

POLLING PROBABILITY, & POLITICAL SCIENCE

In every classroom



WHO AM I?

- ❖ Teacher here at Heritage Christian Academy!
- ❖ 5th year Social Science Teacher
 - *8th Grade American History, 10th Grade World History, AP World History, 11th Grade American History, 12th Grade Government & Economics, AP American Government and Politics*
- ❖ BA History with a Political Science Minor
- ❖ MA in Education with an emphasis on Instruction

**THIS SESSION
IS FOR
EVERYONE!**

**EVERY TEACHER IN
THE ROOM HAS A
STAKE IN WHETHER
THEIR STUDENTS
CAN READ A POLL
CRITICALLY**

SESSION OVERVIEW

Start

How Polls Work

How can a poll of 1,000 people tell us something real about 330 million, and under what conditions?

Margin of Error

It is not a measure of all possible errors. It does not account for bad question wording, biased samples, or social desirability effects.

Teaching & Assessing

Instructional strategies, Student questioning ladder, etc.

Cross-Curricular Connections

Polling is a social science, but the skills it develops are fundamental across all disciplines.

End

**RAISE YOUR
HAND IF**

**YOU'VE EVER
CITED A POLL
IN YOUR
INSTRUCTION**

KEEP IT UP IF YOU
FEEL CONFIDENT
EXPLAINING
EXACTLY HOW
THAT POLL
WORKED

**"THE POLLS
WERE
WRONG"**



THE 1936 LITERARY DIGEST DISASTER

The Literary Digest

NEW YORK

OCTOBER 31, 1936

Topics of the day

LANDON, 1,293,669; ROOSEVELT, 972,897

Final Returns in The Digest's Poll of Ten Million Voters

Well, the great battle of the ballots in the Poll of ten million voters, scattered throughout the forty-eight States of the Union, is now finished, and in the table below we record the figures received up to the hour of going to press.

These figures are exactly as received from more than one in every five voters polled in our country—they are neither weighted, adjusted nor interpreted.

Never before in an experience covering more than a quarter of a century in taking polls have we received so many different varieties of criticism—praise from many; condemnation from many others—and yet it has been just of the same type that has come to us every time a Poll has been taken in all these years.

A telegram from a newspaper in California asks: "Is it true that Mr. Hearst has purchased THE LITERARY DIGEST?" A telephone message only the day before these lines were written: "Has the Repub-

lican National Committee purchased THE LITERARY DIGEST?" And all types and varieties, including: "Have the Jews purchased THE LITERARY DIGEST?" "Is the Pope of Rome a stockholder of THE LITERARY DIGEST?" And so it goes—all equally absurd and amusing. We could add more to this list, and yet all of these questions in recent days are but repetitions of what we have been experiencing all down the years from the very first Poll.

Problem—Now, are the figures in this Poll correct? In answer to this question we will simply refer to a telegram we sent to a young man in Massachusetts the other day in answer to his challenge to us to wager \$100,000 on the accuracy of our Poll. We wired him as follows:

"For nearly a quarter century, we have been taking Polls of the voters in the forty-eight States, and especially in Presidential years, and we have always merely mailed the ballots, counted and recorded those

returned and let the people of the Nation draw their conclusions as to our accuracy. So far, we have been right in every Poll. Will we be right in the current Poll? That, as Mrs. Roosevelt said concerning the President's reelection, is in the 'lap of the gods.'

"We never make any claims before election but we respectfully refer you to the opinion of one of the most quoted citizens to-day, the Hon. James A. Farley, Chairman of the Democratic National Committee. This is what Mr. Farley said October 14, 1932:

"Any sane person can not escape the implication of such a gigantic sampling of popular opinion as is embraced in THE LITERARY DIGEST straw vote. I consider this conclusive evidence as to the desire of the people of this country for a change in the National Government. THE LITERARY DIGEST poll is an achievement of no little magnitude. It is a Poll fairly and correctly conducted."

In studying the table of the voters from

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FIGURE 5. Returns in the *Literary Digest's* mass mail-in poll of 1936 suggested Alf Landon was headed for an easy victory over President Franklin D. Roosevelt. The poll missed the outcome by almost twenty percentage points. (Credit: *Literary Digest*)

THE 1936 LITERARY DIGEST DISASTER

The Literary Digest sent 10 million survey postcards and got back 2.4 million responses (one of the largest polls in history). They predicted Alf Landon would defeat Franklin Roosevelt in a landslide. However, Roosevelt won by the largest electoral margin in over a century.

What went wrong? The magazine mailed surveys to its own subscribers, automobile owners, and telephone users (all groups that skewed wealthy and Republican in 1936). The sample was enormous but catastrophically biased. **Meanwhile**, a young pollster named George Gallup surveyed fewer than 2,000 people, but used random sampling. He predicted Roosevelt's win correctly AND predicted the Digest would get it wrong, before the results came in. **The lesson: size does not save a bad sample. A smaller, well-designed sample beats a massive biased one every time.**

HOW POLLS *actually* WORK



THE SAMPLING PROBLEM

For SCIENCE teachers: This is identical to the concept of sampling bias in experimental design. A large sample does not correct for a flawed methodology.

For MATH teachers: This previews the concept that standard error depends on how the sample is drawn, not just how big it is.

For ELA teachers: This is a source credibility story. 2.4 million responses sounds authoritative. The question is always: who responded and why?

MARGIN OF ERROR

WHAT IT IS

Margin of error is a mathematical statement about the range within which the true population value likely falls, given your sample size and confidence level.

WHAT IT IS NOT

It is not a measure of all possible errors. It does not account for bad question wording, biased samples, or social desirability effects. It only captures random sampling variation.

A margin of error tells you how much your result might vary, just from the randomness of who happened to be in your sample, assuming everything else was done correctly.

MARGIN OF *Error*

CANDIDATE A48%

CANDIDATE B.....45%

Margin of Error $\pm 3\%$

WHO IS WINNING?

MARGIN OF *Error*

CANDIDATE B

CANDIDATE A



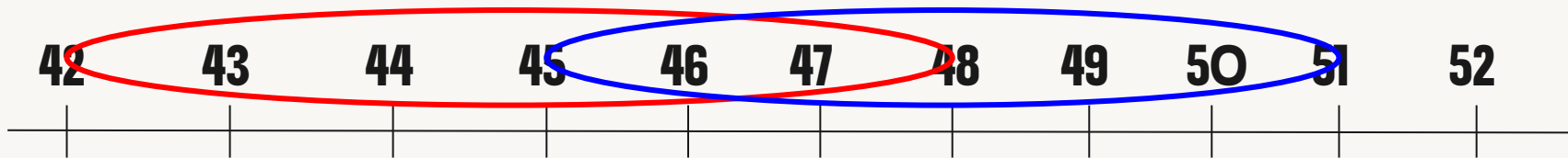
WHO IS WINNING?

MARGIN OF

Error

CANDIDATE B

CANDIDATE A



So,

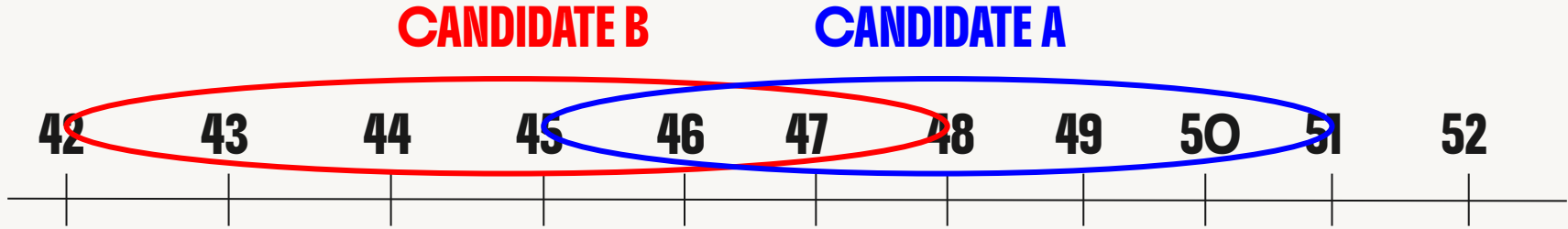
WHO IS WINNING?

But this headline is still true...

**CANDIDATE A IS
LEADING THE
POLLS BY 3
POINTS!!!!!!**

MARGIN OF

Error



HOWEVER, Candidate B ends up winning and Candidate A's numbers were much closer to 46%

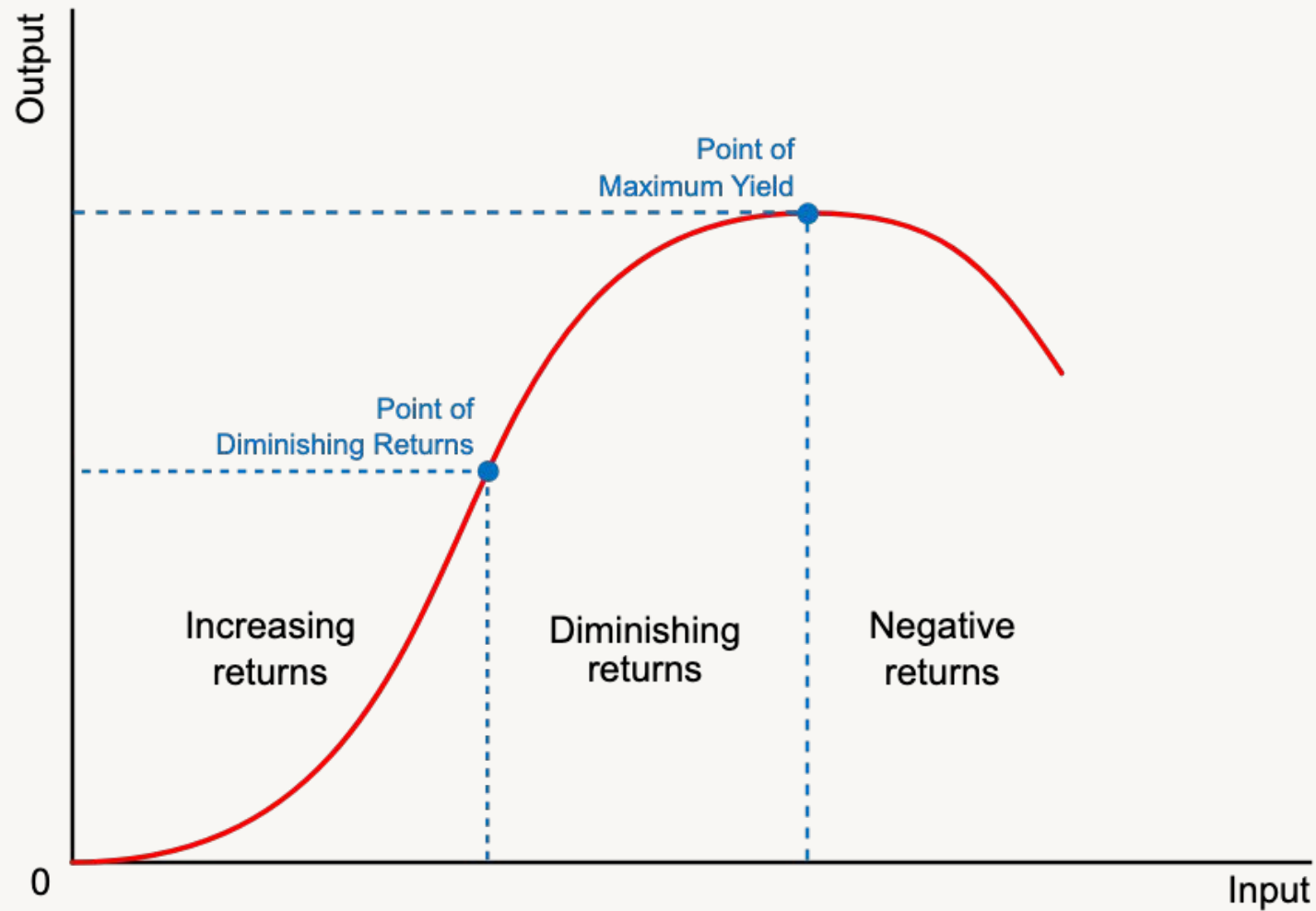
**"THE POLLS
WERE WRONG"
... EVEN IF THE
POLL IS
CONDUCTED
NEAR
PERFECTLY**



**SO A LARGER SAMPLE
SIZE MEANS LOWER
MARGIN OF ERROR...
RIGHT?**

Yes and No

Bigger samples shrink the margin of error, but with **diminishing returns. Going from 100 to 400 respondents cuts your margin of error in half. Going from 400 to 1,600 cuts it in half again. But going from 1,000 to 10,000 **barely moves it.****



$$\text{MOE} = z \times \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}$$

In English:

The margin of error equals the critical value times the square root of the sample proportion times one minus the sample proportion, divided by the sample size.

In simpler English:

Margin of error depends on how confident we want to be, how mixed people's answers are, and how many people were surveyed

REASONS FOR DIMINISHING RETURNS

Square Root Formula

The margin of error is inversely proportional to the square root of the sample size (Square root of n). To reduce the error by half, you must quadruple the sample size.

Not a catch all

Increasing the sample does not fix, and may exacerbate, errors caused by poor study design, non-response bias, or misleading survey questions.

Cost vs Benefit

The cost of obtaining additional data often outweighs the minute improvements in accuracy, making it more efficient to focus resources on reducing bias

MARGIN OF ERROR is
just the tip of the
iceberg... Let's talk
CONFIDENCE INTERVALS

CONFIDENCE INTERVALS (EX. 95%)

WHAT IT IS

Approx. 95 of 100 polls would capture the true population value within their reported margin of error. Five of them would miss; not because of bad methodology, but just because of chance.

SO WHAT?

When you see '95% confidence level' on a poll, you can translate that to: there is about a 1 in 20 chance that this poll's result, through random bad luck, does not include the true number at all. That is not a scandal. That is honest science

THIS CONCEPT IS TEACHABLE!

- ❖ **For SCIENCE teachers**, this directly parallels experimental replication and statistical power. A larger sample reduces the effect of random variation the same way repeated trials do.
- ❖ **For MATH teachers**, The MOE decreases in proportion to the inverse square root of the sample size. This means that as sample size increases, the margin of error decreases, but at a decreasing rate; to halve the margin of error, you must quadruple the sample size.
- ❖ **For ELA/History teachers**: When citing a poll as evidence in an argument, readers deserve to know the sample size. This is a source documentation issue and a source analysis skill.

WHY ELSE DO WE GET IT WRONG?

- Social Desirability Bias
- Likely Voter Screens
- Non-Response Bias
- Push Polls

LET'S ASK THE IMPORTANT QUESTIONS:

Who paid for this poll?

How many people were surveyed?

When was it conducted?

What exactly was the question?

SUBJECT AREA CONNECTION

Math/Statistics: Random sampling, standard deviation, and confidence intervals are explicit stats standards. Polling is the most engaging real-world application of these concepts. Co-plan a unit where math teaches the calculation & civics teaches the meaning.

Science: The methodological questions of statistics are identical to the questions scientists ask. Use poll design to teach scientific thinking.

ELA/Reading: Every poll is a text that must be read critically. Who wrote it? For what purpose? What does the methodology disclose? What does it omit? Source evaluation is all over ELA standards. Polling adds a quantitative dimension to skills students are already developing.

SUBJECT AREA CONNECTION

History: Historical polling failures (1936, '48, 2016) are primary sources. They reveal what people believed at a moment in time, how institutions processed that information, and why collective expectations can be systematically wrong. This is historical thinking.

Health/Science: Public health relies on survey data. Vaccination rates, mental health prevalence, substance use statistics; all of it comes from polling and sampling methodology. Teaching students to evaluate health statistics begins with understanding how they are produced.

Economics/Business: Market research is polling applied to consumer behavior. Survey design, sample selection, and bias management are core professional skills in business, marketing, and policy analysis.

INSTRUCTIONAL STRATEGY (FOUNDATIONAL)

- ❖ Before introducing any **vocabulary**, ask the room a question students can actually experience: 'I want to know how many people in this building own a dog. How should we figure that out?'
- ❖ Let them suggest **methods**. Guide toward: ask everyone (census), ask some people (sample). Then ask: which people? How do we pick?
- ❖ This generates vocabulary organically. Students arrive at 'random sample' themselves before you define it.
- ❖ Applicable in any class that introduces evidence, research, or data — science, ELA, history, math, econ.

INSTRUCTIONAL STRATEGY (DEVELOPING)

- ❖ Display a real **poll graphic** at the start of class (it takes 30 seconds to find one on Pew, Gallup, or FiveThirtyEight)
- ❖ Students have 3 minutes to write answers to evaluation questions silently, then discuss briefly.
- ❖ Done weekly for four weeks, this becomes a habit of mind. Students stop accepting data at face value.
- ❖ This works in any class that involves reading nonfiction, data, or current events

INSTRUCTIONAL STRATEGY (PROFICIENT)

- ❖ Give students a real poll that produced a notable miss (1936 Literary Digest, 2016 Wisconsin, or a local example) and the actual outcome.
- ❖ Working backward, students identify which **methodological failure** most likely caused the error, citing specific evidence.
- ❖ This develops **causal and analytical reasoning**, not just definitional recall. It is a strong fit for Government or any class that teaches argument from evidence.

INSTRUCTIONAL STRATEGY (ADVANCED)

- ❖ Students **design, administer, and analyze their own poll** on a school or community question.
- ❖ The learning is in the design process: Who counts as the population? How do we reach a random sample? What happens when we can't? What biases did we introduce?
- ❖ They present findings with a written methodology statement that names their sampling method, acknowledges limitations, and states what their results can & cannot claim.
- ❖ Scalable: a one-day version has students poll 10 classmates and reflect on bias. A two-week version produces a full research report.
- ❖ Natural fit for civics, social studies, ELA research units, science fair projects, statistics, health class surveys.

ASSESSING USING POLLING DATA (FORMATIVE ASSESSMENTS)

Exit Ticket: After any lesson involving polling data, students answer four questions in writing: What was the sample size? What was the margin of error? Who paid for this poll? Does the headline accurately reflect what the data shows?

Poll Graphic Annotation: Students receive a polling graphic with no teacher commentary. They circle what they trust, underline what they question, and write one sentence explaining what the margin of error means in this specific context.

2-Minute Methodology Critique: Students watch or read a brief news segment citing a poll and write: one thing the journalist got right about the methodology, and one thing they got wrong or omitted. Reveals whether students can apply, not just define.

ASSESSING USING POLLING DATA (SUMMATIVE ASSESSMENTS)

The Poll Evaluation Essay: Students receive three polls on the same topic, each with different methodologies, sample sizes, and sponsors. They write an analytical essay identifying which is most reliable and why, citing specific methodological evidence. This mirrors AP Gov FRQ format.

The Methodology Statement: As the culminating task for the Class Poll Project, students produce a written methodology statement modeled on professional polling disclosure. They must name their sampling method, acknowledge sources of bias, state their margin of error, and explain what their results can and cannot claim. High-ceiling task.

ASSESSING USING POLING DATA (SUMMATIVE ASSESSMENTS)

The News Desk Memo: Students are assigned the role of a journalist or fact-checker who has received a poll from a political campaign. They write a one-page memo to their editor recommending whether to publish the findings, with a methodological justification. Authentic task; assesses both content knowledge and civic reasoning.

Socratic Seminar with Rubric: Using a rubric that assesses both content accuracy (Does the student correctly apply polling concepts?) and civic reasoning (Does the student connect polling reliability to democratic participation?), teachers can assess discussion without multiple choice.

**Many students
assume “data”
means certainty.
We need to
revise this way
of thinking**

MOVE THROUGH BLOOM'S TAXONOMY

Level	What it looks like	Example Task
Remember	Define margin of error	Vocabulary quiz
Understand	Explain what $\pm 3\%$ means	Exit ticket explanation
Apply	Identify margin of error in a real poll	Poll annotation
Analyze	Determine whether a poll's headline is justified	News desk memo
Evaluate	Compare three polls and defend which is most reliable	Poll evaluation essay
Create	Design and administer a valid poll	Class poll project

RECOMMENDED RESOURCES

Resource	How you might use it
Pew Research Center pewresearch.org	Model of transparent polling methodology. Every poll includes a detailed methodology statement. Use the methodology page as a primary source for teaching poll evaluation.
Gallup gallup.com	Long historical archive of polling data, including tracking polls going back decades. Excellent for showing how public opinion shifts over time on the same question.
FiveThirtyEight fivethirtyeight.com	Polling aggregation with transparency about weighting and methodology. Polling explainer articles are accessible and accurate for classroom use.
Roper Center ropercenter.cornell.edu	The largest archive of U.S. public opinion data. Searchable by topic, date, and polling organization. Excellent for research and for a “Broken Poll Autopsy” activity.

- ❖ *This matters because students are already surrounded by data, but they're not being taught how to question it. Whether the numbers come from a lab, a survey, a graph in a textbook, or a headline on their phone, the thinking skills are the same. What changes is the context, not the reasoning.*
- ❖ *You don't need to teach polling. Take one graph, one table, or one claim your students already see and run it through the question ladder. Five minutes of structured questioning can completely change how students engage with data*
- ❖ *Data literacy isn't about knowing the right answer but instead knowing what questions to ask when there isn't one*