In [1]:
```
from datascience import *
import numpy as np

%matplotlib inline
import matplotlib.pyplot as plots
plots.style.use('fivethirtyeight')
```

Alameda County Jury Panels

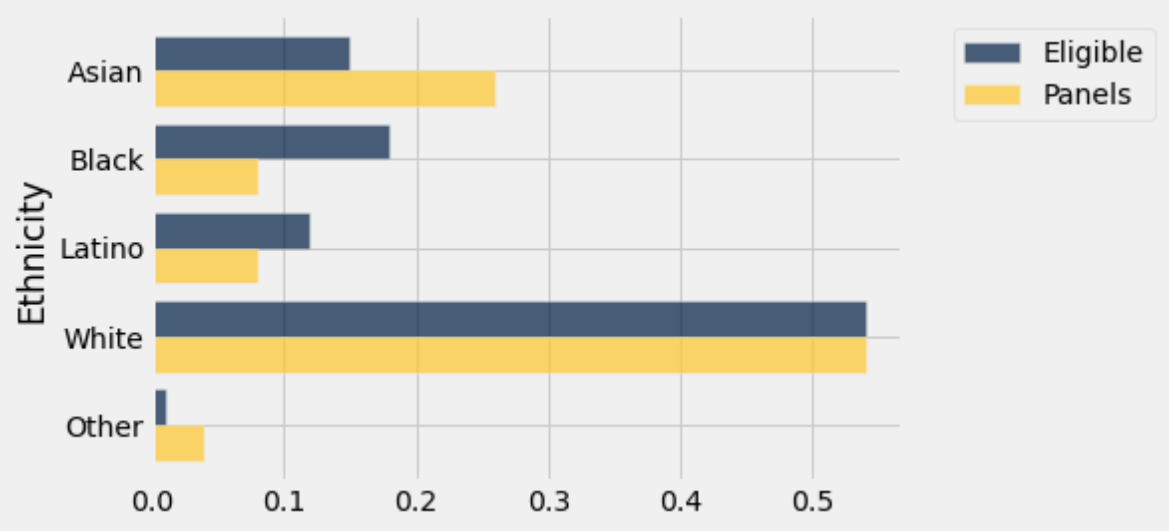
In [2]:
```
jury = Table.read_table('alameda.csv')

jury
```

Out[2]:

Ethnicity	Eligible	Panels
Asian	0.15	0.26
Black	0.18	0.08
Latino	0.12	0.08
White	0.54	0.54
Other	0.01	0.04

In [3]:
```
jury.barh('Ethnicity')
```



In [4]:
```
jury_with_diffs = jury.with_column(
    'Difference', jury.column('Panels') - jury.column('Eligible')
)
```

In [5]:
```
jury_with_diffs
```

Out[5]:

Ethnicity	Eligible	Panels	Difference
Asian	0.15	0.26	0.11
Black	0.18	0.08	-0.1
Latino	0.12	0.08	-0.04
White	0.54	0.54	0
Other	0.01	0.04	0.03

In [6]:
```
jury_with_diffs = jury_with_diffs.with_column(
    'Absolute Difference', np.abs(jury_with_diffs.column('Difference'))
)
```

In [7]:
```
jury_with_diffs
```

Out[7]:

Ethnicity	Eligible	Panels	Difference	Absolute Difference
Asian	0.15	0.26	0.11	0.11
Black	0.18	0.08	-0.1	0.1
Latino	0.12	0.08	-0.04	0.04
White	0.54	0.54	0	0
Other	0.01	0.04	0.03	0.03

In [8]:
```
sum(jury_with_diffs.column('Absolute Difference'))
```

Out[8]:
```
0.28
```

In [9]:
```
sum(jury_with_diffs.column('Absolute Difference')) / 2
```

Out[9]:
```
0.14
```

In [10]:
```
def total_variation_distance(distribution_1, distribution_2):
    return sum(np.abs(distribution_1 - distribution_2)) / 2
```

In [11]:
```
total_variation_distance(jury.column('Eligible'), jury.column('Panels'))
```

Out[11]:
```
0.14
```

In [12]:
```
eligible = jury.column('Eligible')
```

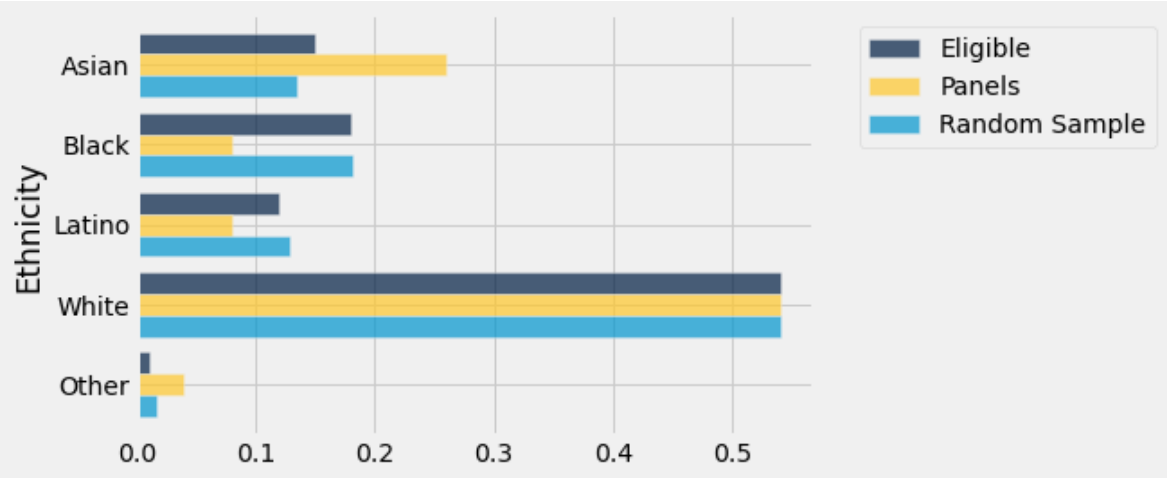
In [13]:
```
sample_distribution = sample_proportions(1453, eligible)
panels_and_sample = jury.with_column('Random Sample', sample_distribution)
```

In [14]:
```
panels_and_sample
```

Out[14]:

Ethnicity	Eligible	Panels	Random Sample
Asian	0.15	0.26	0.134205
Black	0.18	0.08	0.181005
Latino	0.12	0.08	0.128011
White	0.54	0.54	0.540262
Other	0.01	0.04	0.0165175

In [15]:
```
panels_and_sample.barh('Ethnicity')
```



In [16]:
```
total_variation_distance(panels_and_sample.column('Random Sample'), eligible)
```

Out[16]:
```
0.015794907088781812
```

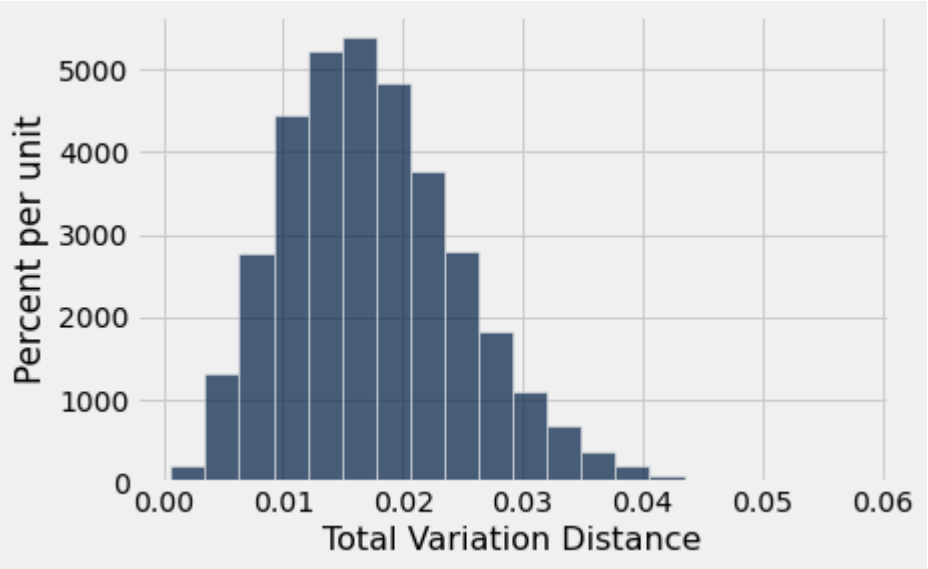
In [17]:
```
sample_distribution = sample_proportions(1453, eligible)
total_variation_distance(sample_distribution, eligible)
```

Out[17]:
```
0.016875430144528556
```

In [18]:
```
tvds = make_array()

for i in np.arange(10000):
    sample_distribution = sample_proportions(1453, eligible)
    new_tvd = total_variation_distance(sample_distribution, eligible)
    tvds = np.append(tvds, new_tvd)
```

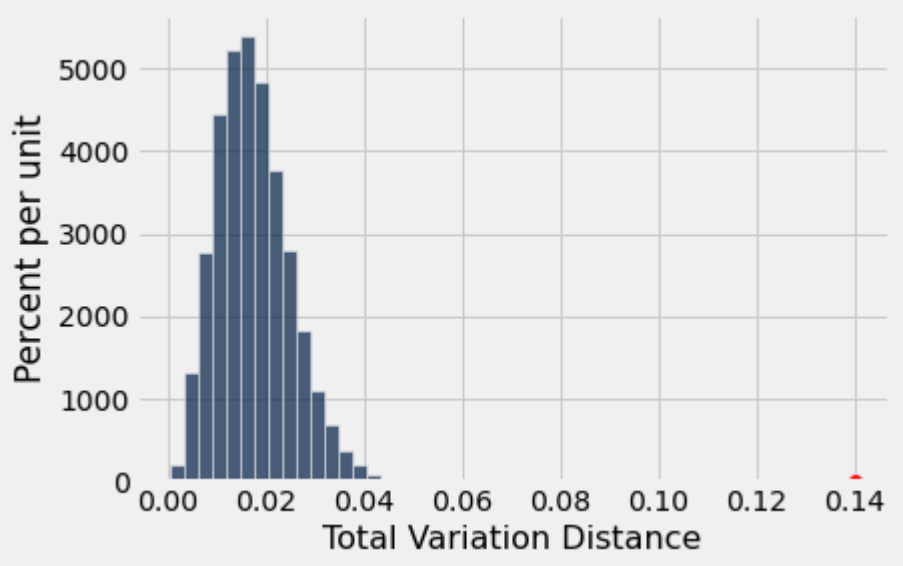
In [19]:
```
Table().with_column('Total Variation Distance', tvds).hist(bins = 20)
```



In [20]:
```
observed_tvd = total_variation_distance(jury.column('Panels'), eligible)
observed_tvd
```

Out[20]: 0.14

In [21]:
```
Table().with_column('Total Variation Distance', tvds).hist(bins = 20)
plots.scatter(observed_tvd, 0, color = 'red', s=40);
```



In [ ]:
```

```

In [ ]: