

# **GOV 1010: Survey Research Methods**

## **Pre-Election Polls**

We're forecasting the election with three models

Polls-plus forecast

What polls, the economy and historical data tell us about Nov. 8

Polls-only forecast

What polls alone tell us about Nov. 8

Now-cast

Who would win the election if it were held today

 National overview

Updates

National polls

States to watch

Arizona

Colorado

Florida

Georgia

Iowa

Maine

Michigan

Minnesota

Nevada

New Hampshire

New Mexico

North Carolina

Ohio

Pennsylvania

Utah

Virginia

Wisconsin

All states

Alabama

Alaska

Arizona

Arkansas

California

Colorado

Connecticut

Delaware

D.C.

Florida

Georgia

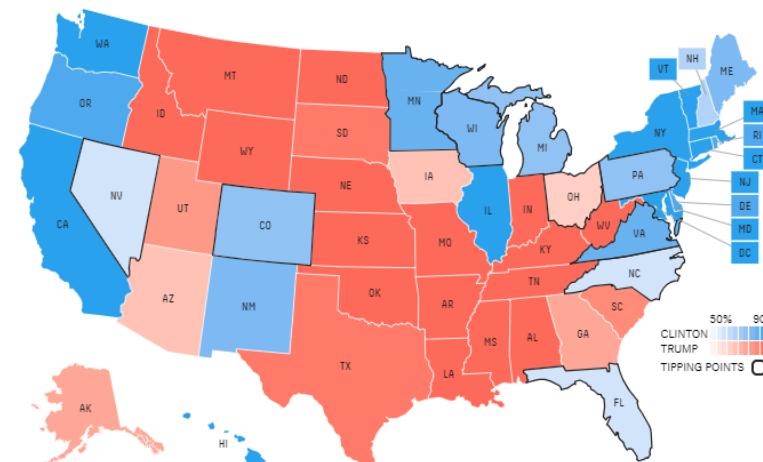
Hawaii

Idaho

## Who will win the presidency?



### Chance of winning



### Electoral votes

■ Hillary Clinton	302.2
■ Donald Trump	235.0
■ Evan McMullin	0.8
■ Gary Johnson	0.0

### Popular vote

■ Hillary Clinton	48.5%
■ Donald Trump	44.9%
■ Gary Johnson	5.0%
■ Other	1.6%

### How the forecast has changed

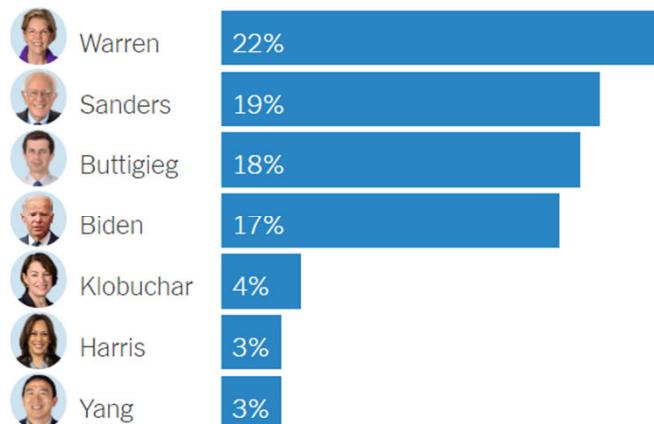
We'll be updating our forecasts every time new data is available, every day through Nov. 8.

# Latest News

## Warren Leads Tight Iowa Race as Biden Fades, Poll Finds

Ms. Warren garnered 22 percent in a New York Times/Siena College poll, to 19 percent for Bernie Sanders. Pete Buttigieg has surged, while Mr. Biden's travails have put the race in flux.

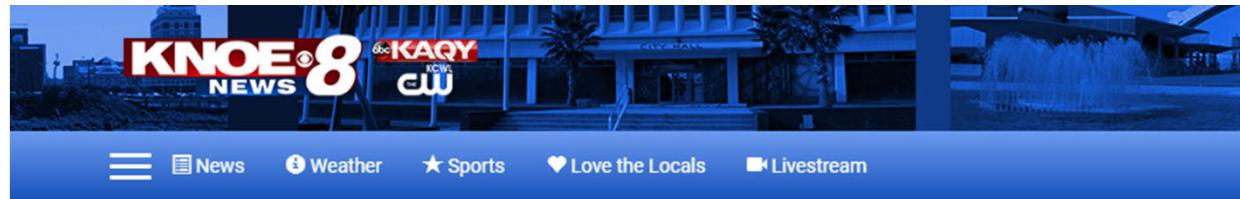
**Which of these Democrats would be your first choice in the Iowa caucuses?**



Source: New York Times Upshot/Siena College poll conducted Oct. 25-30. | Note: Candidates who received below 3 percent are not shown in this chart.

# Sources of Polling Data...

- RealClearPolitics [https://www.realclearpolitics.com/epolls/latest\\_polls/](https://www.realclearpolitics.com/epolls/latest_polls/)
- FiveThirtyEight.com <https://fivethirtyeight.com/politics/>
  - (Search for Polls)
- The Polling Report <https://www.pollingreport.com/>
  - Some Data Behind Paywall
- The Upshot <https://www.nytimes.com/interactive/2020/us/elections/democratic-polls.html>



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## New poll shows Edwards and Rispone in a tight race



According to the poll, 50.3% of respondents favor Edwards and 46.6% of respondents favor Rispone. 3.1% said they were undecided.

By Matthew Segura | Posted: Wed 5:00 PM, Oct 30, 2019 | Updated: Wed 5:09 PM, Oct 30, 2019



**MONROE, La. (KNOE)** - A new poll released on Oct. 30 shows a tight race between incumbent Governor John Bel Edwards and his Republican challenger Eddie Rispone.

The poll was released by Edgewater Research and My People Vote on Wednesday.

According to the poll, 50.3% of respondents favor Edwards and 46.6% of respondents favor Rispone. 3.1% said they were undecided.

Support is mostly along party lines. Only 11% of Democrats crossed party lines to support Rispone. Only 13% of Republicans showed support for Edwards. Among voters who are neither Democrat nor Republican, Edwards has 48% support while Rispone

**EDGEWATER RESEARCH | MY PEOPLE VOTE®**

2019 LOUISIANA GUBERNATORIAL RUNOFF

STATEWIDE SURVEY OF LIKELY VOTERS

October 30, 2019

A Louisiana statewide survey of 722 likely voters was conducted on October 28, 2019 by pollsters Dr. Edward Chervenak of Edgewater Research LLC and Tony Licciardi of My People Vote®. Dr. Chervenak is a 20-year veteran pollster of the University of New Orleans Survey Research Center (SRC). Licciardi served as a graduate research assistant in UNO's SRC as a doctoral student and he is the developer of the My People Vote® campaign canvassing app.

The poll gauged who likely voters preferred in the runoff for governor. It also asked respondents if they supported impeachment of the president.

A likely voter is defined in this survey as an individual who has voted at least 3 times in the last 5 statewide elections. Survey respondents were asked in an interactive voice response telephone survey (IVR)<sup>1</sup> who they preferred in the upcoming governor's runoff election and what their attitude was about impeachment. The survey yields a margin of error of +/- 3.6% at a confidence level of 95%.

# Remarkable Candor.....

<sup>1</sup> IVR surveys, also known as “robo-polls” employ an automated, recorded voice to call respondents who are asked to answer questions by punching telephone keys. Advantages of IVR surveys include their low cost, the almost immediate collection of data, and the simple and convenient processing of data. They also reduce interviewer bias to zero by eliminating the live human interviewer. Every survey respondent hears the same question read the same way.

When conducting IVR surveys, pollsters must not rely on all details of a call list. They cannot assume that the details of the person in the file will match the individual who picks up the call. Demographic categories of race, age, gender, and political party identification must be self-reported by the respondent to ensure a valid and accurate analysis.

Ideally, the sample of respondents should reflect the population of interest. Unfortunately, this is usually not the case. One of the problems with telephone surveys is non-response since some people may screen their calls or hang-up when called. This may cause some groups to be over- or under-represented.

Because IVR surveying is prohibited by FCC rules from calling cell phone numbers, only VOIP and home phone numbers can be called. The growing trend of minority and younger households without land lines can result in a coverage error. Residents who are cell phone only who would be eligible to participate are excluded from IVR polls, unless they answer the survey from a home telephone in another home. As such, no reliable conclusions can be drawn from the observed survey data unless the sample has been post-weighted to correct for the lack of representativeness. It is imperative that survey analysts accurately post weight the cases to reflect the demographics of the population of interest. In this instance this sample was post-weighted to reflect gender, age, racial, and regional parameters of the population of likely voters in Louisiana.

# Louisiana Polling Data

Poll	Dates	Number of Interviews	Population	Method	Edwards	Rispone	Don't know	Spread
Edgewater Research / My People Vote	October 28 2019	772	LV	IVR	50	47		Edwards + 3
JMC Analytics	October 24 - 26	600	LV	Blended IVR	50	47		Edwards + 3
We Ask America	October 14 - 16	600	LV	Blended IVR	47	47	6	Even



# Dem bypasses party unity in his run for Mississippi governor

By EMILY WAGSTER PETTUS, Associated Press | Nov. 1, 2019 | Updated: Nov. 1, 2019 1:27 p.m.



1 of 7



Democratic nominee for governor, Attorney General Jim Hood, addresses business leaders at the Mississippi Economic Council's annual "Hobnob Mississippi," in Jackson, Miss., Thursday, Oct. 31, 2019. The social event is hosted by the state chamber of commerce and is one of the last big political gatherings before the Nov. 5 elections.

Photo: Rogelio V. Solis, AP

# Mississippi Polling Data

Poll	Dates	Number of Interviews	Population	Method	Hood	Reeves	Other	Don't know	Spread
SurveyMonkey	October 8 - 22		1,002 RV	Opt-In Intenet	40	47	9	4	Reeves + 7
Targoz MR	October 13 - 20		384 LV	Internet Panel	46	47			Reeves +1
Mason-Dixon	October 17 - 19		625 RV	Telephone	43	46	2	9	Reeves +3
Hickman Analytics*	September 22 - 26		508 LV	Telephone	46	42			Hood + 4
Hickman Analytics*	August 11 - 15		600 LV	Telephone	43	42			Hood +1

\* Hickman Analytics Polls Sponsored by Hood for Governor

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TEXT 134

OPINION | COMMENTARY | CROSS COUNTRY

# Kentucky Governor's Race Tests Trump's Re-Election Strategy

Matt Bevin is abrasive and unpopular. Can he win a second term on a campaign of provocation?

Allycia Finley

Nov. 1, 2019 6:57 pm ET



Kentucky Gov. Matt Bevin at a debate in Highland Heights, Ky., Oct. 29. PHOTO: ALBERT CESARE/ASSOCIATED PRESS

# Kentucky Governor Polls

Poll	Dates	Number of Interviews	Population	Method	Beshear	Bevin	Hicks	Spread
Targoz Market Research	October 13 - 20	401	LV	Opt In Internet	50	47	4	<a href="#">Edwards + 3</a>
Targoz Market Research	October 13 - 20	548	RV	Opt In Internet	50	47	4	<a href="#">Edwards + 3</a>
Mason-Dixon	October 14 - 16	625	LV	Telephone	46	46	1	<a href="#">Even</a>

# Last Year at This Time

TRENDING: DONALD TRUMP ELIZABETH WARREN

FEATURED: RISING



## Just In...

Turkish officials believe Khashoggi body may have been destroyed in acid: report

INTERNATIONAL — 5M 44S AGO

Google employees stage walkouts over handling of workplace harassment

TECHNOLOGY — 9M 11S AGO

Manchin has 5-point lead over GOP challenger in West Virginia Senate race: poll

CAMPAIGN — 14M 45S AGO

Glenn Beck says Dem candidates to left of voters in heartland

RISING — 21M 24S AGO

Ex-Florida GOP chair shreds Trump: 'The

# Poll: Sinema leads McSally by 6 points in Arizona Senate race

BY TAL AXELROD - 10/30/18 10:05 AM EDT

126 COMMENTS

2,403 SHARES

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Rep. Kyrsten Sinema (D-Ariz.) holds a 6-point lead over Rep. Martha McSally (R-Ariz.) in the race to replace retiring Sen. Jeff Flake (R-Ariz.), according to a new NBC News/Marist poll released Tuesday.

Sinema gets the support of 50 percent of likely Arizona voters in the sample, while 44 percent support McSally. Six percent of likely voters say they will vote for another candidate or are undecided. Sinema led by 3 points in the same poll from September.

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Q

## POLL: Martha McSally has lead over Kyrsten Sinema as election nears

BY: Justin Pazera

POSTED: 7:04 PM, Oct 31, 2018

UPDATED: 3 hours ago

TAG: central phoenix | phoenix metro

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PHOENIX - New polling numbers out Wednesday show the Senate race between Martha McSally and Kyrsten Sinema is still close - but has McSally pulling ahead.

The exclusive ABC15 Arizona and OH Predictive Insights poll shows McSally with a seven-point lead with 52% of the vote compared to Sinema's 45%.

Only 2% are undecided with 1% saying they'll vote for Green Party candidate Angela Green.

The chief pollster for OH Predictive Insights says the shift in numbers is being linked to the confirmation of Brett Kavanaugh and the caravan of migrants headed to the United States.

"If Kavanaugh didn't happen I think it'd be an extremely tight race," said chief pollster Mike Noble. "If not, I'd actually say the odds would go to

# Arizona Polling

Poll	Dates	n (POP)	Sinema	McSalley
RCP Average	10/15 - 10/29	--	47.5	46.8 Sinema +0.7
FOX News	10/27 - 10/29	643 LV	46	46 Tie
CNN	10/24 - 10/29	702 LV	51	47 Sinema +4
NBC News/Marist	10/23 - 10/27	506 LV	50	44 Sinema +6
CBS News/YouGov	10/23 - 10/26	972 LV	47	44 Sinema +3
ABC 15/OH Predictive Insights*	10/22 - 10/23	600 LV	45	52 McSally +7
NY Times/Siena	10/15 - 10/19	606 LV	46	48 McSally +2
CBS News/YouGov	10/2 - 10/5	898 LV	47	44 Sinema +3
ABC 15/OH Predictive Insights	10/1 - 10/2	600 LV	41	47 McSally +6
FOX News	9/29 - 10/2	716 LV	47	45 Sinema +2
Suffolk*	9/27 - 9/30	500 LV	45	42 Sinema +3
Emerson*	9/19 - 9/21	650 RV	45	39 Sinema +6
NBC News/Marist	9/16 - 9/20	564 LV	48	45 Sinema +3
CNN	9/11 - 9/15	761 LV	50	43 Sinema +7
FOX News	9/8 - 9/11	710 LV	47	44 Sinema +3
ABC 15/OH Predictive Insights	9/5 - 9/6	597 LV	46	49 McSally +3
Gravis	9/5 - 9/7	882 LV	48	49 McSally +1
ABC 15/OH Predictive Insights	7/23 - 7/25	600 LV	48	44 Sinema +4
Gravis	6/27 - 7/2	925 LV	43	39 Sinema +4
Emerson	6/21 - 6/22	650 RV	40	32 Sinema +8
NBC News/Marist	6/17 - 6/21	839 RV	49	38 Sinema +11
CBS News/YouGov	6/19 - 6/22	869 LV	45	37 Sinema +8
ABC 15/OH Predictive Insights	4/10 - 4/11	600 LV	48	42 Sinema +6
OH Predictive Insights	11/9 - 11/9	600 LV	46	45 Sinema +1

Search for a race or candidate

 Search

Back to the national overview

## How do you like your Senate forecast?

 Lite

Keep it simple, please — give me the best forecast you can based on what state and national polls say

 Classic

I'll take the polls, plus all the "fundamentals": fundraising, past voting in the state, historical trends and more

 Deluxe

Gimme the works — the Classic forecasts plus experts' ratings

## Arizona LEAN D

**5 in 8**

Chance the Democrat wins (61.7%)

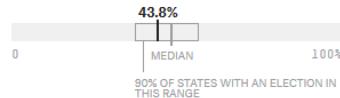
**3 in 8**

Chance the Republican wins (38.3%)

Candidate	Forecasted vote share	Chance of winning
Kyrsten Sinema (D)	49.8	<b>5 in 8</b> (61.7%)
Martha McSally (R)	48.2	<b>3 in 8</b> (38.3%)
Angela Green (Green)	2.0	<1 in 100 (<0.1%)

## Forecasted turnout

Our model expects 2,016,000 out of an estimated 4,598,000 eligible voters to cast a ballot — that's 43.8%



## Partisan lean

Arizona is 9.3 points more Republican than the nation overall and is the 23rd-most-Republican state in the country



## What goes into the Lite forecast in Arizona

The Lite version of our model normally projects a race's outcome by taking a weighted average of polls of the race (if available) and polls of similar races (CANTOR). In this race, there are lots of polls available, so the Lite forecast is based on those polls alone.



Search for a race or candidate

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## How do you like your Senate forecast?

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Keep it simple, please — give me the best forecast you can based on what state and nation voters say

 Classic  
I'll take the polls, plus all the "fundamentals": fundraising, past voting in the state, historical trends and more

Gimme the works — the Classic forecasts plus experts' ratings

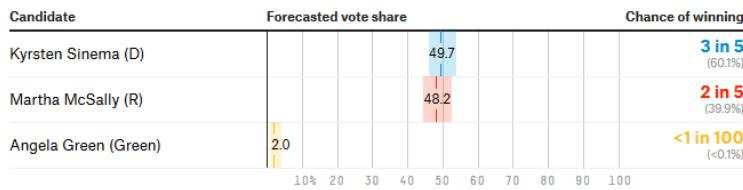
## Arizona LEAN D

**3 in 5**

Chance the Democrat wins (60.1%)

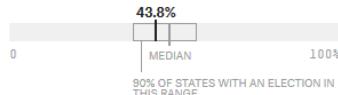
**2 in 5**

Chance the Republican wins (39.9%)



## Forecasted turnout

Our model expects 2,016,000 out of an estimated 4,598,000 eligible voters to cast a ballot — that's 43.8%



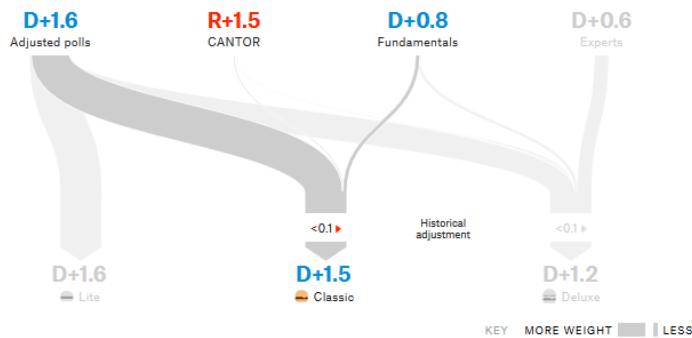
## Partisan lean

Arizona is 9.3 points more Republican than the nation overall and is the 23rd-most-Republican state in the country



## What goes into the Classic forecast in Arizona

The Classic version of our model projects a race's outcome by taking a weighted average of polls of the race (if available), polls of similar races (CANTOR) and non-polling factors (fundamentals). It is then reverted toward a mean based on long-term trends in midterms and presidential approval ratings.



Search for a race or candidate

 Search

Back to the national overview

## How do you like your Senate forecast?

 Lite

Keep it simple, please — give me the best forecast you can based on what state and national polls say

 Classic

I'll take the polls, plus all the "fundamentals," past voting in the state, historical trends and more

 Deluxe

Gimme the works — the Classic forecasts plus experts' ratings

Arizona TOSS-UP**4 in 7**

Chance the Democrat wins (58.5%)

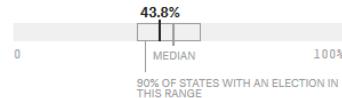
**3 in 7**

Chance the Republican wins (41.5%)

Candidate	Forecasted vote share	Chance of winning
Kyrsten Sinema (D)	49.6	<b>4 in 7</b> (58.5%)
Martha McSally (R)	48.4	<b>3 in 7</b> (41.5%)
Angela Green (Green)	2.0	<1 in 100 (<0.1%)

## Forecasted turnout

Our model expects 2,016,000 out of an estimated 4,598,000 eligible voters to cast a ballot — that's 43.8%



## Partisan lean

Arizona is 9.3 points more Republican than the nation overall and is the 23rd-most-Republican state in the country



## What goes into the 🍔 Deluxe forecast in Arizona

The Deluxe version of our model projects a race's outcome by taking a weighted average of polls of the race (if available), polls of similar races (CANTOR), non-polling factors (fundamentals) and expert ratings. It is then reverted toward a mean based on long-term trends in midterms and presidential approval ratings.



**Live Polls**

What is live polling?

Mich. 8 • Va. 7 • Calif. 48 • Tex. 32 • Ga. 6 • N.J. 7 • Wash. 8 •

NYT Upshot / Siena College Poll

## We polled voters in Arizona.

*This poll was conducted from Oct. 15 to Oct. 19.*

Two congresswomen square off over Jeff Flake's open seat. We made **39,289** calls, and **606** people spoke to us.

### Our poll shows a close race.



Martha McSally  
CONGRESSWOMAN



Undecided



Kyrsten Sinema  
CONGRESSWOMAN

But remember: It's just one poll, and we talked to only 606 people. Each candidate's total could easily be four points different if we polled everyone in the state. And having a small sample is only one possible source of error.

[RACE DETAILS](#) | [RESULTS OVER TIME](#) | [TURNOUT ①](#) | [WHO RESPONDED](#) | [ISSUES](#) | [CROSSTABS](#)

### Where we called:

Each dot shows one of the **39,289** calls we made.

Vote choice:  Dem.  Rep.  Don't know  Didn't answer





# The New York Times

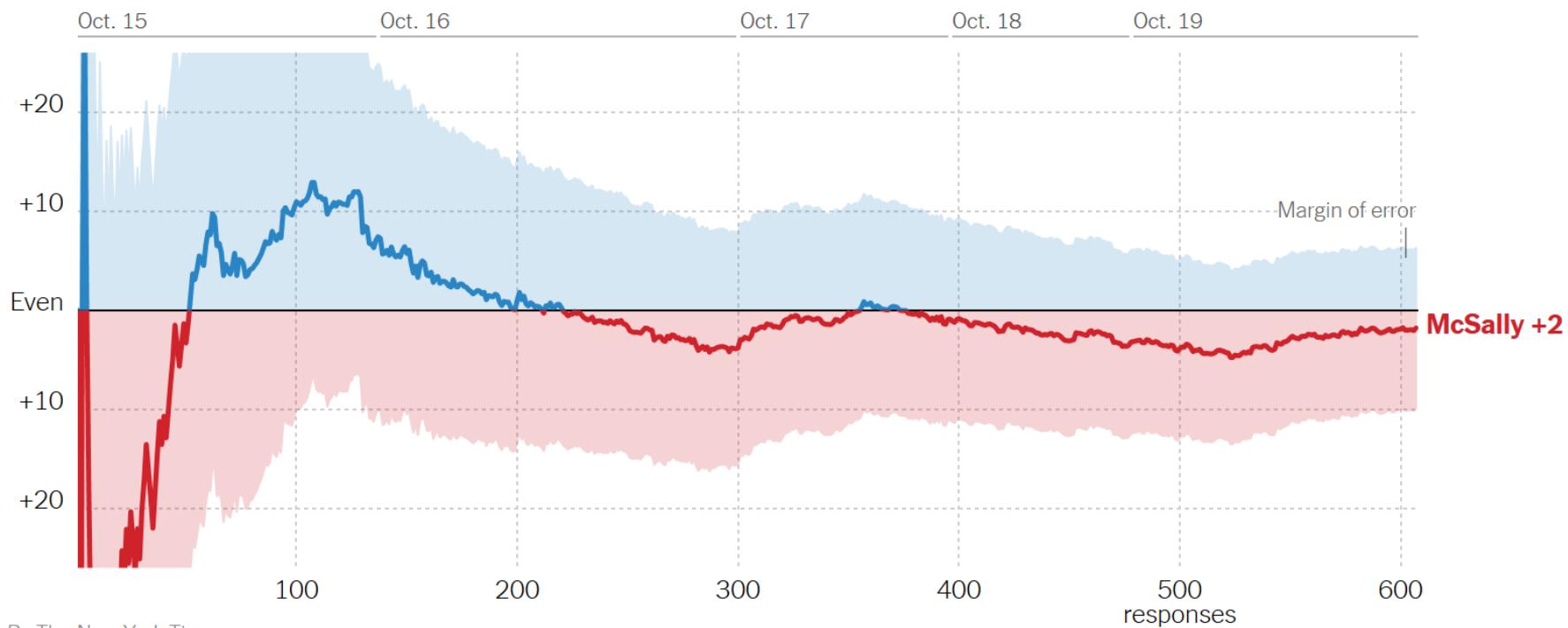


## Live Polls

What is live polling?

Mich. 8 ● Va. 7 ● Calif. 48 ● Tex. 32 ● Ga. 6 ● N.J. 7 ● Wash. 8 ● Iowa 1

sampling error will shrink. The changes in the timeline below reflect that sampling error, not real changes in the race.



By The New York Times

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# The New York Times



## Live Polls

What is live polling?

Mich. 8 • Va. 7 • Calif. 48 • Tex. 32 • Ga. 6 • N.J. 7 • Wash. 8 • Iowa 1

this race.

	WHO WILL VOTE?	EST. TURNOUT	OUR POLL RESULT
Our poll under different turnout scenarios	The types of people who voted in 2014	1.5m	McSally +6
	People whose voting history suggests they will vote, regardless of what they say	2m	McSally +3
	Our estimate	2m	McSally +2
	People who say they are almost certain to vote, and no one else	2.1m	Sinema +7
	People who say they will vote, adjusted for past levels of truthfulness	2.1m	McSally +3
	The types of people who voted in 2016	2.3m	McSally +5
	Every active registered voter	3.4m	McSally +2

All estimates based on 606 interviews

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# The New York Times



## Live Polls

What is live polling?

Mich. 8 • Va. 7 • Calif. 48 • Tex. 32 • Ga. 6 • N.J. 7 • Wash. 8 •

Pollsters compensate by giving more weight to respondents from under-represented groups.

Here, we're weighting by age, party registration, gender, likelihood of voting, race, education and region, mainly using data from voting records files compiled by L2, a nonpartisan voter file vendor.

But weighting works only if you weight by the right categories and you know what the composition of the electorate will be. In 2016, many pollsters didn't weight by education and overestimated Hillary Clinton's standing as a result.

Here are other common ways to weight a poll:

### OUR POLL RESULT

Our poll under different weighting schemes	Don't weight by party registration, like most public polls	Even
	Don't weight by education, like many polls in 2016	McSally +1
	Weight using census data instead of voting records, like most public polls	McSally +1
	Our estimate	McSally +2

All estimates based on 606 interviews

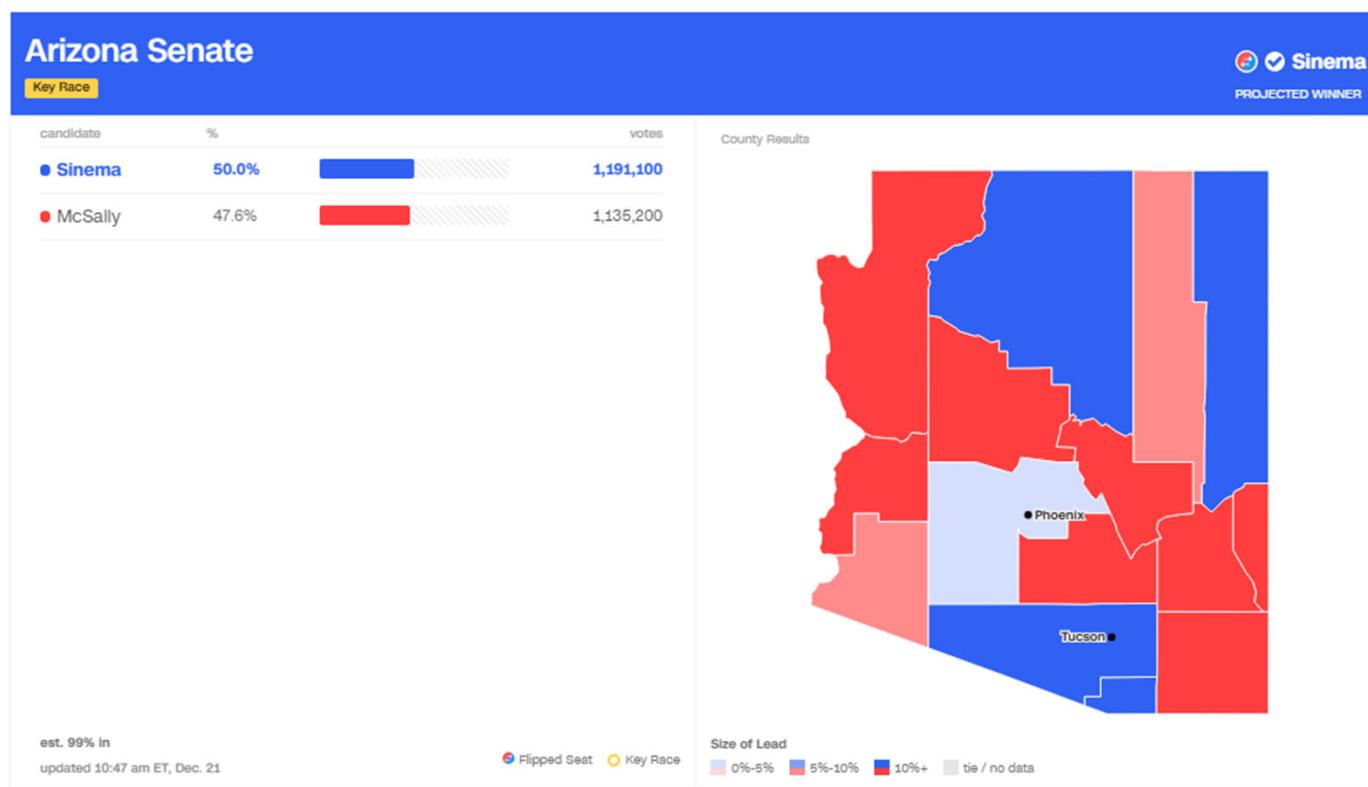
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# Arizona

Arizona is one of just a handful of pickup opportunities for Democrats where a win would bolster their chances of taking back the Senate. Two members of Congress are fighting hard for the seat opened up by Republican Jeff Flake's retirement. Reps. Kyrsten Sinema (D) and Martha McSally (R), who made history as the Air Force's first woman to fly in combat, are facing off in one of the most competitive Senate races of the year. President Trump's health care and immigration policies have emboldened both sides to vote in the Grand Canyon State, where he won by only 4 points in 2016. In addition to the Senate race, Gov. Doug Ducey (R) is seeking his second term against university professor David Garcia in a race where education has become a central issue. The unexpectedly tight margin in the 8th House District special election in April — a district Trump won by more than 20 points — has Democrats seeing an opening for the party. Three of the five GOP congressional races are considered competitive, including McSally's Tucson-area district, which Hillary Clinton won by 5 points.

[SENATE](#) [HOUSE](#) [GOVERNOR](#)



Two years ago.....

TRENDING: LAS VEGAS DONALD TRUMP NORTH KOREA



## Just In...

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FLOOR ACTION — 5M 48S AGO

**Government should not interfere with patient-physician decision making**  
OPINION — 6M 24S AGO

**Texas shooting brings familiar response on Capitol Hill**  
HOUSE — 6M 49S AGO

**Research group says GOP tax bill costs \$1.75 trillion**  
FINANCE — 10M 57S AGO

**It's time to put an old cop back on the internet beat**  
OPINION — 26M 24S AGO

**EPA won't say which areas don't meet Obama smog rule**  
ENERGY & ENVIRONMENT — 30M 50S AGO

**Major internet outages after 'configuration error'**  
TECHNOLOGY — 34M 35S AGO

# Poll: Moore up 17 points in Alabama Senate race

BY MALLORY SHELBOURNE - 10/31/17 11:49 AM EDT

576 COMMENTS

921 SHARES



© Greg Nash

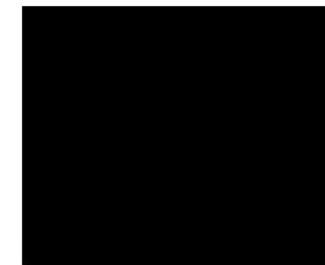
Republican Roy Moore leads his Democratic opponent in the Alabama Senate race by 17 points, according to a new poll.

Moore takes 56 percent of the vote, while Democrat Doug Jones takes 39 percent, according to a survey commissioned by the Senate Leadership Fund (SLF), which has ties to Senate Majority Leader Mitch McConnell (R-Ky.), and conducted by Axis Research.

More than half of voters in Alabama are backing Moore, a former state supreme court justice, the poll noted. The survey also said Alabamians care most about transforming Washington, D.C. and moral values.

The results of the survey come a little more than one month before the special election to fill the seat vacated by Attorney General Jeff Sessions.

Moore, who lead an insurgent campaign to defeat Sen. Luther Strange (R-Ala.) in September, has the backing of former White House chief strategist Stephen Bannon. Bannon has vowed to challenge the Republican establishment in the 2018 midterm elections.



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- 4 There is nothing normal



## Polls

Battleground States

Top Senate Races

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Quick Poll/Map Links

### Alabama Senate Special Election - Moore vs. Jones (December 12)

Earlier Results: GOP Primary (Aug 15): Moore 38.9, Strange 32.8, Brooks 19.7, Pittman 6.9 | GOP Run-Off (Sep 26): Moore 54.6, Strange 45.4



Candidates	
Roy Moore (R) <a href="#">Bio</a>   <a href="#">Campaign Site</a>	Doug Jones (D) <a href="#">Bio</a>   <a href="#">Campaign Site</a>

Alabama Snapshot
RCP Average: Moore +6.0 -----PAST KEY RACES----- 2016: President   Senate 2014: Senate   Governor 2012: President 2010: Governor   Senate   AL-2   AL-5 2008: President 2006: Governor 2004: President

Poll	Date	Sample	MoE	Moore (R)	Jones (D)	Spread
RCP Average	9/27 - 10/19	--	--	48.0	42.0	Moore +6.0
FOX 10/Strategy Research	10/19 - 10/19	3000 LV	3.0	52	41	Moore +11
FOX News	10/14 - 10/16	801 RV	3.5	42	42	Tie
JMC Analytics	9/30 - 10/1	500 LV	4.4	48	40	Moore +8
Opinion Savvy	9/27 - 9/28	590 LV	4.0	50	45	Moore +5

All Alabama Senate Special Election - Moore vs. Jones Polling Data



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- Parties' 2018 Hopes Ride on Selling--or Maligning--Tax Bill
- House Republicans Unveil Tax Cuts, But Obstacles Remain
- Presidential Job Approval
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Scientists Nearly Kept This Subatomic Discovery Secret



Is Roger Goodell Pulling the NFL to the Left?



Kate Upton Instagrams Wedding Pic With Astros' Justin Verlander

### In The News



Conway to Stelter: In Your Network's "Commercial Interest" To Be Anti-Trump; "CNN Should Own It"



Trump In Japan: When Nations Underestimated Us "It Was Not Pleasant For Them"

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Tax Cuts Now John F. Kennedy - Commercial From Job Creators Network

# Alabama Senate Special Election - Moore vs. Jones (December 12)



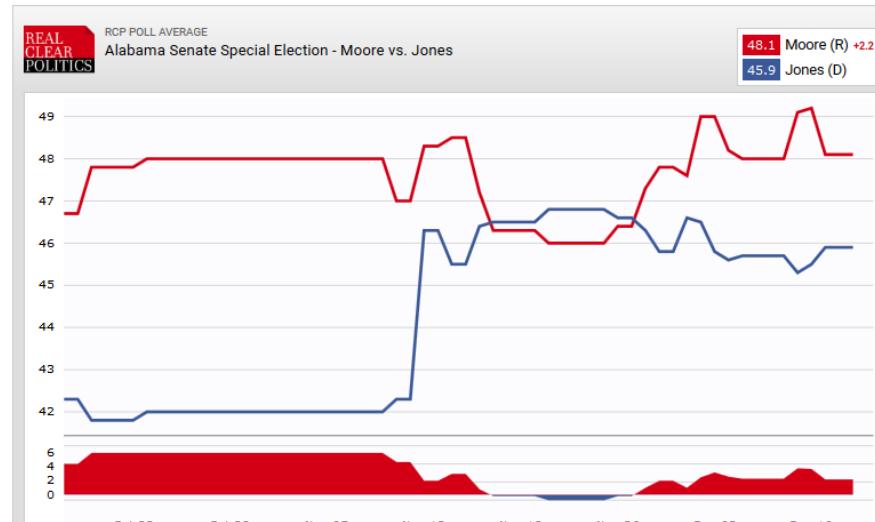
Earlier Results: GOP Primary (Aug 15): Moore 38.9, Strange 32.8, Brooks 19.7, Pittman 6.9 | GOP Run-Off (Sep 26): Moore 54.6, Strange 45.4

Candidates	
Roy Moore (R) <a href="#">Bio</a>   <a href="#">Campaign Site</a>	Doug Jones (D) <a href="#">Bio</a>   <a href="#">Campaign Site</a>

Alabama Snapshot	
RCP Average: Moore +2.2 RCP Ranking: Toss Up	PAST KEY RACES
2016: President   Senate 2014: Senate   Governor 2012: President 2010: Governor   Senate   AL-2   AL-5 2008: President 2006: Governor 2004: President	

Polling Data						
Poll	Date	Sample	MoE	Moore (R)	Jones (D)	Spread
Final Results	--	--	--	48.4	49.9	Jones +1.5
RCP Average	11/27 - 12/10	--	--	48.1	45.9	Moore +2.2
FOX News	12/7 - 12/10	1127 LV	3.0	40	50	Jones +10
Emerson	12/7 - 12/9	600 LV	3.9	53	44	Moore +9
Monmouth	12/6 - 12/9	546 LV	4.2	46	46	Tie
Trafalgar Group (R)	12/6 - 12/7	1419 LV	2.6	51	46	Moore +5
Gravis	12/5 - 12/8	1254 LV	2.8	49	45	Moore +4
WBRC-TV/Strategy Research	12/4 - 12/4	3200 LV	2.0	50	43	Moore +7
CBS News/YouGov	11/28 - 12/1	766 LV	4.8	49	43	Moore +6
Wash Post/Scharf	11/27 - 11/30	739 LV	4.5	47	50	Jones +3

All Alabama Senate Special Election - Moore vs. Jones Polling Data



## From RealClearLife



Republican Pilot Sully Lands in Middle of Midterm Politics by Slamming GOP



"Halloween," "Widows" Show #MeToo Movement Ready for Close-up



Popularity of Indian Costumes on Halloween a Horror for Native Americans

## Latest Polls

All Polls

### Arizona Senate - McSally vs. Sinema

CNN  
Sinema 51    McSally 47  
Sinema +4

### Nevada Senate - Heller vs. Rosen

CNN\*  
Heller 45    Rosen 48  
Rosen +3

### Tennessee Senate - Blackburn vs. Bredesen

NBC News/Marist  
Blackburn 51    Bredesen 46  
Blackburn +5

### Wisconsin Senate - Vukmir vs. Baldwin

Marquette  
Baldwin 54    Vukmir 43  
Baldwin +11

More Latest Polls

## In The News



RNC Chair Ronna McDaniel: Republicans Keep Control Of House, May Pick Up More Senate Seats



Carlson: Establishment Siding With Foreigners Over Its Own People, That Tells You Everything



Don Lemon: "Biggest Terror Threat In This Country Is White Men"; We Had Muslim Ban, Why No "White Guy Ban?"

# Alabama Election Results: Doug Jones Defeats Roy Moore in U.S. Senate Race

By MATTHEW BLOCH, NATE COHN, JOSH KATZ and JASMINE LEE DEC. 12, 2017, 11:59 PM ET

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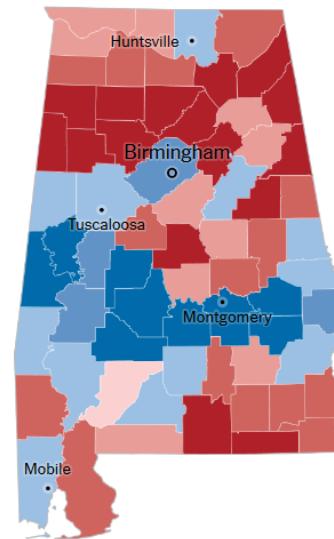
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CANDIDATE	PARTY	VOTES	PCT.
✓ Doug Jones	Democrat	671,151	49.9%
Roy Moore	Republican	650,436	48.4
Total Write-Ins	—	22,819	1.7

100% reporting (2,220 of 2,220 precincts)

Doug Jones, a Democrat, won the [special election](#) on Tuesday to fill the United States Senate seat vacated by Jeff Sessions, now the attorney general. Mr. Jones aimed to create a lead in the urban counties that include Birmingham and Montgomery, and across a band of largely black counties. Strong support for Roy S. Moore, the Republican, was expected in rural, mostly white parts of the state.

One critical battleground was a trio of smaller, whiter cities: Mobile, Tuscaloosa and Huntsville. Late Tuesday night, Mr. Jones led by a large margin in Mobile County, and he had won Tuscaloosa County and Madison County, home of Huntsville.



COUNTY	JONES	MOORE	WRITE-INS	RPT.
Jefferson	149,522	66,309	3,710	100%
Madison	65,664	46,313	3,446	100
Mobile	62,253	46,725	1,539	100

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Back in 2015 in Kentucky.....

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## Why were the polls so wrong?, Kentucky governor edition

A [B](#) [22](#)

By Philip Bump November 4 Follow @pbump



Democratic gubernatorial candidate Jack Conway thanks his supporters during a concession speech at the Kentucky Democratic Party election night watch party at the Frankfort Convention Center in Frankfort, Ky., Tuesday, Nov. 3, 2015. (AP Photo/David Stephenson)

If you'd asked most political people a week ago who'd be celebrating his victory in the Kentucky gubernatorial race Wednesday morning, they'd have probably guessed it would be the Democrat, Jack Conway. Kentucky has a long tradition of electing Democrats to the highest position in the state; since 1971, only one Republican had won the position (Ernie Fletcher in 2003).

But also, the polls! Surveys conducted in late October showed Conway with a decent lead over Republican Matt Bevin -- suggesting that the race would be close, but Conway was likely to win.

Conway didn't win. Conway got beaten, badly -- as did three other Democrats running in Kentucky's six statewide elections.

So how'd the polls get it so wrong? And, as an important corollary, should we, once again, be worried about the polling guiding the coverage of the 2016 election?

First, let's consider the polls, as compiled by [Huffington Post Pollster](#). There were only six since October 1, including an internal poll from Bevin's campaign. (Independent [Drew Curtis](#) is indicated with a yellow line.)

**Most Read**

- How the Missouri football team just took down its university president
- Chief justice favors some when assigning court's major decisions
- A decade into a project to digitize U.S. immigration forms, just 1 is online
- The Daily 202: First-time candidate Ben Carson doesn't understand what running for president entails
- Federal salaries lag behind private sector by 35 percent on average, pay council says

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Why

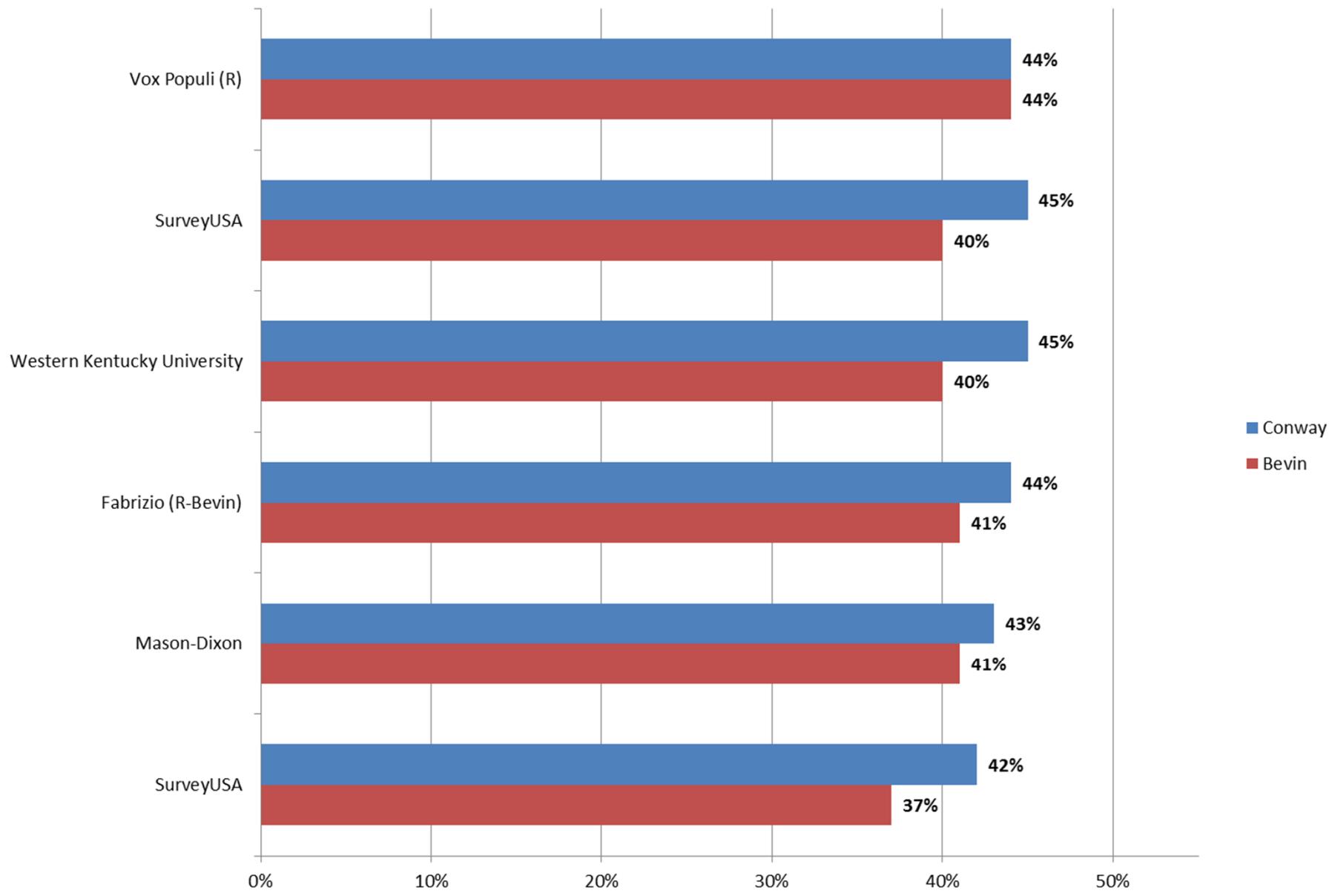
# Pre-Election Polls in Kentucky

## Kentucky Pre-Election Polls (Governor 2015)

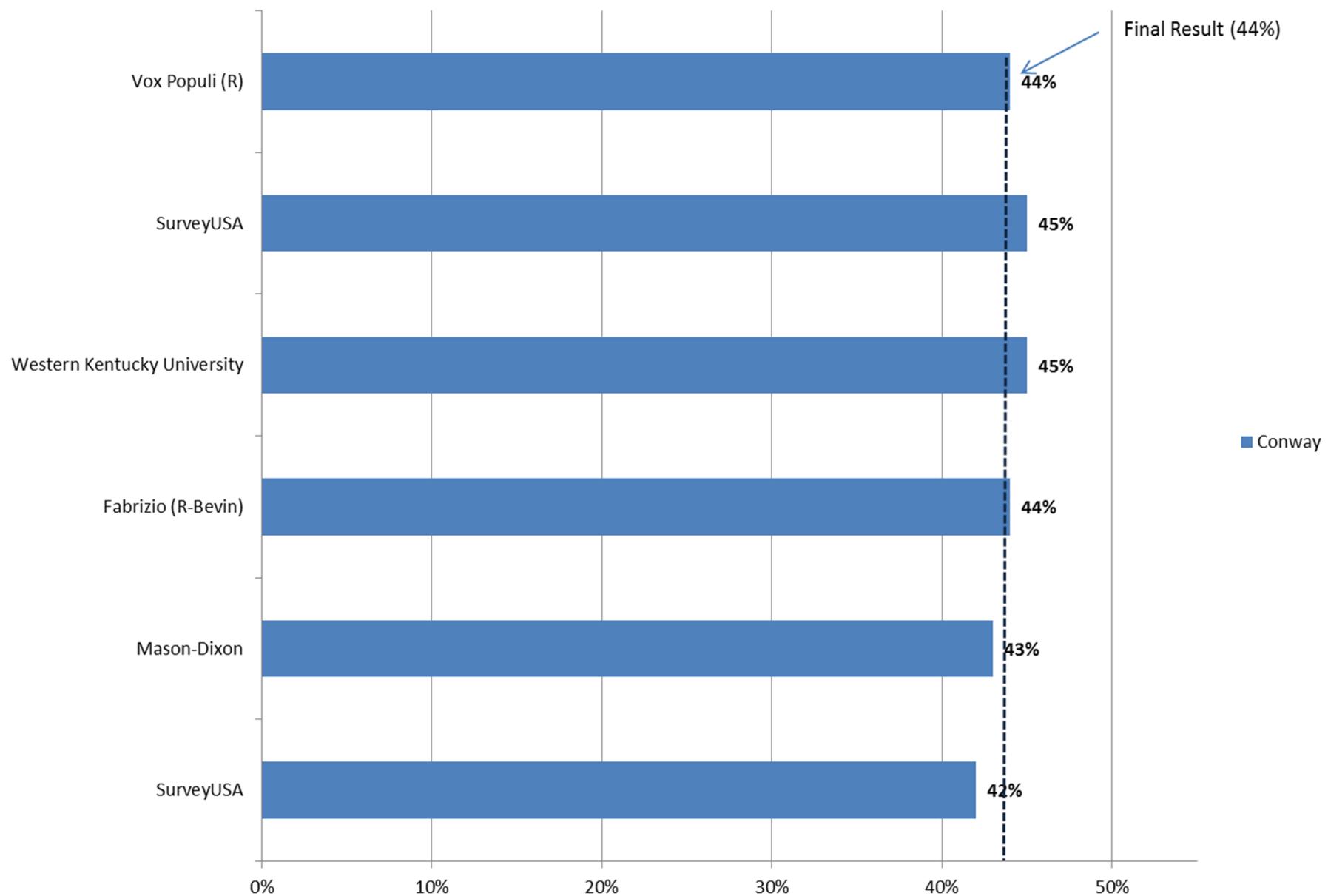
Firm	Dates	Pop.	Conway	Bevin	Curtis	Undecided
Vox Populi (R)	10/26 - 10/27	618	44	44	6	5
SurveyUSA/Courier-Journal/Herald-Leader/WHAS/WKYT	10/23 - 10/26	798	45	40	6	10
Western Kentucky University	10/19 - 10/25	770	45	40	7	8
Fabrizio (R-Bevin)	10/14 - 10/15	500	44	41	11	4
Mason-Dixon	10/6 - 10/8	625	43	41	6	10
SurveyUSA/Courier-Journal/Herald-Leader/WHAS/WKYT	9/22 - 9/27	701	42	37	7	15

**Target Populations: Likely Voters**

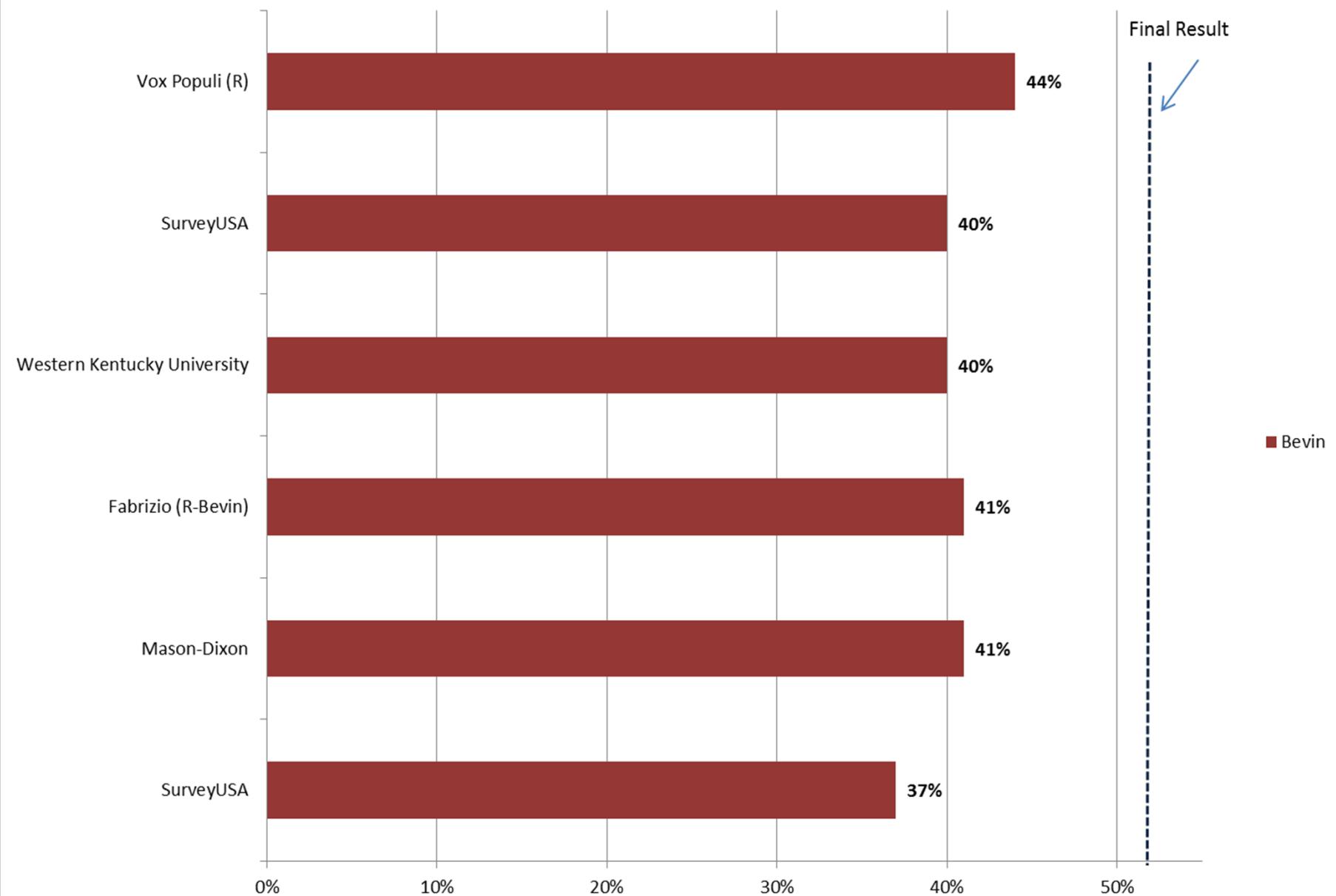
## Kentucky Election Polls (Governor)



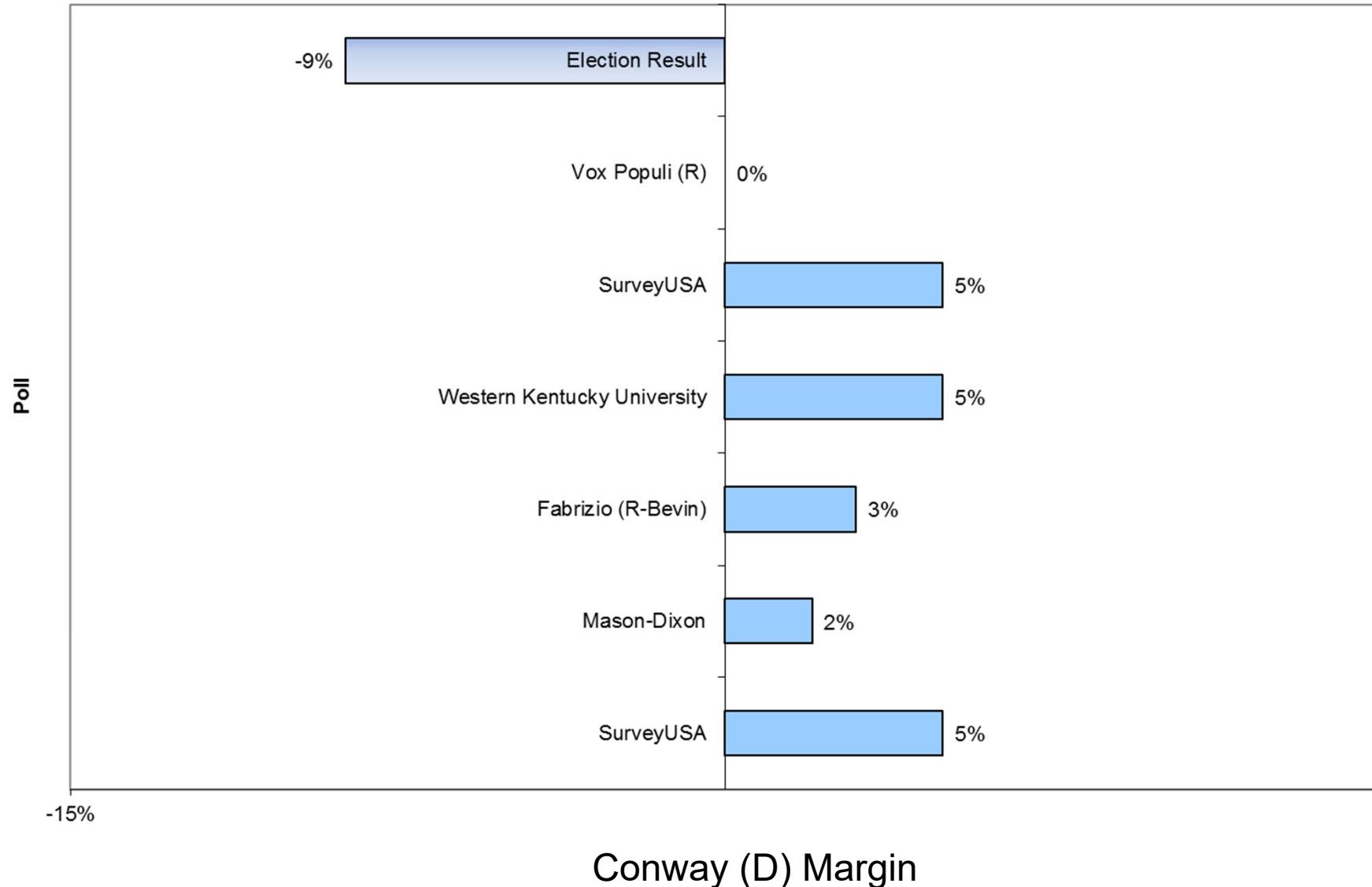
## Kentucky Election Results (Governor)



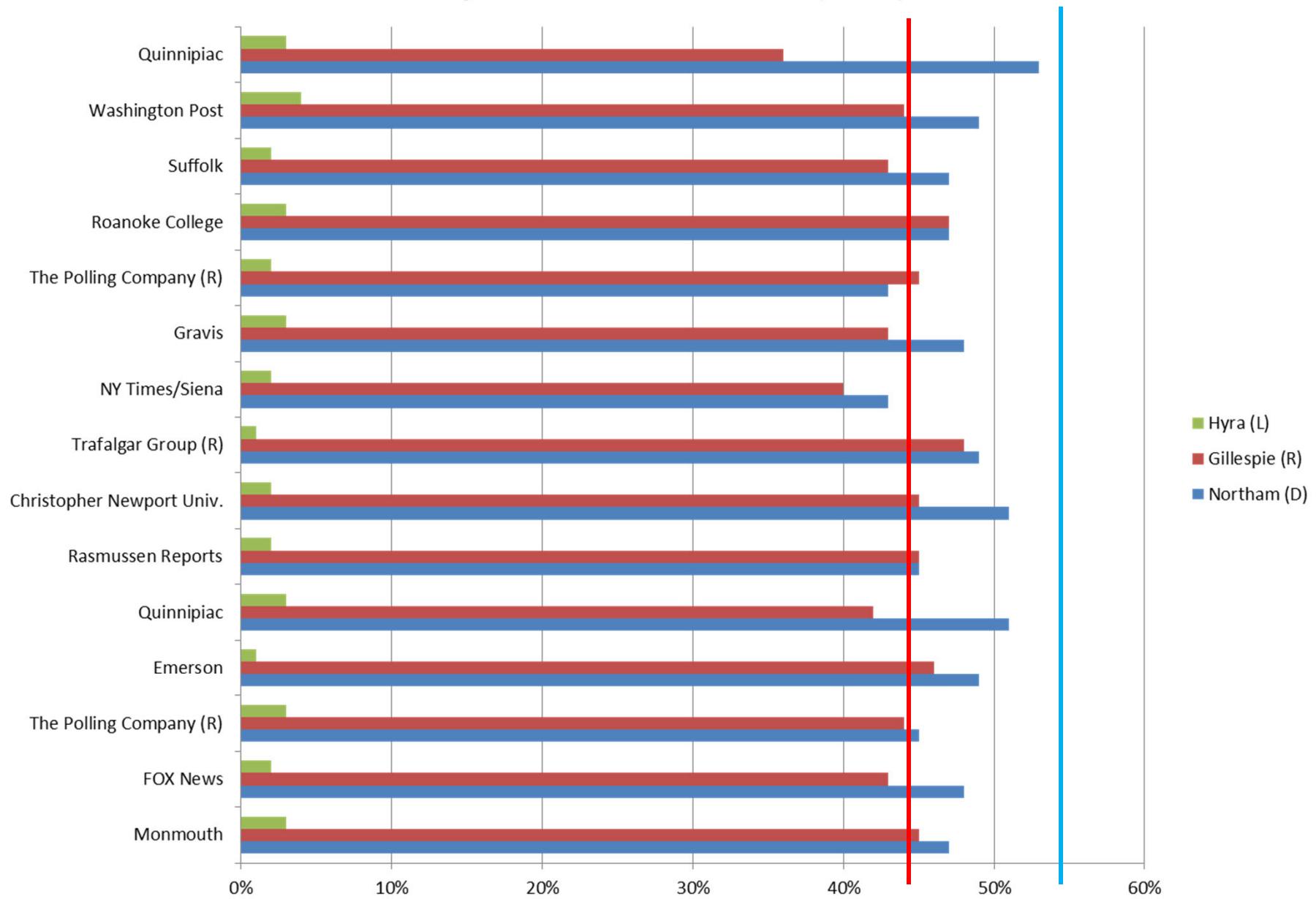
## Kentucky Election Results (Governor)



## Final Election Poll Predictions (Democratic Margin)



## Virginia Pre-Election Polls (2017)



# Reasons why???

- Who is the target population?
- How was the target population sampled?
  - Sample frame
  - Sampling method

# Likely Voter Models

- Likely voter models use a survey to predict an election
- Items:
  - Voter registration
  - Self-reported intention
  - Past voter history (self-reported)
  - Interest in campaign

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2019 LOUISIANA GUBERNATORIAL RUNOFF

STATEWIDE SURVEY OF LIKELY VOTERS

October 30, 2019

A Louisiana statewide survey of 722 likely voters was conducted on October 28, 2019 by pollsters Dr. Edward Chervenak of Edgewater Research LLC and Tony Licciardi of My People Vote®. Dr. Chervenak is a 20-year veteran pollster of the University of New Orleans Survey Research Center (SRC). Licciardi served as a graduate research assistant in UNO's SRC as a doctoral student and he is the developer of the My People Vote® campaign canvassing app.

The poll gauged who likely voters preferred in the runoff for governor. It also asked respondents if they supported impeachment of the president.

A likely voter is defined in this survey as an individual who has voted at least 3 times in the last 5 statewide elections. Survey respondents were asked in an interactive voice response telephone survey (IVR)<sup>1</sup> who they preferred in the upcoming governor's runoff election and what their attitude was about impeachment. The survey yields a margin of error of +/- 3.6% at a confidence level of 95%.

# Christopher Newport (Virginia) Methodology

- **How the survey was conducted:** The results of this poll are based on 839 interviews of likely Virginia voters in the upcoming November election (**registered voters who have voted in recent statewide elections, who also say they are thinking about the upcoming election, are following news about the campaigns, and will definitely or probably vote in the upcoming elections**), including 400 on landline and 439 on cell phone, conducted October 29 to November 4, 2017. Percentages may not equal 100 due to rounding. The margin of error for the likely voter model is +/- 3.5% at the 95% level of confidence. This means that if 50% of respondents indicate a topline view on an issue, we can be 95% confident that the population's view on that issue is somewhere between 46.5% and 53.5%. The margin of error is higher for subgroups. All error margins have been adjusted to account for the survey's design effect, which is 1.1 in this survey. The design effect is a factor representing the survey's deviation from a simple random sample, and takes into account decreases in precision due to sample design and weighting procedures. Sub samples have a higher margin of error. In addition to sampling error, the other potential sources of error include non-response, question wording, and interviewer error. The response rate (AAPOR RRI Standard Definition) for the survey was 18%. Five callbacks were employed in the fielding process. Live calling was conducted by trained interviewers at the Wason Center for Public Policy Survey Research Lab at Christopher Newport University. **The data reported here are weighted using an iterative weighting process on sex, age, race and region of residence to reflect as closely as possible the demographic composition of likely voters in the November 2017 Virginia elections.**

# Turnout Models

- RBS: Registration-Based Sampling
  - Voter lists
  - Predict turnout from past turnout
- Hybrid approaches
  - Predict turnout based on self-report
  - Supplement with past history
- Weighted turnout
  - Estimate likely electorate
  - Demographics: Education, gender, age, etc.

# Sources for Turnout Information

- Current Population Supplement
  - Biennel Data
  - Large probability-based survey
- Exit Polls: Edison/Mitofsky or Others
  - Survey on day of election
  - Telephone supplement for early voting / absentee
- Proprietary methods
  - Append data to voter files



After a Tough 2016, Many Pollsters Haven't Changed Anything



THE NEW HEALTH CARE  
Don't Nudge Me: The Limits of Behavioral Economics in Medicine



OPINION  
Relax, You Don't Need to 'Eat Clean'



Upshot/Siena Poll Gives Democrat Narrow Lead in Virginia Governor's Race



Your Race Against Time: How Climate Affects the Marathon



What Did Bernie Sanders Learn in His Weekend in Canada?

## The Upshot

THE 2016 RACE

SHARE

# We Gave Four Good Pollsters the Same Raw Data. They Had Four Different Results.

By NATE COHN SEPT. 20, 2016

How four pollsters, and The Upshot, interpreted 867 poll responses:



You've heard of the "margin of error" in polling. Just about every article on a new poll dutifully notes that the margin of error due to sampling is plus or minus three or four percentage points.

But in truth, the "margin of sampling error" – basically, the chance that polling different people would have produced a different result – doesn't even come close to capturing the potential for error in surveys.

Polling results rely as much on the judgments of pollsters as on the science of survey methodology. Two good pollsters, both looking at the same underlying data, could come up with two very different results.

How so? Because pollsters make a series of decisions when designing their survey, from determining likely voters to adjusting their respondents to match the demographics of the electorate. These

1  
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## Different Approaches

Charles Franklin [Clinton +3](#)

Marquette Law

Mr. Franklin approximated the approach of a traditional pollster and did not use any of the information on the voter registration file. He weighed the sample to an estimate of the demographic composition of Florida's registered voters in 2016, based on census data, by age, sex, education, gender and race. Mr. Franklin's likely voters were those who said they were "almost certain" to vote.

Patrick Ruffini [Clinton +1](#)

Echelon Insights

Mr. Ruffini weighted the sample by voter file data on age, race, gender and party registration. He next added turnout scores: an estimate for how likely each voter is to turn out, based exclusively on their voting history. He then weighted the sample to the likely turnout profile of both registered and likely voters – basically making sure that there were the right number of likely and unlikely voters in the voter file. This is probably the approach most similar to the Upshot/Siena methodology, so it is not surprising that it also is the closest result.

Sam Corbett-Davies, Andrew Gelman and David Rothschild [Trump +1](#)

Stanford University/Columbia University/Microsoft Research

Long story short: They built a model that tries to figure out what characteristics predict support for Mrs. Clinton and Mr. Trump based on many of the same variables used for weighting. They then predicted how every person in the state would vote, based on that model. It's the same approach we used to make the pretty dot maps of Florida. The likely electorate was determined exclusively by vote history, not self-reported voice choice. They included 2012 voters – which is why their electorate has more black voters than the others – and then included newly registered voters according to a model of voting history based on registration.

Margie Omero, Robert Green, Adam Rosenblatt [Clinton +4](#)

Penn Schoen Berland Research

The sample was weighted to state voter file data for party registration, gender, race and ethnicity. They then excluded the people who said they were unlikely to vote. These self-reported unlikely voters were 7 percent of the sample, so this is the most permissive likely voter screen of the groups. In part as a result, it's also Mrs. Clinton's best performance. In an email, Ms. Omero noted that every scenario they examined showed an advantage for Clinton.

# Other Ways to Think About Pre-Election polls

- Survey design decisions:
  - Mode
    - Telephone
    - IVR
    - Internet
- Field period
- Procedures (refusals/not at home)
- Sample size

# Other Decisions

- Probing undecided voters
- Allocating undecided voters
  - Ignore
  - Proportionate
  - Allocate to challenger
  - Other

# Other Factors

- Change in vote intention before election
  - Media
  - Advertising
  - Contact / Persuasion
  - “Change of heart”
- Change in turnout
  - Mobilization
  - Weather

# Sample Error Lecture

November 16 2109

# The Washington Post

November 6, 2019

Democracy Dies in Darkness

Edition: U.S. & World | Regional

In the News Mexico massacre Mormon victims OK, boomer Martin Luther King James Stern Great Danes Juli Briskman Little Mermaid Rodney Reed Oscars Nationals

## Kentucky outcome embarrasses Trump, worries many in GOP ahead of 2020

The outcome, despite President Trump's raucous rally for Gov. Matt Bevin, underscored how Republicans are struggling to navigate choppy political waters as the 2020 campaign now begins in earnest.

By Robert Costa • 2 hours ago

- Democrat claims victory in Kentucky governor's race; Republican projected winner in Mississippi

Kentucky Results



Attorney General Andy Beshear (D), left, and Gov. Matt Bevin (R). (AP)

Mississippi Results



Attorney General Jim Hood (D), left, and Lt. Gov. Tate Reeves (R). (AP)



Election 2019



▶ Virginia turns blue 1:33

Virginia House Speaker Kirk Cox (R) talks with supporters including David Sylvester, center, on Tuesday. (Photo: Julia Rendleman for The Post; video: Amber Ferguson/The Post)

## Republicans in Virginia brace for a new political reality as Democrats take full control in Richmond

The GOP faces sweeping policy changes and the specter of redrawn legislative districts after the 2020 Census.

By Paul Schwartzman

- Results from Virginia
- Analysis: Tuesday delivered something Trump very much wants to avoid: Weakness
- Analysis: 3 election years under Trump, 3 decisive losses for the GOP

Democracy Dies in Darkness

## Morning Mix



Racist trolls targeted a Somali refugee's campaign. She still managed to pull off a historic victory.

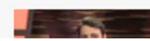
By Antonia Noori Farzan



Harvard Law School traces its origins to an Antiguan slave owner. Now the country wants reparations.



A black man refused to put down his 1-year-old. Then cops Tasered him multiple times.



A radio station called its host a gay



# Dem bypasses party unity in his run for Mississippi governor

By EMILY WAGSTER PETTUS, Associated Press | Nov. 1, 2019 | Updated: Nov. 1, 2019 1:27 p.m.



1 of 7



Democratic nominee for governor, Attorney General Jim Hood, addresses business leaders at the Mississippi Economic Council's annual "Hobnob Mississippi," in Jackson, Miss., Thursday, Oct. 31, 2019. The social event is hosted by the state chamber of commerce and is one of the last big political gatherings before the Nov. 5 elections.

Photo: Rogelio V. Solis, AP

# Mississippi Polling Data

Poll	Dates	Number of Interviews	Population	Method	Hood	Reeves	Other	Don't know	Spread
SurveyMonkey	October 8 - 22	1,002 RV		Opt-In Internet	40	47	9	4	Reeves +7
Targoz MR	October 13 - 20	384 LV		Internet Panel	46	47			Reeves +1
Mason-Dixon	October 17 - 19	625 RV		Telephone	43	46	2	9	Reeves +3
Hickman Analytics*	September 22 - 26	508 LV		Telephone	46	42		4	Hood + 4
Hickman Analytics*	August 11 - 15	600 LV		Telephone	43	42		1	Hood +1

\* Hickman Analytics Polls Sponsored by Hood for Governor

**Result: Reeves +5.7%**

**Latest:** Tate Reeves, the Republican, has won the governor's race, according to the Associated Press. 11:45 PM ET

Candidate	Party	Votes	Pct.
✓ Tate Reeves	Republican	448,760	<b>52.2%</b>
Jim Hood	Democrat	400,067	<b>46.5</b>
David Singletary	Independent	8,231	<b>1.0</b>
Bob Hickingbottom	Constitution	2,525	<b>0.3</b>

859,583 votes, 100% reporting (1,768 of 1,768 precincts)

The [race for Mississippi governor](#) pits an establishment Republican, Lt. Gov. Tate Reeves, against Attorney General Jim Hood, an anti-abortion, pro-gun Democrat. The current governor, Phil Bryant, a Republican, is leaving office because of term limits. [READ MORE](#)

# What's the real difference with the SurveyMonkey?



If the 2019 election for governor were being held today among the following candidates, who would you vote for?

10/8—10/22/19	Tate Reeves, the Republican	Jim Hood, the Democrat	Bob Hickingbottom, the Constitution Party	David Singletary, the Independent	No answer
	47	40	2	7	3

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OPINION | COMMENTARY | CROSS COUNTRY

# Kentucky Governor's Race Tests Trump's Re-Election Strategy

Matt Bevin is abrasive and unpopular. Can he win a second term on a campaign of provocation?

Allycia Finley

Nov. 1, 2019 6:57 pm ET



Kentucky Gov. Matt Bevin at a debate in Highland Heights, Ky., Oct. 29. PHOTO: ALBERT CESARE/ASSOCIATED PRESS

# Kentucky Governor Polls

Poll	Dates	Number of Interviews	Population	Method	Beshear	Bevin	Hicks	Spread
Targoz Market Research	October 13 - 20	401	LV	Opt In Internet	50	47		4 Beshear + 3
Targoz Market Research	October 13 - 20	548	RV	Opt In Internet	50	47		4 Beshear + 3
Mason-Dixon	October 14 - 16	625	LV	Telephone	46	46		1 Even

**Latest:** The Associated Press says the race is too close to call.

10:30 PM ET

Candidate	Party	Votes	Pct.
Andy Beshear	Democrat	709,673	<b>49.2%</b>
Matt Bevin*	Republican	704,523	<b>48.8</b>
John Hicks	Libertarian	28,426	<b>2.0</b>

**Current Result: Beshear + 0.4%**

1,442,622 votes, 100% reporting (3,659 of 3,659 precincts)

\* Incumbent

In Kentucky, Gov. Matt Bevin, the Republican candidate, refused to concede the election to his Democratic challenger, Attorney General Andy Beshear. With 100 percent of the precincts counted, Mr. Beshear was ahead by 5,300 votes. [READ MORE](#)

# Statistical Tests for Proportions

- As a requirement for this class, you will have to carry out and interpret a test of statistical significance **in your final paper**
- You will likely have to answer some questions regarding basic statistical tests and their interpretations **on the exam**

- No previous statistical knowledge is assumed for this class
- No previous statistical software experience is assumed
- We will teach you everything required to complete the statistics requirement so you can choose to do so using a calculator or Excel. (If you have experience with statistical software you are, of course, allowed to use your preferred software)

## **Two Key Statistical Elements Found in Any Population**

**Central Tendency**

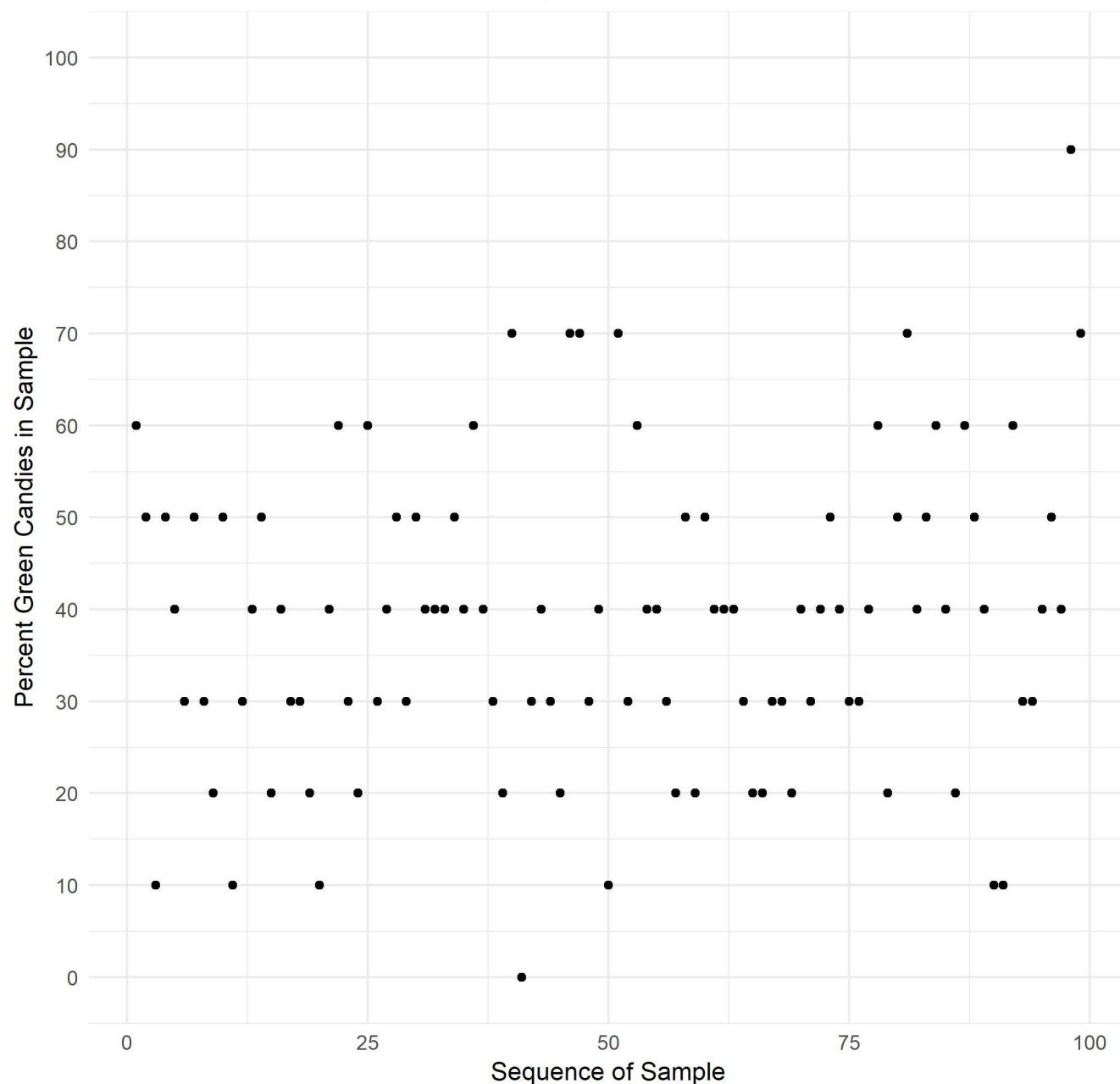
**(Mean)**

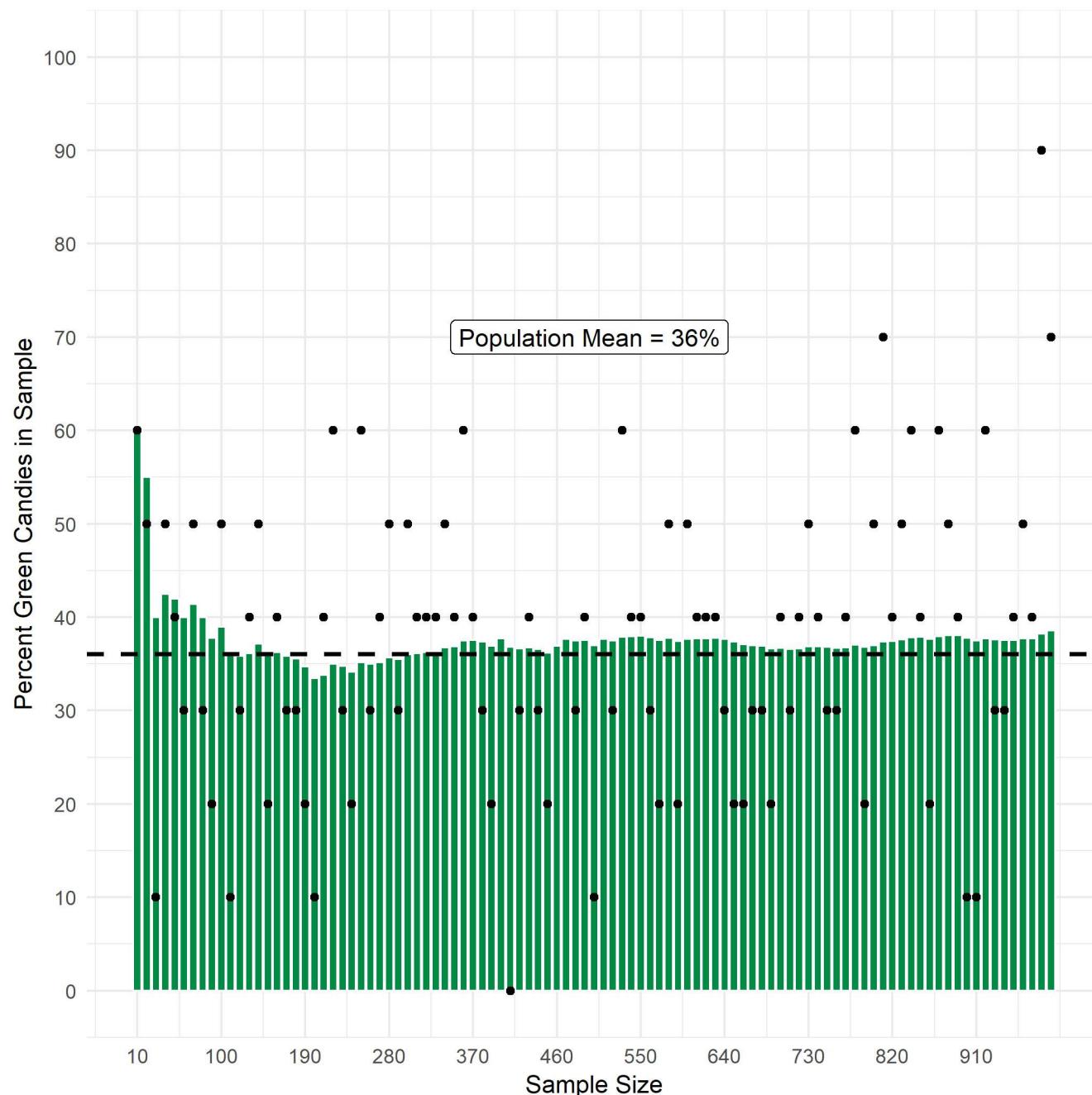
**(Proportion)**

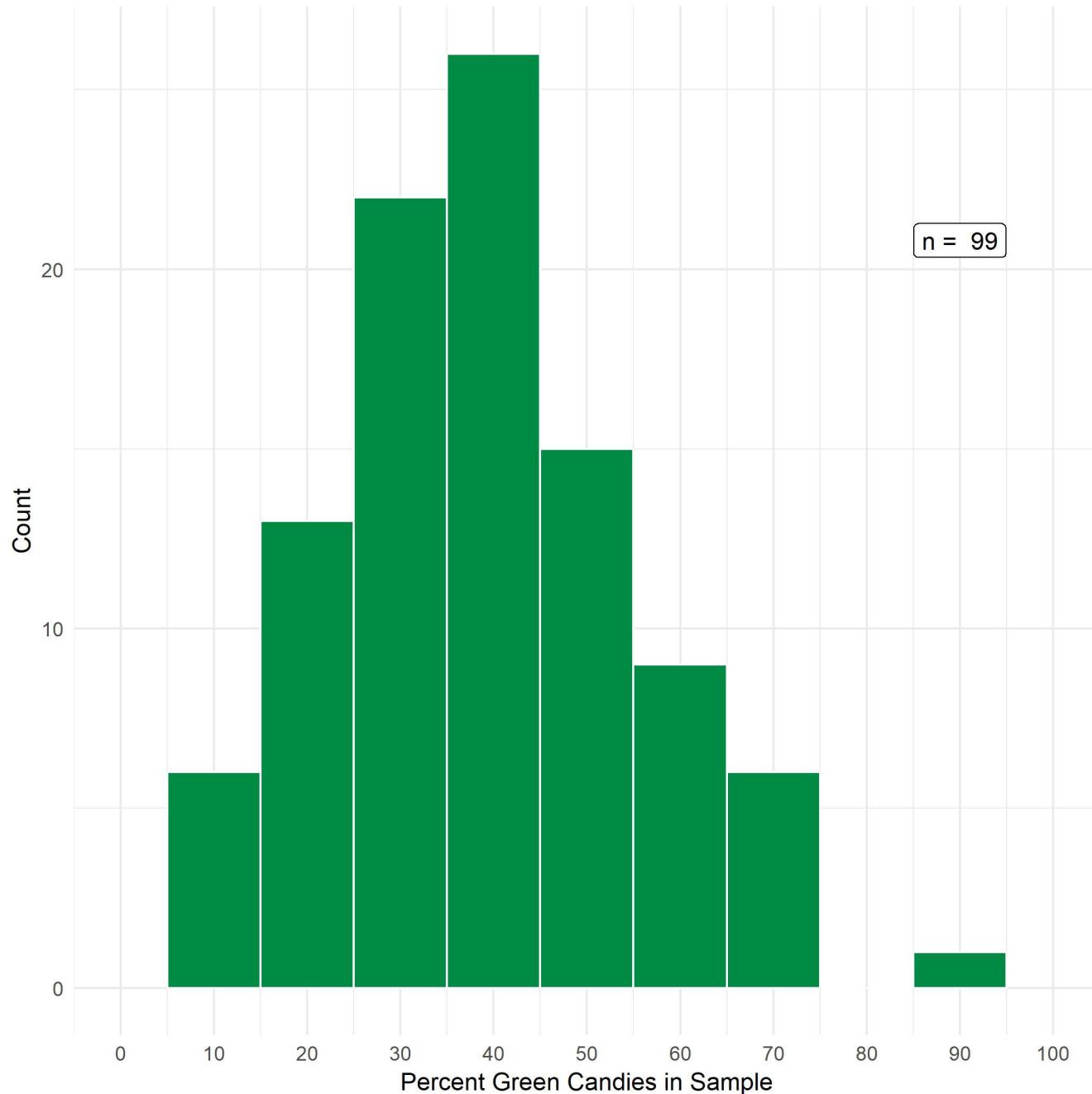
**Dispersion**

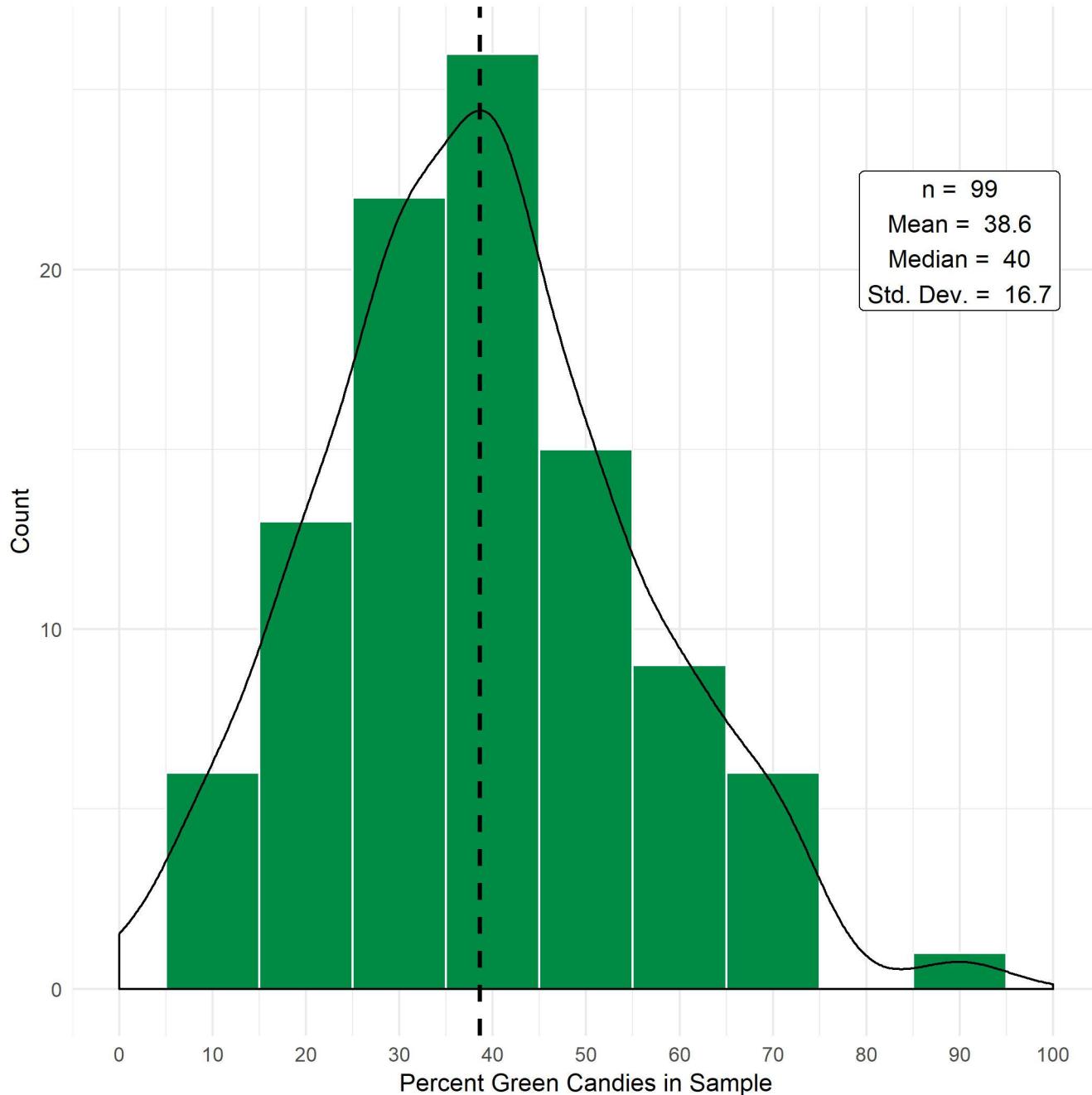
**(Variance or Standard Deviation)**

### Individual Sample Estimates Over Time









## **Standard Errors and Standard Deviations:**

The **Sampling Distribution** is the distribution of all possible sample means for a given sample design, sample size, and population mean

The Sampling Distribution of any sample design, sample size, and population will approximate the Standard Normal Distribution

Although the sampling distribution of any sample mean ( $\bar{x}$ ) is centered on ( $\bar{\mu}$ ), any individual sample mean ( $\bar{x}$ ) that we draw will likely be different from the population mean by some unknown degree

To estimate how far off any given sample mean is likely to be from the mean of the sampling distribution, we need an estimate of the variability of the sampling distribution

A good estimate of the sampling distribution is the standard deviation – the square root of the variance – of the sampling distribution

To avoid confusing the standard deviation of the sampling distribution with the standard deviation of the statistics we are interested in, we refer to the standard deviation of the sampling distribution as the **Standard Error**.

## Describing data: Categorical survey responses

Many survey responses are categorical. These include Likert scales, Yes/No/I don't know response options, or anything where there isn't a clear numeric difference between response options. These will often be described by a **proportion**.

$$\text{Proportion} = \frac{\text{Number in that category}}{\text{Total number}}$$

Response	Frequency
Agree	735
Disagree	1812
I don't know	78
<b>Total</b>	2625

$$\text{Proportion who agree} = \frac{\text{Number who agree}}{\text{Total number}} = \frac{735}{2625} = 0.28$$

# Describing data: Categorical survey responses

Is there a difference between freshman and seniors and satisfaction with their decision to attend Harvard?

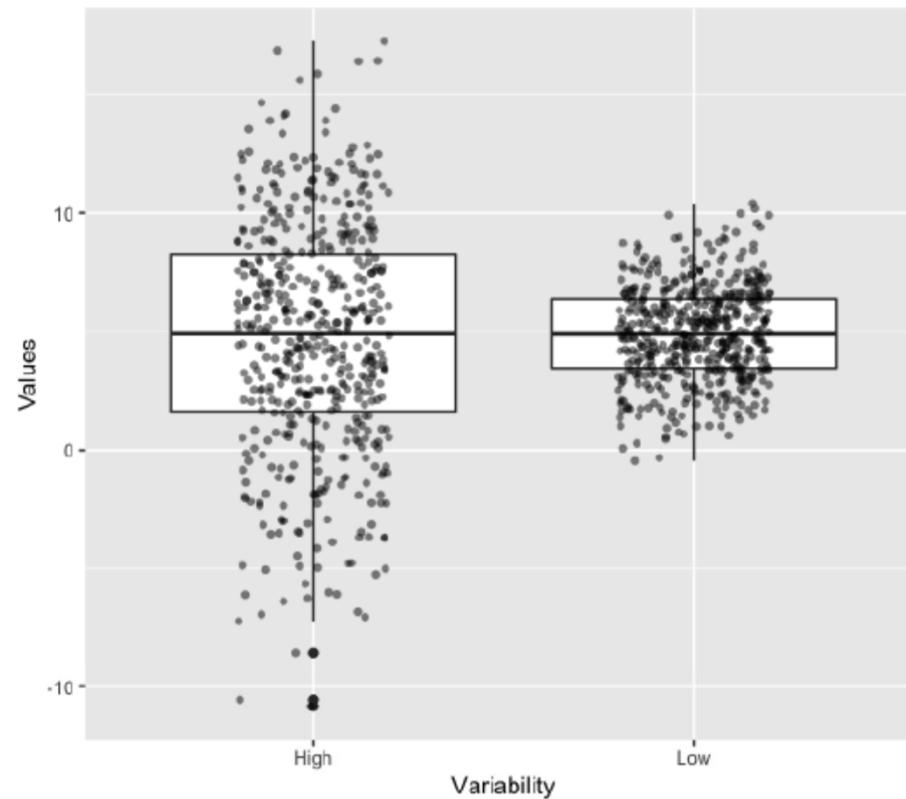
Stub: Q17: How satisfied are you with your decision to attend Harvard in general/overall?

gradyr: What year do you expect to graduate?					
	Total	2019	2020	2021	2022
Total Count	115	26	21	29	39
Neutral	8	2	2	2	2
Not Satisfied	1	1	0	0	0
Somewhat Dissatisfied	5	2	2	1	0
Somewhat Satisfied	27	6	3	9	9
Very Satisfied	74	15	14	17	28
Neutral	7.0%	7.7%	9.5%	6.9%	5.1%
Not Satisfied	0.9%	3.8%	0.0%	0.0%	0.0%
Somewhat Dissatisfied	4.3%	7.7%	9.5%	3.4%	0.0%
Somewhat Satisfied	23.5%	23.1%	14.3%	31.0%	23.1%
Very Satisfied	64.3%	57.7%	66.7%	58.6%	71.8%

$\frac{15}{26} = .577$  seniors were very satisfied;  $\frac{28}{39} = .718$  first-years were very satisfied

## Describing data: Categorical survey responses

To say if this is a significant difference in satisfaction we need to understand how these proportions vary.



A good way to quantify the uncertainty or variability of our estimate is the **standard error**.

## Describing data: Categorical survey responses

The **standard error** for a sample proportion for a simple random sample of size  $n$  is:

$$se(p) = \sqrt{\frac{p(1-p)}{n-1}}; \text{ where } p \text{ is your estimated proportion and } n \text{ is the sample size.}$$

Standard error of proportion of seniors who were very satisfied:

As a reminder  $\frac{15}{26} = .557$  seniors were very satisfied

$$se(p_{seniors}) = \sqrt{\frac{.557(1-.557)}{26-1}} = \sqrt{\frac{.557(.443)}{25}} = \sqrt{\frac{.247}{25}} = 0.1$$

## Describing data: Categorical survey responses

Repeating the process for first-years:

As a reminder  $\frac{28}{39} = .718$  first-years were very satisfied

$$se(p_{fy}) = \sqrt{\frac{.718(1-.718)}{39-1}} = \sqrt{\frac{.718(.282)}{38}} = \sqrt{\frac{.202}{38}} = 0.07$$

## Describing data: Categorical survey responses

With this information we can now construct a **confidence interval** for the proportion of first-years and seniors who are very satisfied:

The mathematical representation of a confidence interval is:

$$p \pm z_{1-(\alpha/2)} * \sqrt{\frac{p(1-p)}{n-1}};$$

where  $p$  is the estimated proportion, and the last term is simply the standard error we already calculated. The  $z_{1-(\alpha/2)}$  term is chosen based on your desired level of confidence. Often people choose 1.96 because this is the 97.5th percentile of a normal distribution, which gives you a 95% confidence interval.

## Describing data: Categorical survey responses

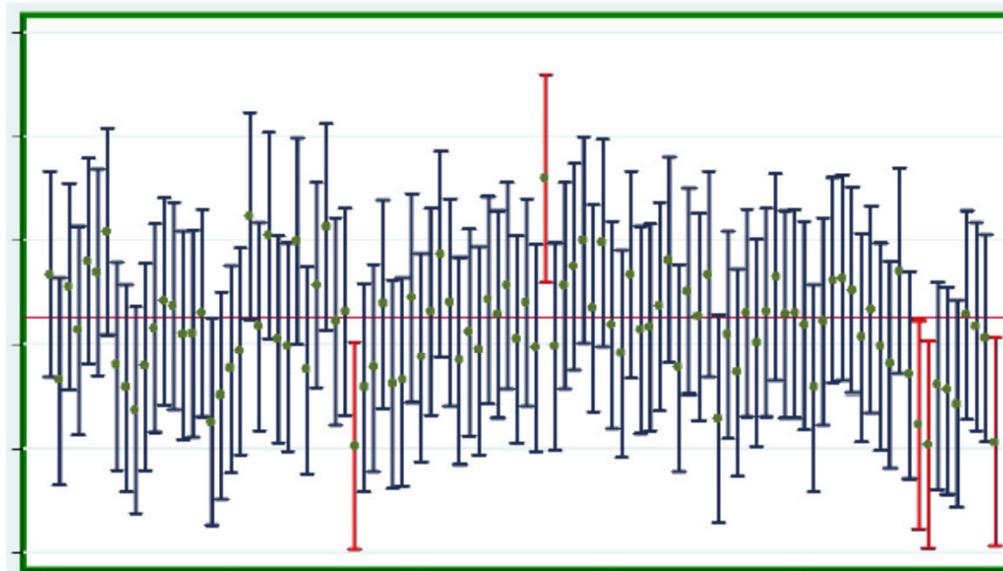
The **interpretation of a confidence interval** is as follows:

The confidence interval of a parameter is an interval computed from sample data by a method that will capture a specified proportion of all samples. Or in English, when we calculate an X% confidence interval the way we do, the true population mean will fall within the calculated interval X% of the time.

## Describing data: Categorical survey responses

So for a 95% confidence interval, if we took random 100 samples from a population and calculated 100 different 95% confidence intervals, we would expect 95 of these to include the population mean.

Visually:



## Describing data: Categorical survey responses

So the 95% confidence interval for seniors who are very satisfied is:

$$p_{seniors} \pm z_{1-(\alpha/2)} * \sqrt{\frac{p(1-p)}{n-1}} = 0.557 \pm 1.96 * 0.1 = (0.361, 0.753)$$

So the 95% confidence interval for first-years who are very satisfied is:

$$p_{fy} \pm z_{1-(\alpha/2)} * \sqrt{\frac{p(1-p)}{n-1}} = 0.718 \pm 1.96 * 0.07 = (0.581, 0.855)$$

Notice that these two intervals overlap, so we cannot say that there is a significant difference in those who are very satisfied with attending Harvard between first-years and seniors.

## Describing data: Categorical survey responses

Another way to see if there is a significant difference between two proportions is a test for difference in two proportions. If we want to test the hypothesis that the proportion of seniors who were very satisfied is not equal to the proportion of first-years who were very satisfied the formula is:

$$z = \frac{p_1 - p_2}{\sqrt{\frac{p(1-p)}{n_1} + \frac{p(1-p)}{n_2}}};$$

where z is the test statistic used to obtain the p-value, p1 is the sample proportion of one group, p2 is the sample proportion of the other group, p is the pooled proportion i.e. the proportion of first-years and seniors who were very satisfied out of all first-years and seniors, n1 is the sample size of group 1 and n2 is the sample size of group 2.

## Describing data: Categorical survey responses

Applying this to our example:

$$p = \frac{15+28}{26+39} = .662; \text{ and we have everything else from before}$$

$$z = \frac{0.557 - .718}{\sqrt{\frac{0.662(1-0.662)}{26} + \frac{0.662(1-0.662)}{39}}} = \frac{-0.161}{\sqrt{\frac{.224}{26} + \frac{.224}{39}}} = \frac{-0.161}{0.123} = -1.31$$

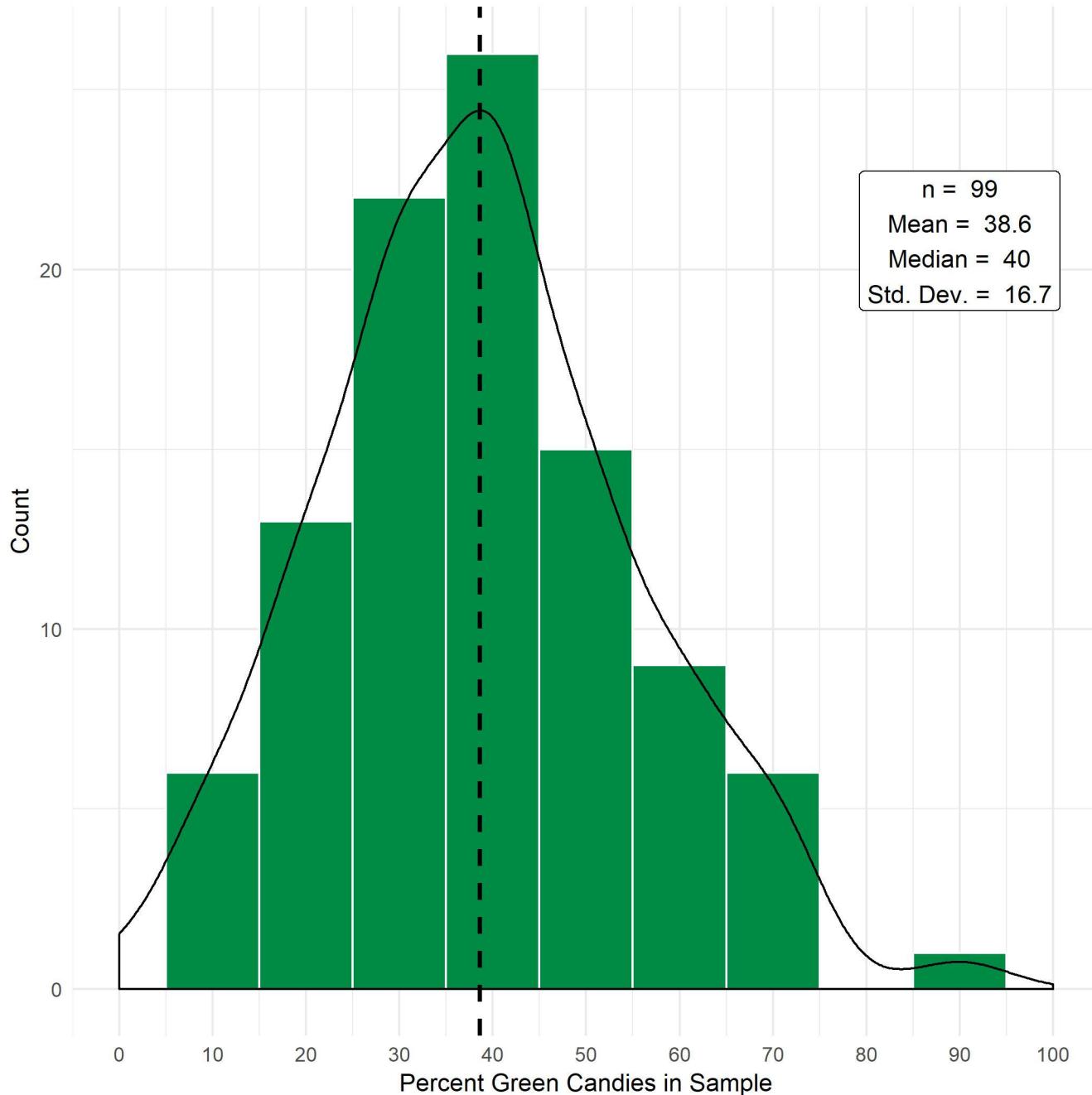
So now we have  $z = -1.31$ , what do we do with this?

We can calculate a **p-value** which is the probability, given there is no difference between the proportions, that we observe a sample as extreme as the observed sample. Generally for a result to be accepted as statistically significant a p-value of 0.05 or lower is required.

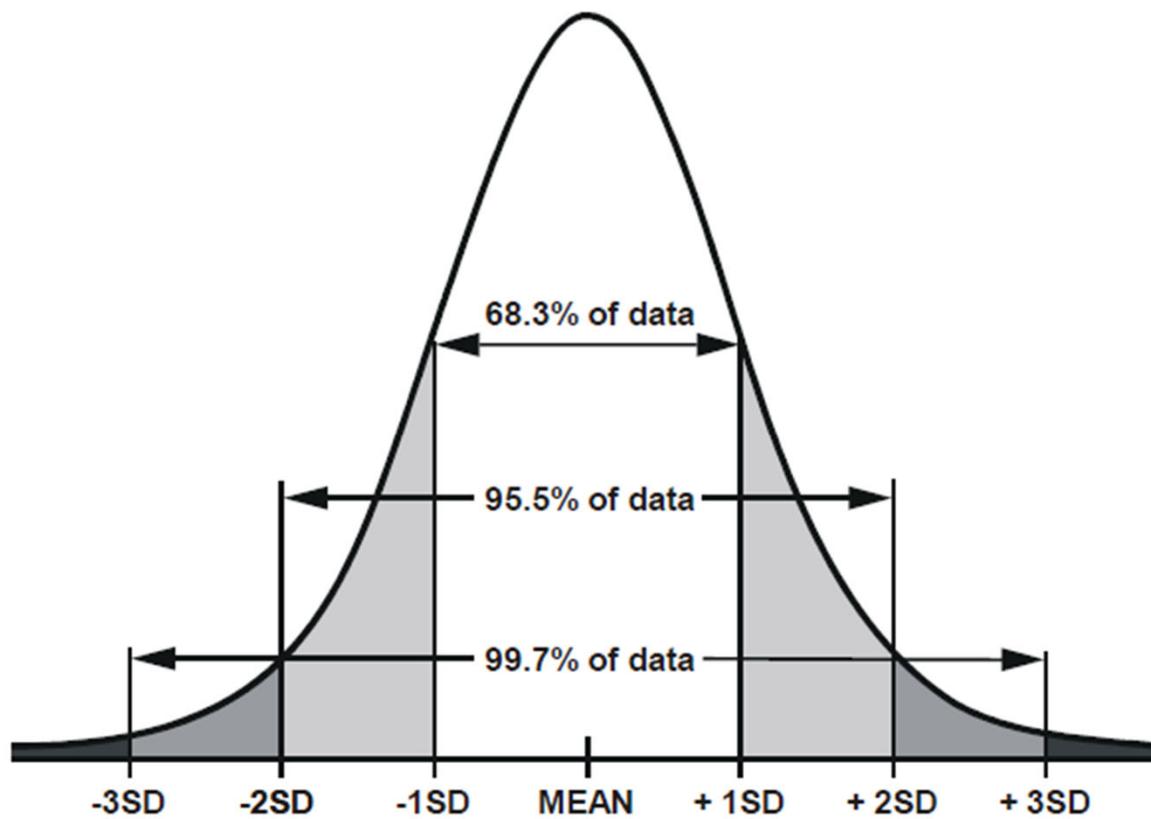
## Describing data: Categorical survey responses

You can use a simple table to look up the p-value of a corresponding z-statistic. The p-value for  $z = -1.31$  is 0.19, so again we find no significant difference between first-years and seniors who are very satisfied with their decision to attend Harvard.

<http://www.z-table.com/>



## The Standard Normal Distribution



**How do we know how far our sample proportion is from the population proportion?**

We can't know this with certainty...

But because the sampling distribution follows a precise mathematical formula, we can estimate the probability that our sample mean is close or far from the population mean.

And so we can estimate the chances that the population mean will be within a certain interval from our measured sample mean...

This is called a confidence interval, because we can have p% confidence that our sample mean is within x of the population mean.

<http://www.z-table.com/>

## **Common Two-Tailed Z Values**

<b>c.i.</b>	<b>Z</b>
-------------	----------

80%	1.28
-----	------

90%	1.65
-----	------

95%	1.96
-----	------

99%	2.58
-----	------

**EDGEWATER RESEARCH | MY PEOPLE VOTE®**

2019 LOUISIANA GUBERNATORIAL RUNOFF

STATEWIDE SURVEY OF LIKELY VOTERS

October 30, 2019

A Louisiana statewide survey of 722 likely voters was conducted on October 28, 2019 by pollsters Dr. Edward Chervenak of Edgewater Research LLC and Tony Licciardi of My People Vote®. Dr. Chervenak is a 20-year veteran pollster of the University of New Orleans Survey Research Center (SRC). Licciardi served as a graduate research assistant in UNO's SRC as a doctoral student and he is the developer of the My People Vote® campaign canvassing app.

The poll gauged who likely voters preferred in the runoff for governor. It also asked respondents if they supported impeachment of the president.

A likely voter is defined in this survey as an individual who has voted at least 3 times in the last 5 statewide elections. Survey respondents were asked in an interactive voice response telephone survey (IVR)<sup>1</sup> who they preferred in the upcoming governor's runoff election and what their attitude was about impeachment. The survey yields a margin of error of +/- 3.6% at a confidence level of 95%.

$$p \pm z_{1-(\alpha/2)} * \sqrt{\frac{p(1-p)}{n-1}}$$

$$Z_{1-(\alpha/2)} = 1.96$$

Percent Voting for Edwards: 50.3%

Percent Undecided on Impeachment: 3.7%

N = 722

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$$Z_{1-(\alpha/2)} = 1.96$$

Percent Voting for Edwards: 50.3% (+/- 3.65%)

Percent Undecided on Impeachment: 3.7% (+/- 1.38%)

N = 722

## Three Factors in Binomial Confidence Interval

Confidence Level (Z)

Proportion (& variance)

$$p \pm z_{1-(\alpha/2)} * \sqrt{\frac{p(1-p)}{n}}$$

Sample Size

$$p \pm z_{1-(\alpha/2)} * \sqrt{\frac{p(1-p)}{n-1}}$$

$$Z_{1-(\alpha/2)} = 1.96$$

Percent Voting for Edwards: 50.3% (+/- 3.65%)

Percent Undecided on Impeachment: 3.7% (+/- 1.38%)

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## METHODOLOGY

The NBC News|SurveyMonkey Mississippi Poll was conducted online among a sample of 1,139 adults aged 18 and over who live in Mississippi, including 1,002 who say they are registered to vote. The poll was conducted from October 8, 2019 until October 22, 2019. Respondents for this survey were selected from the more than two million people who take surveys on the SurveyMonkey platform each day.

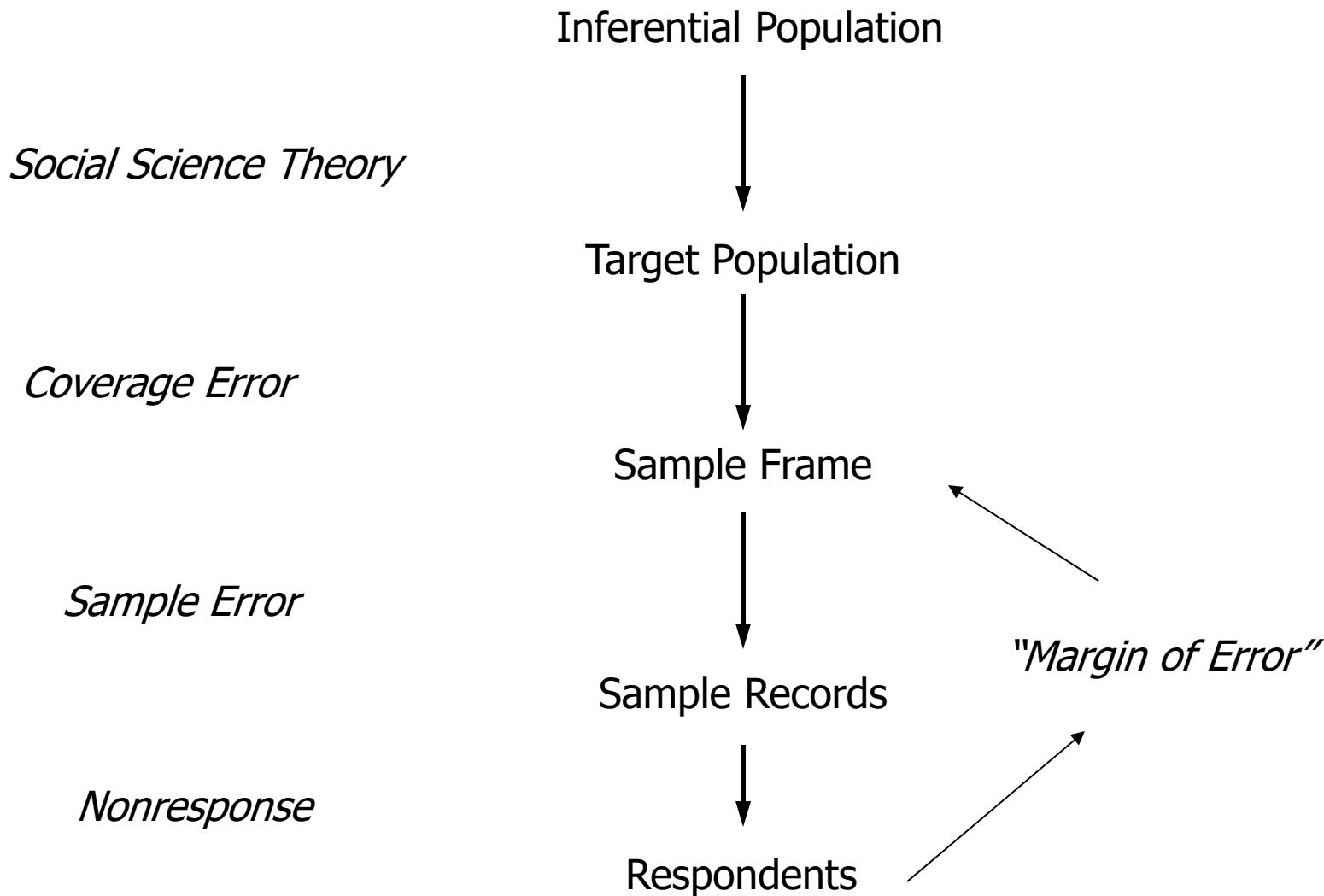
We employ multi-stage raking to construct state-level registered voter weights. We first classify postal zip codes into clusters according to their population size, population density, median income, and race compositions. Zip code-level characteristics are obtained from the American Community Survey and publicly available zip-level databases. Initial weights are constructed by weighting the sample to zip code-level group targets. The initial weights are then raked by gender, age, race, and education to match targets obtained from the American Community Survey. The third stage of raking weights initial weights to gender, age, race, and education of forecasted registered voters for non-voters of 2016 general election, and gender, age, race, education of forecasted registered voters, and presidential vote for voters of 2016 general election. We employed a time-series based model to forecast registered voter composition, given Current Population November Supplement samples from 1994 through 2016. The state-level presidential vote targets are obtained from the Federal Election Commission.

Because the sample is based on those who initially self-selected for participation rather than a probability sample, no estimates of sampling error can be calculated. All surveys may be subject to multiple sources of error, including, but not limited to sampling error, coverage error, and measurement error.

To assess the variability in the estimates and account for design effects, we create a bootstrap confidence interval to produce an error estimate. The bootstrap confidence interval for this survey among registered voters is plus or minus 4.7 percentage points.

To calculate the bootstrap confidence interval, we use the weighted data to generate 5,000 independent samples and calculate the 95% confidence intervals for the weighted average. When analyzing the survey results and their accuracy, this error estimate should be taken into consideration in much the same way that analysis of probability polls takes into account the margin of sampling error.

Group	Unweighted N	Plus or minus
Total RVs	1,002	4.7
Republican RVs	632	5.4
Democrat RVs	268	8.7
Male RVs	421	7.1
Female RVs	581	5.3
White RVs	725	4.8
Black RVs	219	8.7



# Sampling and Finite Populations

- What is the sample error for a census?

# Finite Populations

- If there is no sampling in a census, there can be no sample error in a census
- Intuitively, if we sample a very large proportion of a population, the sample error should be smaller than if we sample an infinite population

Note that the sample error for the binomial proportion from a finite population must really be a function of THREE things.....

Sample Size ( $n$ )

The Population Variance  $(\sigma_x^2)$  (Measured by  $(S_x^2)$ )

The sampling fraction:  $\left(\frac{n}{N}\right)$

### **Confidence Interval for Proportion under Simple Random Sampling**

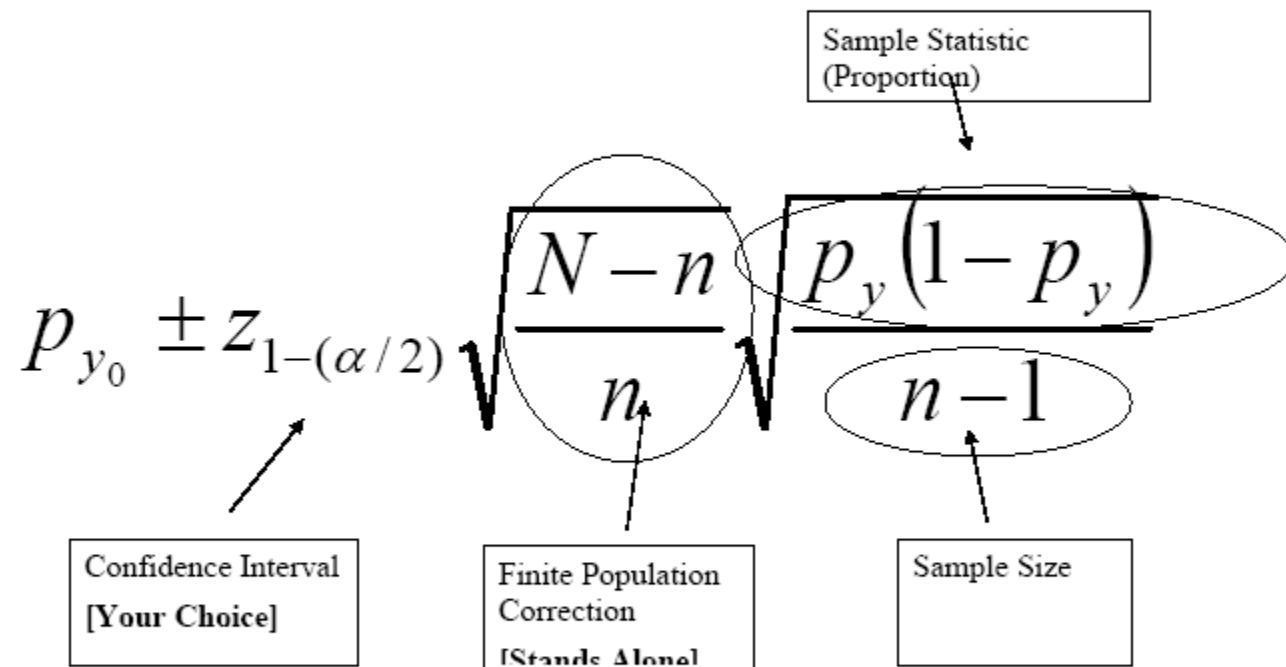
$$p_{y_0} \pm z_{1-(\alpha/2)} \sqrt{\frac{N-n}{n}} \sqrt{\frac{p_y(1-p_y)}{n-1}}$$

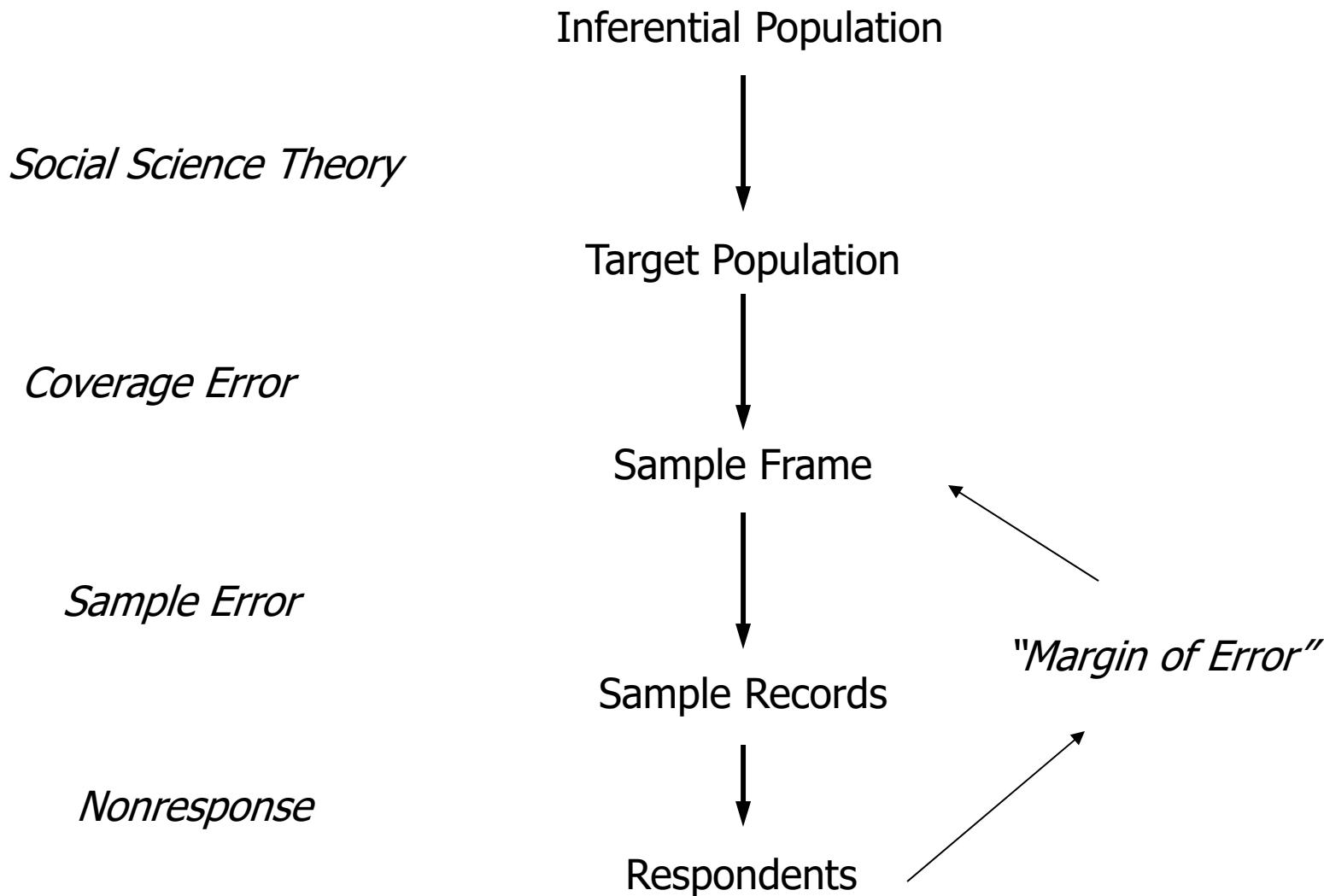
Where  $p_{y_0}$  represents the sample proportion

N represents the population size and n represents the sample size

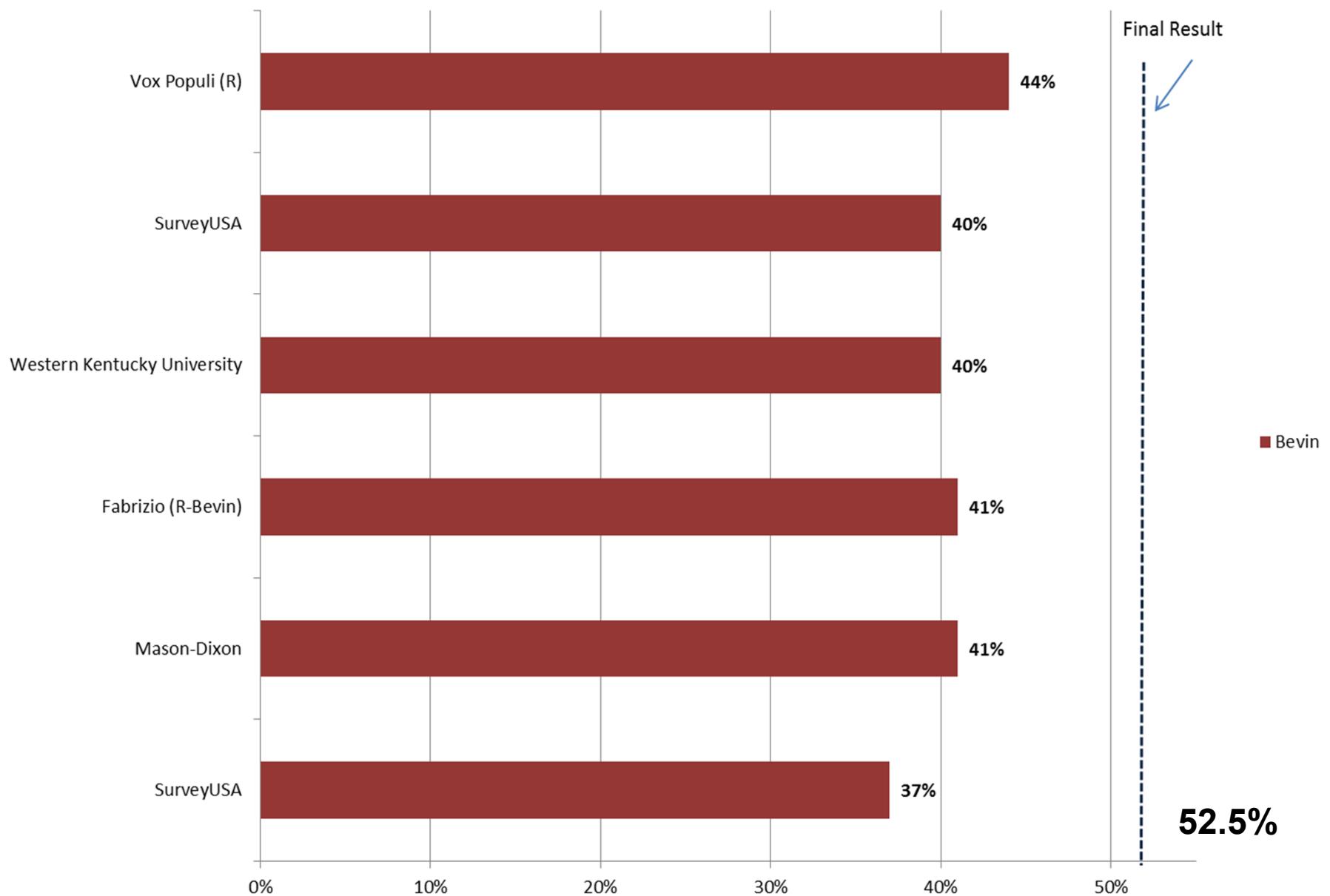
$z_{1-(\alpha/2)}$  is the 100[1-( $\alpha/2$ )]th percentile from the standard normal distribution.]

### Anatomy of a Confidence Interval for Proportions:





## 2015 Kentucky Election Results (Governor)



# Calculating Sample Error

- The formula we know is for a binomial proportion ( $x\%$  versus  $1-X\%$ )
- Lets think of this as:
  - What is the sample error for the final Vox Populi estimate for a binomial percentage
  - Let's take Bevin = 44% of vote

# Sample Calculation...

$$p_{y_0} \pm z_{1-(\alpha/2)} \sqrt{\frac{N-n}{n}} \sqrt{\frac{p_y(1-p_y)}{n-1}}$$

$$p_{y_0} \pm z_{1-(\alpha/2)} \sqrt{\frac{.44(1-.44)}{617}}$$

# Sample Calculation...

$$p_{y_0} \pm z_{1-(\alpha/2)} \sqrt{\frac{.2464}{617}}$$

$$p_{y_0} \pm z_{1-(\alpha/2)}.01998$$

## Summary of Confidence Intervals for Kentucky Poll

<i>c.i.</i>	Z	Z*se	<i>Lower Boundary</i>	<i>Upper Boundary</i>
80%	1.28	2.5%	41.5%	46.5%
90%	1.65	3.3%	40.7%	47.3%
95%	1.96	3.9%	40.1%	47.9%
99%	2.58	5.1%	38.9%	49.1%

$$1.96 * .01998 = .039$$

#### *METHODOLOGY:*

*The sample size for the survey is 618 active voters in the US taken from a listed sample of registered voters who voted in the 2012 or 2014 general election or registered since the 2014 general election. The margin of error is +/- 3.9%. All interviews were conducted October 26-27, 2015 by Vox Populi Polling.*