Virtual Tactile Resampling for Permutations and Bootstraps

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Simulation and Randomization

Tactile demonstrations using a deck of cards can help build intuition for sampling

Drawbacks:

- Limit to how many sets you can reasonably distribute
- Time required to sort / prepare decks
- Shuffling cards during class can be time consuming

Online Alternatives

Existing online resources were lacking. . .

- No abiity to customize deck composition
- Limited or missing visualizations
- Required user to download and install cumbersome programs

A solution?

Goal: Create a lightweight card shuffler with appropriate visualization that could be used to replicate an in-class simulation activity.

Tools: R, `ggplot2`, `shiny`

Activity

The first time I discuss hypothesis testing, I have students perform the following activity:

- Is Yawning contagious? In an experiment conducted on the tv show *Mythbusters*, 50 subjects were divided into two groups:
  - A seed group of 34 who were exposed to a yawn.
  - A control group of 16 who were not.
  - In the seed group, 10 of 34 later yawned. In the control group, 4 of 16 later yawned.
  - This gives a difference in proportion of 0.044 between seed and control.
- Students are asked to investigate how likely it would be to observe this result just due to chance if there were no relationship between exposure to a yawn and later yawning.
- Assume that the assignment of group labels is superfluous. A subject will yawn (or not) regardless of what group they are in.
- To simulate new samples under this hypothesis, we shuffle group labels among all subjects and compute the difference in proportions of the new groups.

Shiny App

To reproduce the activity of card shuffling, I have students use the following shiny app:

https://chalkboardsonata.shinyapps.io/2_sample/