Appendix

Formulas for Variance Component Estimates from Mean Squares and *g* Coefficients

Table A1 displays the formulas for estimating variance components from the ANOVA mean squares for each main effect and interaction in the model (adapted from Shavelson & Webb, 2006). These variance components are used to calculate the absolute error variance ($\sigma^2_{abs,e}$) using the following equation:

$$\sigma^2_{abs,e} = \frac{\sigma^2_{po}}{n_o} + \frac{\sigma^2_{ps}}{n_s} + \frac{\sigma^2_{pso}}{n_o n_s} + \frac{\sigma^2_{o}}{n_o} + \frac{\sigma^2_{s}}{n_s} + \frac{\sigma^2_{so}}{n_s n_o}$$

where n_o is the number of observers and n_s is the number of sessions. The g coefficient is the proportion of the total variance explained by person, and is calculated using the following equation:

$$g = \frac{\sigma^2_p}{\sigma^2_p + \sigma^2_{abs,e}}$$

In an optimization study, several hypothetical absolute error variances are calculated by changing the *n* terms in the equation above to represent different numbers of sessions and/or observers. These absolute error variances are then used to calculate *g* coefficients that reflect the proportion of total variance explained by person under these hypothetical conditions.

Table A1

Formulas for Estimating Variance Components from Mean Squares

Variance Component	Formula
Person x Session x Observer, residual (σ^2_{pso})	$\sigma^2_{pso} = MS_{pso}$
Session x Observer (σ^2_{so})	$\sigma^2_{so} = \frac{MS_{so} - \sigma^2_{pso}}{n_p}$
Person x Observer (σ^2_{po})	$\sigma^2_{po} = \frac{MS_{po} - \sigma^2_{pso}}{n_s}$
Person x Session (σ^2_{ps})	$\sigma^2_{ps} = \frac{MS_{ps} - \sigma^2_{pso}}{n_o}$
Observer (σ^2_o)	$\sigma^2_o = \frac{MS_o - \sigma^2_{pso} - n_p\sigma^2_{so} - n_s\sigma^2_{po}}{n_p n_s}$
Session (σ^2_s)	$\sigma^2_s = \frac{MS_s - \sigma^2_{pso} - n_p\sigma^2_{so} - n_o\sigma^2_{ps}}{n_p n_o}$
Person (σ^2_p)	$\sigma^2_p = \frac{MS_p - \sigma^2_{pso} - n_o\sigma^2_{ps} - n_s\sigma^2_{po}}{n_o n_s}$

Note. MS_{pso} = Mean square for person x session x observer interaction; MS_{so} = Mean square for session x observer interaction; MS_{po} = Mean square for person x observer interaction; MS_{ps} = Mean square for person x session interaction; MS_o = Mean square for observer; MS_s = Mean square for session; MS_p = Mean square for person; n_p = number of persons; n_s = number of sessions; n_o = number of observers.