CCJS200 Friday Discussion Sections

Week 6: 3/7/2025

Today's Agenda

- First exam is over! How'd it go?

- We will be going over the remainder of practice questions from Chapter 6 of the textbook (6.6-6.11)

- Any questions?

Practice Question 6.6

A gang of criminals is planning to rob a supermarket. Eddy, the gang leader, reports that he "staked the store out" the day before and saw the store detective going for a 15-minute coffee break at 9:15am. He suggests that would be the best time to strike. Clive, a gang member, thinks that his plan is too risky—how do they know that the detective takes his break at the same time each day? Eddy, who is desperate for the money, thinks that the plan is safe enough and wants to carry out the robbery the next day. After an argument, they agree to compromise and watch the supermarket for three more days. On each of the three days, the store detective indeed takes his 15-minute break at 9:15am. The gang decides to go ahead with the robbery on the fourth day.

The robbers can be seen as having set themselves a research question and having made a statistical decision based on a simple study.

Practice Question 6.6a

How would you frame the robbers' null hypothesis and research hypothesis?

Null hypothesis: The time of the store detective's break is the same each day.

Research hypothesis: The store detective's break is not at the same time each day.

Practice Question 6.6b

Based on these hypotheses, what is their decision?

The robbers have to decide whether to reject Ho (the store detective's break is at the same time each day).

Based on the evidence, the robbers failed to reject Ho.

Practice Question 6.6c

How would the robbers make a Type 1 error? How would the robbers make a Type 2 error? What type of statistical error ought the robbers to be most concerned with making? Explain why.

A Type 1 error involves rejecting Ho when Ho is true (concluding that the store detective takes their break at different times). A Type 2 error involves failing to reject Ho when Ho is false (concluding that the store detective takes their breaks at the same time daily when they do not).

The robbers should be more concerned with making a Type 2 error, because they could get caught if the detective is present when they commit the robbery.

Practice Question 6.6d

How does the argument between Eddy and Clive relate to the concept of statistical significance?

Because this argument is connected to the question of what evidence would convince us that Ho is wrong.

Practice Question 6.7

The government wishes to launch a pre-Christmas advertising campaign warning about the dangers of drunk driving. It suspects that drivers aged 18 to 21 are most likely to drive while under the influence of alcohol and is considering targeting the campaign specifically at this age group. A preliminary study gathers data on the ages of drunk drivers apprehended in a particular district over a six-month period.

Practice Problem 6.7a

What are the null and research hypotheses? Explain why the research hypothesis is directional or nondirectional.

Null hypothesis: The age 18 to 21 group has the same likelihood of driving drunk as other age groups.

Research hypothesis: The age 18 to 21 group is more likely to drive drunk than other age groups.

The research hypothesis is directional because we use the phrase "more likely" in our hypothesis.

Practice Problem 6.7b

How might the government make a Type 1 error?

A Type 1 error includes rejecting Ho when Ho is true. The government could make a Type 1 error when they conclude that the age 18 to 21 group is more likely to drive drunk when they are really not.

Practice Problem 6.7c

How might the government make a Type 2 error?

A Type 2 error involves failing to reject Ho when Ho is false. The government could make a Type 2 error by concluding that the age 18 to 21 group has the same likelihood of driving drunk as other age groups.

Practice Problem 6.7d

The government accepts that targeting specific age group in the advertising campaign will not cost any extra money. There is a feeling that the new campaign will be "worth a try," even if the study does not find enormous differences between the offending rate of 18-to 21-year-olds and that of other ages. How should these considerations affect the researchers' decision on what level of significance to set?

So the cost of a Type 1 error is small, we could say that we don't need a large amount of evidence to reject Ho (what your book refers to as a "liberal" significance level).

Practice Problem 6.8

The head of the police force in the city of Cheadle suspects that increasing the pay of his officers might increase their efficiency. A police researcher is assigned to test whether there is a difference between the crime-solving rates of a group of detectives who have been randomly awarded pay raises and a control group of detectives who have not been awarded any pay raises. In writing up his report, the researcher concludes as follows:

The results show that the observed significance level if 0.14, meaning that rejecting the null hypothesis would run a 14% risk of a Type 1 error. Although a 5% significance level is considered standard, in light of the potential benefits of salary increases for crime control rates, a higher 15% threshold is justified here, and the null may therefore be rejected.

Practice Problem 6.8a

What is the null hypothesis to which the researcher refers?

Null hypothesis: Officers who get pay raises and don't get pay raises are equally efficient.

Practice Problem 6.8b

Explain why the researcher's statistical reasoning is problematic.

Because the researcher is setting the p-value (evidence needed to reject Ho) after looking at the data; this is inappropriate. Evidence threshold should be stated in advance.

Practice Problem 6.9

A study explored whether there is a link between male aggression and climate. The researcher recorded her results as follows: 5% significance level set, null could not be rejected.

Practice Problem 6.9a

Explain these results in plain English.

Studies often measure relationships between an independent variable and dependent variable. The null hypothesis assumes no relationship between the two variables. Therefore, the researcher concluded that there was insufficient evidence to conclude that there was a relationship between male aggression and climate.

Practice Problem 6.9b

Why is it important for the researcher to set the significance level at the beginning of the research and not at the end?

If the researcher decides on the evidentiary threshold that would be required to reject Ho after looking at the data, the researcher might set a threshold that allows them to draw the conclusion they want to draw. This would call the researcher's objectivity in evaluating the evidence into question.

Practice Problem 6.10

A private research foundation claims that increased regulation of handguns would reduce homicides in the United States. To examine this relationship, the foundation funds a study to assess the impact of handgun legislation on homicides in four states that recently passed laws restricting handgun ownership. The foundation expects that the reduced availability of handguns following the change in law will reduce the number of opportunities for lethal violence. The researcher collects data on homicides in the four states for one year before and one year after the change in handgun laws.

Practice Problem 6.10a

What are the null and research hypotheses? Explain why the research hypothesis is directional or nondirectional.

Null hypothesis: There was no change in homicides between the before and after periods of the law implementation.

Research hypothesis: Homicide levels will drop after the handgun law is passed.

Because the researcher expects homicide levels to drop after the law, this would be a directional hypothesis (the word "drop" implies directionality).

Practice Problem 6.10b

Explain how the researcher could make a Type 1 error.

A Type 1 error involves rejecting Ho when Ho is true. If the researcher concludes that homicide levels dropped even if Ho is true, the researcher would make a Type 1 error.

Practice Problem 6.10c

Explain how the researcher could make a Type 2 error.

A Type 2 error involves failing to reject Ho when Ho is false. If the researcher fails to reject Ho, but homicide levels really did drop, then the researcher would make a Type 2 error.

Practice Problem 6.10d

The results show an observed significance level of 0.06. The researcher wants to conclude that the null hypothesis cannot be rejected based on a 5% risk of Type 1 error. An official from the foundation wants the researcher to increase the significance level of the study to 10% and reject the null hypothesis. Should the researcher increase the significance level of the study?

The researcher should not change the significance level (evidentiary threshold) after the data have been examined.

Practice Problem 6.11

A group of researchers at a private think tank claims that the increased use of incarceration in the United States has not been harmful to the social fabric of the country. To support this claim, the researchers conduct a study looking at rates of incarceration and rates of divorce, but does not expect to find a relationship between the two variables.

Practice Problem 6.11a

What are the null and research hypotheses? Explain why the research hypothesis is directional or nondirectional.

Null hypothesis: There is no relationship between rates of incarceration (IV) and rates of divorce (DV).

Research hypothesis: Rates of incarceration has a harmful effect on rates of divorce

The research hypothesis seems to be directional because the researchers imply that the range of plausible effects is "no effect" or a "harmful effect"

Practice Problem 6.11b

Explain how the research group could make a Type 1 error.

A Type 1 error involves rejecting Ho when Ho is true. The researchers would make a Type 1 error if they concluded that there was a harmful effect when there was really no effect.

Practice Problem 6.11c

Explain how the research group could make a Type 2 error.

A Type 2 error involves failing to reject Ho when Ho is false. The researchers would make a Type 2 error if they concluded prisons had no effect even if they were actually having a harmful effect.

Practice Problem 6.11d

The observed significance level developed in their study is 0.03. The research group initially set a 5% risk of Type 1 error. One member of the research group suggests that they simply decrease the significance level of the study to 1% and fail to reject the null hypothesis. Should the research group decrease the significance level of the study? Why?

It is inappropriate to change the significance level (evidentiary threshold) to get a desired result.

Reminders

- Assignment #2 will be distributed next Thursday 3/13/2025 & it is **DUE** on Wednesday 3/26/2025 at 11:59pm
- Let us know if you have any questions or concerns.