

# WU #8 - Permuting

Math 154 - Jo Hardin

Thursday, September 30, 2021

Name: \_\_\_\_\_

Consider the MacNell experimental data.

Skeptic: the differences in averages are due to random variability (null hypothesis)

Advocate: the difference in averages are due to the identity of the TA (alternative hypothesis)<sup>1</sup>

The null hypothesis that the gender **identity** of the instructor is the same with respect to the probability distribution of the course evaluations. Which is the correct permutation scheme?

1. Permute the identity variable
2. Permute the gender variable
3. Permute the gender variable after grouping by the identity variable
4. Permute the identity variable after grouping by the gender variable

Provide a permutation under your suggested permutation strategy. That is, permute the correct variable(s).

```
## # A tibble: 20 x 3
##   tagender taidgender overall
##   <int>      <int>    <dbl>
## 1         0          0        5
## 2         0          0        1
## 3         0          0        1
## 4         0          0        4
## 5         0          0        4
## 6         0          1        3
## 7         0          1        4
## 8         0          1        4
## 9         0          1        4
## 10        0          1        4
## 11        1          0        4
## 12        1          0        4
## 13        1          0        4
## 14        1          0        4
## 15        1          0        4
## 16        1          1        4
## 17        1          1        3
## 18        1          1        4
## 19        1          1        5
## 20        1          1        4
```

---

<sup>1</sup>Note that there should generally be no causal claim / conclusion in the alternative. Usually, the conclusion is that of an association (not a causation). **However**, here the data were collected under experimental conditions, so there is a possible causal claim if warranted by the data.

## Solution

The structure of the permutation test will be to permute the identity variable after grouping by the gender variable. One possible permutation is:

```
## # A tibble: 20 x 4
##   tagender taidgender permTAID overall
##   <int>    <int>    <int>    <dbl>
## 1      0      0      0      5
## 2      0      0      0      1
## 3      0      0      1      1
## 4      0      0      0      4
## 5      0      0      1      4
## 6      0      1      1      3
## 7      0      1      0      4
## 8      0      1      1      4
## 9      0      1      1      4
## 10     0      1      0      4
## 11     1      0      0      4
## 12     1      0      0      4
## 13     1      0      1      4
## 14     1      0      1      4
## 15     1      0      1      4
## 16     1      1      1      4
## 17     1      1      0      3
## 18     1      1      0      4
## 19     1      1      0      5
## 20     1      1      1      4
```