

3.2: Factorial ANOVA - Main Effects

Graphing the Results of Factorial Designs

The results of between-subjects factorial designs with two independent variables can be graphed by representing one independent variable on the x -axis and representing the other by using different colored bars or lines. (The y -axis is always reserved for the dependent variable.) Figure 3.2.1 shows results for two hypothetical factorial experiments. The top panel shows the results of a 2×2 design. Time of day (day vs. night) is represented by different locations on the x -axis, and cell phone use (no vs. yes) is represented by different-colored bars. (It would also be possible to represent cell phone use on the x -axis and time of day as different-colored bars. The choice comes down to which way seems to communicate the results most clearly.) The bottom panel of Figure 3.2.1 shows the results of a 4×2 design in which one of the variables is quantitative. This variable, psychotherapy length, is represented along the x -axis, and the other variable (psychotherapy type) is represented by differently formatted lines. This is a line graph rather than a bar graph because the variable on the x -axis is quantitative with a small number of distinct levels. Line graphs are also appropriate when representing measurements made over a time interval on the x -axis.

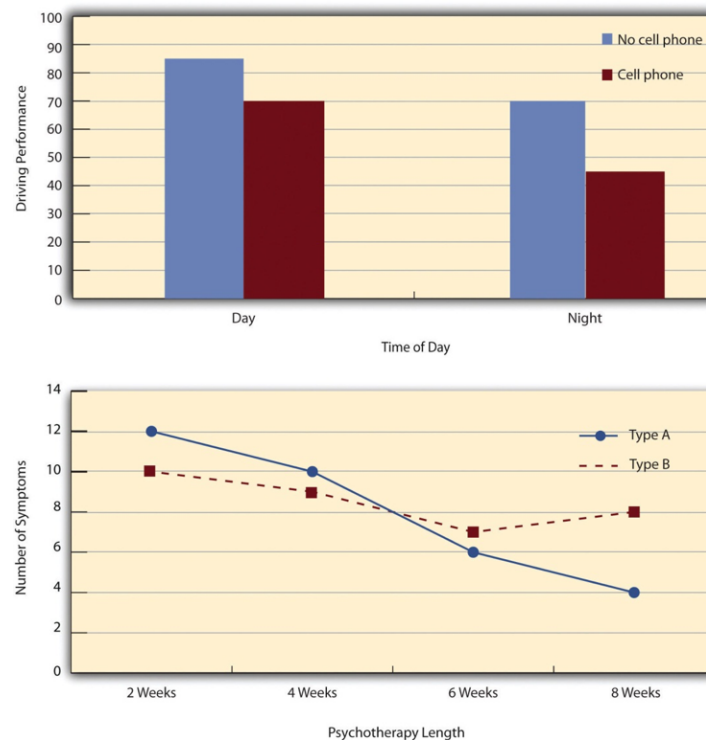


Figure 3.2.1: Two Ways to Plot the Results of a Factorial Experiment With Two Independent Variables

Main Effects

In factorial designs, there are three kinds of results that are of interest: main effects, interaction effects, and simple effects. A **main effect** is the effect of one independent variable on the dependent variable—averaging across the levels of the other independent variable. Thus there is one main effect to consider for each independent variable in the study. The top panel of Figure 3.2.1 shows a main effect of cell phone use because driving performance was better, on average, when participants were not using cell phones than when they were. The blue bars are, on average, higher than the red bars. It also shows a main effect of time of day because driving performance was better during the day than during the night—both when participants were using cell phones and when they were not. Main effects are independent of each other in the sense that whether or not there is a main effect of one independent variable says nothing about whether or not there is a main effect of the other. The bottom panel of Figure 3.2.1, for example, shows a clear main effect of psychotherapy length. The longer the psychotherapy, the better it worked.

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