# HYPOTHESIS TESTING

Data Analysis for Journalism and Political Communication
(Fall 2024)

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# WRITING HYPOTHESES

Every hypothesis has <u>two</u> opposing versions, both of which are critically important:

1. The null hypothesis ($H_0$), also called "H-naught"
2. The alternative hypothesis ($H_A$ or $H_1$)

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  - $H_0$: There is no difference in vote preference among voters who decided in the last month.

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- $H_0$ is the hypothesis of *no difference*. For example:
  - $H_0$: There is no difference in vote preference among voters who decided in the last month.
- $H_A$ is the hypothesis of *difference*. For example:
  - $H_A$: Voters who decided in the last month were more likely to support Donald Trump than Joe Biden.

# LET'S PRACTICE

Identify whether each of these hypotheses is $H_0$ or $H_A$, and provide it's opposite:

1. Global temperatures are no different today than they were 50 years ago.
2. Regular viewers of 24-hour news channels are more partisan than non-viewers.
3. The number of soldiers from a voter's area who are killed in Iraq is positively correlated with votes for John Kerry in the 2004 presidential election.

# LET'S PRACTICE

Identify whether each of these hypotheses is $H_0$ or $H_A$, and provide it's opposite:

1. $H_0$: Global temperatures are no different today than they were 50 years ago.
   $H_A$: Global temperatures are higher today than they were 50 years ago.

2. Regular viewers of 24-hour news channels are more partisan than non-viewers.

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1. $H_0$: Global temperatures are no different today than they were 50 years ago.
   $H_A$: Global temperatures are higher today than they were 50 years ago.

2. $H_A$: Regular viewers of 24-hour news channels are more partisan than non-viewers.
   $H_0$: Regular viewers of 24-hour news channels are as partisan as non-viewers.

3. The number of soldiers from a voter's area who are killed in Iraq is positively correlated with votes for John Kerry in the 2004 presidential election.

# LET'S PRACTICE

Identify whether each of these hypotheses is $H_0$ or $H_A$, and provide it's opposite:

1. $H_0$: Global temperatures are no different today than they were 50 years ago.
   $H_A$: Global temperatures are higher today than they were 50 years ago.

2. $H_A$: Regular viewers of 24-hour news channels are more partisan than non-viewers.
   $H_0$: Regular viewers of 24-hour news channels are as partisan as non-viewers.

3. $H_A$: The number of soldiers from a voter's area who are killed in Iraq is positively correlated with votes for John Kerry in the 2004 presidential election.
   $H_0$: The number of soldiers from a voter's area who are killed in Iraq is not correlated with votes for John Kerry in the 2004 presidential election.

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  - This is why we say that the criminal justice system has a presumption of innocence:

    $H_0$: The person is not guilty.
    $H_A$: The person is guilty.
- To do this, we assume a world in which $H_0$ is true, and place the burden on us (the prosecution) to show that this assumption is likely wrong.

In-class example

# TYPES OF HYPOTHESIS TESTS

## One-sample t-test

A difference-of-means test comparing an estimate of the mean to a specific alternative mean (often 0)

## Two-sample t-test

A difference-of-means test comparing estimates of the mean of two samples

# Types of Hypothesis Tests

## One-tailed t-test
A difference-of-means test of whether an estimate of the mean is greater or less than an alternative (mean or sample)

## Two-tailed t-test
A difference-of-means test of whether an estimate of the mean is different than an alternative (mean or sample)

*Most researchers use two-tailed tests even when they hypothesize a directional difference (greater or lesser) because a two-tailed test is more conservative and less likely to result in Type 1 error.

Return to the in-class example