

## 4.3 Inference from Samples & Experiments

Read 266–268

The Scope of Inference refers to the type of inferences (conclusions) that can be drawn from a study. The types of inferences we can make (inferences about the population and inferences about cause-and-effect) are determined by two factors in the design of the study:

		Were individuals randomly assigned to groups?	
		Yes	No
Were individuals randomly selected from a population?	Yes	Inferences about the population: <u>Y</u> Inferences about cause and effect: <u>Y</u>	Inferences about the population: <u>Y</u> Inferences about cause and effect: <u>N</u> <i>Some observational studies are in this category.</i>
	No	Inferences about the population: <u>N</u> Inferences about cause and effect: <u>Y</u> <i>Most experiments are in this category.</i>	Inferences about the population: <u>N</u> Inferences about cause and effect: <u>N</u> <i>Some observational studies are in this category.</i>

Example: Silence is golden? Many students insist that they study better when listening to music. A teacher doubts this claim and suspects that listening to music actually hurts academic performance. Here are four possible study designs to address this question at your school. In each case, the response variable will be the students' GPA at the end of the semester.

1. Get all the students in your AP Statistics class to participate in a study. Ask them whether or not they study with music on and divide them into two groups based on their answer to this question.
2. Select a random sample of students from your school to participate in a study. Ask them whether or not they study with music on and divide them into two groups based on their answer to this question.
3. Get all the students in your AP Statistics class to participate in a study. Randomly assign half of the students to listen to music while studying for the entire semester and have the remaining half abstain from listening to music while studying.
4. Select a random sample of students from your school to participate in a study. Randomly assign half of the students to listen to music while studying for the entire semester and have the remaining half abstain from listening to music while studying.

For each design, suppose that the mean GPA for students who listen to music while studying was significantly lower than the mean GPA of students who didn't listen to music while studying. What can we conclude for each design?

- ① Results apply ONLY to students in this class (no random selection/assignment)
- ② Results apply to the entire school (population), but cannot determine if music helps them study.
- ③ We can conclude a cause-effect relationship of music & studying but ONLY for students in this class.
- ④ We can conclude a cause-effect relationship that applies to the entire school.

Suggested: Pg.264 #87-94 & Pg.273 #97-102