



FOUNDATIONS OF INFERENCE

Example: opportunity cost

The study

- Control group (75 students) presented with 2 options:
 - (A) Buy this entertaining video
 - (B) Not buy this entertaining video
- Treatment group (75 students) presented with slightly modified option (B):
 - (A) Buy this entertaining video
 - (B) Not buy this entertaining video. Keep the \$14.99 for other purchases

State the hypotheses

- H_0 : Reminding students will have no impact on their spending decisions
- H_A : Reminding students will reduce the chance they continue with a purchase

The data

	Buy DVD	Not buy DVD	Total	
Control group	56	19	75	0.7467
Treatment group	41	34	75	0.5467
Total	97	53	150	



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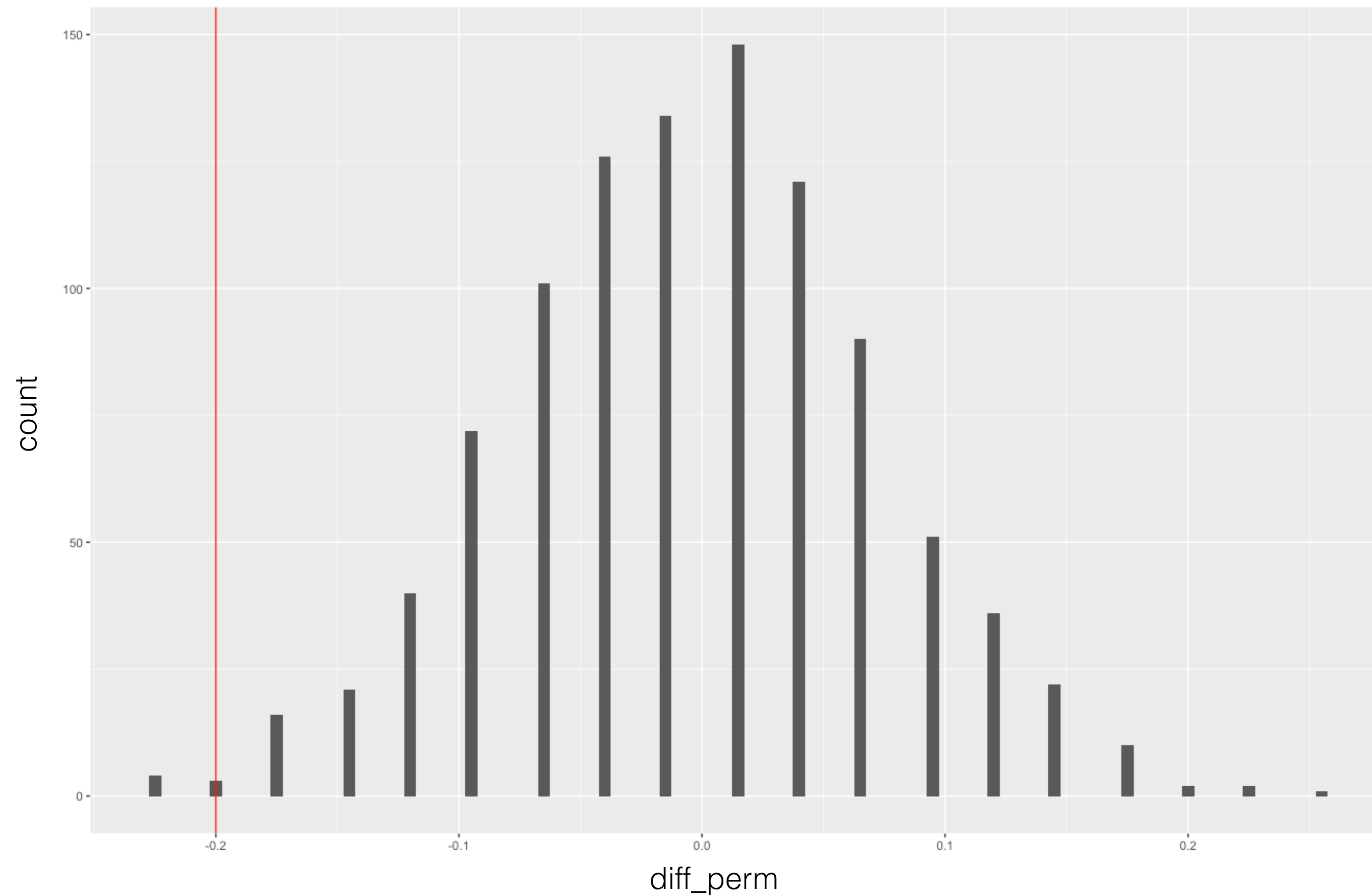
Let's practice!





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Errors and their consequences

Opportunity cost conclusion



Errors in hypothesis testing

		Test Conclusion	
		Do not reject H_0	Reject H_0 in favor of H_A
Truth	H_0 true		Type I error
	H_A true	Type II error	

Errors in US judicial system

		Decision	
		Fail to convict defendant	Convict defendant
Truth	Defendant is innocent (H_0 true)	✓	Wrongly convicted
	Defendant is guilty (H_A true)	Wrongly set free	✓



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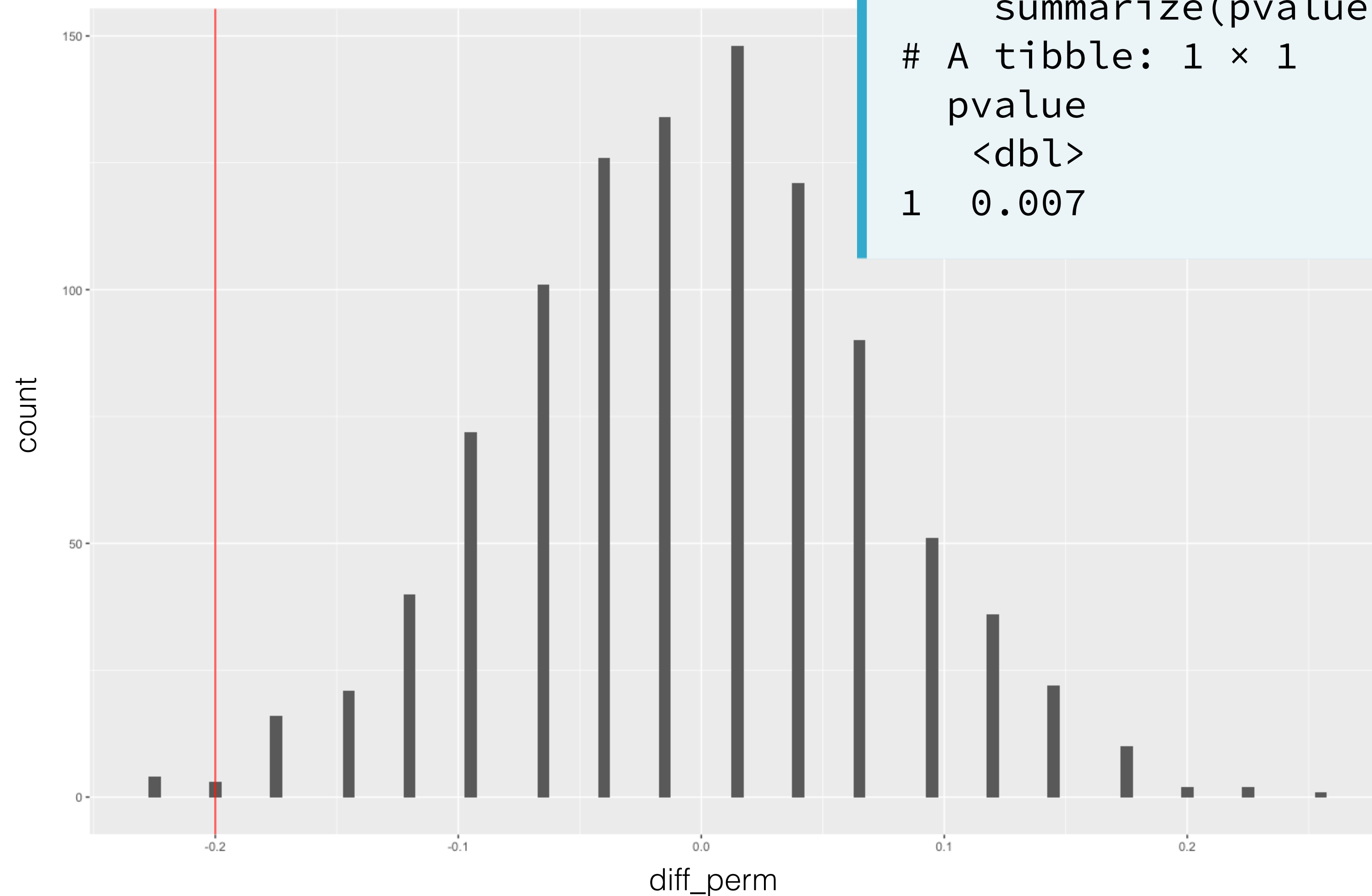
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Summary of opportunity costs

Significance



```
> # Calculate the p-value
> opp_perm %>%
  summarize(pvalue = mean(diff_perm <= diff_orig))
# A tibble: 1 × 1
  pvalue
  <dbl>
1 0.007
```

Causation

- Study was randomized (i.e. individuals were randomly assigned the choices)
- Nothing systematically different about participants in treatment and control groups
- Therefore, any difference in buying rates is due to the options given (i.e. being reminded to save)

Random sample

- 150 individuals in the sample were not randomly sampled from all people
- In order to generalize, we need more information about the students and who they represent





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Let's practice!