Project title

Brilliant Cassowary - Report

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Introduction

One of the most widely known beverages in today's age is coffee. It is present in many different settings, ranging from students and employees to casual coffee shop frequenters and critical coffee enthusiasts. Our current research questions are: - How does self-perceived coffee experience affect actual and stated preferences? - How does coffee preference and consumption habits differ by demographic attributes such as age, gender, education level, race, and political identity?

Data description

What are the observations (rows) and the attributes (columns)?

The observations represent an individual respondent to the survey. There are 4,042 rows. The columns are questions that they answered, ranging from demographic data to coffee preferences. There are 98 of these columns.

Why was this dataset created?

To understand the general public's preferences as consumers for coffee. Additionally, since Cometeer funded the creation of this dataset, they may be interested to know people's preferences in order to make their coffee capsules more appealing to a wider market.

Who funded the creation of the dataset?

World champion barista James Hoffmann and Cometeer – a subscription service that makes flash-frozen coffee capsules.

What processes might have influenced what data was observed and recorded and what was not?

The survey quickly was sold out, and Hoffman's audience in general is coffee specialists. That will likely skew the population surveyed to be people who likely prefer specialty coffee, so it may be a biased sample. Additionally, this survey was conducted through people ordering tasting kits online, which were then sent to the participants to prepare and complete voluntarily, so there may have been differences in that. One example is that because participants were following a livestream to demonstrate how to do their taste test, their coffees may have been out long enough to have cooled, which could be another unaccounted variable that affected their taste preferences.

What preprocessing was done, and how did the data come to be in the form that you are using?

Zip codes and geographic data seemed to have been removed. Participants were anonymized to protect their privacy. It wasn't disclosed how Hoffmann and his team collected all the taste test results that participants filled out, but once they got that data, they made it into a spreadsheet to be shared with the public.

If people are involved, were they aware of the data collection and if so, what purpose did they expect the data to be used for?

People were involved, and they were made aware of the data collection by a YouTube video stating that the purpose of this taste test was to understand coffee preferences in the USA. The participants had to order the coffee tasting kit on their own in order to participate, showing their willingness to accept these terms. Hoffmann also made his intentions clear in his video with why he wanted to collect the data, and that he was planning to publicize the raw data later on.

Notes

Coffee A - Light roast, Washed Coffee B - Medium Roast Coffee C - Dark roast Coffee D - Fermented, Natural, Fruity

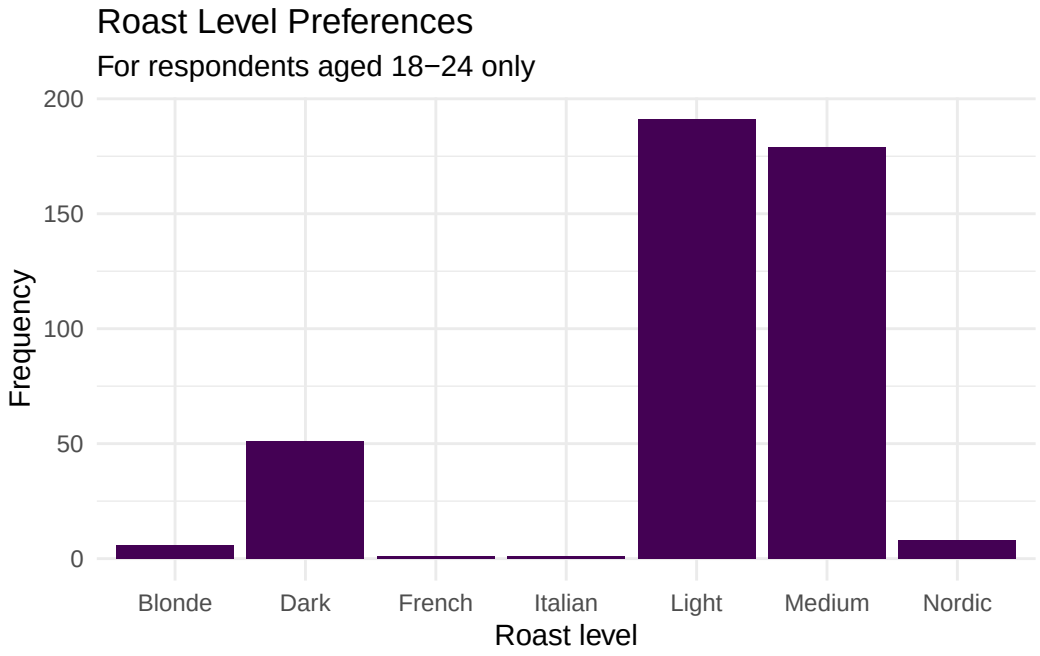
Loading data

Data analysis

We address our first question on actual self-perceived coffee experience compared to stated preferences. We use examples of people stating their preferences and look at the difference in data where they have a taste test.

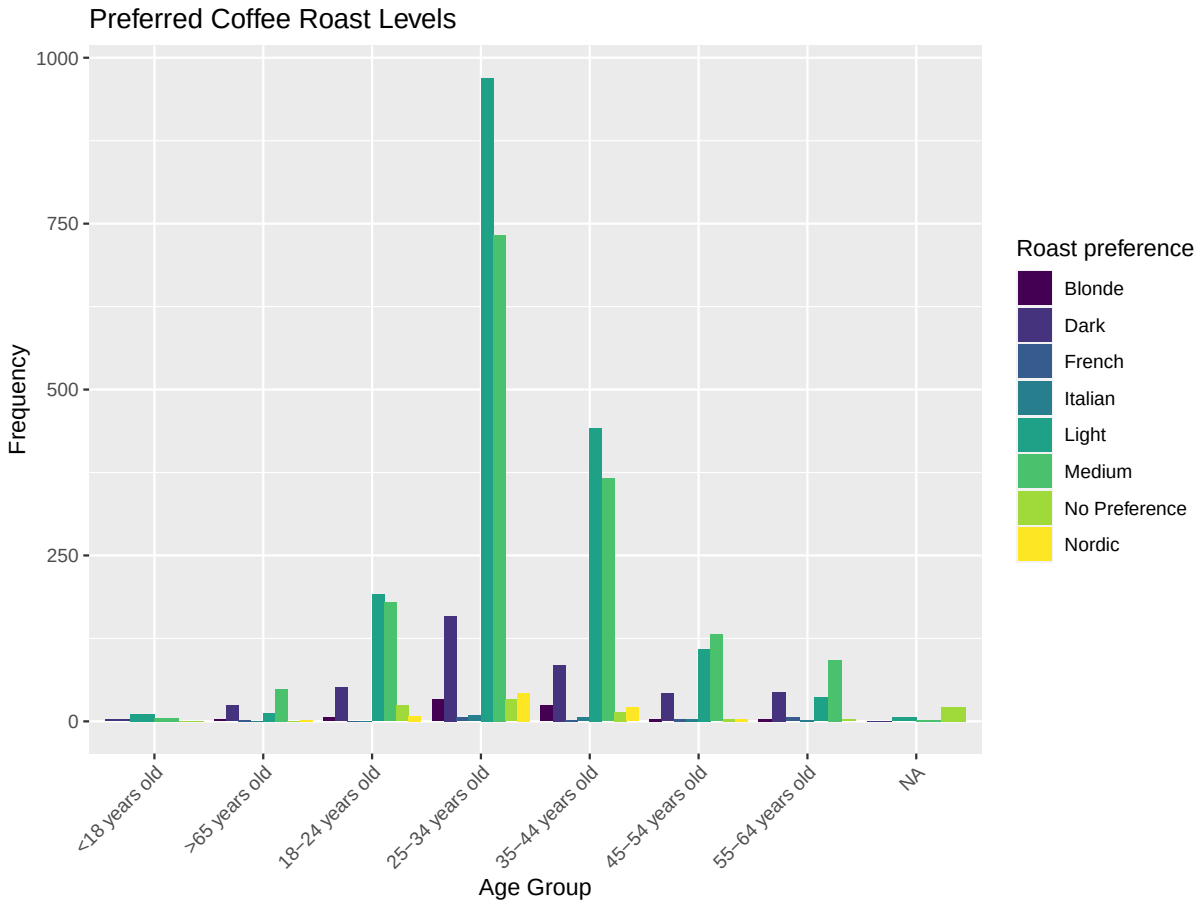
Pre-registered hypotheses

Our first pre-registered hypothesis was that younger people 18 - 25 prefer their coffee with lighter roasts.



We see that there is a clear peak around the Light and Medium roast levels, suggesting that in this sample, younger people that are 18-24 years old have a strong preference for Light and Medium roast levels. However, there is more of a preference for Dark roasts than Nordic roasts, even though Nordic roasts are also generally considered to be lighter roasts.

This leads to the question of whether the younger age range of 18-24 is the most likely age to prefer lighter roast levels (Light, Medium, or Nordic). We investigate this below by first visualizing the preferences of all the age ranges, and then using a linear regression model.



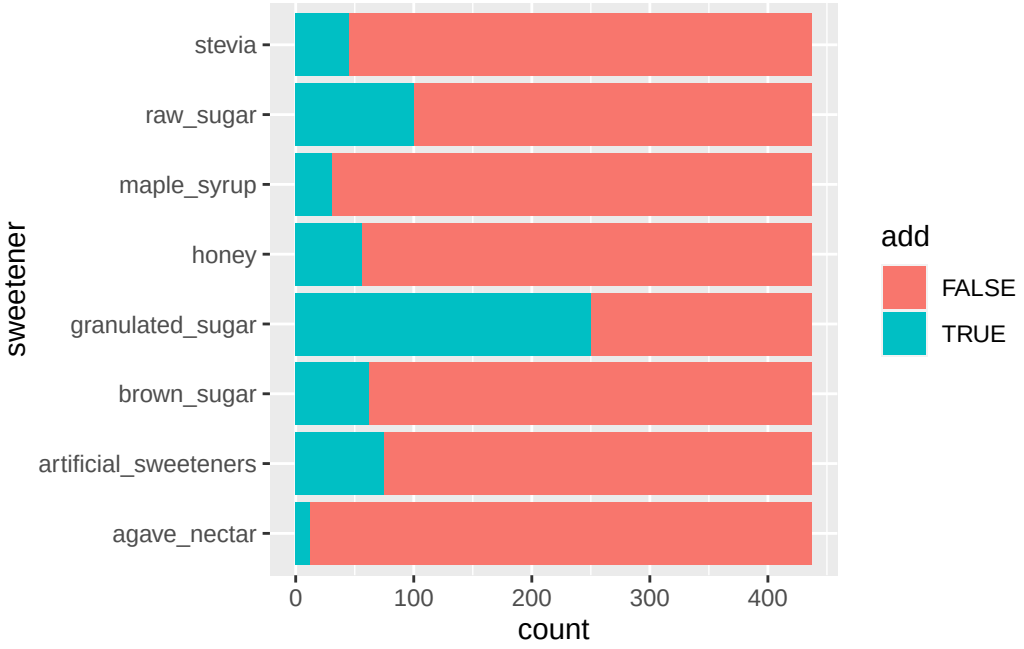
In the future, exploring a logistic regression model may also lead to more accurate results, since the data when visualized doesn't appear to be very linear.

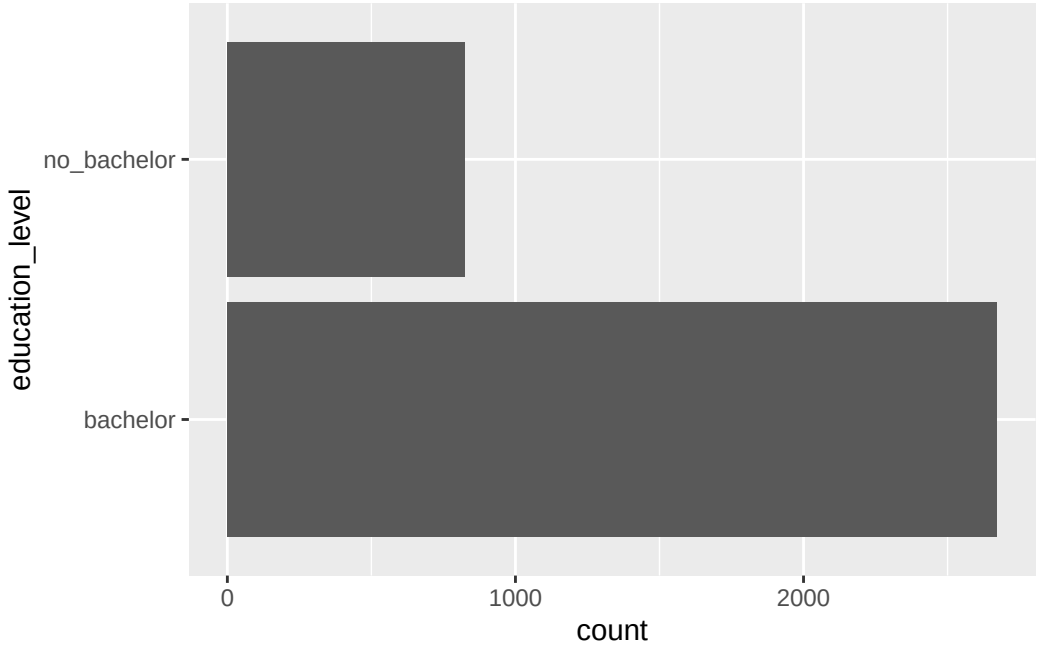
```
# A tibble: 7 x 5
  term               estimate std.error statistic  p.value
  <chr>                 <dbl>     <dbl>     <dbl>    <dbl>
1 (Intercept)           0.842     0.0772    10.9   2.73e-27
2 age18-24 years old    0.0229    0.0789     0.290 7.72e- 1
3 age25-34 years old    0.0519    0.0776     0.669 5.04e- 1
4 age35-44 years old    0.0342    0.0780     0.439 6.61e- 1
5 age45-54 years old   -0.0233    0.0797    -0.293 7.70e- 1
6 age55-64 years old   -0.146     0.0811    -1.81  7.11e- 2
7 age>65 years old     -0.161     0.0847    -1.90  5.70e- 2
```

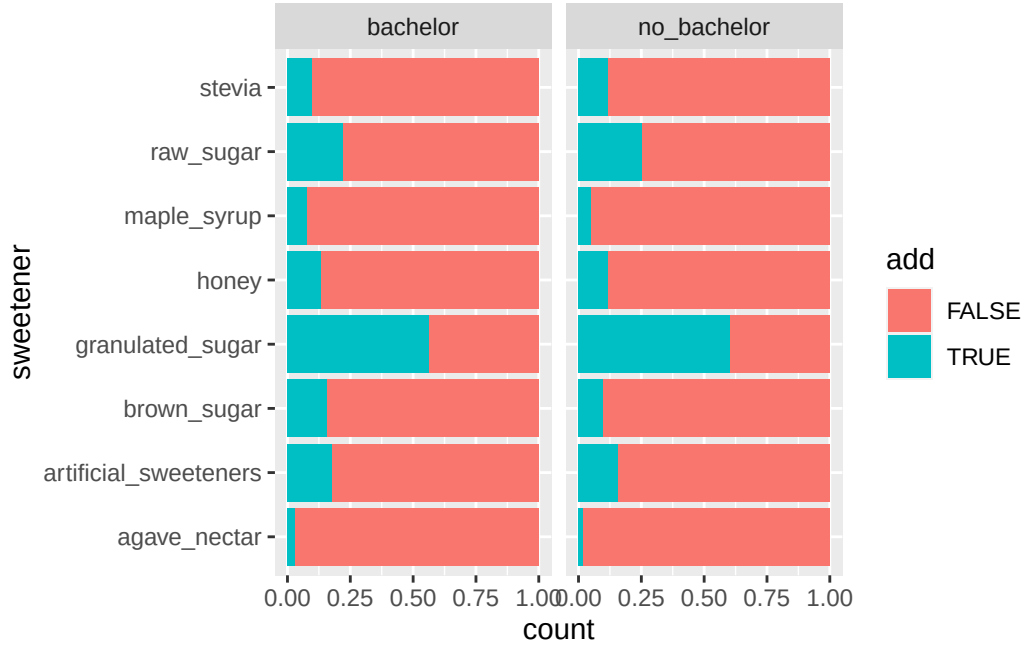
Each of the coefficients gives the proportion of people choosing lighter roasts for the corresponding age group relative to the reference level of <18 years old. The reference level has a coefficient of 0, meaning its estimated proportion is the intercept, 0.842. Notably, the model

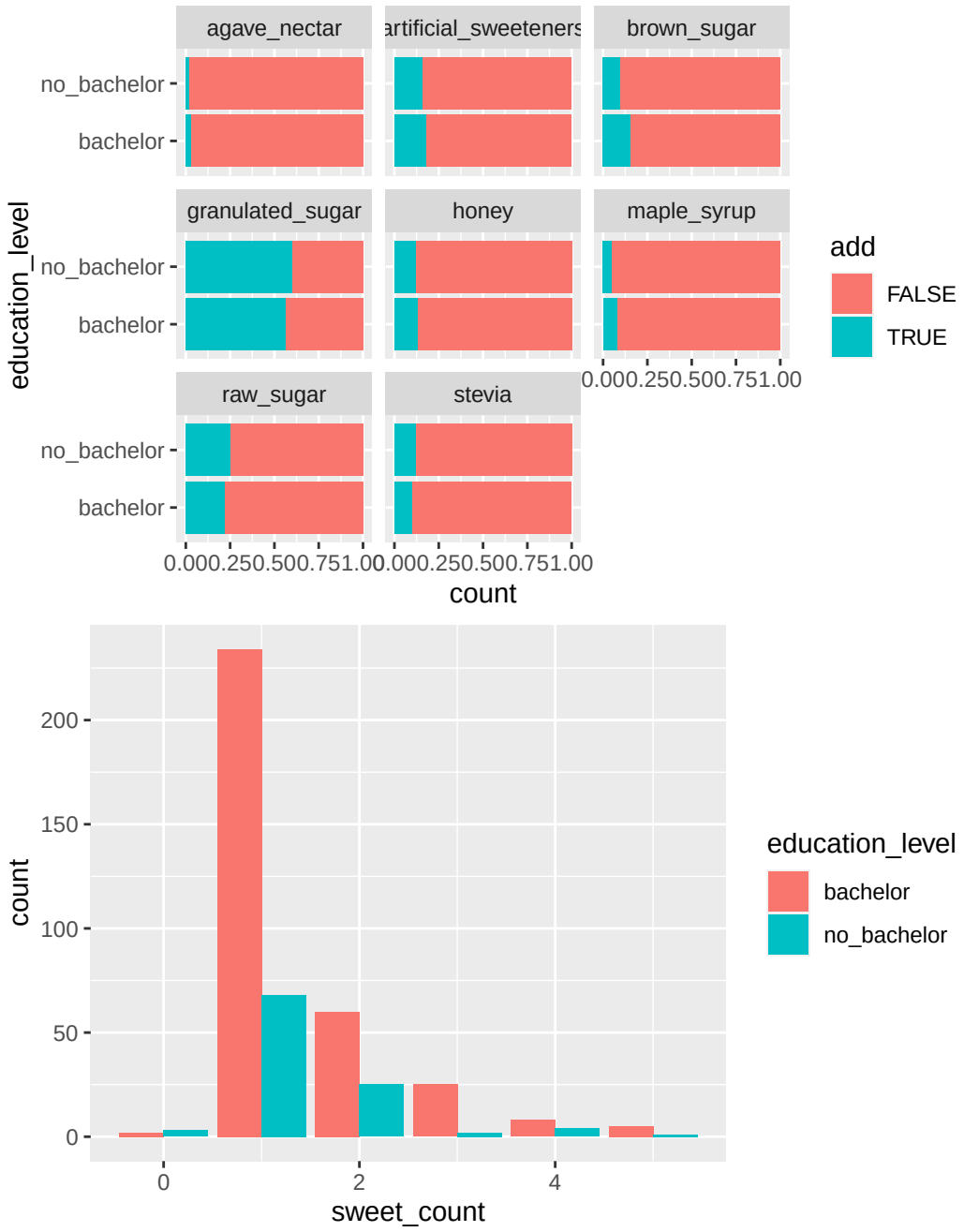
predicts that people aged 18-24 years old will have a 0.029 lower proportion of people that prefer lighter roasts than people aged 25-34 years old, on average. So, the model predicts that younger people aged 18-24 are actually not the most likely group to prefer lighter roasts.

Pre-registered Hypothesis 2 Our second pre-registered hypothesis is was that people with a bachelor's degree will higher would be more likely to add more types of sweeteners to their coffee as compared to those without a bachelor's degree




education_level
no_bachelor
bachelor
0
1000
2000
count


bachelor
no_bachelor
sweetener
stevia
raw_sugar
maple_syrup
honey
granulated_sugar
brown_sugar
artificial_sweeteners
agave_nectar
0.00
0.25
0.50
0.75
1.00
count
add
FALSE
TRUE



The visualizations seem to show little difference between the distribution of the number of sugar types preferred by those with a Bachelor's or higher degree compared to that preferred by those with less than Bachelor's degree. We can conduct a hypothesis test to further test our hypothesis. We conduct a linear regression below

```
# A tibble: 2 x 5
```

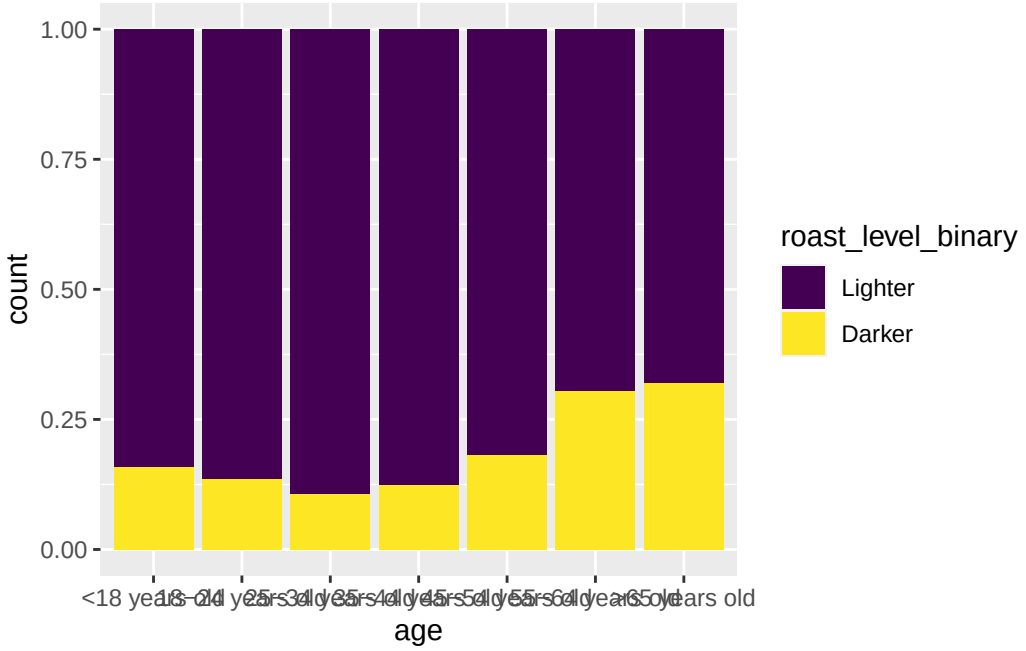
```
  term        estimate std.error statistic    p.value
  <chr>          <dbl>     <dbl>     <dbl>      <dbl>
1 (Intercept)  -1.08       0.225    -4.81  0.00000153
2 sweet_count  -0.0676     0.137    -0.493 0.622
```

The logistical regression model calculated the coefficients representing the that a person with less than a Bachelor's degree would on average have 0.06 less probability to choose less sugar additive types than a person with a Bachelor's degree or higher would, holding all else constant.

Evaluation of significance

Pre-registered Hypothesis 1

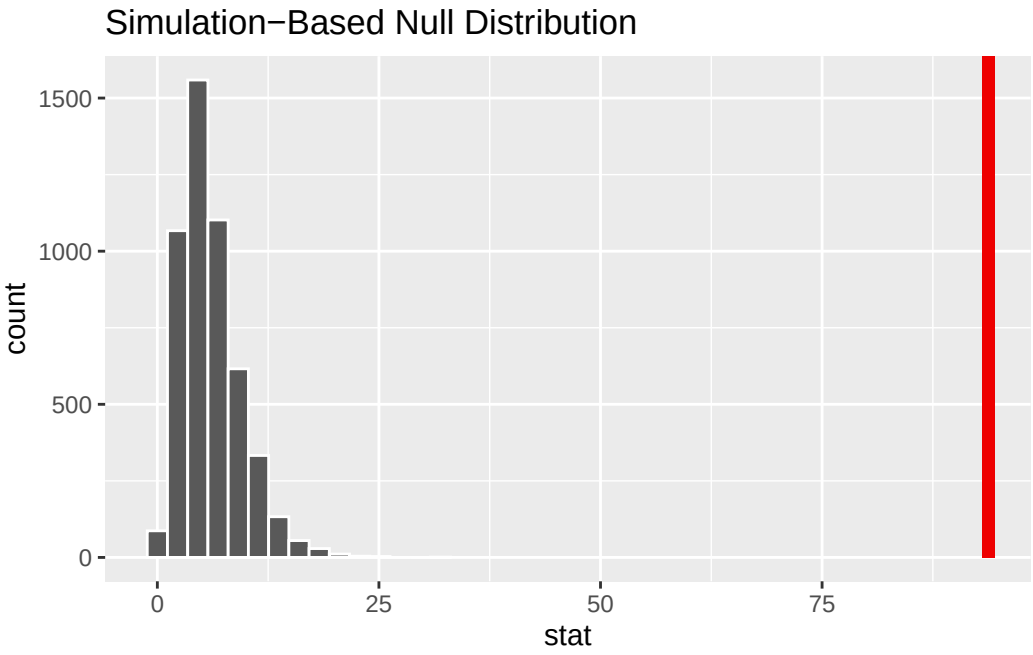
We can investigate if the difference in proportions of preferring a lighter roast between age groups is statistically significant or not with a chi-squared test of independence.



If there were no relationship between these two variables, we would expect to see the purple bars reaching to the same height, regardless of age group. We need to conduct a chi-squared test of independence to see if the differences we see here are just random noise or a meaningful relationship.

Null hypothesis: There is no association between age group and a lighter roast level preference.

Alternative hypothesis: There is an association between age group and a lighter roast level preference.




```
# A tibble: 1 x 1
  p_value
    <dbl>
1       0
```

Hypothesis 2

We can investigate if the difference in accepted sugar additive types between education groups is statistically significant through a hypothesis test.

Null hypothesis: The true average number of types of sweetener preferred is the same between people in America with a Bachelor's degree or higher and people without a Bachelor's degree.

$$H_0 : \mu_{\text{bach}} - \mu_{\text{no bach}} = 0$$

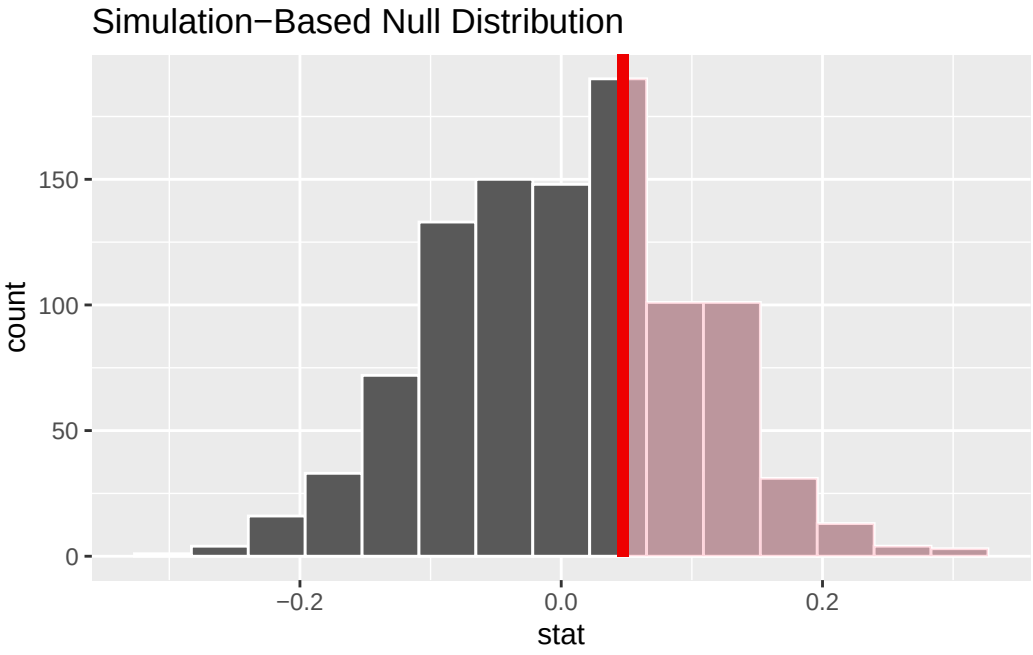
$$H_a : \mu_{\text{bach}} - \mu_{\text{no bach}} \neq 0$$

To evaluate whether the number of types of sweetener accepted differ between people with different education degrees, we will conduct a two-side hypothesis test

Alternative hypothesis: The true average number of types of sweetener preferred is not the same between people in America with a Bachelor's degree or higher and people without a Bachelor's degree.

```
# A tibble: 2 x 2
  education_level  mean
  <fct>           <dbl>
1 bachelor         1.46
2 no_bachelor      1.41
```

The observed statistic is 1.455-1.408 = 0.047




```
# A tibble: 1 x 1
  p_value
    <dbl>
1   0.357
```

Research Question 2

Interpretation and conclusions

Hypothesis 1 From the evaluation of significance, using an alpha value of 0.05, because our p-value of approximately 0 is less than 0.05, we can reject the null hypothesis. There is sufficient evidence that there is an association between age group and preferring lighter roasts of coffee.

In the data analysis, a possible explanation for younger people showing more of a preference for Dark roasts than Nordic roasts despite showing an overwhelming preference for Light and Medium roasts is that more people may be unfamiliar with what a Nordic roast is. For people with general coffee knowledge, seeing light, medium, and dark roasts tends to be more common than Nordic; however, we should still consider that this sample likely has many respondents that are knowledgeable about coffee. So, these results still may have another underlying cause and reveal something about younger people's coffee preferences.

Limitations

Acknowledgments