Number of cases at 
$$j$$
 at  $t$ 

$$I(t,j) \sim Pois\Big(\Lambda(j,t)\Big)$$
Past Incidence
$$\Lambda(j,t) = \sum_{i}^{n} \left(p_{i \to j} \left(R_{t,i} \sum_{s=0}^{t} I_{t-s,i} \omega_{s}\right)\right)$$
Probability of movement
Serial Interval