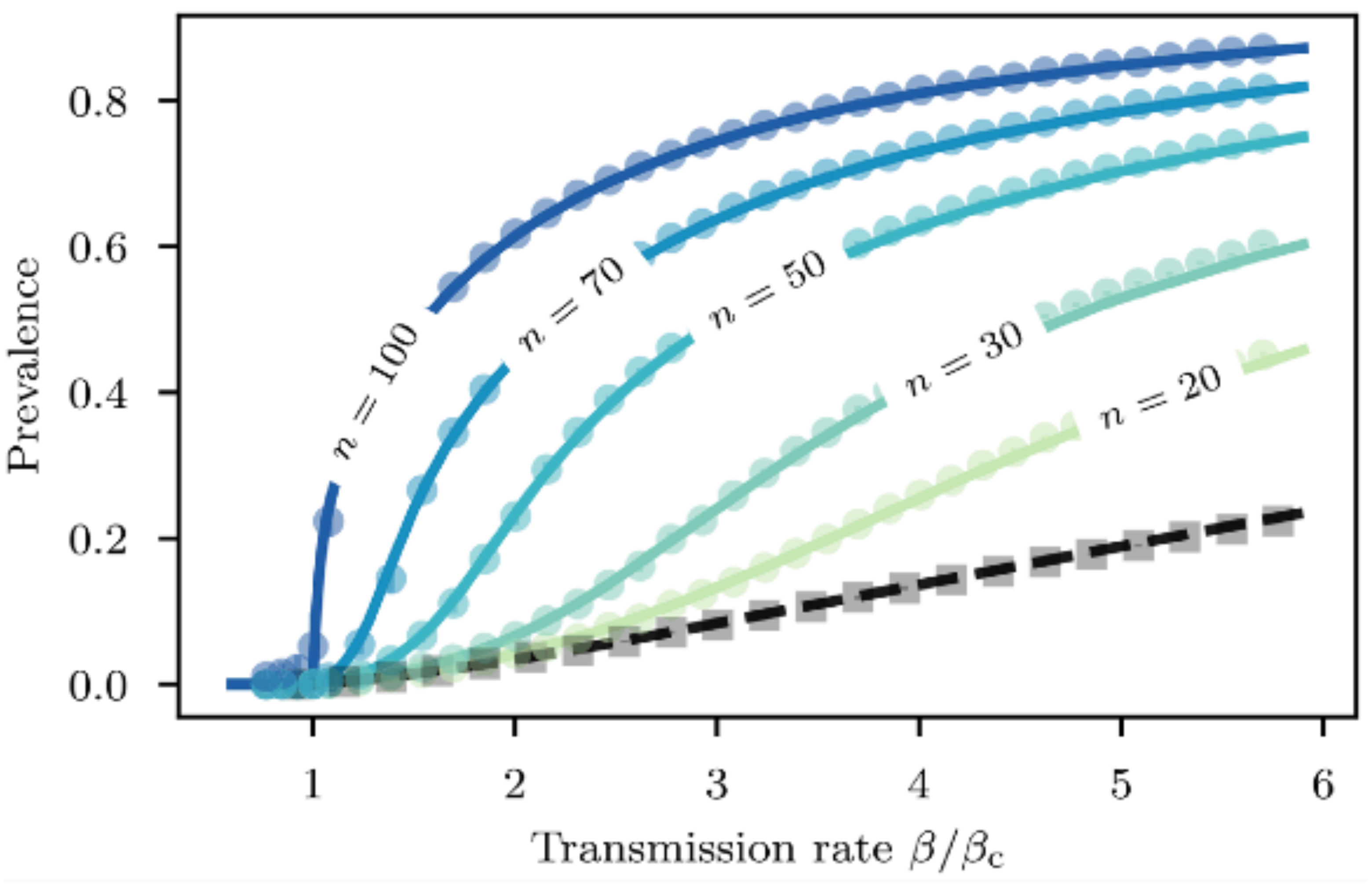
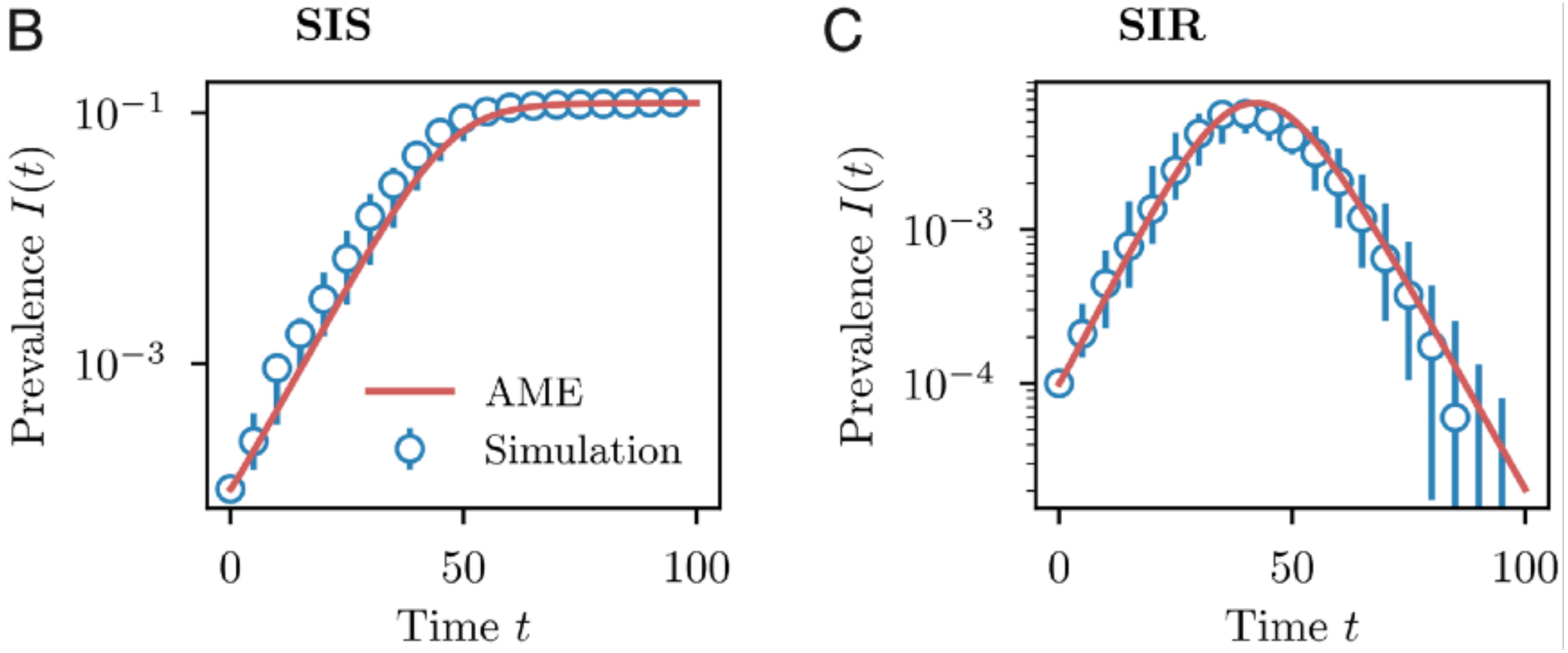
6

The model and its mathematical description



Prevalence
0.0
0.2
0.4
0.6
0.8
1
2
3
4
5
6
Transmission rate β/β_c
$n = 100$
$n = 70$
$n = 50$
$n = 30$
$n = 20$



B
SIS
10^{-1}
10^{-3}
Prevalence $I(t)$
AME
Simulation
0
50
100
Time t
C
SIR
10^{-3}
10^{-4}
Prevalence $I(t)$
0
50
100
Time t

Good agreement between theory and numerical simulations.

Stationary state

$$S_m^* = \frac{g_m}{1 + mr}$$

$$\mu(i+1)G^*_{n,i,\beta} = \left[\mu i + (n-i)(\Theta_{n,i,\beta} + \rho)\right]G^*_{n,i,\beta} - (n-i+1)(\Theta_{n,i-1,\beta} + \rho)G^*_{n,i-1,\beta}$$

Epidemic threshold

$$\left.\frac{\mathrm{d}F}{\mathrm{d}\rho}\right|_{\rho\to 0} > 1$$

where

$$F(\rho) \equiv r(\rho)\frac{\sum_m m(m-1)S_m(\rho)}{\sum_m mS_m(\rho)}$$

The model and its mathematical description

Stationary state

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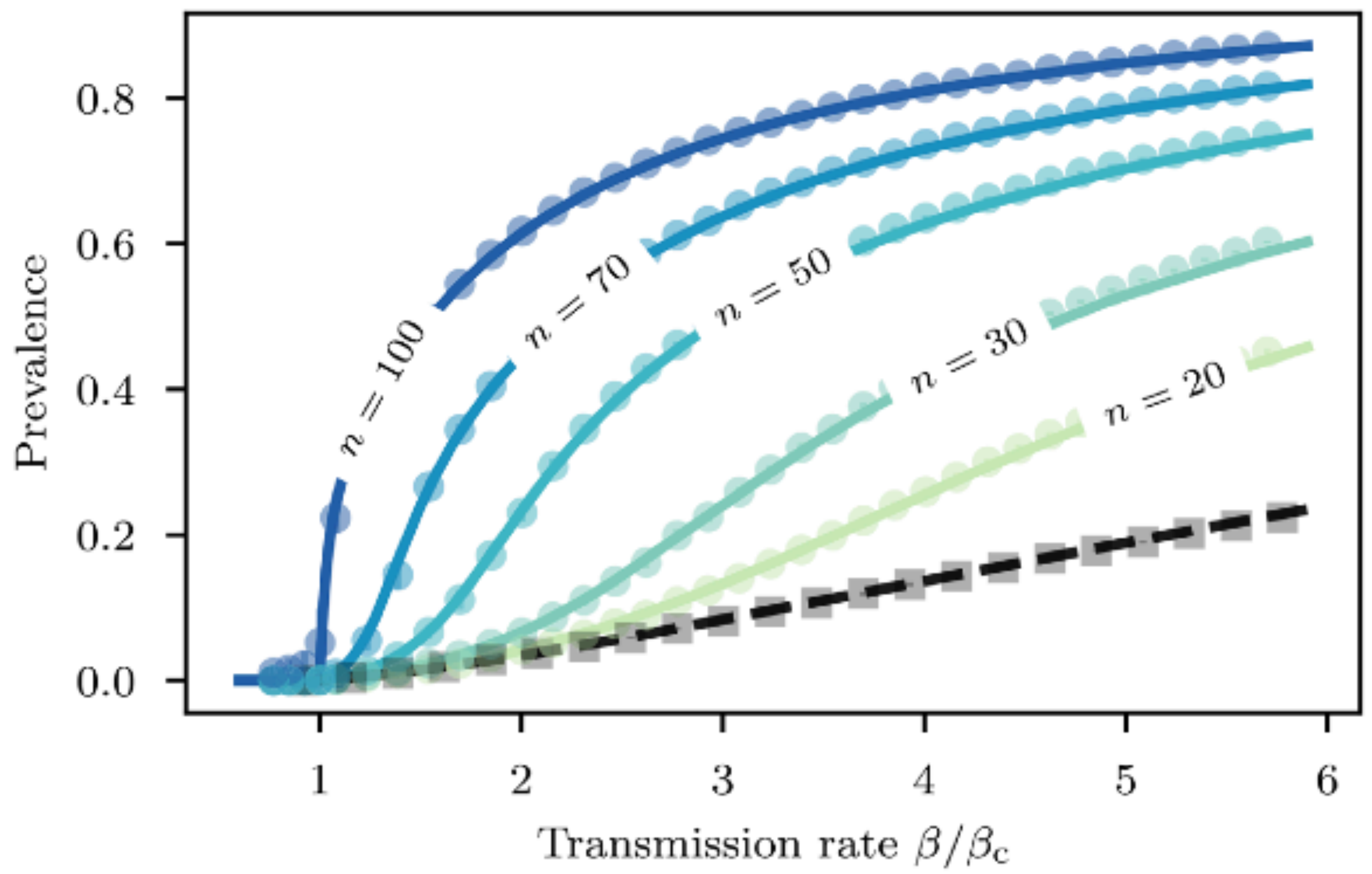

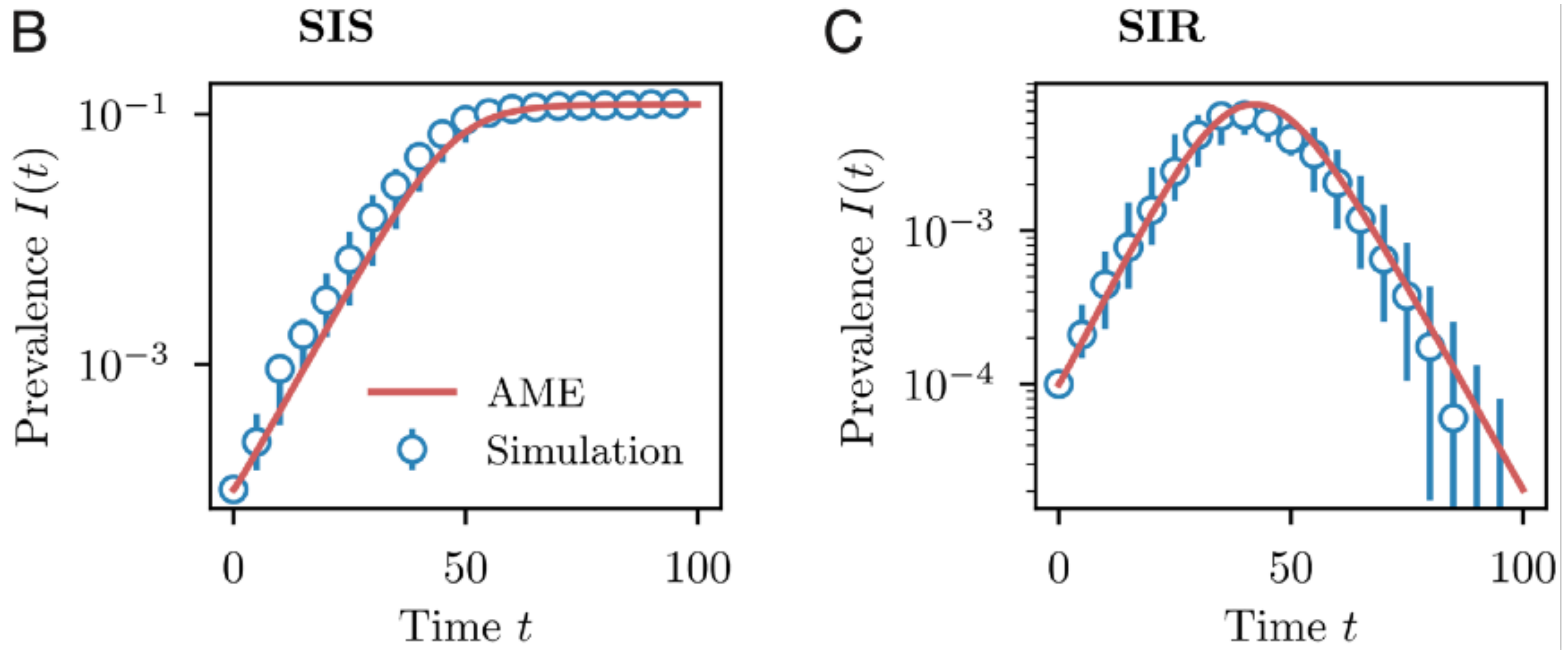

Outline

1. The model and its mathematical description

2. Some applications

   (a) **Mesocopic localization**

   (b) Heterogeneous transmission settings

   (c) Context-sensitive behavior