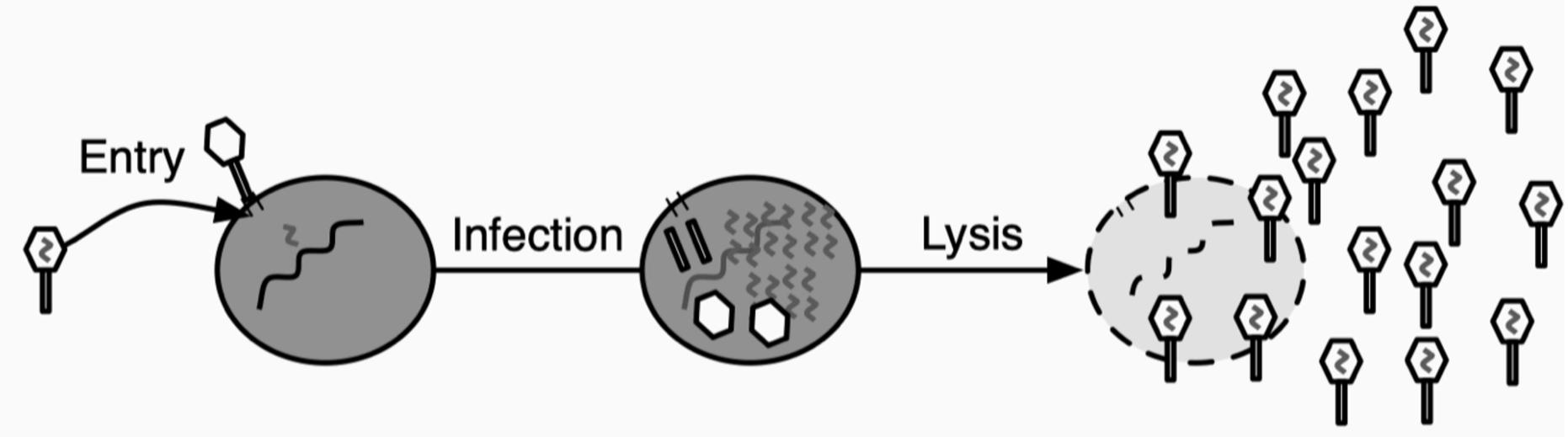
# Eco-Evo dynamics

## Evolution & Ecology

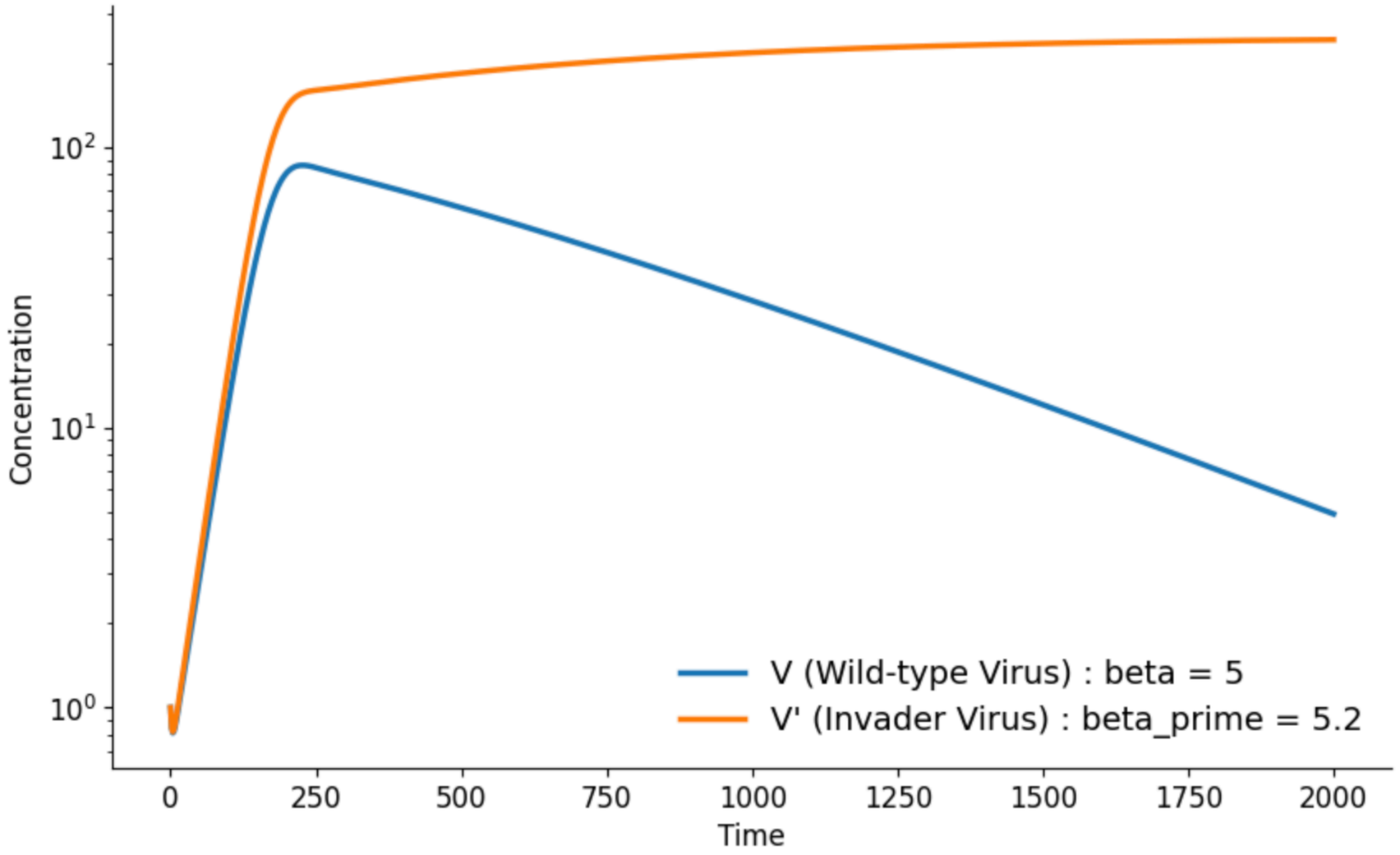
**Jacopo Grilli, Ciudad de Guatemala, 1/12/2025**

# What is optimal?



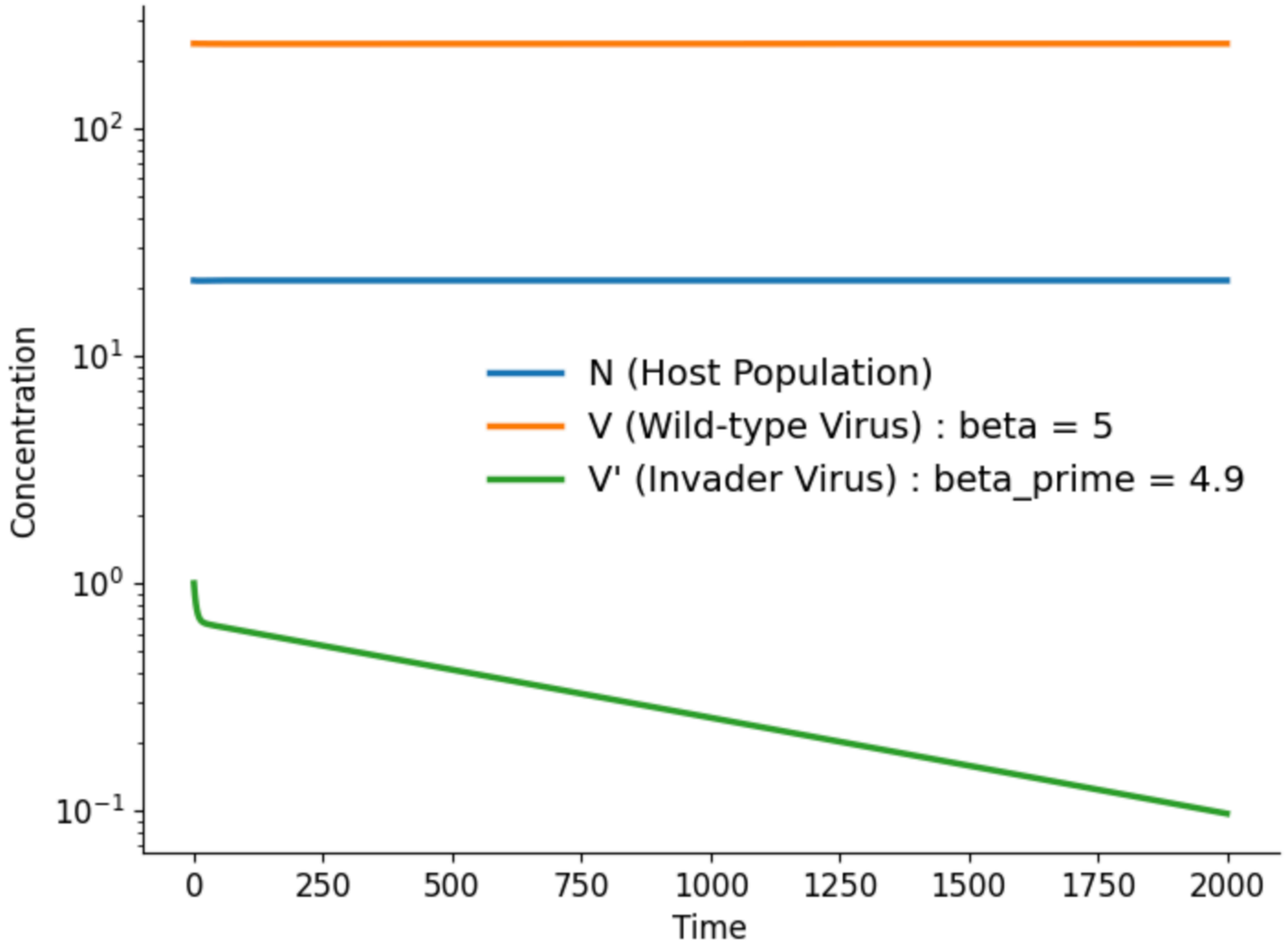
# Multiple phages

# Competition between phages

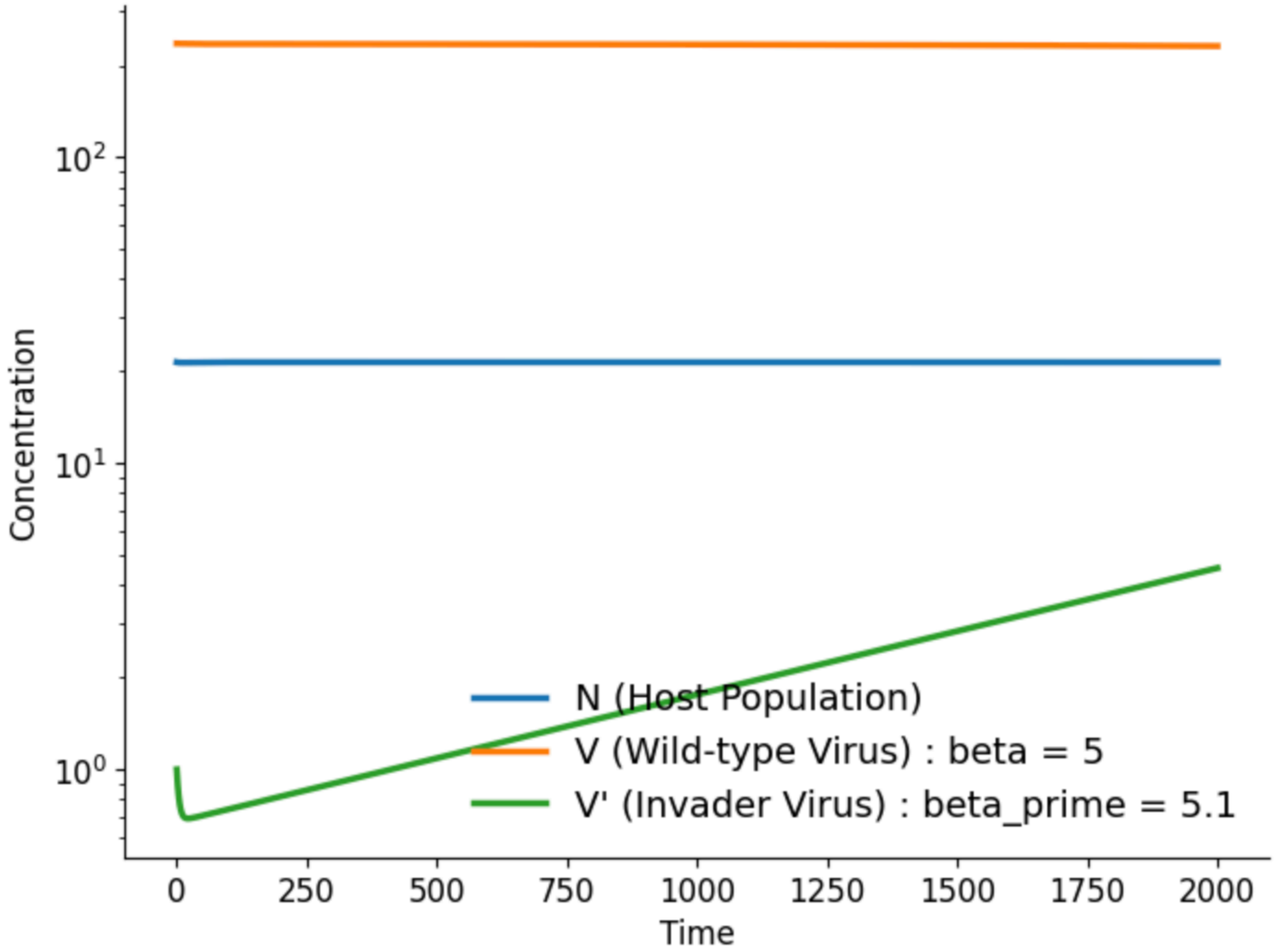


# Invasion

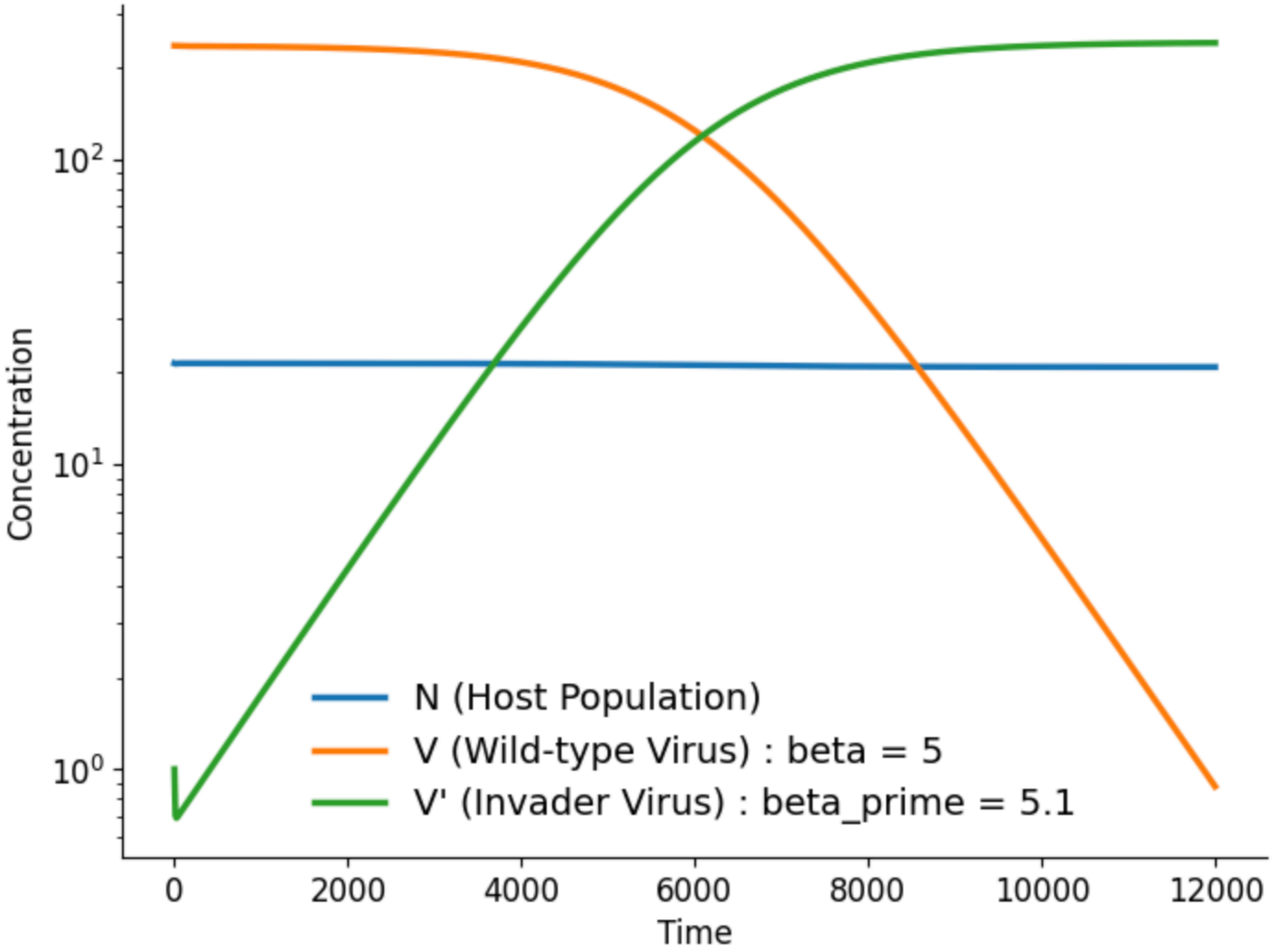
# Failed invasion



# Successful invasion

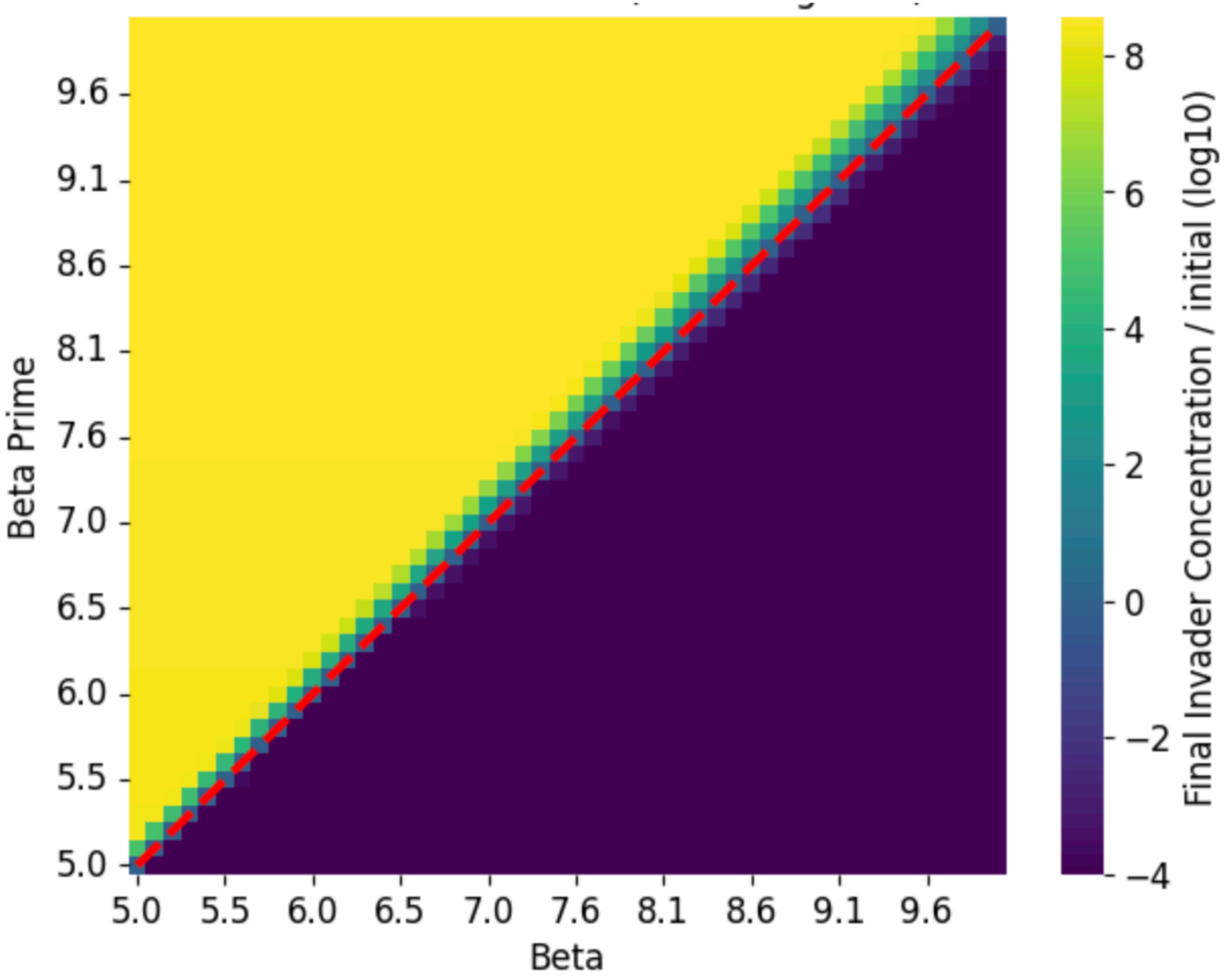


# Successful invasion (longer time)

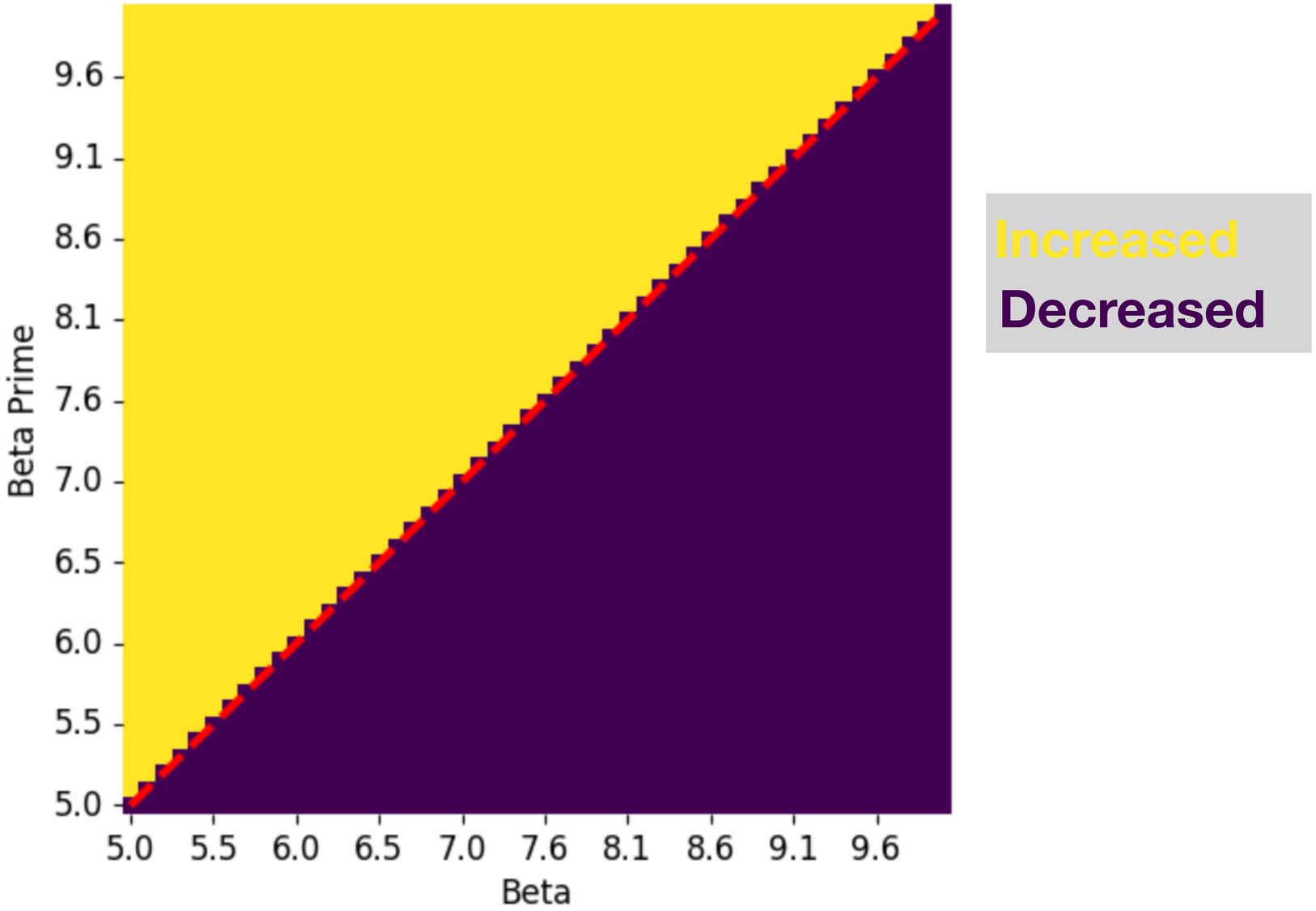


# Invasions, systematically

# Final invader concentration

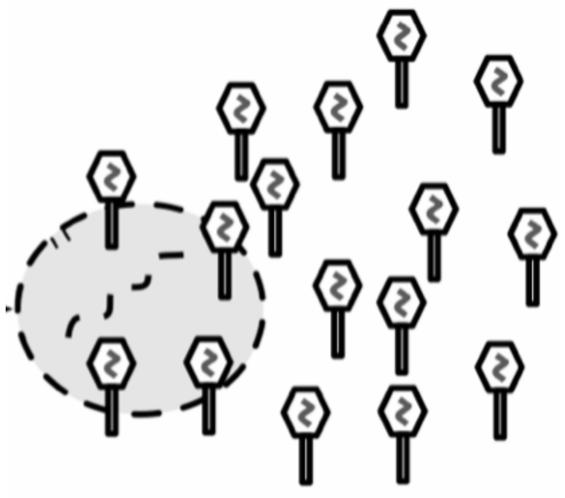


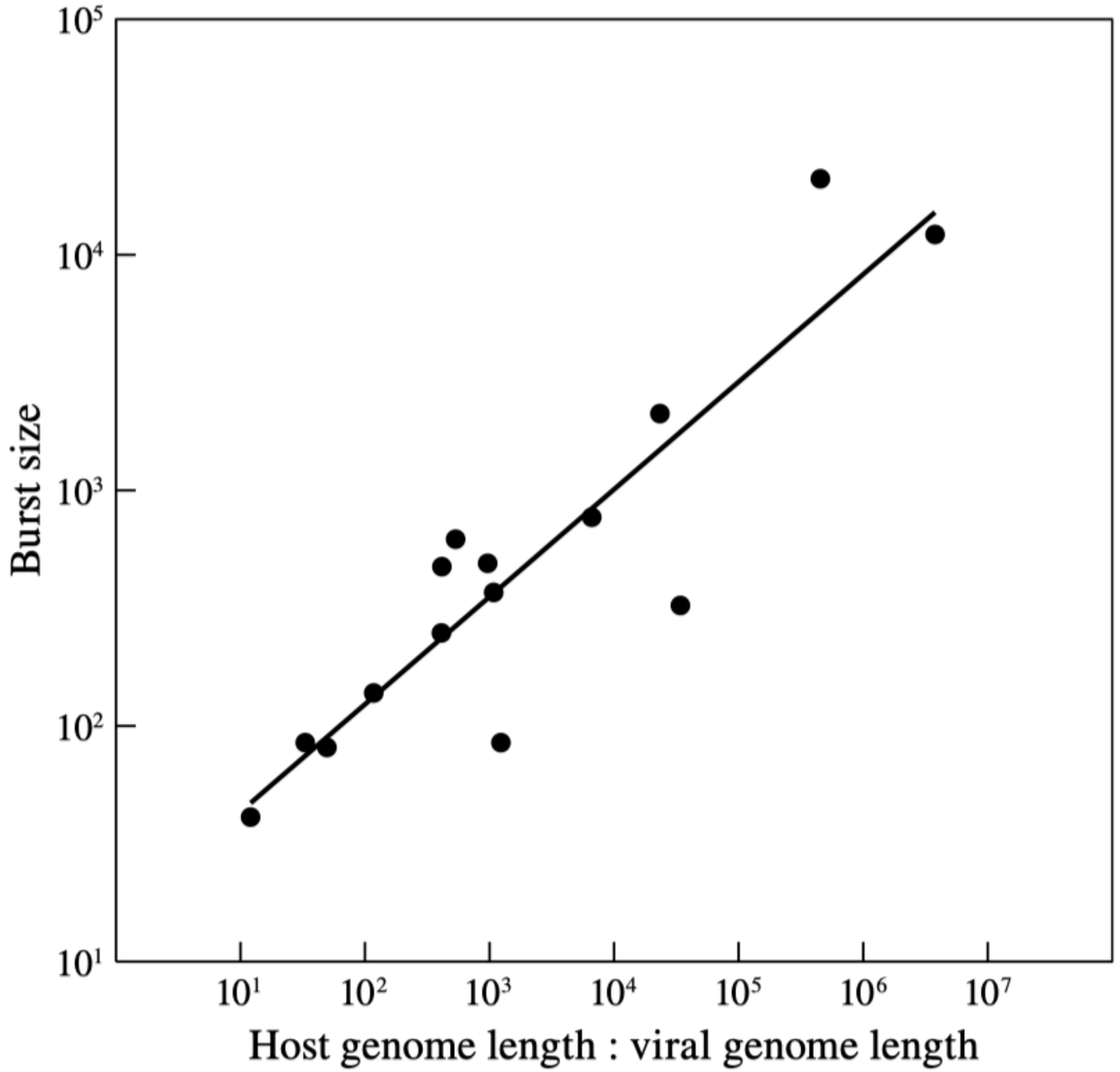
# Final invader concentration. Did it grow?



# Optimal: maximize burst size
# Is this the whole story?

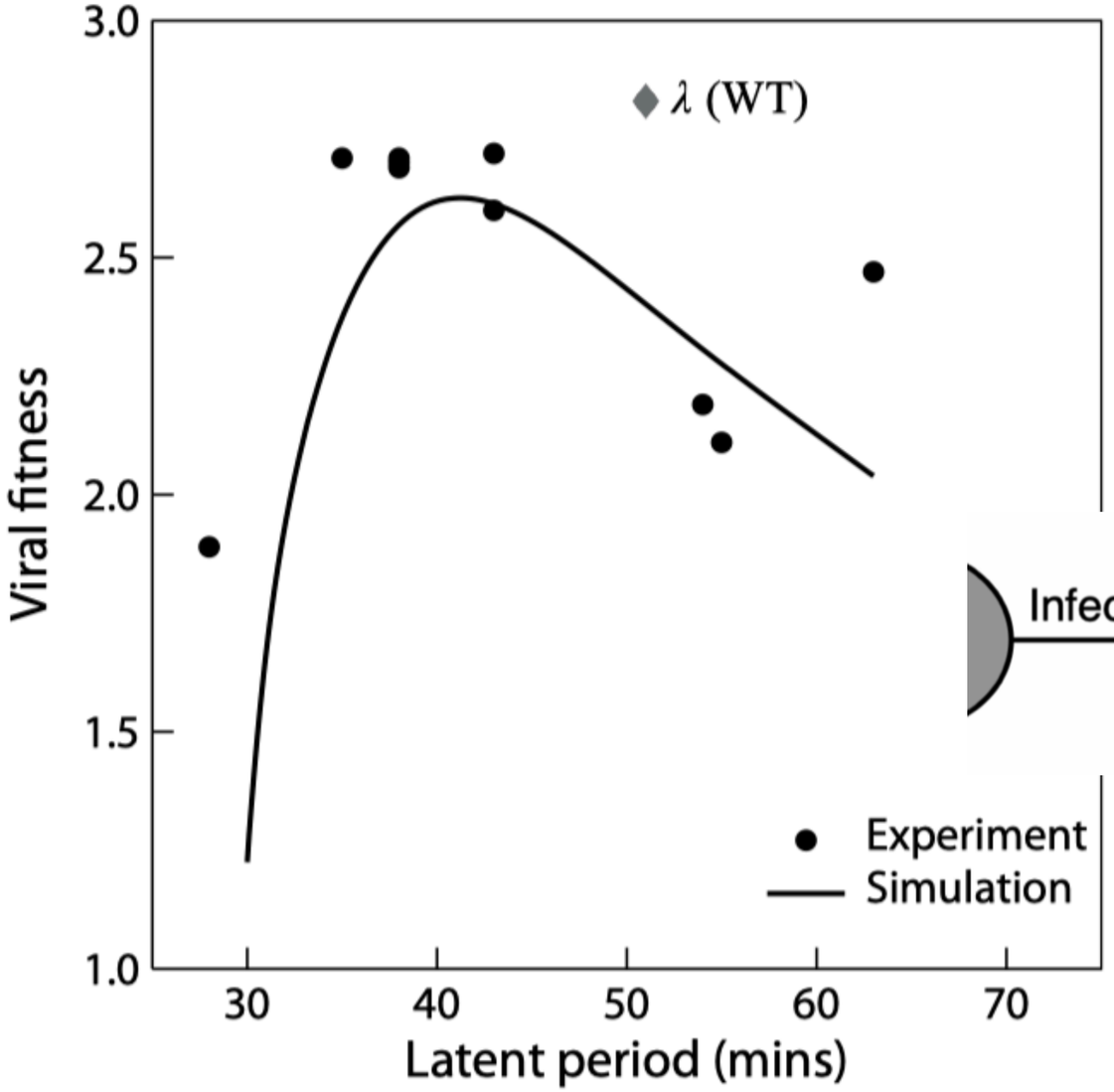
# Variation of the burst size

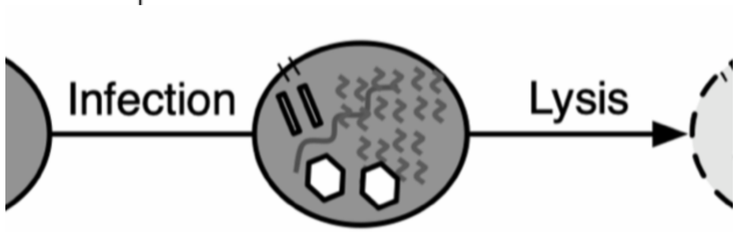





Brown et al., 2006

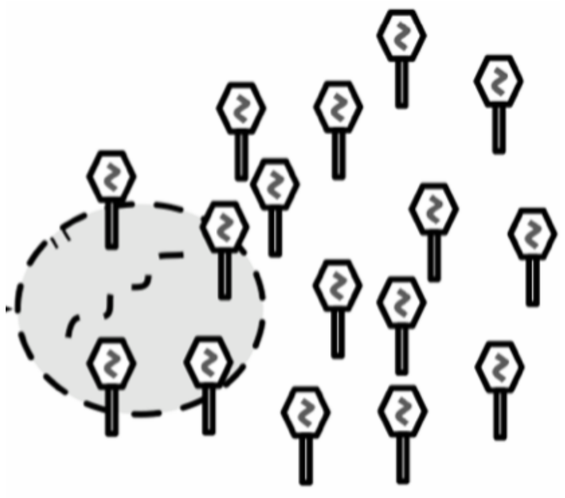
# Intermediate optimal latency time

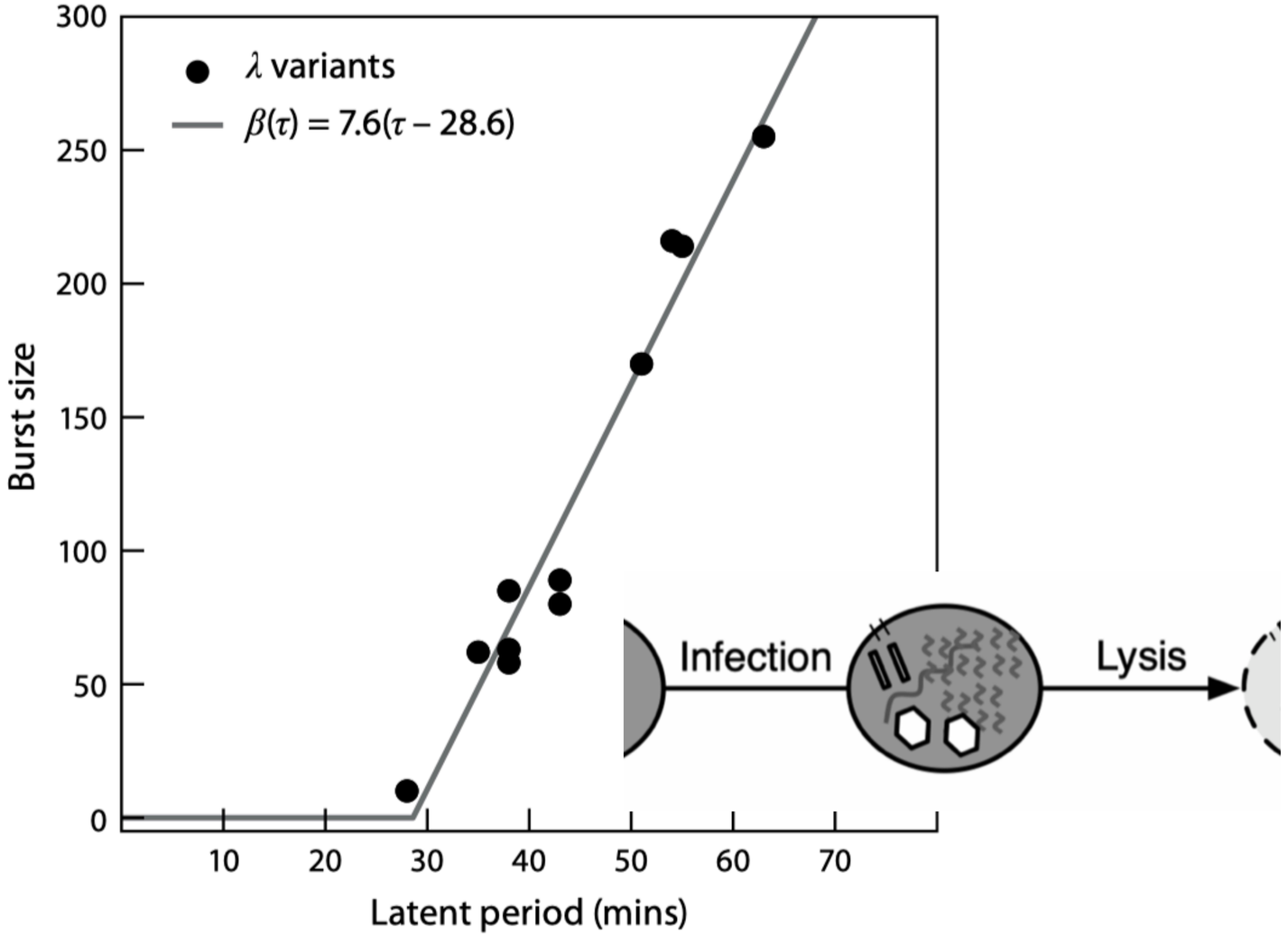



Wang et al., 2006

# Latency time and burst are not independent

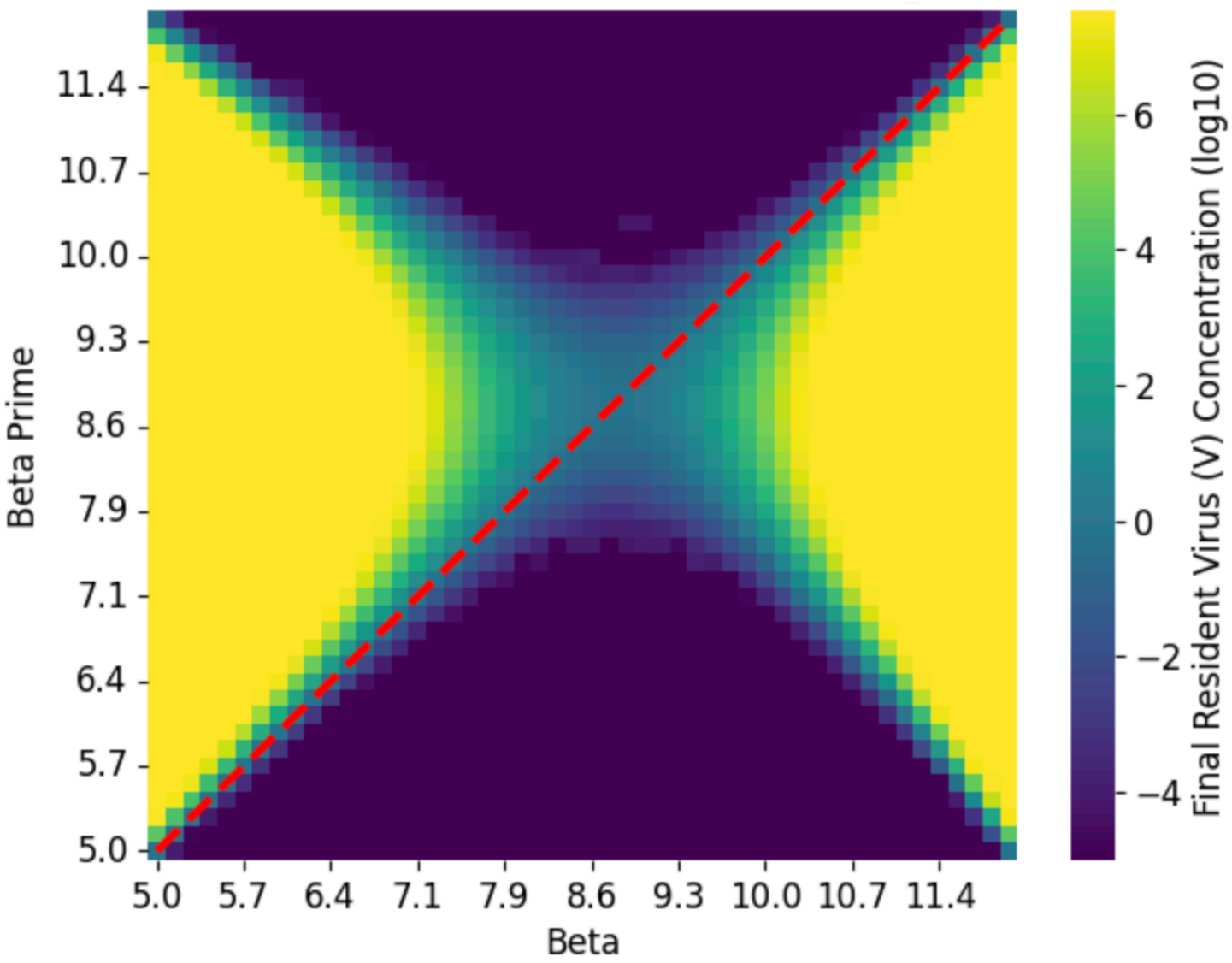




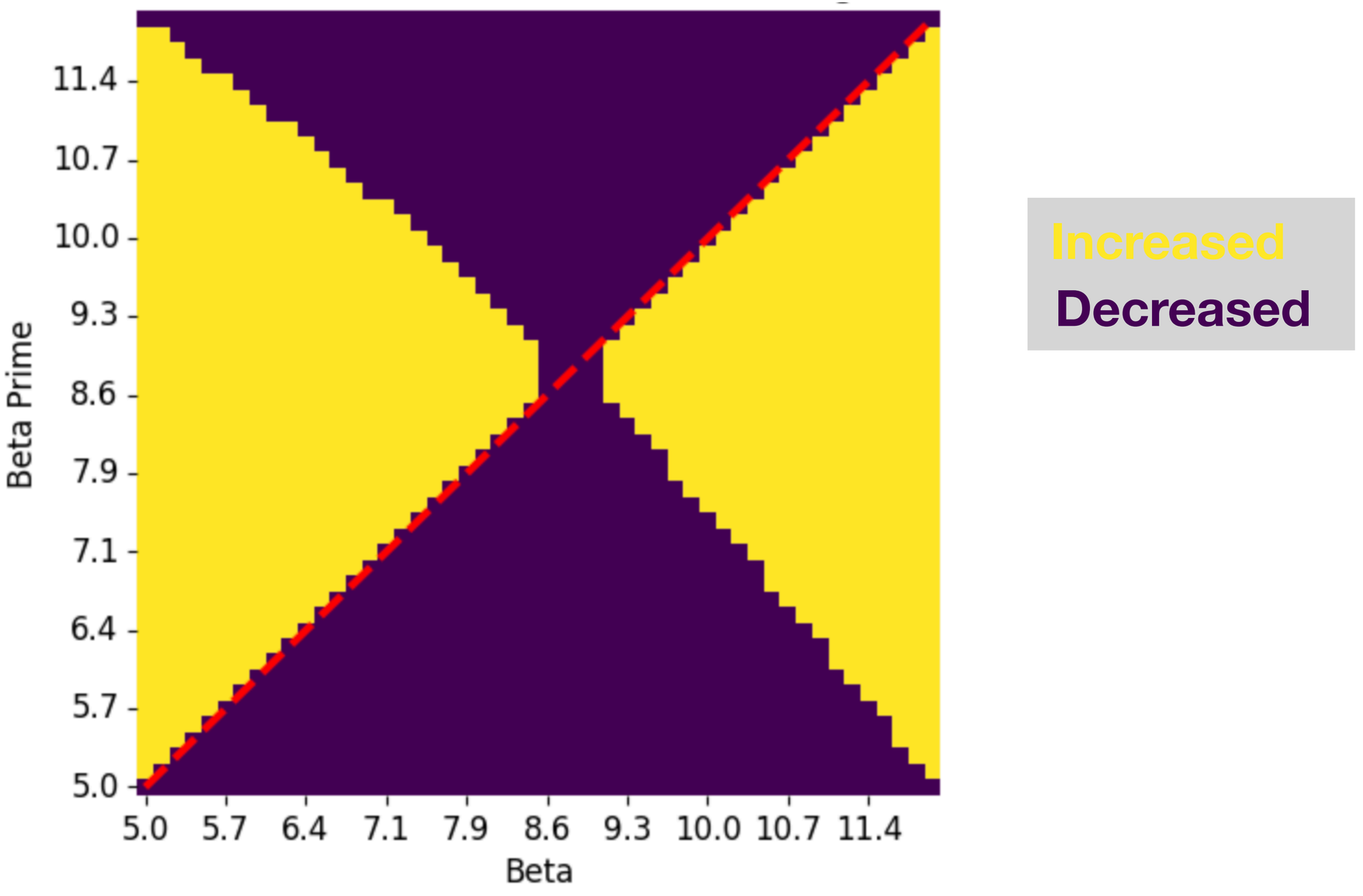

Wang et al., 2006

# Tradeoff

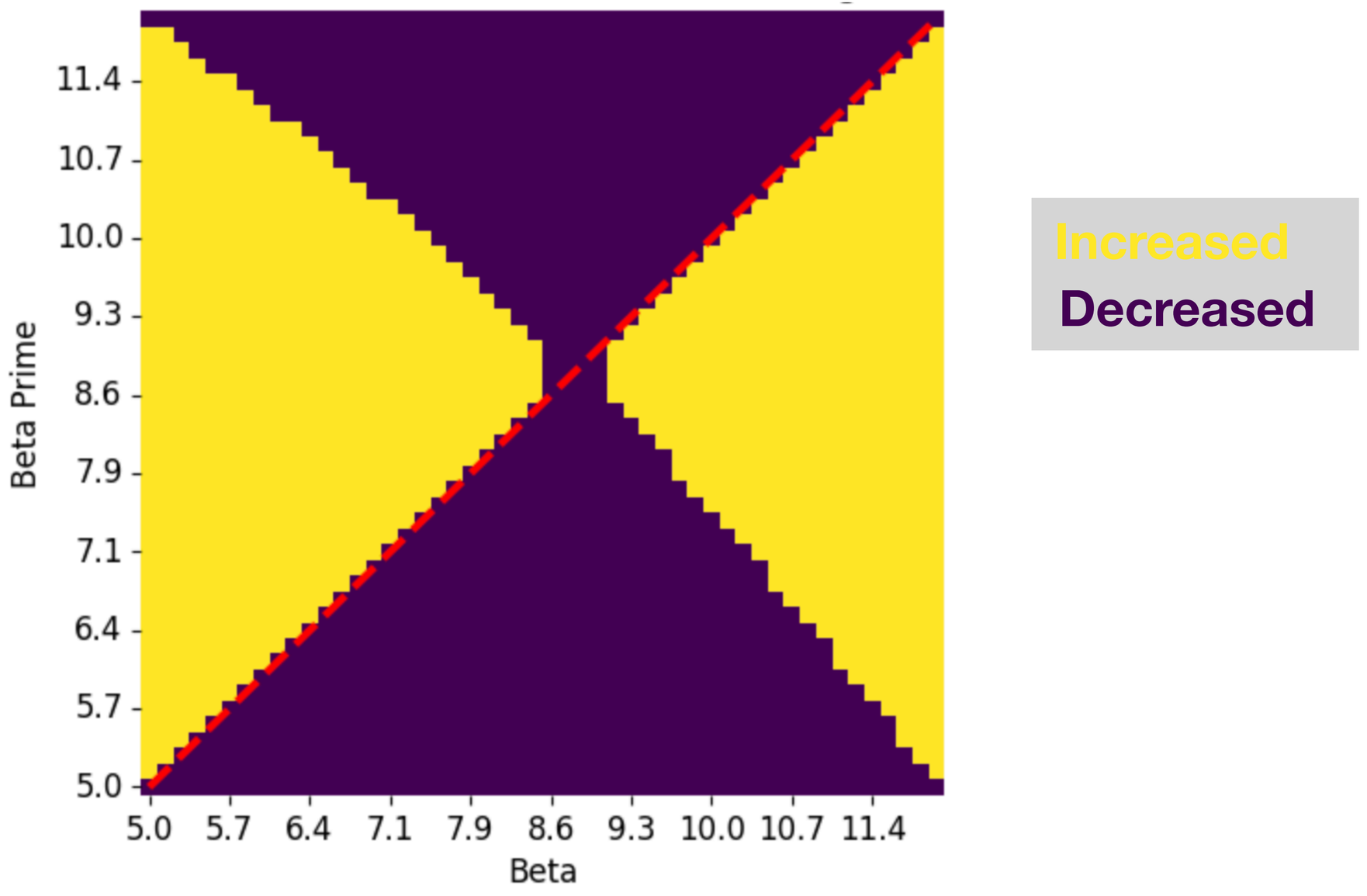
# Final invader concentration



# Final invader concentration. Did it grow?



# What do you expect over long time?




Increased

Decreased

# Invasions, systematically

# An optimal compromise

$$\eta_{opt} = \sqrt{\omega \eta_0}$$

$$\beta_{opt} = \beta_0 \frac{\sqrt{\eta_0}}{\sqrt{\omega} + \sqrt{\eta_0}}$$