Calculating the likelihood ratio for the ego depletion effect

The likelihood ratio (λ) compares the relative fit of the data to two models. In the most common application of λ, the models are the null and a model based on the observations. Likelihood ratios can be calculated from many common statistics; for an F-ratio obtained from a repeated measures ANOVA, one would calculate the likelihood ratio as follows:

$$\lambda = \left[1 + \frac{[F\ (1,df)}{df}\right]^{\frac{(df+1)}{2}}$$

One then applies an adjustment for the fact that the alternative model has one more parameter than the null. A commonly-used adjustment is based on the Akaike Information Criterion (Akaike, 1973):

$$AIC = -2\ln(l) + 2k$$

where *l* is the maximum likelihood of the data and *k* is the number of parameters. For models that differ by one parameter, the effect of applying the AIC adjustment simplifies to 1/exp(1), meaning the adjusted likelihood ratio in this case would be

$$\lambda adj = \left[1 + \frac{[F\ (1,df)}{df}\right]^{\frac{(df+1)}{2}} \quad \left[\frac{1}{\exp(1)}\right]$$

Applying this to the effect of ego depletion on attention control, where F[1, 653] = 4.84, we get

$$\lambda adj = \left[1 + \left(\frac{4.84}{653}\right)\right]^{(327)} \quad \left[\frac{1}{2.718}\right]$$

$$= 4.11$$

Thus, the data are 4.11 times as likely given an effect of ego depletion than given no effect.