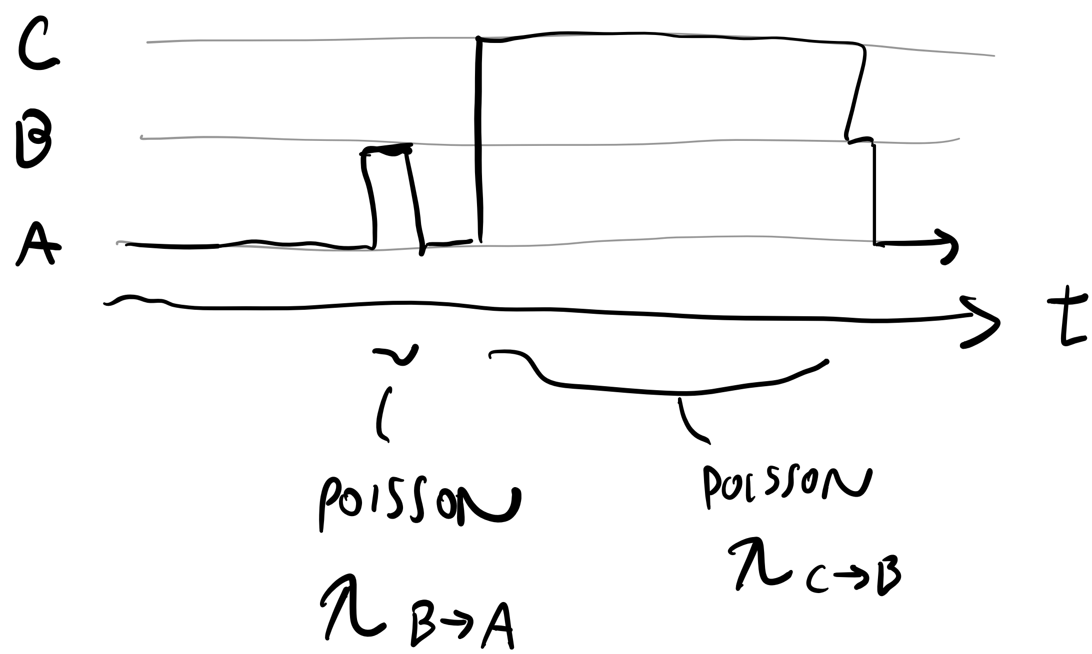
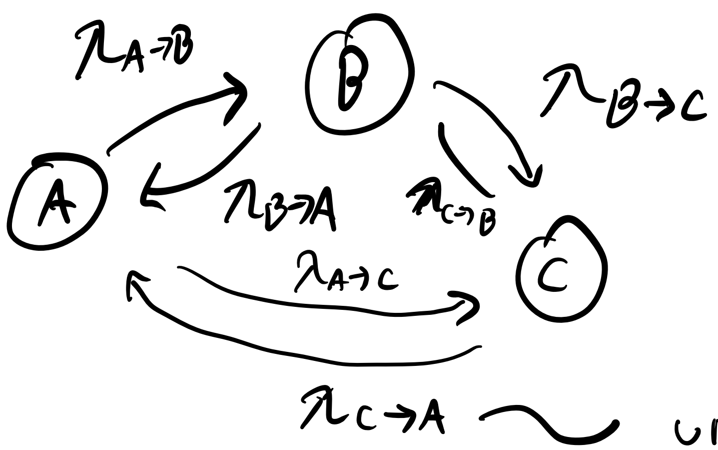
CONTINUOUS TIME MARKOV CHAIN

CONTINUOUS TIME STOCHASTIC PROCESS WHERE STATE SPACE HAS N DISCRETE STATES. TRANSITIONS BETWEEN STATES ARE POISSON





$\sim$ UNITS (s^{-1})

NEXT EVENT FROM B

IS POISSON WITH RATE $\lambda_{B\to C} + \lambda_{B\to A}$

$$\mathbb{P}(B\to C) = \frac{\lambda_{B\to C}}{\lambda_{B\to C} + \lambda_{B\to A}}$$

$\mathbb{P}_i(t)$ - PROB OF BEING IN STATE i AT TIME t

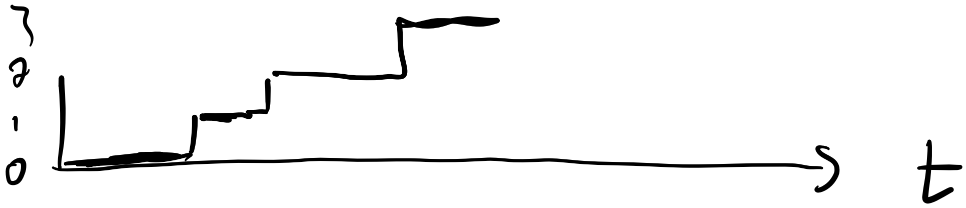
LET $\vec{\mathbb{P}}(t) = \begin{bmatrix} \mathbb{P}_1(t) \\ \vdots \\ \mathbb{P}_N(t) \end{bmatrix}$ THEN

$$\frac{d\vec{\mathbb{P}}}{dt} = \begin{bmatrix} -\sum_{i\neq 1} \lambda_{1\to i} & \boxed{\lambda_{2\to 1}} & \\ \boxed{\lambda_{1\to 2}} & & \\ & & \end{bmatrix}_{N\times N} \cdot \vec{\mathbb{P}}$$

COLUMN

$\Sigma = 0$

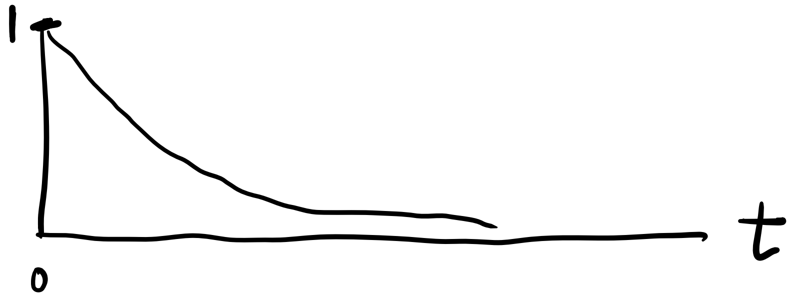
EX $N(t)$ - # POISSON EVENTS UP TO TIME t



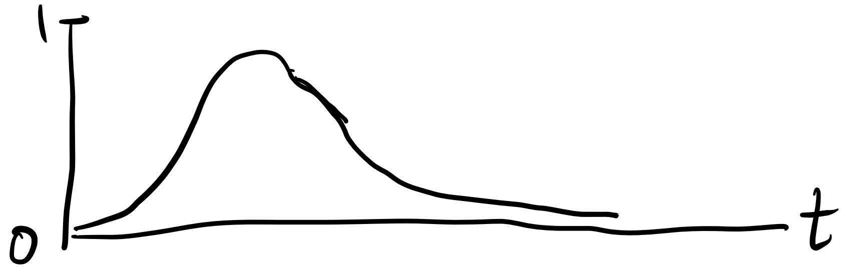
$$\text{MATRIX} = \begin{bmatrix} -\lambda & 0 & 0 & 0 & \cdots \\ \lambda & -\lambda & 0 & 0 & \cdots \\ 0 & \lambda & -\lambda & 0 & \cdots \\ 0 & 0 & \lambda & -\lambda & \cdots \\ 0 & 0 & 0 & \lambda & \cdots \\ 0 & 0 & 0 & 0 & \cdots \\ \vdots & & & & \end{bmatrix}$$

$$\vec{\mathbb{P}}(0) = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ \vdots \end{bmatrix}$$

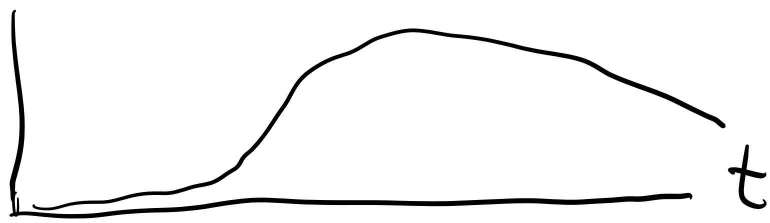
$\mathbb{P}_0(t)$



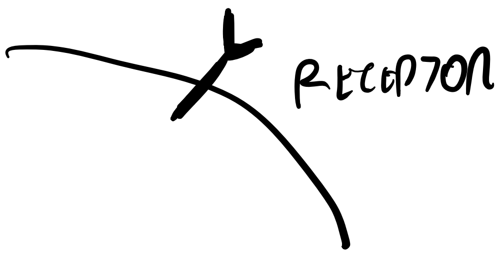
$\mathbb{P}_1(t)$

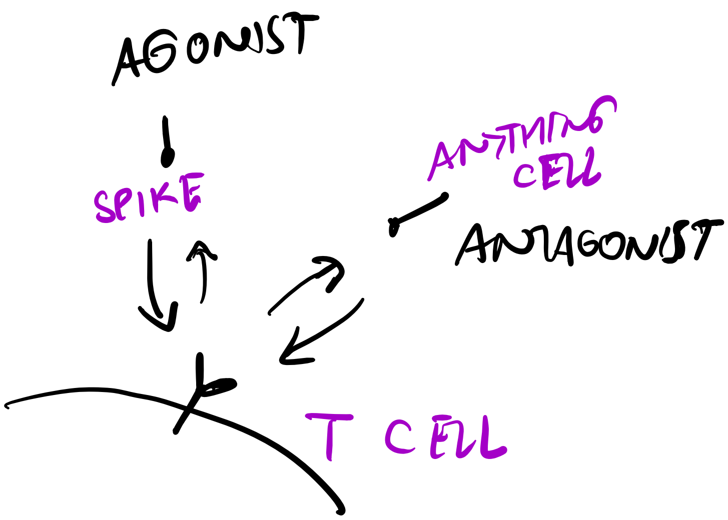


$\mathbb{P}_2(t)$

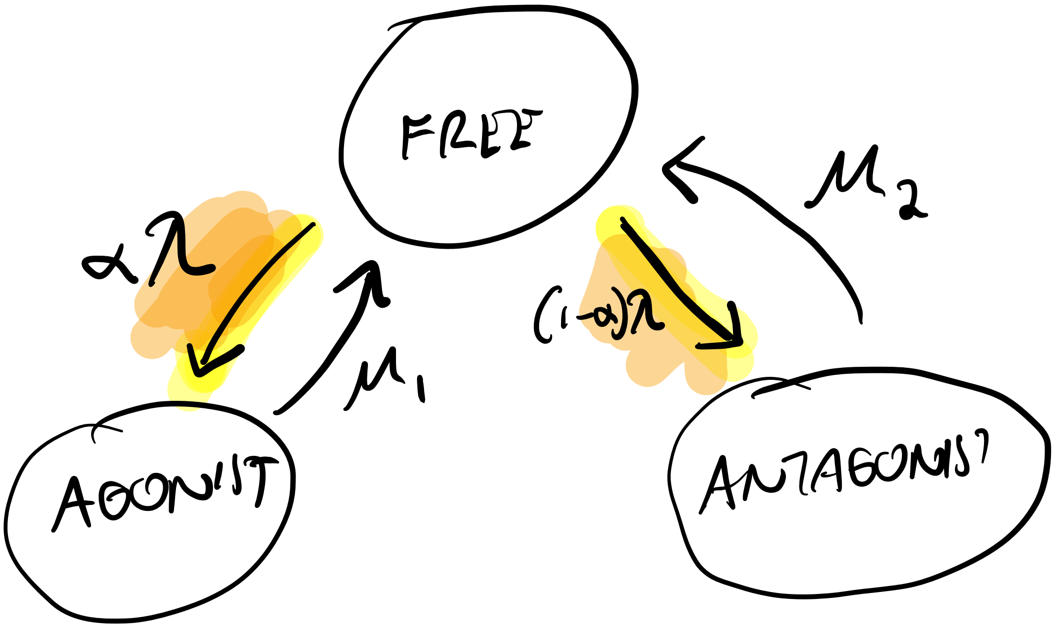


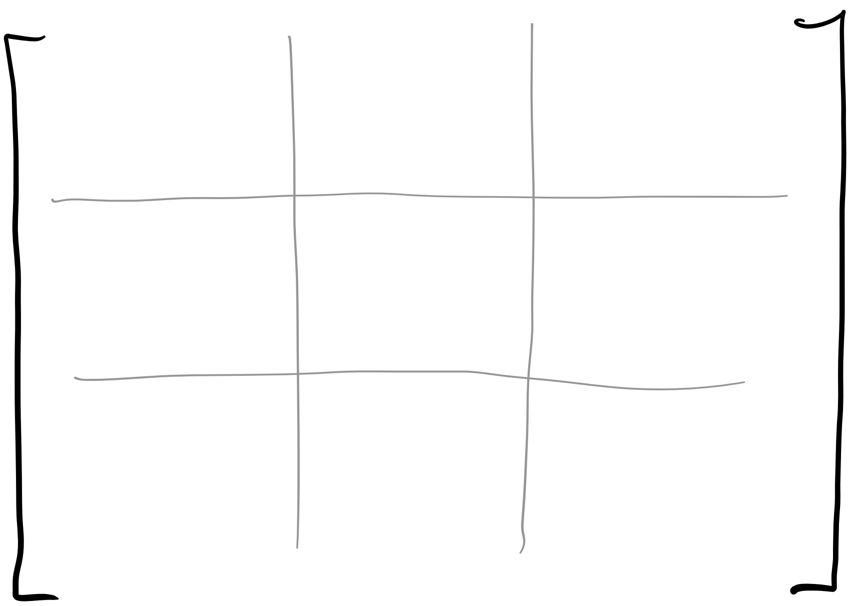
PS5



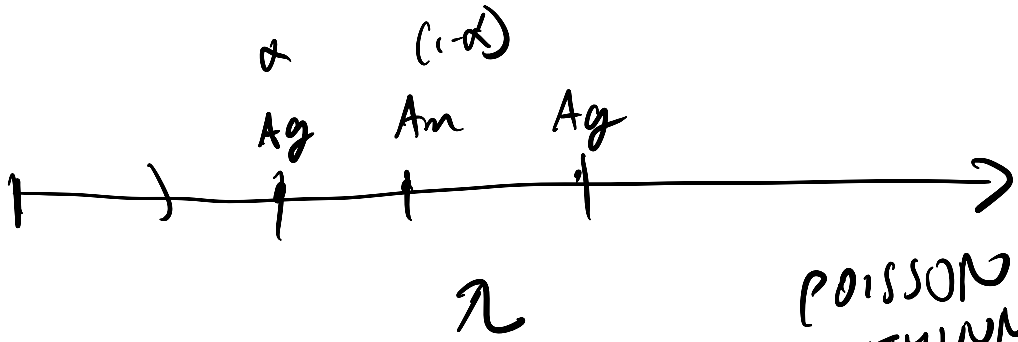



AGONIST
SPIKE
ANTAGONIST
OTHER
FREE


FREE
AGONIST
ANTAGONIST
$\alpha\lambda$
μ_1
$(1-\alpha)\lambda$
μ_2



3×3



POISSON THINNING