

Lesson 05 - Strength of Evidence

- Lesson objectives:
1. Standardized Statistic (Calculate and interpret)
 2. 3x things that impact Strength of Evidence
 3. Two sided test

Strength of Evidence

P-Value

$0.1 < p$	WEAK
$0.05 < p \leq 0.1$	MODERATE
$0.01 < p \leq 0.05$	STRONG
$p \leq 0.01$	VERY STRONG

Standardized Values

$$|z| \leq 1.5$$

$$1.5 < |z| \leq 2$$

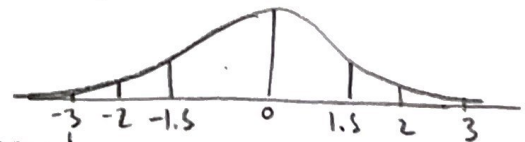
$$2 < |z| \leq 3$$

$$3 < |z|$$

Standardized Statistic

$$z = \frac{\hat{p} - \text{mean}(\text{null})}{SD(\text{null})}$$

- Tells us how far above (below) the mean the observed statistic is in terms of "how many standard deviations"
- Larger values (absolute) \rightarrow stronger evidence



- alternate measure of strength of evidence.
- "Converting to a distance of SD"
- "Converting center to be at 0"
- we say, "The observed statistic (\hat{p}) falls x.x standard deviations from the mean of the null distribution."

P-value vs. Standardized Statistic (in measuring SOE)

- P-value - indicates probability, under the null hypothesis, of getting a statistic as extreme as or more extreme than the one observed.
- Standardized Statistic (z): Standardize the observed statistic by measuring how far it is from the mean of the distribution using standard deviation units.

What impacts Strength of Evidence?

- Distance from null - The further away the observed statistic (\hat{p}) is from the mean of null distribution, the more evidence there is against the null.
"more extreme \rightarrow more evidence"
- Sample Size - As sample size ^(observational units) increases (and the value of the observed sample statistic (\hat{p}) stays the same), the SOE against the null hypothesis \uparrow
 - "Variability \downarrow as sample size \uparrow "
(less sample-to-sample variability in the sample proportions as the sample size gets bigger.)
 \rightarrow variability of null distribution \downarrow
- 1 tail vs. 2 tail - 2 sided tests increase p-value (\sim double) and \therefore decrease SOE
 - more extreme must go in both directions
 - require higher standard of proof
 - How calculate?