

A word on Quiz 1 and Lab 1

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Quiz 1

Overall

- Great job!
- Just a few things that I think are important to review before we move into more complicated models

Question 7

Which of the following statements is true about the value -0.834 in our regression table?

- a. It is the estimate of the sample intercept
- b. It is the estimate of the population intercept
- c. It is the estimate of the sample slope

d. It is the estimate of the population slope

- Because -0.834 corresponds to the “Age” row of the regression table, this is the slope of our fitted regression line
- This means $\hat{\beta}_1 = -0.834$
- $\hat{\beta}_1$ is the estimate of the population slope
- -0.834 is just the realized value (the result of fitting the population model)
- We read $\hat{\beta}_1 = -0.834$ as: the estimate of the population slope is -0.834
- While speaking, I might say “coefficient estimate.” If I am saying estimate, then I mean the population estimate
 - Please stop and ask me if my language ever feels unclear

Question 9 and 10 (1/2)

- The following are required parts of the interpretation
 - Units of Y
 - Units of X
 - Mean/average/expected before Y when discussing intercept
 - Mean/average/expected before difference, increase, or decrease when discussing coefficient for continuous covariate
 - You can also have expected/average/mean before the Y, but not necessary
 - Confidence interval

Question 9 and 10 (2/2)

- **Intercept:** For someone 0 years old, the average peak exercise heart rate is 214.233 beats per minute (95% CI: 204.918, 223.548).
- **Slope:** For every one year increase in age, the peak exercise heart rate is expected to decrease by 0.834 beats per minute (95% CI: -0.982, -0.685).
 - OR: For every one year increase in age, the expected peak exercise heart rate decreases by 0.834 beats per minute (95% CI: -0.982, -0.685).

More on coefficient interpretations

Population model:

$$E[Y|X] = \beta_0 + \beta_1 X$$

What is β_1 mean?

- Let's say we have $X = x_1$ and $X = x_2$
- The difference between x_1 and x_2 is 1: $x_1 - x_2 = 1$
- We don't have to know the actual values of the x's, just that their difference is 1
- Now, let's look at the expected values for each of those x's:

$$E[Y|x_1] = \beta_0 + \beta_1 x_1$$

$$E[Y|x_2] = \beta_0 + \beta_1 x_2$$

- If we take the difference between the expected values, we get:

$$E[Y|x_1] - E[Y|x_2] = (\beta_0 + \beta_1 x_1) - (\beta_0 + \beta_1 x_2)$$

$$E[Y|x_1] - E[Y|x_2] = \beta_0 + \beta_1 x_1 - \beta_0 - \beta_1 x_2$$

$$E[Y|x_1] - E[Y|x_2] = \beta_1 x_1 - \beta_1 x_2$$

$$E[Y|x_1] - E[Y|x_2] = \beta_1 (x_1 - x_2)$$

$$\beta_1 = \frac{E[Y|x_1] - E[Y|x_2]}{x_1 - x_2}$$

$$\beta_1 = \frac{E[Y|x_1] - E[Y|x_2]}{1}$$

$$\beta_1 = E[Y|x_1] - E[Y|x_2]$$

- So, we can consider β_1 as the difference in the expected Y for every 1 unit increase in X

Thinking of the expected value another way

- Or: we can look at β_1 another way:

$$\beta_1 = E[Y|x_1] - E[Y|x_2]$$

$$\beta_1 = E[(Y|x_1) - (Y|x_2)]$$

- This would make β_1 the expected difference in Y for every 1 unit increase in X

Lab 1

Overall

- I really appreciated everyone's perspective!
- I definitely learned a few things while reading
- Biggest reason why points were lost: the research question was not focused enough
 - Asked for the IAT score (implicit measure) and one other variable

Limitations of the IAT

- Taking the test multiple times
 - A lot of us mentioned learning bias, which can definitely be true
 - Think about what direction that might bias our results
 - Problems with independence between observations
- Generalizability
 - Does it represent our population? When we just say “population,” is there an unsaid assumption on the population we are referring to?
 - Can we start to narrow the definition of our population to give context to our sample?

Other notes

- Did not intend for us to get focused on the 3 social theories in the article
 - If it helps you contextualize, then go for it!
 - But make sure you are defining the social theories and connecting them to motivation for your
- Minor writing notes
 - While folks is a great, inclusive word to describe people, it is a little too informal in reports
 - Good alternative is “individuals”
 - Do not use “I” or “think” in report
 - Can use the royal “We”
- When we talk about our analysis, avoid how “individuals” scores relate to their other measures.
 - Important to note that we are not making conclusions about the individual
 - We are using individual data to make conclusions about the population!

Moving forward

- Make sure you articulate the motivation for your research question
 - If you are interested in it, then there is likely some research discussing the relationship
 - Contextualize why this is a research question worth exploring
- If you want to review your intro, please come to me!
 - Revising early will be helpful for the report
 - I will grade each portion of the report expecting you make the needed changes
 - I did not make notes on all edits - tried to identify the bigger things
- Good sources for report help
 - Structuring research articles
 - Inclusive language practices
 - Guide on improving readability

