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COMPARING STATIC AND DYNAMIC LANDSCAPES

GENERAL THEORY

MIGRATION RATES BETWEEN SITES i AND j WHOSE DISTANCE IS d_{ij} →

DYNAMIC LANDSCAPE

$$m^D_{ij}(t) = \frac{m}{d_{ij}}\,\theta(r(t) - d_{ij})$$

where $r(t)$ is the critical radius AND $\theta(x) = 1$ if $x > 0$; 0 otherwise

STATIC LANDSCAPE

$$m_{ij}^S = \frac{1}{T}\int_0^T m^D_{ij}(t)\,dt = \frac{m}{d_{ij}}\left(1 - \frac{t^*}{T}\right) \quad \text{where } r(t^*) = d_{ij}$$

IN THIS WAY WE AVENGE ON CONNECTIVITY DYNAMICS :

① PLOS SUBMISSION (JULIA CODE)

$$r(t) = \partial_0 + A\sin(\pi f t) \to t^* = \frac{1}{\pi f}\arcsin\left(\frac{d_{ij} - \partial_0}{A}\right)$$

$$T = 2/f$$

$$m^S_{ij} = \begin{cases} 0 & \text{if } d_{ij} > \partial_0 + A \\ \frac{m}{d_{ij}}\left(1 - \frac{1}{2\pi}\arcsin\left(\frac{d_{ij} - \partial_0}{A}\right)\right) & \text{if } \partial_0 - A \le d_{ij} \le \partial_0 + A \\ m/d_{ij} & \text{if } d_{ij} < \partial_0 - A \end{cases}$$

② NEW VERSION (MATLAB CODE)

$$r(t) = \frac{A}{2}(1 + \sin(2\pi\omega t)) \to t^* = \frac{1}{2\pi\omega}\arcsin\left(\frac{2d_{ij} - A}{A}\right)$$

$$T = 1/\omega$$

$$m^S_{ij} = \begin{cases} 0 & \text{if } d_{ij} > A \\ \frac{m}{d_{ij}}\left(1 - \frac{1}{\pi}\arcsin\left(\frac{2d_{ij} - A}{A}\right)\right) & \text{if } d_{ij} \le A \end{cases}$$