Equations

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$$\text{actual competition ratio} = \frac{\beta}{(\beta - 1)(\frac{n_i}{n_{\text{exp}}}) + 1}$$

when $\beta = 2$:

$$\text{actual competition ratio} = \frac{2}{(\frac{n_i}{n_{\text{exp}}}) + 1}$$

once exponentiated with exponent = 2:

$$\text{actual competition ratio exponentiated} = \left[\frac{2}{(\frac{n_i}{n_{\text{exp}}}) + 1}\right]^2$$

$$p = \text{female fitness} * \left[\frac{2}{(\frac{n_i}{n_{\text{exp}}}) + 1}\right]^2$$

$$\text{num offspring} \sim \text{Poisson}(1, \lambda = 2p)$$