

Civil Rights Act of 1964

The following analysis was excerpted from the Data Camp course "Statistical Thinking in Python"

The vote for the Civil Rights Act in 1964

The Civil Rights Act of 1964 was one of the most important pieces of legislation ever passed in the USA. Excluding "present" and "abstain" votes, 153 House Democrats and 136 Republicans voted yea. However, 91 Democrats and 35 Republicans voted nay. Did party affiliation make a difference in the vote?

To answer this question, you will evaluate the hypothesis that the party of a House member has no bearing on his or her vote. You will use the fraction of Democrats voting in favor as your test statistic and evaluate the probability of observing a fraction of Democrats voting in favor at least as small as the observed fraction of 153/244. (That's right, at least as *small* as. In 1964, it was the *Democrats* who were less progressive on civil rights issues.) To do this, permute the party labels of the House voters and then arbitrarily divide them into "Democrats" and "Republicans" and compute the fraction of Democrats voting yea.

In [3]:

```
def permutation_sample(data1, data2):  
    """Generate a permutation sample from two data sets."""  
  
    # Concatenate the data sets: data  
    data = np.concatenate((data1,data2))  
  
    # Permute the concatenated array: permuted_data  
    permuted_data = np.random.permutation(data)  
  
    # Split the permuted array into two: perm_sample_1, perm_sample_2  
    perm_sample_1 = permuted_data[:len(data1)]  
    perm_sample_2 = permuted_data[len(data1):]  
  
    return perm_sample_1, perm_sample_2
```

In [8]:

```
def draw_perm_reps(data_1, data_2, func, size=1):  
    """Generate multiple permutation replicates."""  
  
    # Initialize array of replicates: perm_replicates  
    perm_replicates = np.empty(size)  
  
    for i in range(size):  
        # Generate permutation sample  
        perm_sample_1, perm_sample_2 = permutation_sample(data_1,data_2)  
  
        # Compute the test statistic  
        perm_replicates[i] = func(perm_sample_1, perm_sample_2)  
  
    return perm_replicates
```

In [10]:

```
import numpy as np

# Construct arrays of data: dems, reps
dems = np.array([True] * 153 + [False] * 91)
reps = np.array([True] * 136 + [False] * 35)

def frac_yea_dems(dems, reps):
    """Compute fraction of Democrat yea votes."""
    frac = np.sum(dems) / len(dems)
    return frac

# Acquire permutation samples: perm_replicates
perm_replicates = draw_perm_reps(dems, reps, frac_yea_dems, 10000)

# Compute and print p-value: p
p = np.sum(perm_replicates <= 153/244) / len(perm_replicates)
print('p-value =', p)
```

p-value = 0.9999

Great work! This small p-value suggests that party identity had a lot to do with the voting. Importantly, the South had a higher fraction of Democrat representatives, and consequently also a more racist bias.