# Chapter Twelve

Analysis of Variance

**Summary**

• Analysis of variance (ANOVA) procedures allow us to examine the variation in means in more than two samples. To determine whether the difference in mean scores is significant, ANOVA examines the differences between multiple samples, as well as the differences within a single sample.

• One-way ANOVA is a procedure using one dependent variable and one independent variable. The five-step hypothesis testing model is applied to one-way ANOVA.

• The test statistic for ANOVA is *F*. The F statistic is the ratio of between-group variance to within-group variance.

**Outline**

* Understanding Analysis of Variance
  + Analysis of variance (ANOVA) is an inferential statistics technique designed to test for a significant relationship between two variables in two or more groups or samples
  + A one-way ANOVA is an analysis of variance application with one dependent and one independent variable
  + ANOVA examines the differences between our four samples, as well as the differences within a single sample
* The Structure of Hypothesis Testing With ANOVA
  + The assumptions
  + The research hypothesis (H1) proposes that at least one of the means is different
  + ANOVA is a test of the null hypothesis of no difference between any of the means
  + The between-group sum of squares or SSB is the sum of squared deviations between each sample mean to the overall mean score
  + Within-group sum of squares or SSW is the sum of squared deviations within each group, calculated between each individual score and the sample mean
  + The total sum of squares or SST is the total variation in scores, calculated by adding SSB and SSW
  + Mean square between is the sum of squares between divided by its corresponding degrees of freedom.
  + Mean square within is the sum of squares within divided by its corresponding degrees of freedom
  + The *F* Statistic is the test statistic for ANOVA, calculated by the ratio of mean square between to mean square within
  + Making a decision and interpreting the results
* Focus on Interpretation
  + Are immigrants good for America’s economy?
* Reading the Research Literature
  + Self-image and ethnic identification
  + Stresses and strains among grandmother caregivers
  + As a statistical method, ANOVA is most commonly used in the field of social psychology