APPENDIX 19.1: POWER FOR THE ONE-FACTOR WITHIN-SUBJECTS ANOVA

We've seen before that the sample size required to achieve a specified power can be determined at both the omnibus level and the contrast level. We've also noted that planning should be based on the contrasts of interest rather than the omnibus effect. Because the required sample size for a contrast is typically larger than the required sample size for an omnibus effect, there is no value in basing sample size on the omnibus effect.

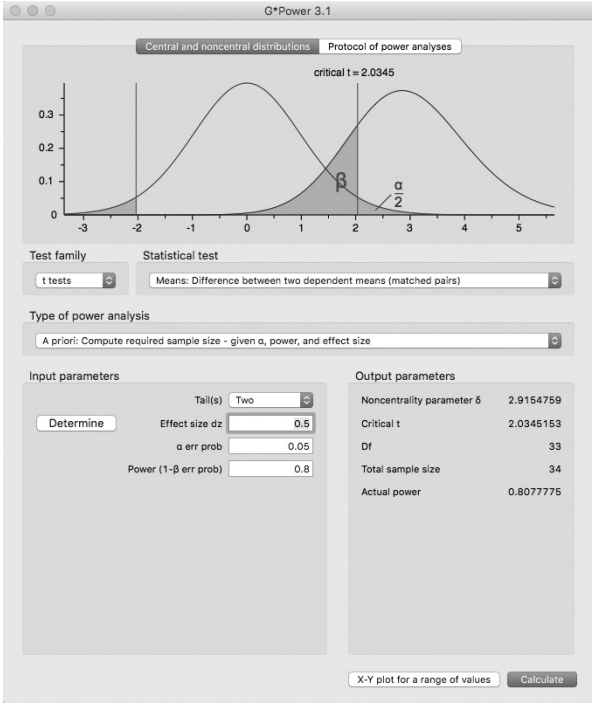
There is a very simple connection between power planning for contrasts in the within-subjects design and power planning in the dependent-samples design (Chapter 12). In fact, the approaches are identical. The effect size of interest is specified as

$$\delta = \frac{\Psi}{\sigma_{cs}}$$

where ψ is the contrast in the population (the quantity estimated by c) and σ_{cs} is the standard deviation of the contrast scores in the population (the quantity estimated by s_{cs}). If a researcher deems that a contrast would be of interest if $\delta = 0.5$, she can use G*Power to determine the sample size required to achieve a desired level of power.

Figure 19.A1.1 shows a power analysis for a contrast when the researcher is interested in $\delta = 0.5$ and power = .8, assuming a two-tailed test with $\alpha = 0.05$. In G*Power, choose t-tests from the Test family choices and Means: Difference between two dependent means (matched pairs) from the Statistical test choices. The Type of power analysis is A priori. The Input parameters specify a Two tailed test with an Effect size of .5, and $\alpha = 0.05$ and power = .8. When the calculation is carried out, we find that the required sample size is $n = 34$.

FIGURE 19.A1.1 ■ Prospective Power Analysis



Power analysis using G*Power for a single contrast in a within-subjects ANOVA.