Chapter 12 Review Questions

1. What is a factorial design?
2. What is an interaction?
3. Can you have interactions without main effects?
4. What would you see in a graph of your data that would suggest that you had an interaction?
5. What would you see in a graph of your data that would suggest that you had a main effect for the variable that has its different values located on different lines?
6. What would you see in a graph of your data that would suggest that you had a main effect for the variable that has its different values marked at the bottom of the graph?
7. In a 4 X 3 factorial design, (a) how many groups of participants are there, (b) what are the df for the first factor, (c) the df for the second factor, and (d) the df for the interaction?
8. What is the difference between a floor and a ceiling effect?
9. What is the difference between an ordinal and a disordinal interaction?
10. What is the difference in the conclusions that you can draw from a “true” independent variable versus a factor that you did not randomly assign?

Answers to Chapter 12 Review Questions

1. What is a factorial design? **A design that has 2 or more independent variables. Note that**
2. **An experiment may have 2 variables but not be a factorial experiment: Any experiment will have at least two variables (an independent variable and a dependent variable).**
3. **Although a between-subjects factorial design must have at least 4 groups, an experiment can have 4 or more groups and not be a factorial experiment. For example, a study looking at color might have several levels of the color variable (blue, red, green, yellow) but only be manipulating one factor (color). In such an experiment, each participant is only receiving one level of that factor (e.g., a participant may be given a red colored test booklet). In a factorial experiment, on the other hand, two or more different factors are being manipulated and participants are receiving different combinations of these factors. For example, a factorial experiment might manipulate color and time pressure so that some participants are given red test booklets and given 10 minutes to complete the test, some are given red test booklets and given 20 minutes to complete the test, some are given white booklets and given 10 minutes to complete the test, and others are given white booklets and given 20 minutes to complete the test.**
4. What is an interaction?

**When the effect of one independent variable depends on the level of another independent variable.**

1. Can you have interactions without main effects?

**Yes. You can have interactions without main effects and main effects without interactions.**

1. What would you see in a graph of your data that would suggest that you had an interaction?

**The lines would not be parallel.**

1. What would you see in a graph of your data that would suggest that you had a main effect for the variable that has its different values located on different lines?

**One line would, on average, be higher than the other.**

1. What would you see in a graph of your data that would suggest that you had a main effect for the variable that has its different values marked at the bottom of the graph?

**The average of the points on the left side of the graph would be either higher or lower than the average of the points on the right side of the graph.**

1. In a **4** X 3 factorial design, (a) how many groups of participants are there, (b) what are the df for the first factor, (c) the df for the second factor, and (d) the df for the interaction?
   1. 12 ( **4** X 3)

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 |

* 1. **3** (**4** -1); Levels -1
  2. **2** (3 -1); Levels - 1
  3. **6** ( 3 X 2); df 1st main effect X df 2nd main effect

1. What is the difference between a floor and a ceiling effect?

**In a floor effect, some participants should score much lower than they do, but the measuring instrument’s “high floor” does not allow them to score that low. Consequently, we cannot clearly see the difference between participants who are low on the variable and those who are extremely low. This might happen if our test was very hard (e.g., imagine a math test that included only questions from third -year calculus—students who didn’t know advanced calculus but were very good at algebra and geometry might be scoring almost as low as students who didn’t even know how to add). We might also get a floor effect if our attitude scale only went from neutral to positive. In that case, we couldn’t distinguish people who had extremely negative attitudes from those who had mildly negative or even neutral attitudes. Because of the high floor, scores on and near the floor are not interval. Instead, they are ordinal—at best—because near the floor, the measure doesn’t allow scores to vary as much as the variable actually varies**

**Ceiling effects, on the other hand, are due to our measuring instrument’s “low ceiling” prohibiting participants who should get much higher scores than other participants not getting those much higher scores. This might happen if the test were too easy (if almost everyone gets a perfect score, the student who is extremely knowledgeable on the topic can’t distinguish herself from the student who is just somewhat knowledgeable). We might also get a ceiling effect if an attitude scale went from neutral to negative. In that case, people with extremely positive views would not score differently than those who were mildly negative or neutral attitudes. So, the effect of a low ceiling is that scores near the ceiling are not interval because there is not room for the higher scores that would reflect the higher levels of the variable.**

1. What is the difference between an ordinal and a disordinal interaction?

**In an ordinal interaction, it appears that a treatment has more of an effect in one condition that another (a graph of such an interaction would show lines sloping in the same direction, but one line would be steeper than the other). However, it is possible that the treatment only appears to have more of an effect in one condition than another because our data—which we assume is interval—is actually ordinal. That is, we think the treatment had more of an effect in one condition than another, but we were fooled because, with ordinal data, a bigger change in scores may not reflect a bigger change in the variable the scores are supposed to reflect. So, it is possible that we would not have had an interaction if we had had interval data**

**In a disordinal interaction, a treatment seems to have a different *kind* of effect in one condition than in another (e.g., it has a positive effect under one set of circumstances but a negative effect in another set of circumstances). A graph of such an interaction would show the lines going in different directions. We have greater confidence in disordinal interactions because they cannot be an artifact of having ordinal data.**

1. What is the difference in the conclusions that you can draw from a “true” independent variable versus a factor that you did not randomly assign?

**You can draw cause-effect conclusions about true independent variables—ones that you randomly assign. You cannot draw cause-effect conclusions about variables that you don’t randomly assign.**