The Intraclass Correlation Coefficient

The intraclass correlation coefficient (ICC) is a measure of agreement between two or more sets of ratings or measurements. When the measurements come from more than one rater, we are measuring interrater agreement, or between rater agreement. When replicate measures are produced by the same rater, we are measuring intrarater agreement, or within rater agreement.

The ICC is a parametric statistic which requires all of the assumptions of the ANOVA model, as the ICC is calculated directly from the ANOVA sums of squares. We test these assumptions using the Shapiro-Wilk test on the residuals of the ANOVA model. Most often, we make use of a one-way ANOVA where the factor is the experimental unit being measured.

One-way ANOVA	$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$
ICC Calculation	$ICC = \dfrac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_\varepsilon^2}$
	Referring to the variance of alpha and epsilon, respectively

This ICC is always non-negative, allowing it to be interpreted as the proportion of total variance that is "between groups." This ICC can be generalized to allow for covariate effects, in which case the ICC is interpreted as capturing the within-class similarity of the covariate-adjusted values. For more on the kind of model needed for the different kinds of assessment, the regarded work by Shrout & Fleiss (1979) should be consulted.

Interpretation: The ICC ranges from 0 to 1, with 1 indicating perfect agreement. A commonly adopted minimum acceptable intraclass correlation coefficient is 0.80 (Shrout and Fleiss, 1979), with 0.90 and