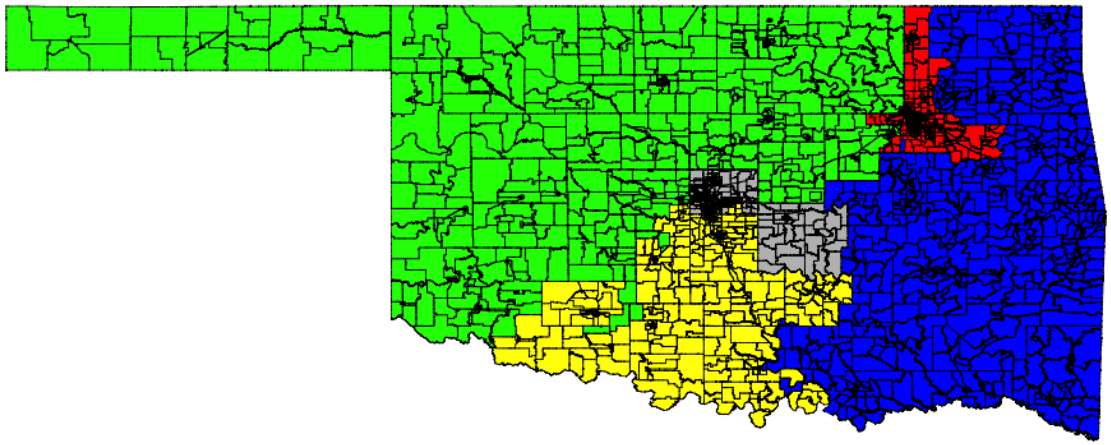
- The new method gives predicted probabilities for each voter by race
- Compute the weighted average of turnout using these probabilities
- This yields precinct-level predicted turnout by racial groups

	Goodman's Regression		King's EI		Bayesian Prediction	
	Bias	RMSE	Bias	RMSE	Bias	RMSE
Precincts						
Whites			.018	.036	−.012	.021
Blacks			−.081	.101	−.027	.050
Latinos			−.045	.080	.006	.041
Others			−.502	.520	.008	.088
Congressional districts						
Whites	.000	.038	.161	.245	−.010	.013
Blacks	−.166	.211	.088	.260	−.034	.035
Latinos	−.232	.400	.030	.087	.007	.018
Others	−.161	.427	−.483	.487	−.023	.042

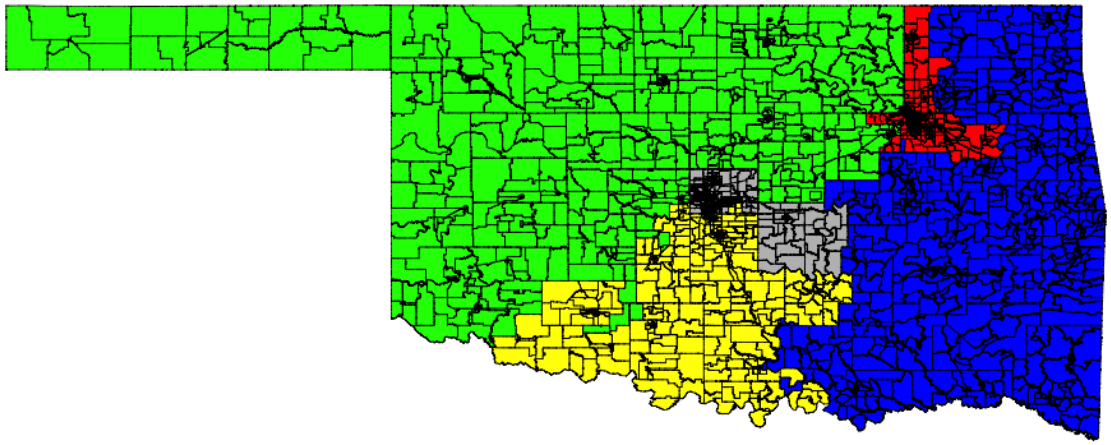
New Method ②: Simulating Redistricting Plans

- Researchers simulate redistricting plans to:
  - detect gerrymandering
  - assess impact of constraints (e.g., population, compactness, race)
- Goal: Characterize the *distribution* of redistricting plans under various constraints
- Existing algorithms (Cirincione et. al 2000, Altman & McDonald 2011, Chen & Rodden 2013):
  1. No theoretical properties known
  2. The resulting sample may not be representative of the population
  3. Leads to biased inference
- We develop a new simulation method that:
  1. obtains a representative sample from the true underlying distribution
  2. incorporates common constraints
  3. scales to larger redistricting problems

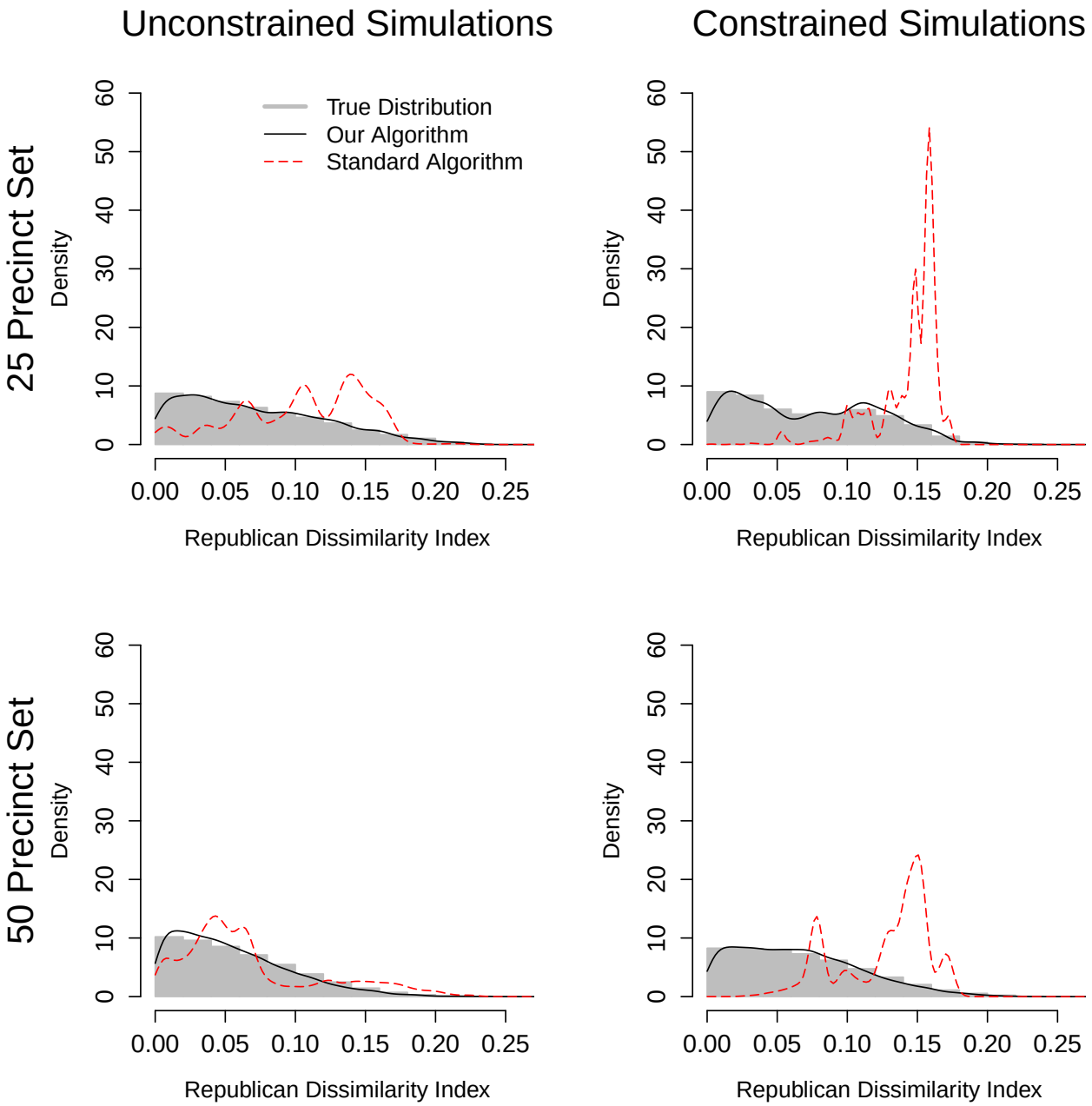
SSD Beta = 0
Iteration 1



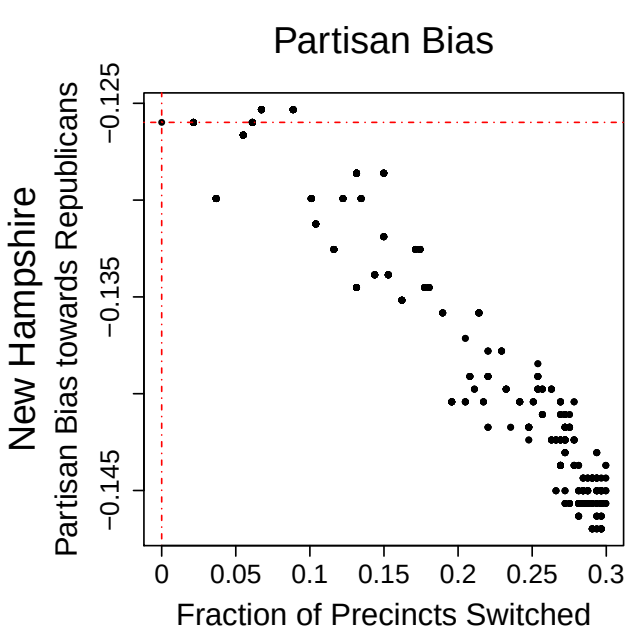
SSD Beta = -2000 (Annealed)
Iteration 1

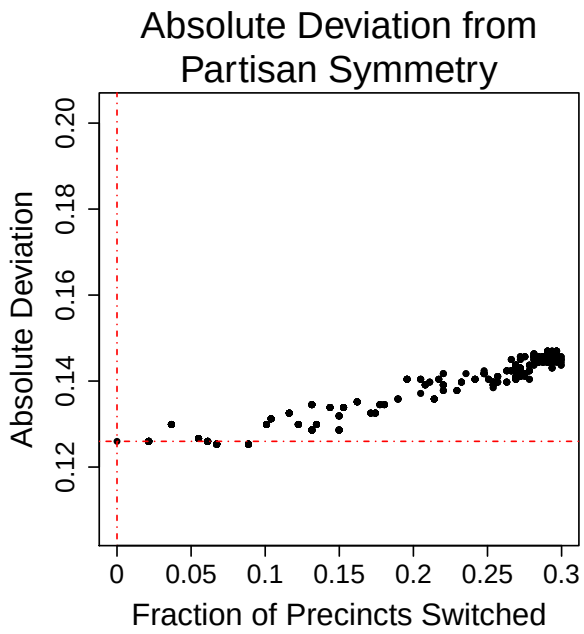


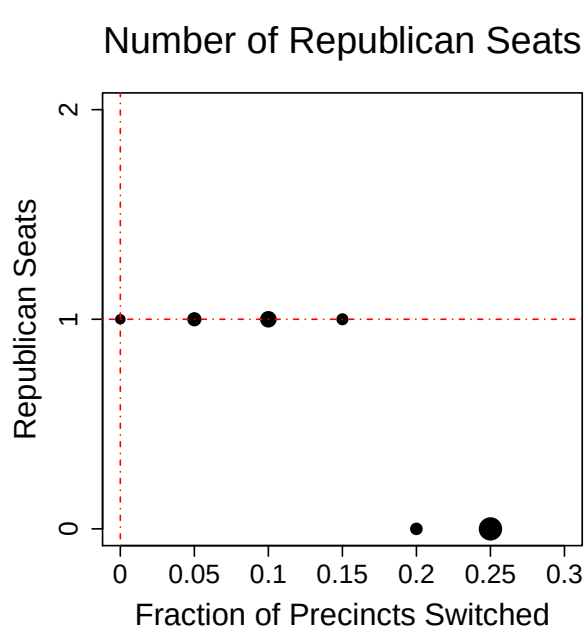
Our Algorithm vs. Standard Algorithm

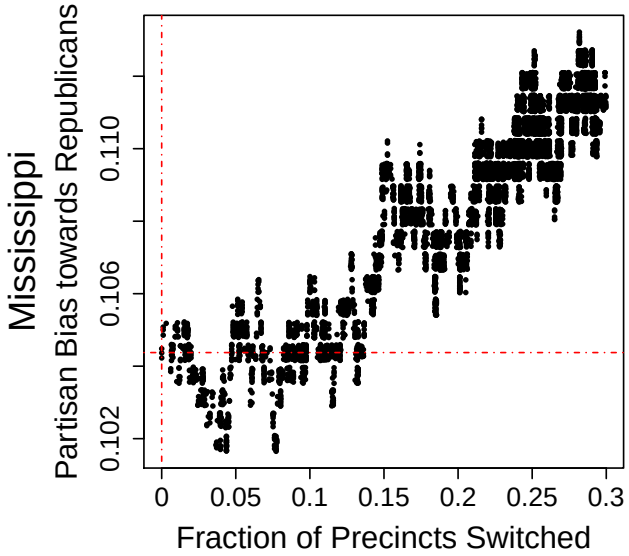


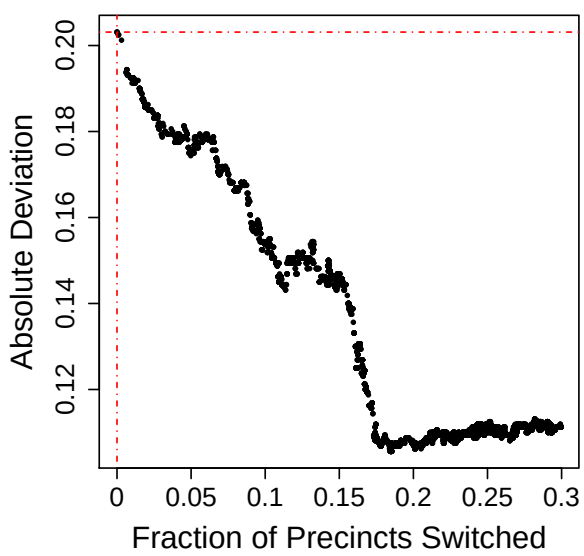
Partisan Implications of "Local Exploration"

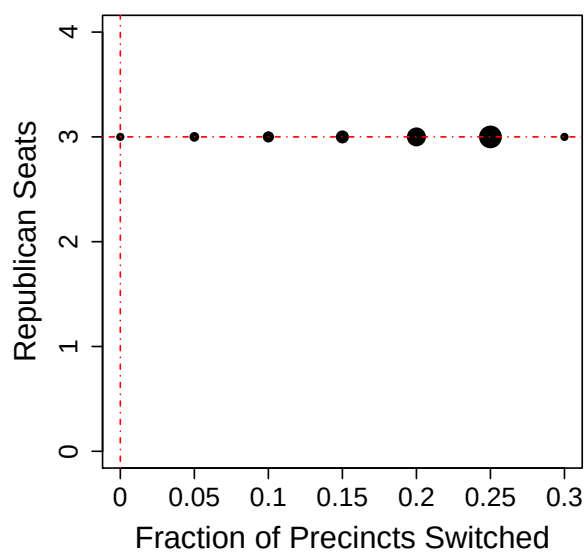












New Method ③: Asking Sensitive Survey Questions

- Sensitive survey questions:
  - discrimination and prejudice: gender, race, religion
  - illegal behavior: corruption, vote-buying
  - seemingly non-sensitive question: turnout
- Two sources of bias:
  1. social desirability bias
  2. non-response bias
- Indirect questioning methods via survey experiments:
  1. list experiment: aggregation
  2. endorsement experiment: evaluation bias
  3. randomized response: random noise
- Empirical validation: 2011 Mississippi personhood referendum
  - a poll 24 hours before the election predicted 44% no votes
  - the amendment was defeated 58% to 42%

List Experiment

Here is a list of four things that some people have done and some people have not. Please listen to them and then tell me HOW MANY of them you have done in the past two years. Do not tell me which you have and have not done. Just tell me how many:

Discussed politics with family or friends

Cast a ballot for Governor Phil Bryant

Paid dues to a union

Given money to a Tea Party candidate or organization

(treatment) Voted 'YES' on the 'Personhood' Initiative

How many of these things have you done in the past two years?

Endorsement Experiment

We'd like to get your overall opinion of some people in the news. As I read each name, please say if you have a very favorable, somewhat favorable, somewhat unfavorable, or very unfavorable opinion of each person.

(control) Phil Bryant, Governor of Mississippi?

(treatment) Phil Bryant, Governor of Mississippi, who campaigned in favor of the 'Personhood' Initiative on the 2011 Mississippi General Election ballot?

Randomized Response

To answer this question, you will need a coin. Once you have found one, please toss the coin two times and note the results of those tosses (heads or tails) one after the other on a sheet of paper. Do not reveal to me whether your coin lands on heads or tails. After you have recorded the results of your two coin tosses, just tell me you are ready and we will begin.

Now, please answer 'yes' if either your second coin toss came up heads or you voted 'YES' on the Personhood Initiative, which appeared on the November 2011 Mississippi General Election ballot.

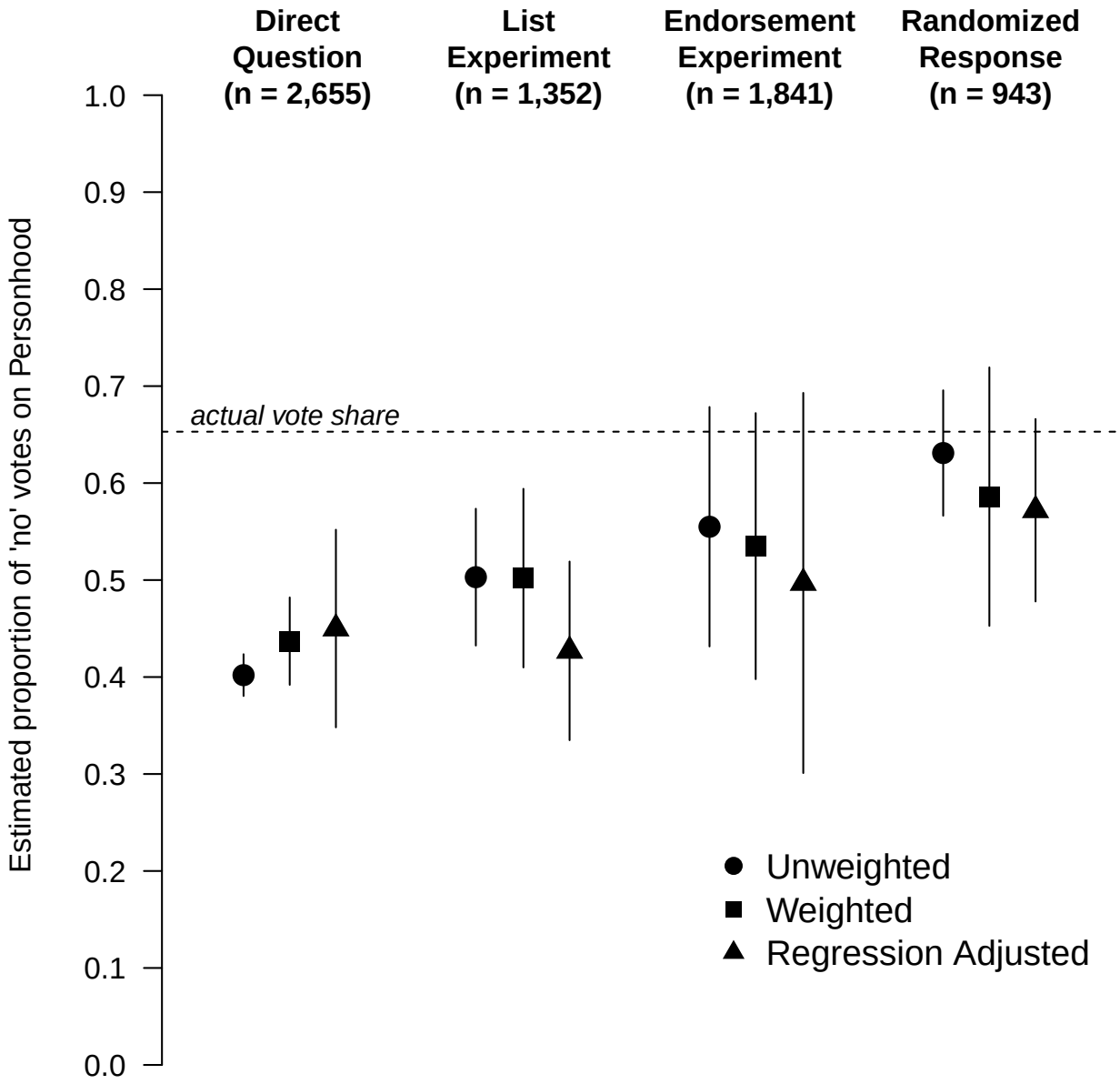
Yes

No

Don't know

Refused

Empirical Validation Results



References

1. Imai and Kahnna. "Improving Ecological Inference by Predicting Individual Ethnicity from Voter Registration Records."

2. Fifield, Higgins, and Imai. "A New Automated Redistricting Simulator Using Markov Chain Monte Carlo."

3. Rosenfeld, Imai, and Shapiro. "An Empirical Validation Study of Popular Survey Methodologies for Sensitive Questions."

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