

Gillespie affinities and forces

You have a vector of populations \mathbf{n} . This is instantaneous and varies over time stochastically.

The instantaneous propensities depend on the rates and stoichiometry. For a general reaction like



Where S_i is the names of species i and ν_i is the stoichiometry.

You then have that the **forward propensities** are

$$a^+(\mathbf{n}) = k^+ \prod_{i=1}^N \binom{n_i}{\nu_i} \quad (2)$$

and similarly the **backward propensities** are

$$a^-(\mathbf{n}) = k^- \prod_{i=1}^N \binom{n_i}{\nu'_i} \quad (3)$$

You can then get an **instantaneous force** as

$$f_i = \ln(a^+/a^-) \quad (4)$$

And can average over time as usual.