Measuring and Modeling Public Opinion in Political Campaigns

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Welcome!
Let's get started.

Introductions

- A bit of my background:
  - Field Organizer, 21st Century Democrats, and Kerry campaign volunteer (2004)
  - NYU Politics PhD (2011), focusing on American politics and political methodology
  - Post-doc, Vanderbilt Center for the Study of Democratic Institutions (2011-12)
  - Data science and analytics consultant (2012 - 2014, 2016 - 2017, 2019 - ?)
  - Director of Data Science, Democratic National Committee (2014 - 2016)
  - Instructor, "Data Science for Political Campaigns", Harvard Extension School (2019)
- Some areas of expertise:
  - Survey methodology and analysis
  - Microtargeting models
  - Experimental design
  - Data engineering and infrastructure

Plan for today's talk

- This talk builds on material from my Harvard class - see the syllabus at **http://bit.ly/dsfpc2019**

- Agenda for this talk:
  - A broad introduction to political campaigns & data, and the role that data science can play across different parts of a campaign
  - An overview of how data scientists use surveys, statistical modeling, and machine learning to predict vote choice and turnout and forecast election results
  - A discussion of the potential ways in which this work can go wrong, and how these risks can be avoided (or at least minimized)

- We'll have plenty of time for discussion, so please ask questions (either along the way or at the end)!

Essentials of Campaign Strategy

What it takes to get elected (a partial list)

- Developing a message
- Soliciting donations
- Attracting media coverage
- Building a campaign team
- Qualifying for the ballot
- Collecting endorsements
- Getting into the debates

- Developing a field program
- Recruiting volunteers
- Creating advertisements
- Convincing swing voters
- Turning out the base
- Winning a primary election
- Winning a general election

A simplified model of campaign strategy

- In a typical race, only two numbers really matter:
    - How many votes your candidate gets
    - How many votes the opponent gets
- So most everything a campaign does is for one of two purposes:
    - **Mobilization** - getting the people you want to vote to show up
    - **Persuasion** - getting the people who do show up to vote for you
- Most every function of a campaign ultimately leads to one or both

Where Data Science Can Help

Efficiency and effectiveness

- Data science is most valuable when there are resource constraints
- Two main ways to have an impact, by improving campaigns' *efficiency* and *effectiveness* when using resources
- Efficiency: allocating resources to where they're most impactful
  - Targeting the voters most likely to be persuaded to vote for your candidate
  - Finding volunteer recruitment targets most likely to show up
  - Identifying the best phone numbers to use for each individual voter
- Effectiveness: maximizing the impact of each resource spent
  - Selecting the best message to use for get-out-the-vote (GOTV) appeals
  - Figuring out the optimal amount of money to ask for in a fundraising mailer
  - Choosing which issues to focus on in a speech or debate

Research and experimentation

- Survey design and analysis

- Election forecasting

- Message development and testing

- A/B tests for fundraising

- Ad testing and optimization

- Field experiments

Tactical uses: campaign targeting

- Geographic and demographic targeting

- Microtargeting of individual voters

- Targeted messaging

- Donor and volunteer recruitment

- Customized fundraising asks
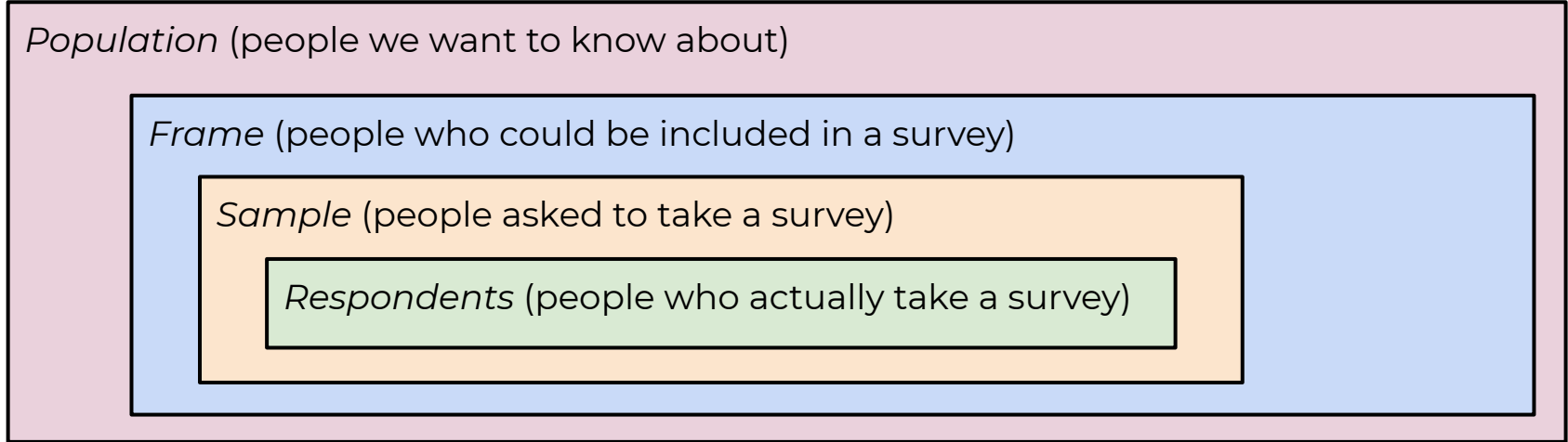
Strategic uses: forecasting and optimization

- Turnout prediction

- Poll aggregation

- Electoral vote and seat simulation

- Spending optimization

Measuring Opinions Using Surveys

What is a survey?

- Groves et al: "*A systematic method for gathering information from (a sample of) entities for the purposes of constructing quantitative descriptors of the attributes of the larger population of which the entities are members.*"

- Key features of surveys:
  - Their purpose is to gather information through a scientific process
  - They are typically used to learn about a *population* by collecting information from a *sample* of that population (a *census* is a uniquely special case)
  - The kind of information gathered is *quantitative* and used to compute *statistics*
  - The primary method of gathering information is to ask people questions
  - These questions normally ask about individuals' characteristics, attitudes, or beliefs

From populations to respondents

Population (people we want to know about)

Frame (people who could be included in a survey)

Sample (people asked to take a survey)

Respondents (people who actually take a survey)

Representativeness is the degree to which the respondents reflect the characteristics of the overall population. *Probability surveys* attempt to select people probabilistically to ensure representation, while *non-probability surveys* focus on coverage and post-survey adjustment

Modes, constructs, and measurements

- Survey *modes* are the overall methods for interviewing respondents - over the phone, online, by mail, in-person, etc.

- *Constructs* are the specific pieces of information we seek to learn through surveys, which reflect respondents' internal or external characteristics (traits, attitudes, beliefs, etc.)

- *Measurements* are the specific processes (generally, a survey question and set of response choices) by which these constructs are translated into quantitative information

The Survey Process

1. Identify a population and a frame to sample from

2. Draw a sample of individuals to solicit responses from

3. Conduct interviews with cooperative respondents from the sample

4. Compile survey responses into a processed dataset

5. Calculate weights for each respondent to make the dataset representative of the broader population

6. Use weights to calculate estimates of population (and if desired, subgroup) statistics and their uncertainty

7. Compile statistics into *toplines* (population-level reports) and *crosstabs* (breakdowns by subgroups)

Modeling and Microtargeting

How and why we target voters

- We build targeting models to give us a proxy for voters' behaviors, opinions, and characteristics that we can't measure directly

- Good targeting can make voter contacts more efficient

  - Most voters aren't receptive, so don't waste time on bad targets

- It can also make those contacts more effective

  - Models are used to tailor messaging and tactics to specific voters

- In the aggregate, models' predictions can be used to inform campaign strategy

History of voter targeting

- Geographic targeting
  - Past election results and survey data tell campaigns where to locate offices, hold events, target advertising, and canvass door-to-door

- Demographic targeting
  - Campaigns have long targeted voters based on age, gender, race, ethnicity, religion, income, and other demographic characteristics

- Behavioral targeting
  - Individuals' past political activities and other relevant activities (union membership, group affiliations, TV viewing habits, etc.) are useful signals as well

- Microtargeting
  - Statistical modeling (and more recently, machine learning) and the availability of voter data has made it possible to target individuals based on many characteristics

Modeling vote choice

- Simplest models are just binary choices between candidates, usually measured through surveys (much preferred over field IDs)

- In primaries or multicandidate races, use multi-category models if just modeling "your candidate / not your candidate" isn't enough

- Can model undecideds, but it's not a perfect proxy for persuadability
  - For what it's worth, neither are support scores near 50%
  - Do persuasion experiments if you can and build models off of those

- Features should focus on key political and demographic variables

- Past local election results and behaviors are also very helpful

- Generic component models are very helpful in partisan races

Predicting Turnout

Voter turnout rates in the US

United States VEP Turnout Rates 1789-2018

Presidential Elections

Midterm Elections

VEP Turnout Rate

Year
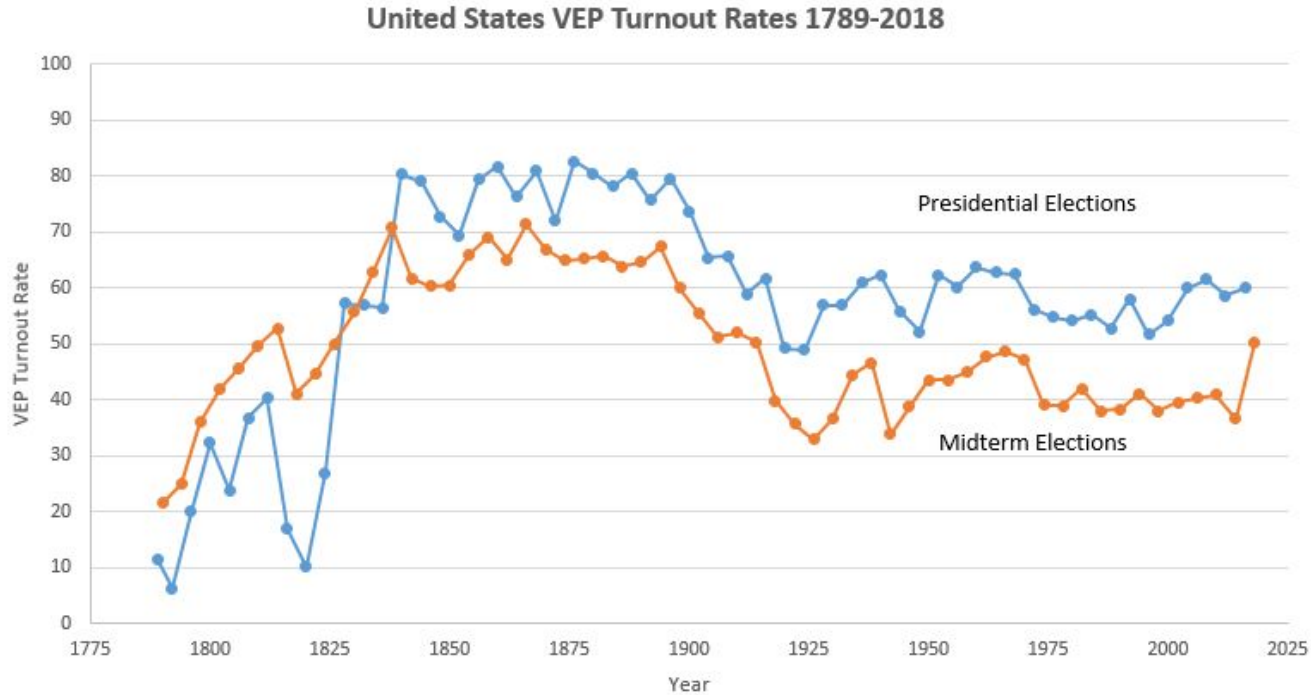
Why turnout modeling is unique

- You're literally predicting the future

- Each election cycle has unique patterns
    - Which races are on the ballot in each place
    - How engaged the electorate is
    - How competitive the elections are
    - How active the campaigns are

- Impossible to get perfect training data, so you have to rely on proxies

- Cannot validate models until it's too late

- Non-voting can be a function of individual behavior *or* data quality

Turnout intention is a poor proxy for turnout

- Most political surveys ask turnout intention as a screening question

- Very few respondents report being unlikely to vote

- Correlation between answers and actual behavior is pretty weak, and varies based on turnout history

- Survey response and turnout *are* highly correlated, so surveys are not representative of nonvoters

Table 4. Study 1 Actual Turnout by Self-Predicted Turnout by Vote History

		Votes Cast in Previous Two General Elections		
		None (col 1)	One (col 2)	Two (col 3)
Self-Reported Likelihood to Vote	Almost Certain	62% (n = 1,080)	80% (n = 2,027)	93% (n = 6,165)
	Probably	44% (n = 209)	72% (n = 267)	88% (n = 528)
	50-50	42% (n = 120)	71% (n = 126)	81% (n = 171)
	Will not vote	30% (n = 66)	56% (n = 63)	76% (n = 72)
	[Don't know]	50% (n = 30)	69% (n = 32)	91% (n = 69)

Rates of turnout in 2008 based on survey responses and individual-level turnout in 2004 and 2006

Source: Todd Rogers and Masa Aida,
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1971312

Past turnout is better, but still not perfect

- Individual-level turnout history more accurately predicts future turnout behavior than intention or enthusiasm

- What past turnout misses:

  - Changes in overall turnout levels from election to election

  - Changes in patterns across groups between elections

- Example: predicting 2008 based on 2004, or 2010 based on 2006

	All Respondents				
Turnout Intention	2.07 (0.22)		1.78 (0.24)		0.90 (0.27)
Voter Enthusiasm		1.51 (0.23)	0.89 (0.25)		0.94 (0.30)
Turnout History				1.67 (0.08)	1.64 (0.08)
n	2193	2186	2186	2193	2186
Correctly Predicted	82.0%	81.8%	82.0%	85.7%	86.8%

Coefficient estimates and robust standard errors from binary logit models

Predicting individual turnout in 2010 based on surveys responses and individual turnout histories (past 5 elections)

Source: Andrew Therriault,
http://andrewtherriault.com/therriault_pastpresentfuture_mpsa2014.pdf

A general formula for turnout propensity

- Individual-level turnout propensity in any given election can be thought of as a product of two distinct factors:
  - The individual's general propensity to vote, regardless of the election
  - Election-specific factors making the individual more or less likely to vote this time
- General turnout propensity is strongly predicted by demographics and individual turnout history
- Some election-specific factors can also be incorporated in historical models and future predictions
  - Races on the ballot
  - Competitiveness (from forecasts, fundraising, surveys, etc.)
- As such, modeling past elections is still the most common approach

A basic turnout model design

- Pick a year
    - Typically use last comparable election

- Select your sampling frame
    - Ideal: voter file as of sample date in previous cycle
    - Not as good but acceptable: current file, limited to voters eligible in previous cycle

- Train on a reasonably large sample
    - Limit to speed up training and keep hold-outs for evaluation, calibration

- Push forward predictions to the current year
    - Shift ages, turnout histories, other date-specific features
    - Adjust election characteristic features to current election cycle

Election Forecasts

Where election forecasts come from

- Election forecasts are a best guess of what's going to happen in an upcoming election
  - Minimal example: a single poll
- Wide variety of inputs
  - "Fundamentals" (economy, incumbency, etc.)
  - Past results
  - Composition of the electorate
  - Polling
  - Fundraising
  - Expert opinions
- Some inputs are causal, others purely predictive

What election forecasts offer

- Media forecasts are done for entertainment value, but campaigns use them for strategic planning
    - If you knew what would happen in the future, how would that change your plans?
    - Example: convention delegates and electoral college votes
- Goal of (most) campaigns is to maximize the probability of winning, and forecasts allow campaigns to quantify hypothetical scenarios
- With forecasts, campaigns can optimize efforts for win probability rather than total number of votes
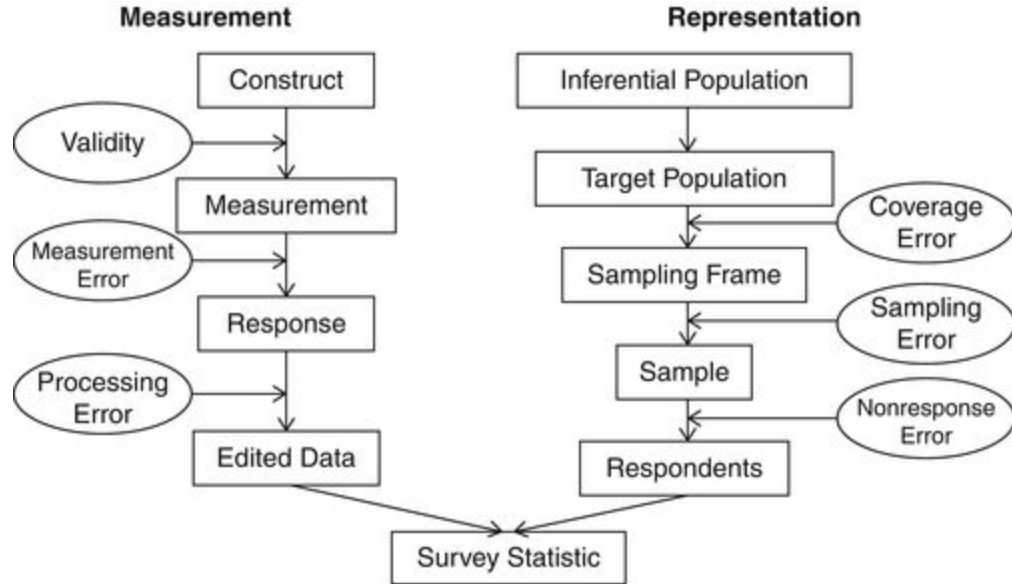
Common types of forecasting models

- Fundamentals-based models from political science

- Poll aggregation

- Extrapolation from past results & registration (aka Win Numbers)

- Extrapolation from individual-level models

Applications

- Resource allocation by campaigns, parties, and interest groups
  - State-by-state example for presidential campaigns
- Candidate recruitment
  - 2009 NYC Mayor example
- Donor investment strategies
  - Donor advising industry
- Spotting irregularities
  - Election night 2014

How Vote and Turnout Predictions Go Wrong

The "Total Survey Error" framework

Measurement

Construct
Validity
Measurement
Measurement Error
Response
Processing Error
Edited Data

Representation

Inferential Population
Target Population
Coverage Error
Sampling Frame
Sampling Error
Sample
Nonresponse Error
Respondents

Survey Statistic

(Reproduced from Groves et al, *Survey Methodology*)

Coverage error

- Occurs when the frame is unrepresentative of the overall population

- Examples:
  - A phone survey's frame cannot reach people who don't have phones
  - An online survey's frame cannot reach people who don't take online surveys
  - An election survey of registered voters using the voter file as a frame cannot reach people whose registrations have not yet been processed

- The difference between a population and a frame only becomes a source of error when the reason why some people are excluded is correlated with survey responses

Nonresponse error

- Occurs when individuals within a sample have an unequal probability of responding

- This is the most common form of error and (especially) bias in modern survey research

- Weighting survey responses is done to offset nonresponse error, but at extreme levels this can make surveys impossible

After brief plateau, telephone survey response rates have fallen again

Response rate by year (%)
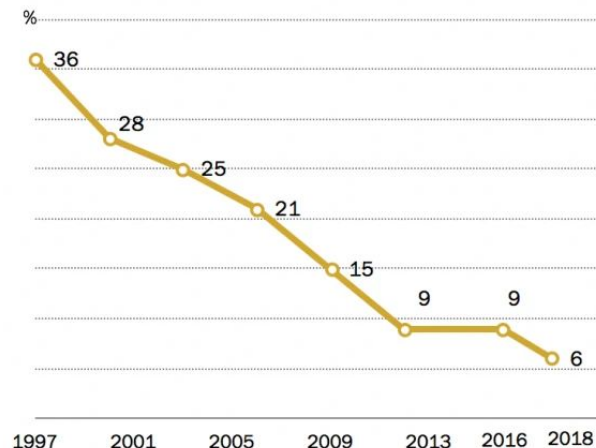
Note: Response rate is AAPOR RR3. Only landlines sampled 1997-2006. Rates are typical for surveys conducted in each year.
Source: Pew Research Center telephone surveys conducted 1997-2018.

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Measurement error

- Occurs when the actual characteristics being measured are not accurately reflected in the recorded response

- Can happen because of bad survey questions, respondent error, or interviewer error

  - Questions can be misleading to respondents or offer response choices that don't fit the way respondents would naturally answer a question

  - Respondents can mishear or misread a question, accidentally give the wrong answer, deliberately lie to interviewers, or pick an answer purely at random

  - Interviewers can incorrectly present a question, inaccurately record the response, or say things that would influence the respondent's answer

Measuring and mitigating errors and bias

- Traditional margins of error only reflect random error due to extrapolating from a sample, and are usually miscalculated (they don't account for increased errors due to weighting)

- Random error on its own is just a fact of life

- When bias is introduced by imperfect representation, it can be partly offset by weighting responses before analysis

- Bias can *only* be corrected by weighting if all the factors that introduced error are observable for everyone
  - Example: if the reasons some people only have cell phones are more complex than just demographics, then weighting cannot make a landline-only survey as good as one that also includes cell phones

Limitations of turnout prediction

- Turnout and likely voter models based on historical patterns cannot fully account for shifts in turnout patterns across elections

- Self-reports of turnout intention are an unreliable substitute

- Those most likely to turn out are also most likely to answer surveys, so infrequent voters may not be well-represented in polls (especially with likely voter screens)

- Turnout models require data that is consistent over the course of several election cycles

- Predicting turnout is very hard for young voters, new registrants, and those who've moved across state lines or changed names

Implications for predicting vote shares

- Predicted vote shares are based on combination of turnout predictions and vote choice predictions
  - Explicitly: combining modeled individual predictions of vote choice and turnout
  - Implicitly: applying likely voter models to survey results
- Bad predictions happen because of systematic problems
  - Misjudging overall turnout
  - Over- or under-estimating turnout rates among specific groups
  - Using likely voter models that are too loose or too tight in surveys
  - Assuming errors in individual or group predictions are independent of each other
- Can result in misallocation of resources or even demobilization
- Remember: more data reduces random error, not systematic bias

Looking ahead to 2020

- Survey research has continued to get harder, so methodologists have continued to innovate

- Highly unlikely that polls will get more accurate in 2020 compared to 2016 or previous elections

- The biggest lesson of 2016: we can't be certain about what's going to happen until the election's over

- Expect tension between incentives for forecasters to claim certainty and caution about repeating 2016 misses

- Within campaigns, the role of data will be determined by the individuals developing strategy - no clear trends thus far

Questions?