3/4/21

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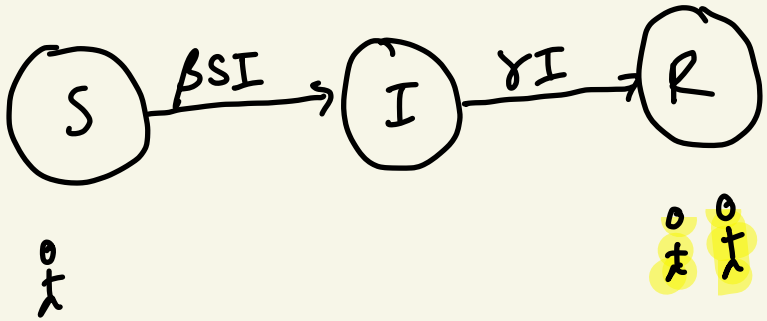
C.S. + BIOF
Networks + Epi.

How is a vaccine modeled?



Assumed that the vaccine was equivalent to (R).

"vaccine efficacy"
↑
clinical trials

"vaccine effectiveness"
↑
real world performance.

→ vaccine ≠ perfect protection

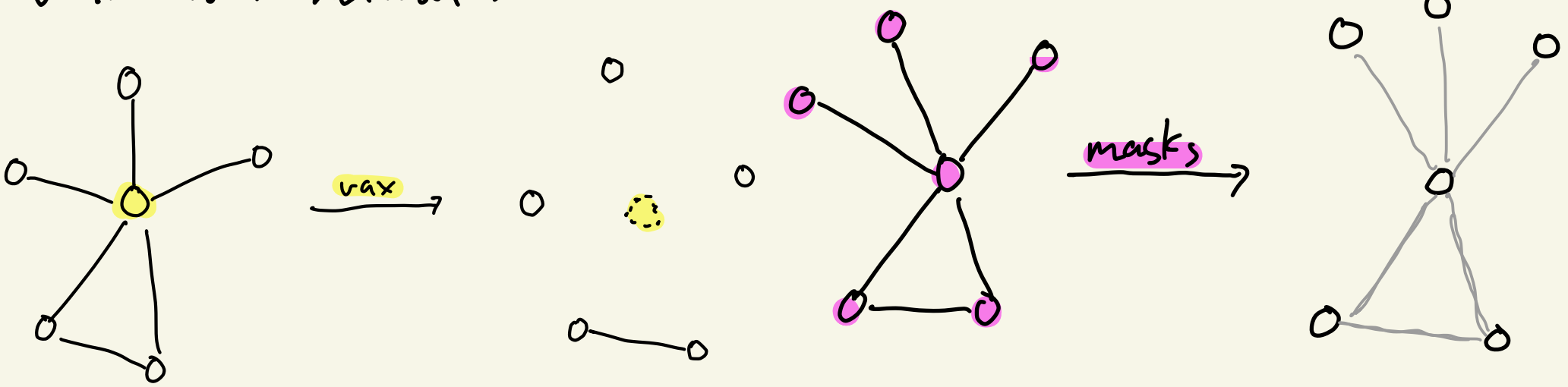
as $f \to 1$, $\frac{dS}{dt} \to 0$

$$\frac{dS}{dt} = -\beta SI \longrightarrow \frac{dS}{dt} = -\beta(1-f)SI$$

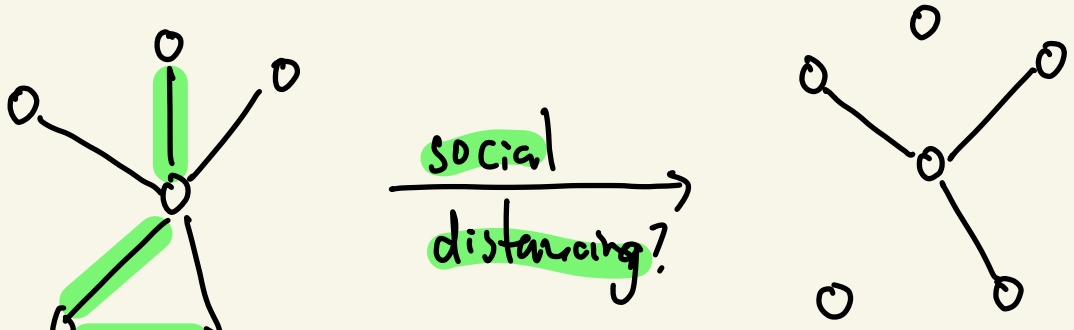
↑ no vax

if vax fraction f S becomes $(1-f)S$

What about networks?



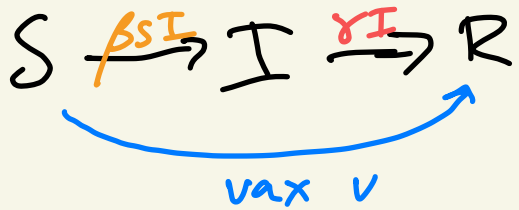
Vaccination = removing a node. (if V.E. = 100%)



GLOBAL

- throw out x% of edges (at random)
- choose nodes who are going to S. Distance _ and throw out 50% of their edges.

Interventions



① Vax
Move ppl. from S to R.
(changing initial condn...)

② Soc. Dist.
reduces rate of SI contact
$\phi < 1$: ϕ = fraction of contact retained

③ Masking
↓ prob that virus spreads, per contact.

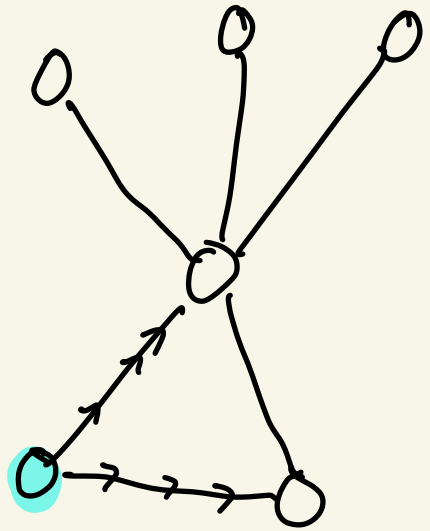
$\beta \leftarrow \frac{\beta}{K}$ K effectiveness of masking

$$\frac{dS}{dt} = -\frac{\beta \phi S I}{K} - v(t)$$

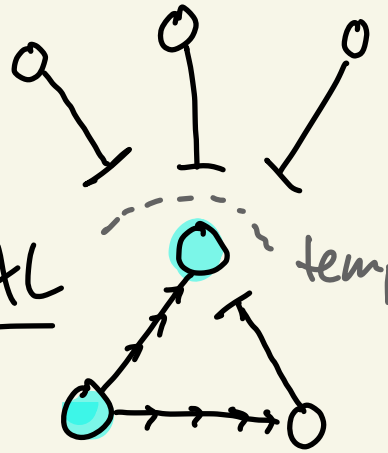
$$\frac{dI}{dt} = \frac{\beta \phi S I}{K} - \gamma I$$

$$\frac{dR}{dt} = \gamma I + v(t)$$

Quarantining?



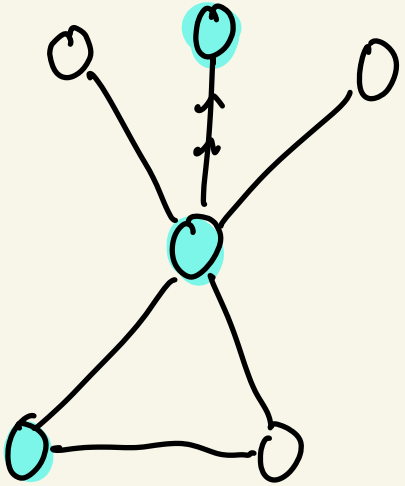
with Quarantining



LOCAL

tempoary

without



Covid +