# LING82100: midterm solution

## 1 Experimental design

This study is a *quasi-experiment* because children are not randomly assigned to particular diagnostic groups; they either already have, or do not have, a developmental disorder—it is not under experimenter control; for this reason, it is also necessarily a *between-subjects* design. The *dependent variable* is number of phoneme errors. *Independent variables* are diagnostic group, and number of syllables in the target nonsense words.

## 2 Standard error and confidence intervals

- S.E. $= \frac{s}{\sqrt{n}} = .078$

- 95% CIs $= \bar{X} \pm 1.96$S.E. $= [1.628, 1.932]$

## 3 Null hypothesis significance testing

This is a significant result: the *p*-value is lower than the $\alpha$-level, so we reject the null hypothesis. In the case that there is no population difference, this is a type I error, since we falsely reject a true null hypothesis.

## 4 Power analysis

The following increase the power of the test:

- Increasing the effect size

- Increasing the sample sizes

Decreasing the $\alpha$-level **decreases** the power of the test.

# 5 Reporting test results

## 5.1 Fisher exact test

The results of a Fisher exact test (odds ratio $= 0.047$, two-sided $p = .005$) are significant at $\alpha = .01$, leading us to reject the null hypothesis that there is no association between criminal conviction and zygoticity.

## 5.2 Welch $t$-test

The results of a Welch unequal variance two-sample $t$-test ($t(97.9) = -3.210$, $p = .002$) are significant at $\alpha = .01$, leading us to reject the null hypothesis that there are no differences between the sepal widths of *I. versicolor* ($\bar{X} = 2.77$) and *I. virginica* ($\bar{X} = 2.97$).

## 5.3 Kendall $\tau_b$ test

The results of Kendall's $\tau_b$ test ($\tau = -.193$, $p = .205$) are non-significant at $\alpha = .01$; we fail to reject the null hypothesis that there is no correlation between degree of clausal embedding and welformedness rating.