S2. Scaling σ_x

To effectively interpret the relative importance of an *x*, it is beneficial to scale σ_x to an interval reflecting its relative significance compared to a baseline theoretical minimum. The theoretical minimum $\sigma_{x'}$, computed for a variable x' that does not improve the model fit at all, represents the least possible importance a variable can have while still being included in the models. Note that including an additional variable x' effectively doubles the model space to 2*R*, as each model can either include or exclude x'. By definition, x' occurs in half, or *R*, of all models, and we assume that AIC_{min} does not include x'.

If the inclusion of x' does not improve the model fit, it only affects the AIC through the penalty for the additional parameter, increasing k_j by 1 and thus increasing AIC_j by 2 units for each model that includes x'. Given that $\sum_{j=1}^{R} \omega_j = 1$, where ω_j are the Akaike weights computed from the original *R* models, the new model space, expanded to $R' = 2R$, has altered weights due to the inclusion of x'. The new sum of weights can be written as:

$$\Omega' = \sum_{r=1}^{R'} e^{\left(-\frac{1}{2}\Delta_r\right)} = \sum_{r=1}^{R} e^{\left(-\frac{1}{2}(\Delta_r+2)\right)} + \sum_{r=1}^{R} e^{\left(-\frac{1}{2}\Delta_r\right)} =$$

$$\sum_{r=1}^{R} e^{\left(-\frac{1}{2}\Delta_r-1\right)} + \Omega = \sum_{r=1}^{R} e^{\left(-\frac{1}{2}\Delta_r\right)} e^{-1} + \Omega = \Omega e^{-1} + \Omega = (e^{-1}+1) \times \Omega. \quad (1)$$

Since this also demonstrates that models that include x' contribute $e^{-1} \times \Omega$ to the sum, we can compute the theoretical minimum $\sigma_{x'}$ as:

$$\sigma_{x'} = \frac{e^{-1}\times\Omega}{(e^{-1}+1)\times\Omega} = \frac{e^{-1}}{e^{-1}+1} = \frac{1}{e\times\left(\frac{1}{e}+1\right)} = \frac{1}{1+e} \quad (2)$$

Thus $\sigma_{x'} = .2689$. Note that this minimum only applies for the fixed and the random effects, but not for the random rslopes, since random slopes only occur in models that also contain the corresponding random effect/intercept and a fixed effect for population size. $\sigma_{x'}$ for random slopes will thus be lower than $\frac{1}{1+e}$.