Name:

Here's a little more information about the data the researchers collected from the students who participated in the "vegemite study" you guys have been talking about in class.

Get this data with this code:

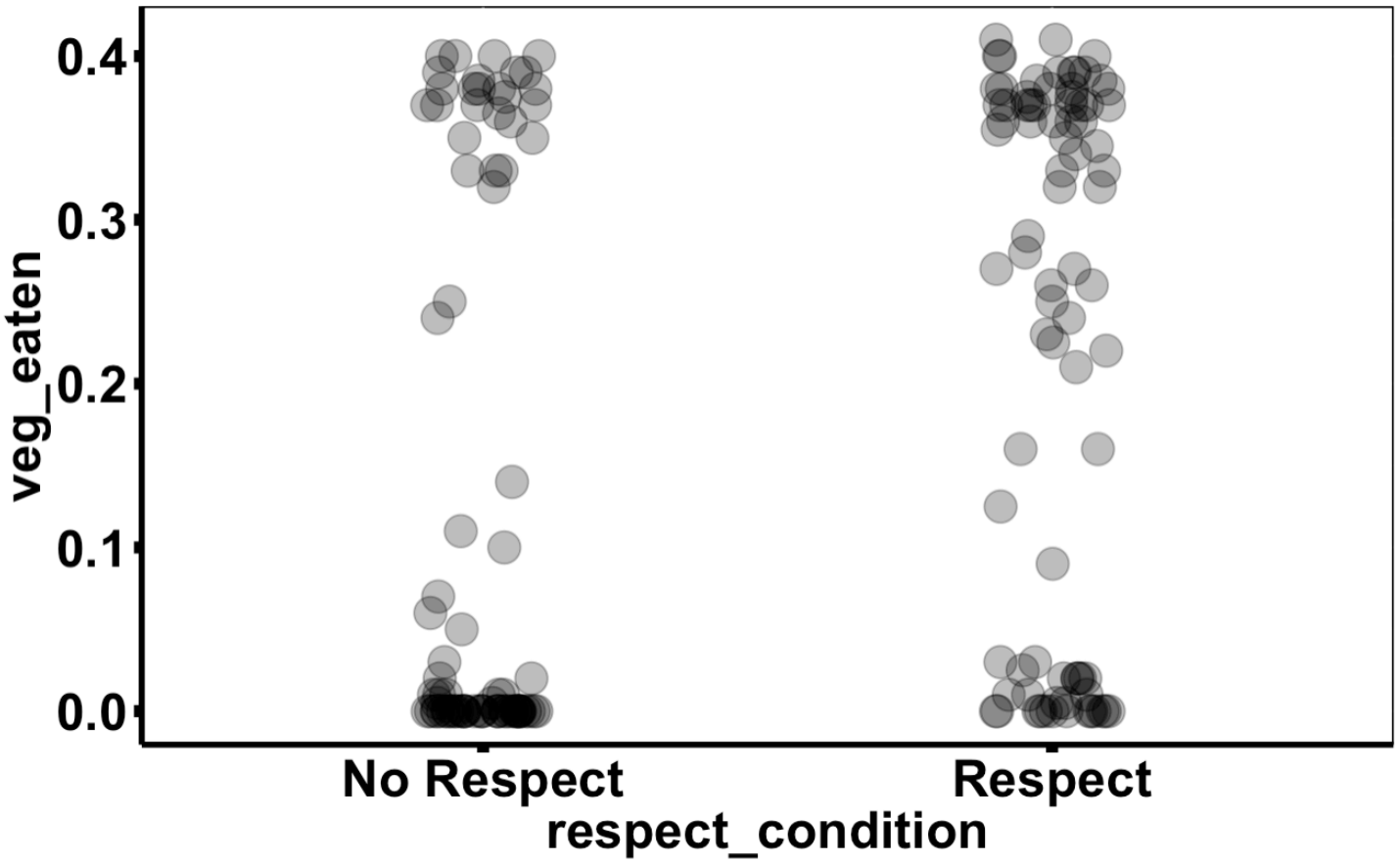
```
library(readr)
vegemite_clean <- read_csv("http://bit.ly/vegemite_clean")
```

subject	ID for the participant.
respect_condition	Whether the participant was spoken to respectfully ("Respect") or not ("No Respect")
testosterone	The measure of the testosterone via the saliva sample
spoon1_before	The mass (grams) of the vegemite in the 1st spoon before it was given.
spoon1_after	The mass (grams) of the vegemite in the 1st spoon after it was given.
spoon2_before	The mass (grams) of the vegemite in the 2nd spoon before it was given.
spoon2_after	The mass (grams) of the vegemite in the 2nd spoon after it was given.
veg_eaten	Amount of vegemite eaten from 2nd spoon: **this is spoon2.difference from before**
ravens_correct	Number of items answered correctly in a Standardized Progressive Matrix
openness	Score from the Big Five personality test (OCEAN), 1 (low) - 7 (high)
conscientious	Score from the Big Five personality test (OCEAN), 1 (low) - 7 (high)
extraversion	Score from the Big Five personality test (OCEAN), 1 (low) - 7 (high)
agreeable	Score from the Big Five personality test (OCEAN), 1 (low) - 7 (high)
narcissism	Score from the Big Five personality test (OCEAN), 1 (low) - 7 (high)
emotion_stability	Average score from questions regarding emotional stability, 1 (low) - 7 (high)
reactance	Average score from questions regarding reactance, 1 (low) - 7 (high)
subjective_power	Average score from questions regarding subjective power, 1 (low) - 7 (high)
aggressive_right_now	"How aggressive are you feeling right now?", 1 (low) - 7 (high)
sex_drive_right_now	"How high is your sex drive right now?", 1 (low) - 7 (high)
campus_greek	Are you in a fraternity or sorority?
status	Average score from questions regarding personal status, 1 (low) - 7 (high)
competent	Average score from questions regarding self-competence, 1 (low) - 7 (high)
autonomous	Average score from questions regarding autonomy, 1 (low) - 7 (high)
respectful	Measure of how respectful they felt the researcher was, 1 (low) - 7 (high)

1. What makes some people eat more or less Vegemite? Come up with a few ideas. Also come up with some ideas that you could look at with this data set (for now focus on the underlined variables).

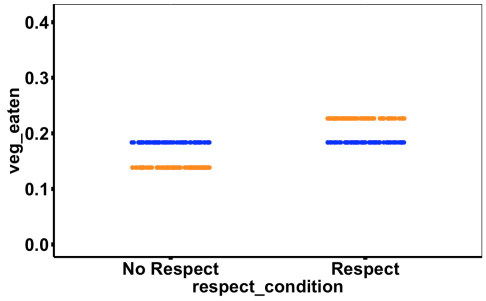
2. We'll come back to those hypotheses later. Maybe knowing which respect condition a student was in help you make a better prediction about their Vegemite eating. In this class, you've been trying to answer this question: HOW MUCH BETTER? Here is a visualization that might help us. Sketch in the empty model and sketch the respect model. Use different colors.

Legend: Empty model
Respect model

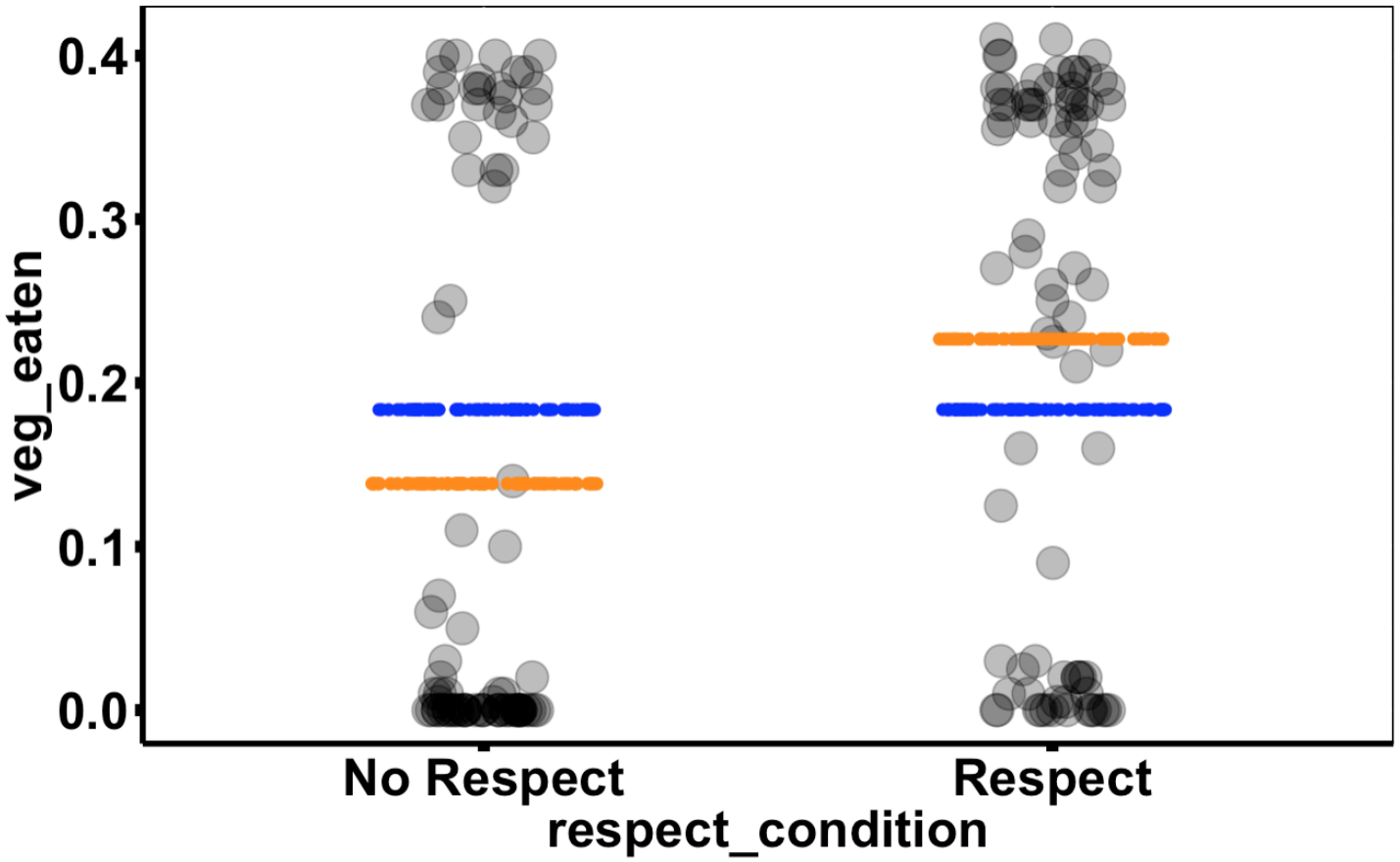


3. Just by looking, is there any leftover error after using the Respect model? YES NO

4. What would the data look like if Respect model explained 100% of variation? Draw some data into the plot.



5. In the scatterplot below:
    a. Pick a data point in the Respect condition and draw a residual from the empty model and a residual from the respect model. (It might help to keep things organized if you consistently used one color for everything associated with the empty model and another for the respect model.)
    b. Do the same for a data point in the No Respect condition.
    c. For one data point, draw (in a different color than what you have been using) how much error has been "explained."

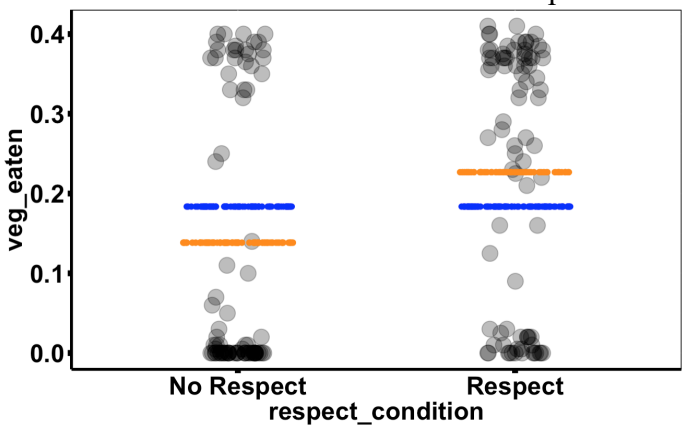


6. Are the residuals from the empty model ***always*** bigger than residuals from a complex model? Draw in some residuals for a data point where the residual from the empty model is smaller than the residual from the complex model in the scatter plot above.

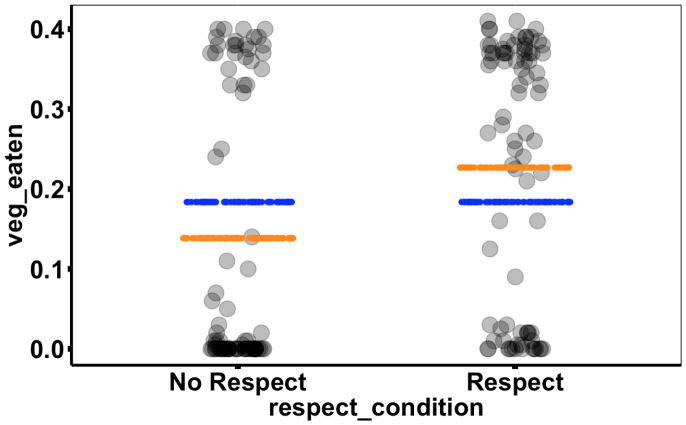
7. WAIT! Isn't the error from the empty model always bigger than error from the complex model? Explain why that statement is true even though the residuals do not always fit this pattern.

8. In the following three plots draw a few squared residuals that make up:

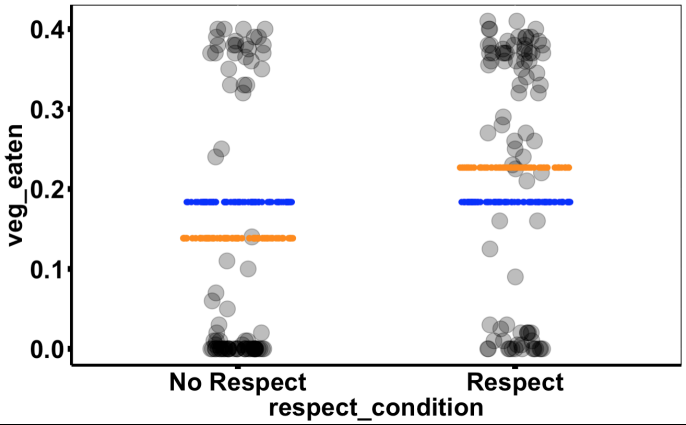
SS Total: "leftover" variation from the simple model



SS Error: "leftover" variation from the complex model

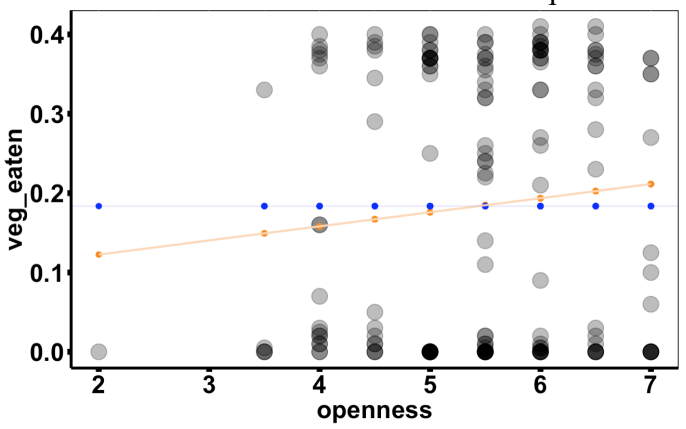


SS Model: variation explained by the complex model

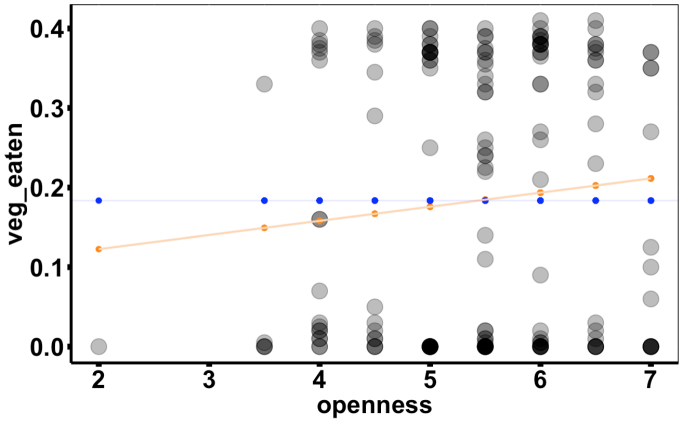


9. In the following three plots draw a few squared residuals that make up:

SS Total: "leftover" variation from the simple model



SS Error: "leftover" variation from the complex model



SS Model: variation explained by the complex model