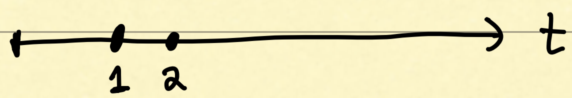
STATE TRANSITIONS

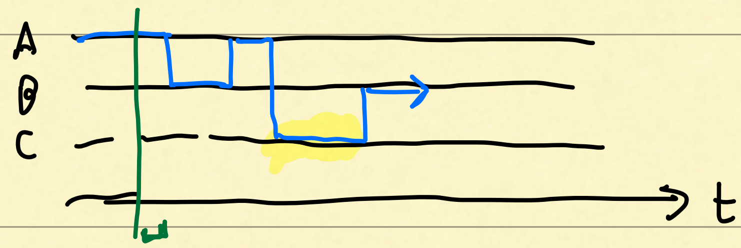
$A \to A \to B \to C \to A \to t$

CONTINUOUS TIME



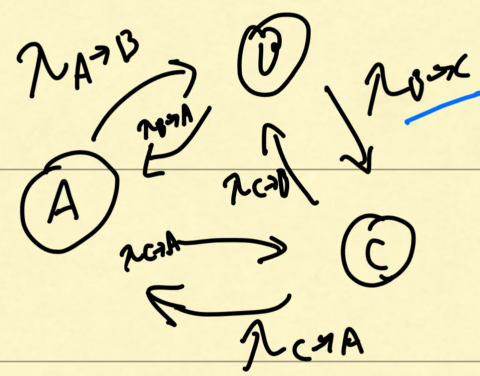
CONTINUOUS TIME MARKOV CHAINS

DISCRETE STATES



TIME TO NEXT EVENT IS POISSON WITH RATE $\lambda_{A\to B} + \lambda_{A\to C}$

ALL TRANSITIONS FROM STATE i TO j ARE POISSON WITH RATE $\lambda_{i\to j}$



UNITS $1/\text{TIME}$

$$\vec{P}(t) = \begin{bmatrix} P_A(t) \\ P_B(t) \\ \vdots \end{bmatrix}$$

$$\boxed{\frac{d\vec{p}}{dt} = \underline{\underline{T}} \cdot \vec{p}}$$

$$\underline{\underline{T}} = \begin{bmatrix} -\sum_j \lambda_{Aj} & \lambda_{B \to A} & \cdots & \\ \lambda_{A \to B} & & & \\ \vdots & & & \\ & & & \end{bmatrix}$$

TO FIND THE STATIONARY DISTRIBUTION, SET $\frac{d\vec{p}}{dt} = 0$.

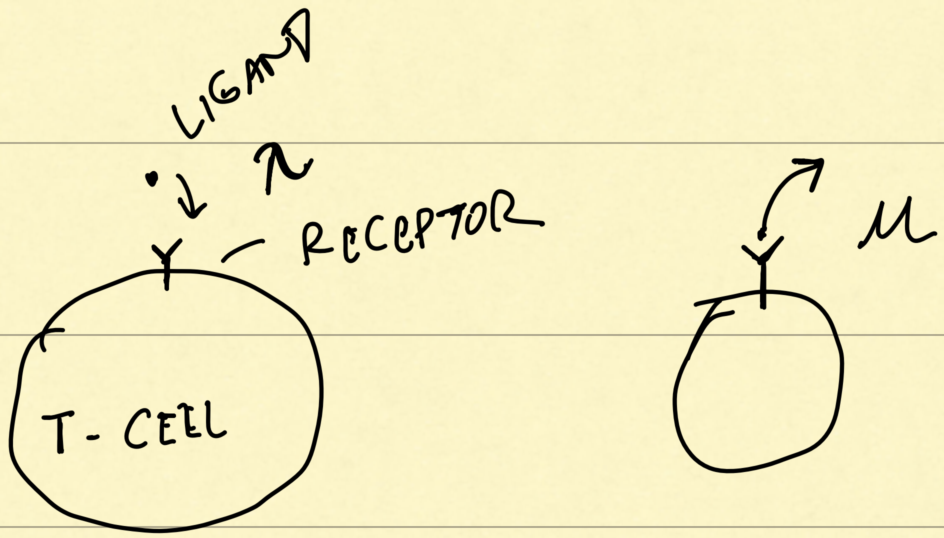
EX $N(t)$ – # OF POISSON HITS BY TIME t

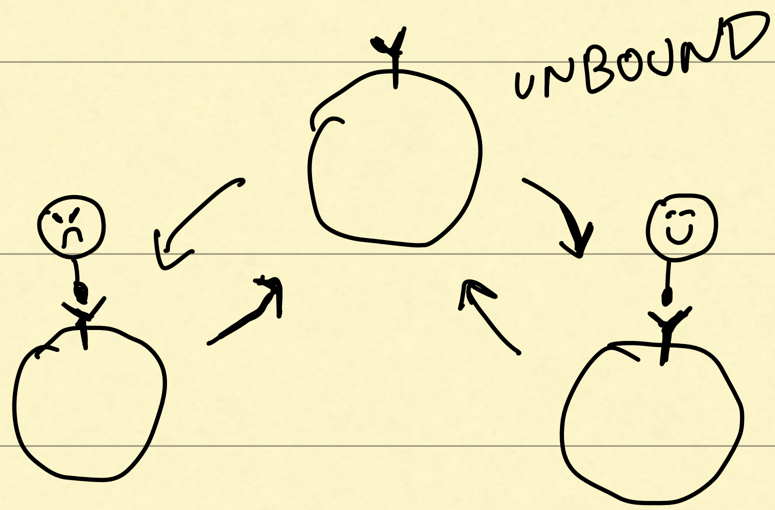
FOR A POISSON PROCESS WITH RATE λ

$$\frac{d}{dt}\begin{bmatrix} P_0 \\ P_1 \\ P_2 \\ \vdots \end{bmatrix} = \begin{bmatrix} -\lambda & 0 & 0 & 0 & 0 & \cdots \\ \boxed{\lambda} & -\lambda & 0 & & & \\ 0 & \lambda & -\lambda & & & \\ 0 & 0 & \lambda & & & \\ \vdots & \vdots & \vdots & & & \end{bmatrix}\begin{bmatrix} P_0 \\ P_1 \\ P_2 \\ \vdots \end{bmatrix}$$

EX $\quad A + B \xrightarrow{r_{A+B}} C$

PS ~~6~~ 5





$$\underline{\underline{T}} = \begin{array}{c c c l} \text{ANTAG} & \text{UNBOUND} & \text{AGONIST} & \\ \left[\begin{matrix} & & 0 \\ & & \\ 0 & & \end{matrix}\right. & & \left.\right] & \begin{matrix} \text{ANTAG} \\ \text{UNBOUND} \\ \text{AG} \end{matrix} \end{array}$$

MEAN TIME FREE: $\frac{1}{\lambda}$

MEAN TIME BOUND TO AGONIST: $\cancel{\alpha}$ $\frac{1}{\mu_2}$

MEAN TIME BOUND TO ANT: $\frac{1}{\mu_1}$

$$\boxed{\begin{array}{l} \text{STATIONARY DISTRIBUTION} \Rightarrow \\ \frac{d\vec{p}}{dt} = \vec{0} \qquad \frac{dp_0}{dt} = 0 \\ \qquad\qquad\quad\; \frac{dp_1}{dt} = 0 \\ \qquad\qquad\quad\; \frac{dp_2}{dt} = 0 \end{array}}$$

FREE ANT AG

$$T = \begin{array}{cl} \begin{bmatrix} & & +M_2 \\ & & 0 \\ & 0 & -M_2 \end{bmatrix} & \begin{array}{l} FRN \\ ANT \\ AG \end{array} \end{array}$$