



IRENA PAPST

MATHEMATICS & STATISTICS

MCMMASTER UNIVERSITY

FEAR (BUT NOT LOATHING)

IN EPIDEMICS

The background is a dark, textured surface with a mix of blue, brown, and black tones. In the center, there is a faint, stylized illustration of a person's face, possibly a mask or a portrait, with a large, glowing orb or light source positioned above it. The overall mood is mysterious and somewhat ominous.

q: How could the fear of an infectious disease affect its spread in a population?

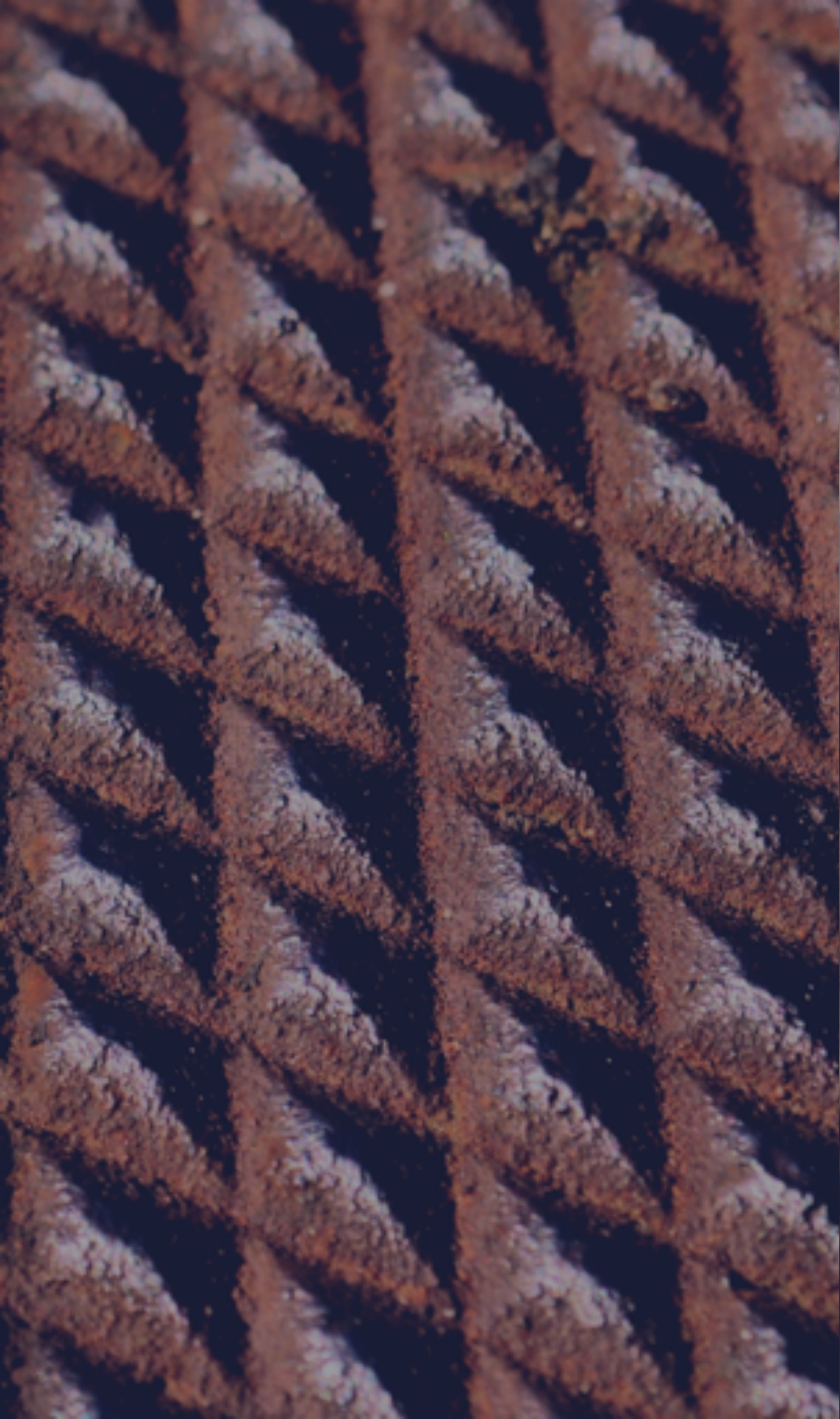
q: What does math have to do with it?

A photograph of three individuals wearing full-body yellow hazmat suits with hoods and gloves, standing in a wooded area. The suits appear to be made of a heavy, possibly waterproof material. The background is slightly blurred, showing trees and foliage. The overall tone of the image is somewhat somber and mysterious.

EXPERIMENTAL

A photograph of three individuals wearing full-body yellow hazmat suits and respirators, walking through a wooded area. The suits have blue trim around the neck and cuffs. They are carrying equipment, possibly on a stretcher or a similar transport device. The background is a dense forest with trees and foliage.

EXPERIMENTAL
EXPERIMENTAL





PATTERNS



ABSTRACT

A person in a blue shirt is seen from behind, writing on a chalkboard. The board is covered in various mathematical equations, diagrams, and symbols, including algebraic formulas like $P(x) = 2x, 50$, $\frac{x+3}{2} = 5$, $\frac{x}{x+2} + \frac{1}{3} = 4$, and $\frac{x}{y+2} + 3(x+2)$, geometric shapes like a pyramid and a cylinder, and chemical structures. The background is a dark blue with a grid of faint mathematical symbols.

MATHEMATICAL

MODEL

A gorilla is shown in a dark, moody setting, holding a banana in its mouth. The gorilla's face is lit up with a wide-eyed, curious expression. The background is a soft, out-of-focus landscape. Overlaid on the center of the image is a question in a stylized, cursive font. The text is white with a red outline, making it stand out against the dark background.

q: How do we build a mathematical model?



English French Croatian Detect language ▾



Greek English French ▾

Translate

disease transmission
recovery
the spread of fear



μετάδοσης της νόσου
ανάκτηση
η εξάπλωση του φόβου



Wrong?



metádosjs tjs nósou
anáktjsj
j exáplwsj tou fóvou

CAUTION CAUTION CAUTION CAUTION

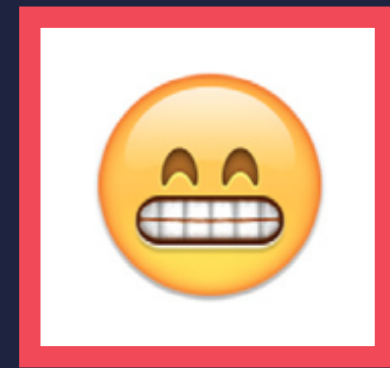


q: What happens when people get scared?



THEY BECOME MORE CAREFUL

THE MODEL

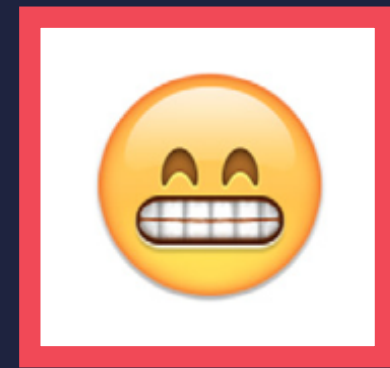




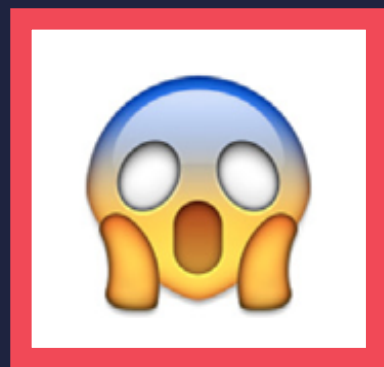
Susceptible



Infected



Removed



Fearful

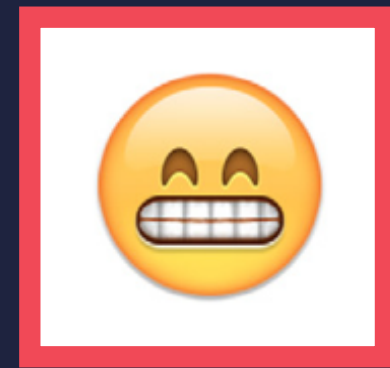


Susceptible

*Transmission
of disease*

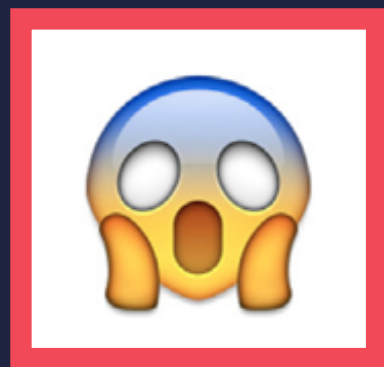


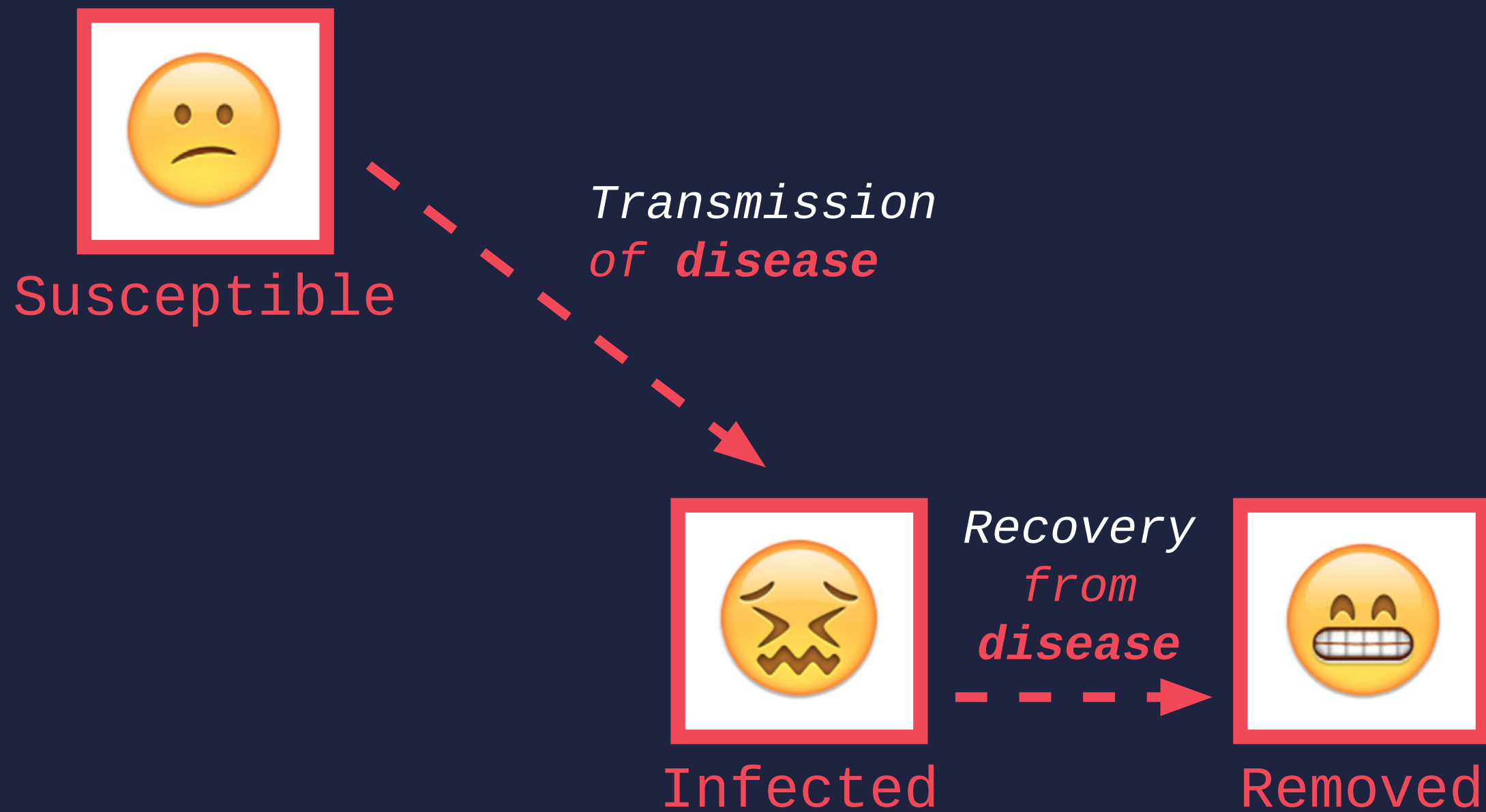
Infected



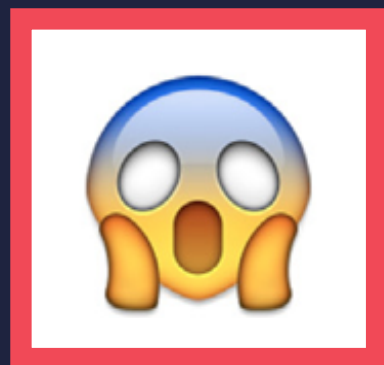
Removed

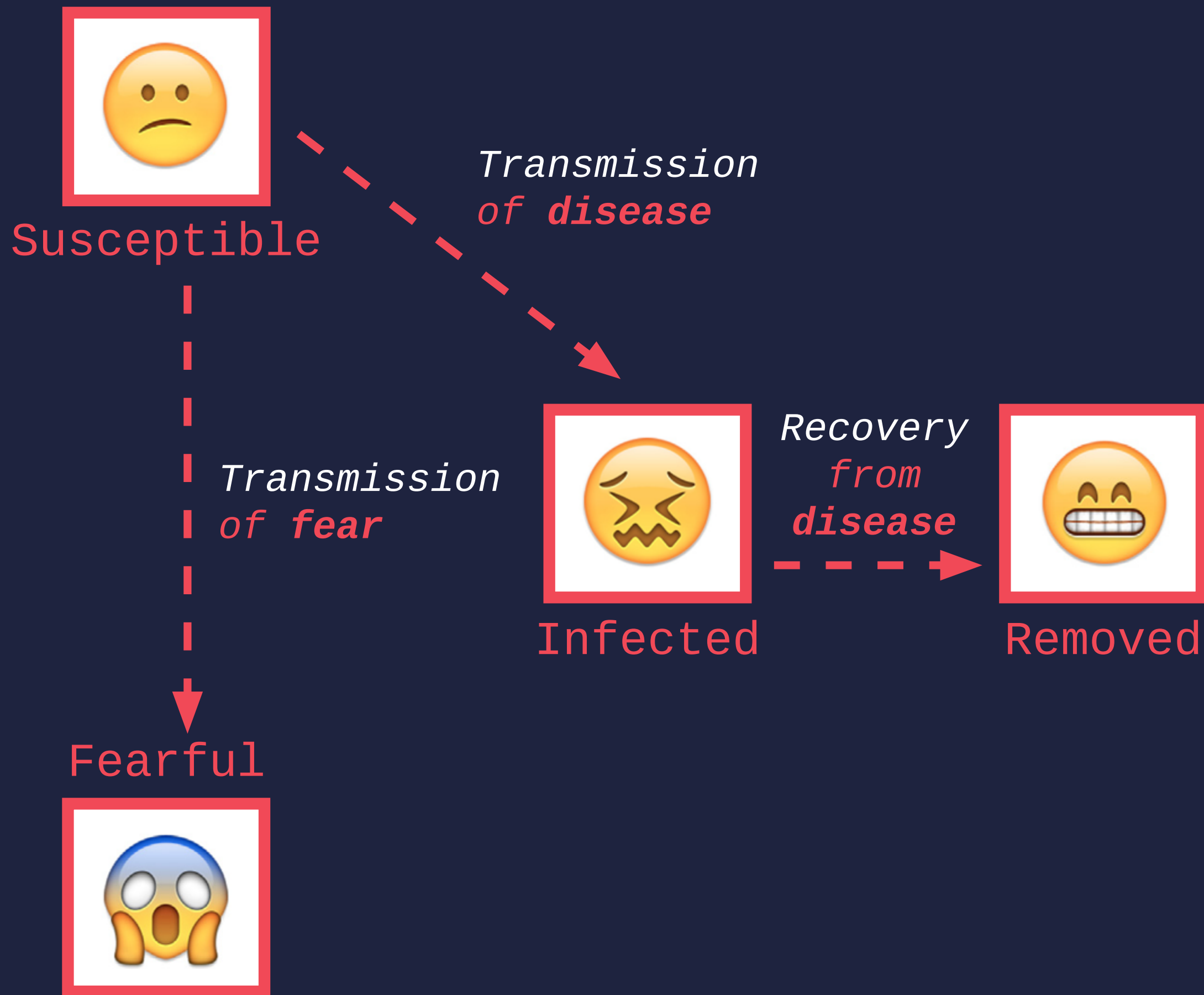
Fearful

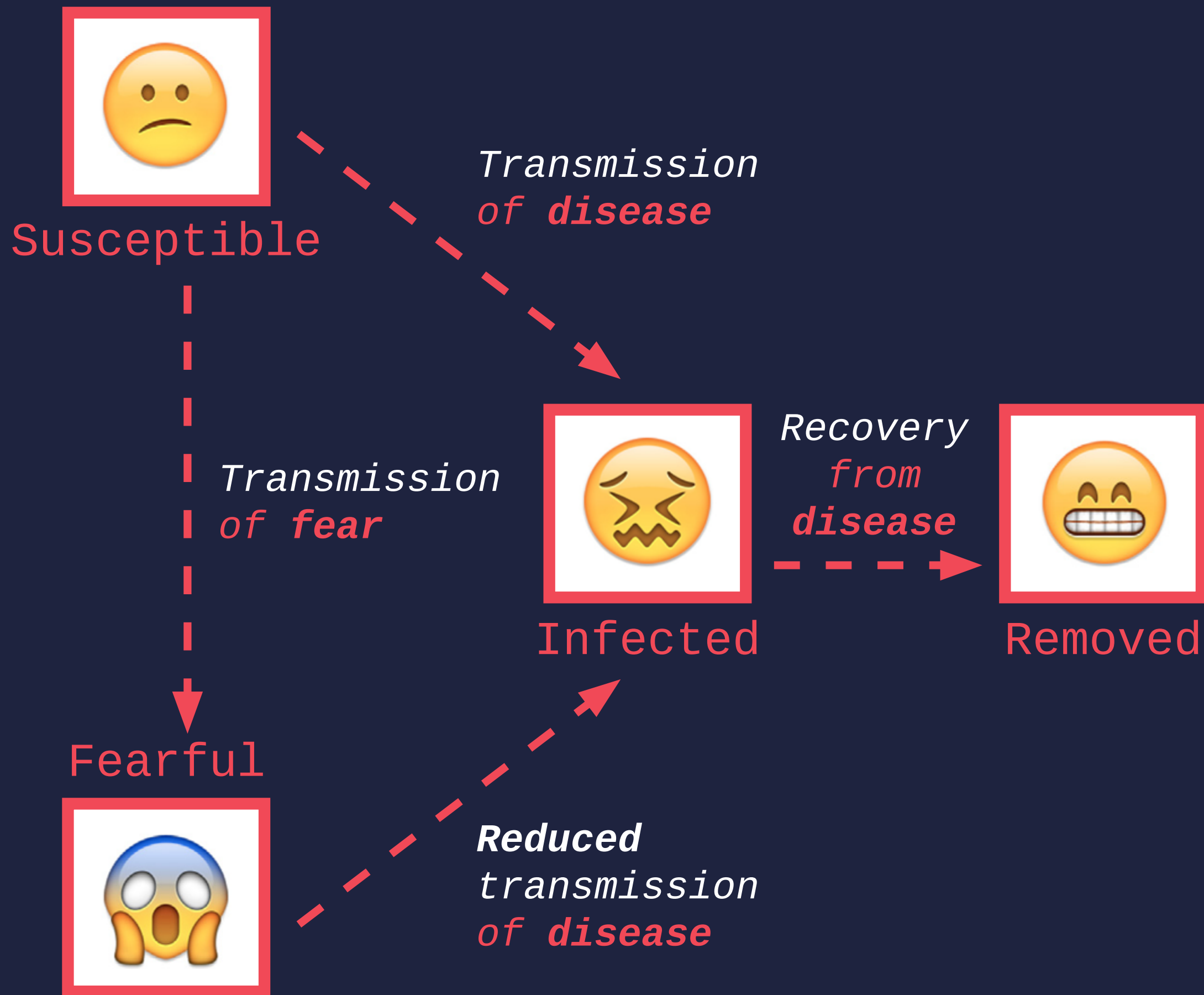


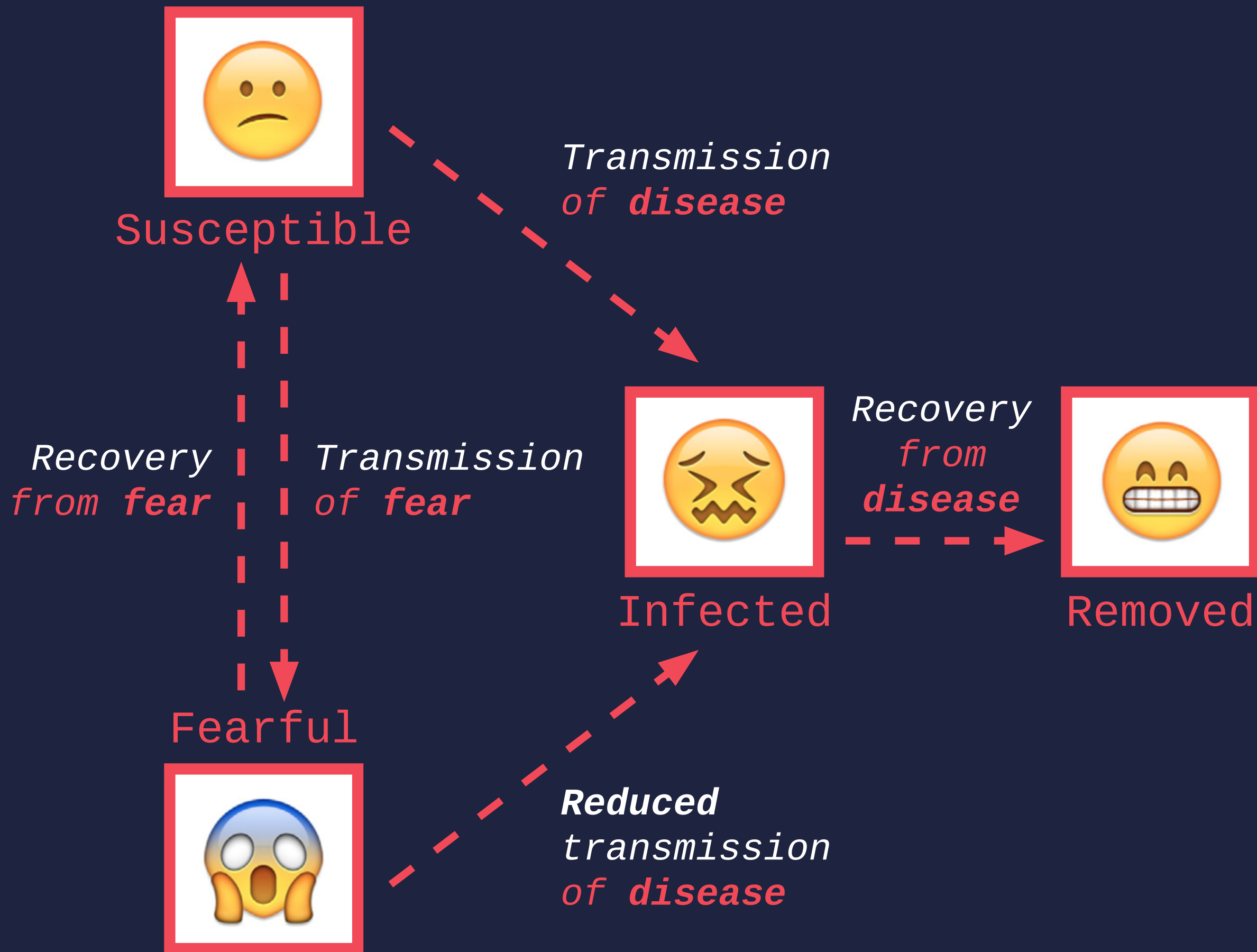


Fearful





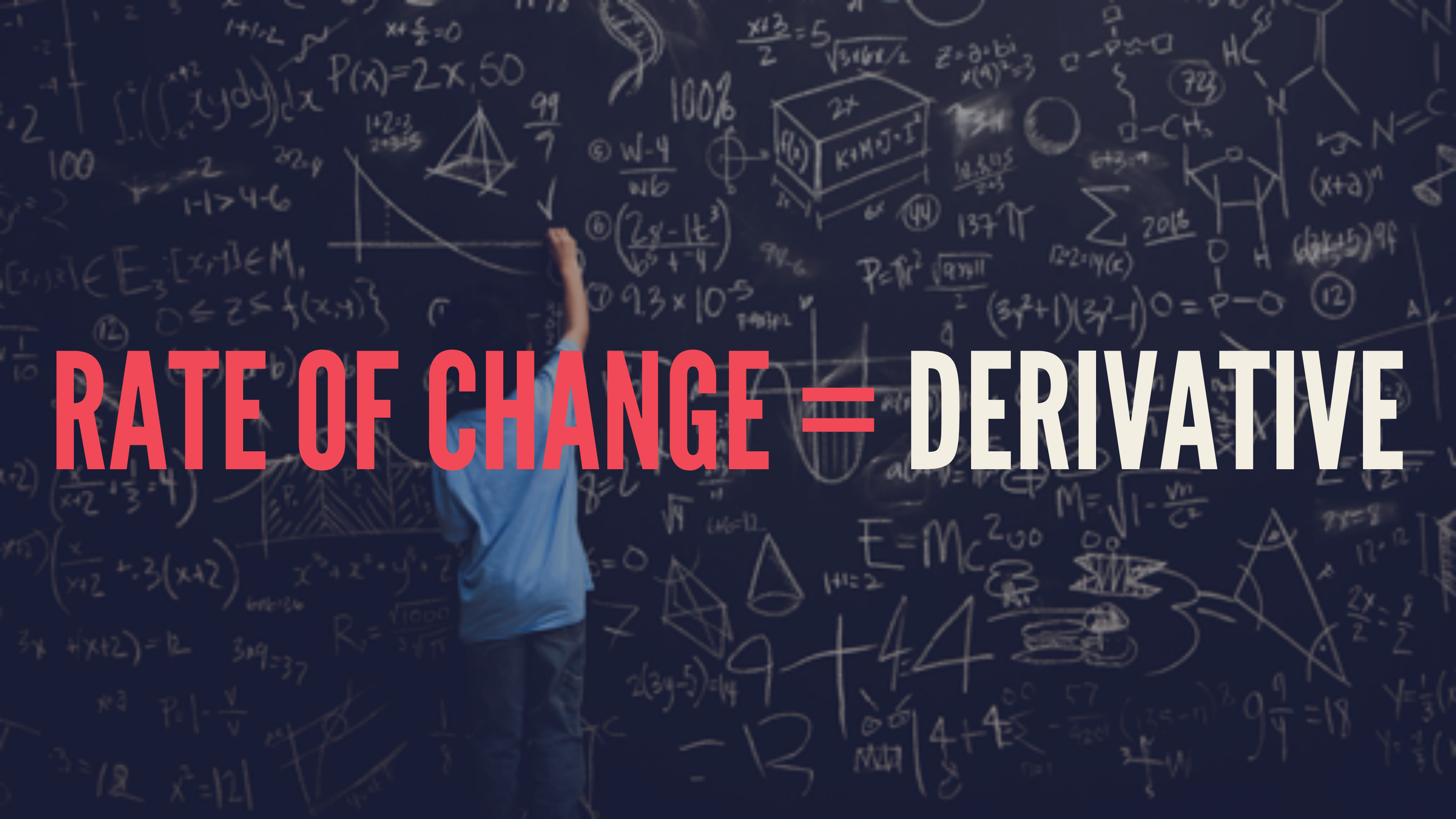


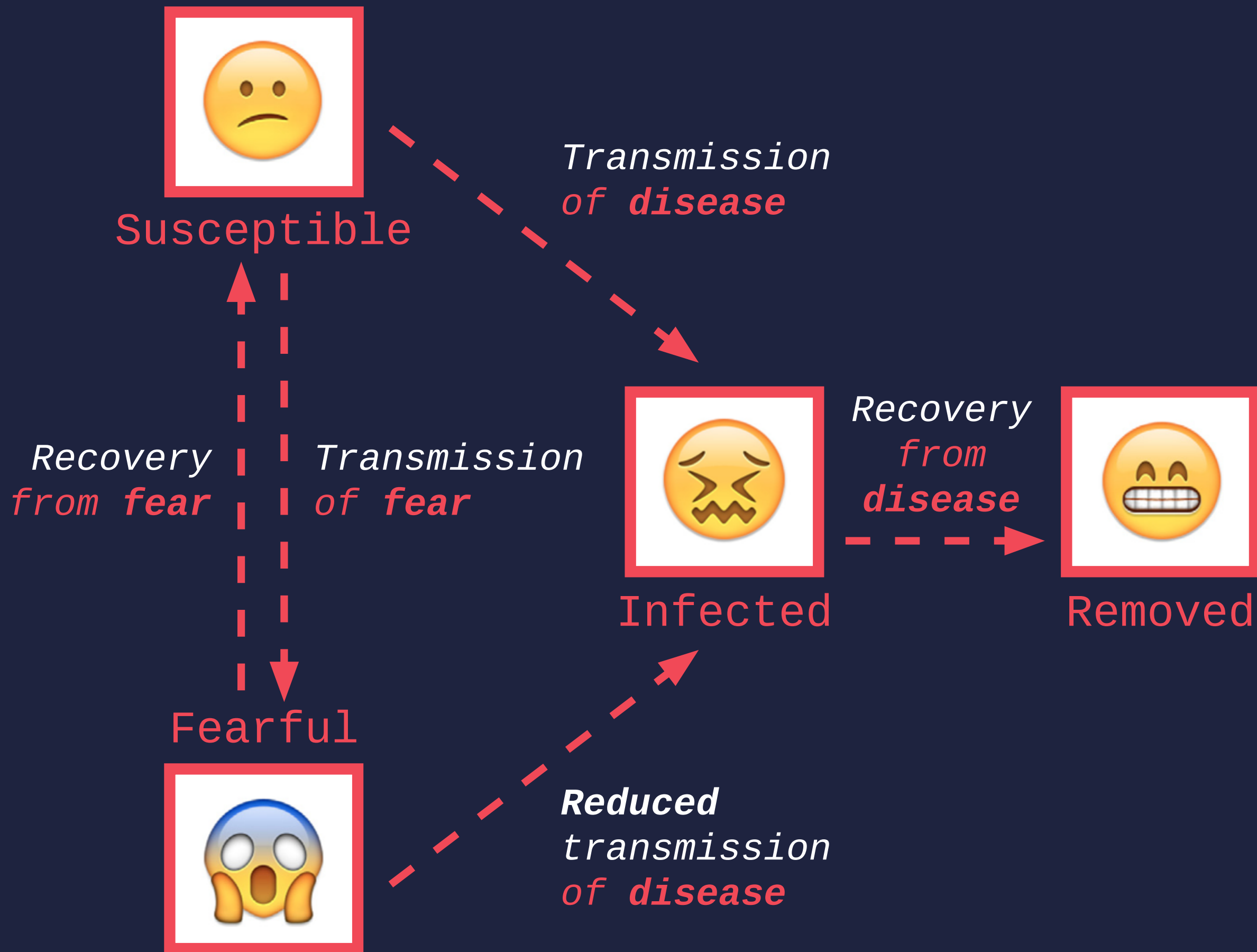




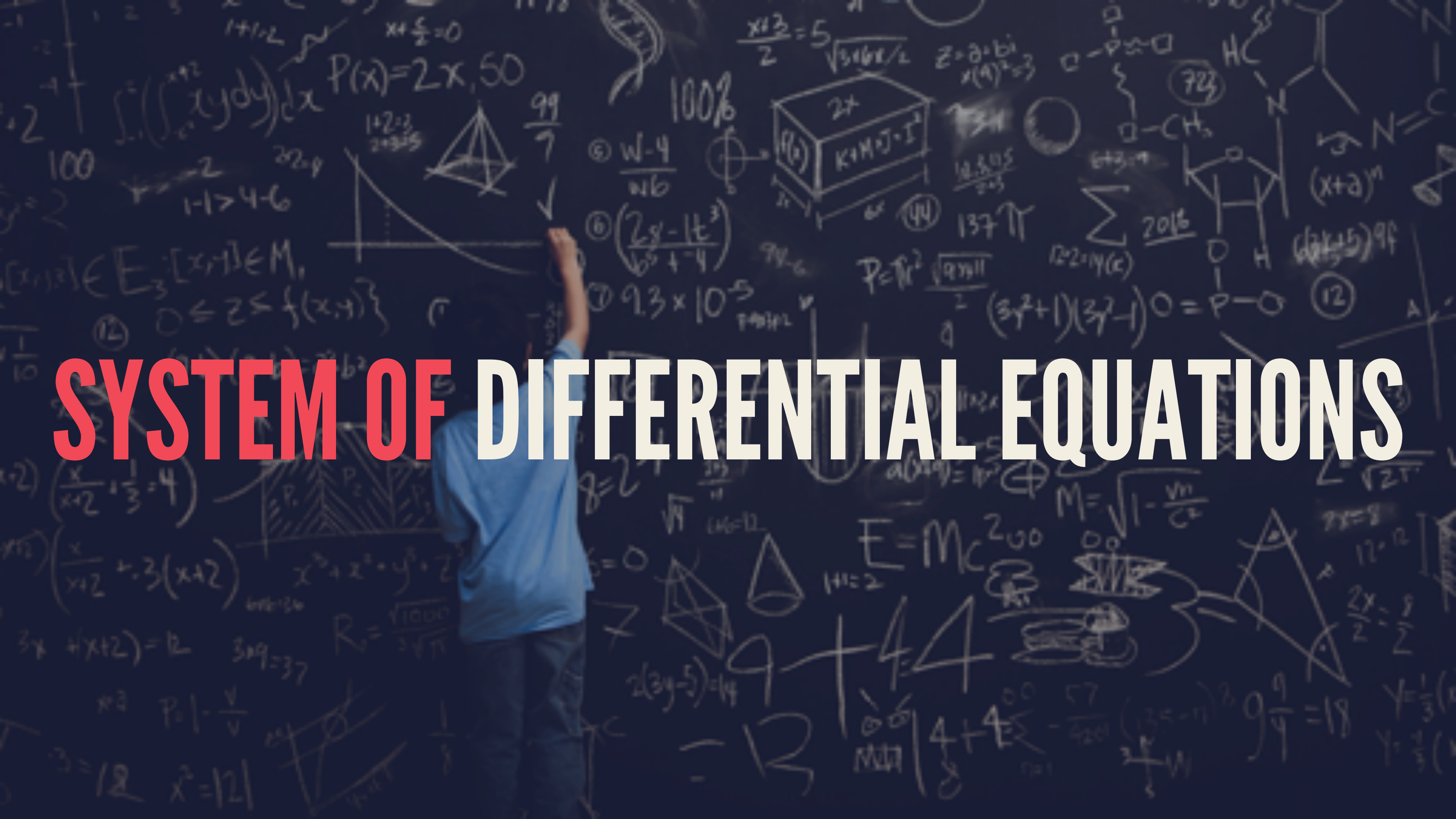
EACH PROCESS HAS AN ASSOCIATED RATE

RATE OF CHANGE = DERIVATIVE





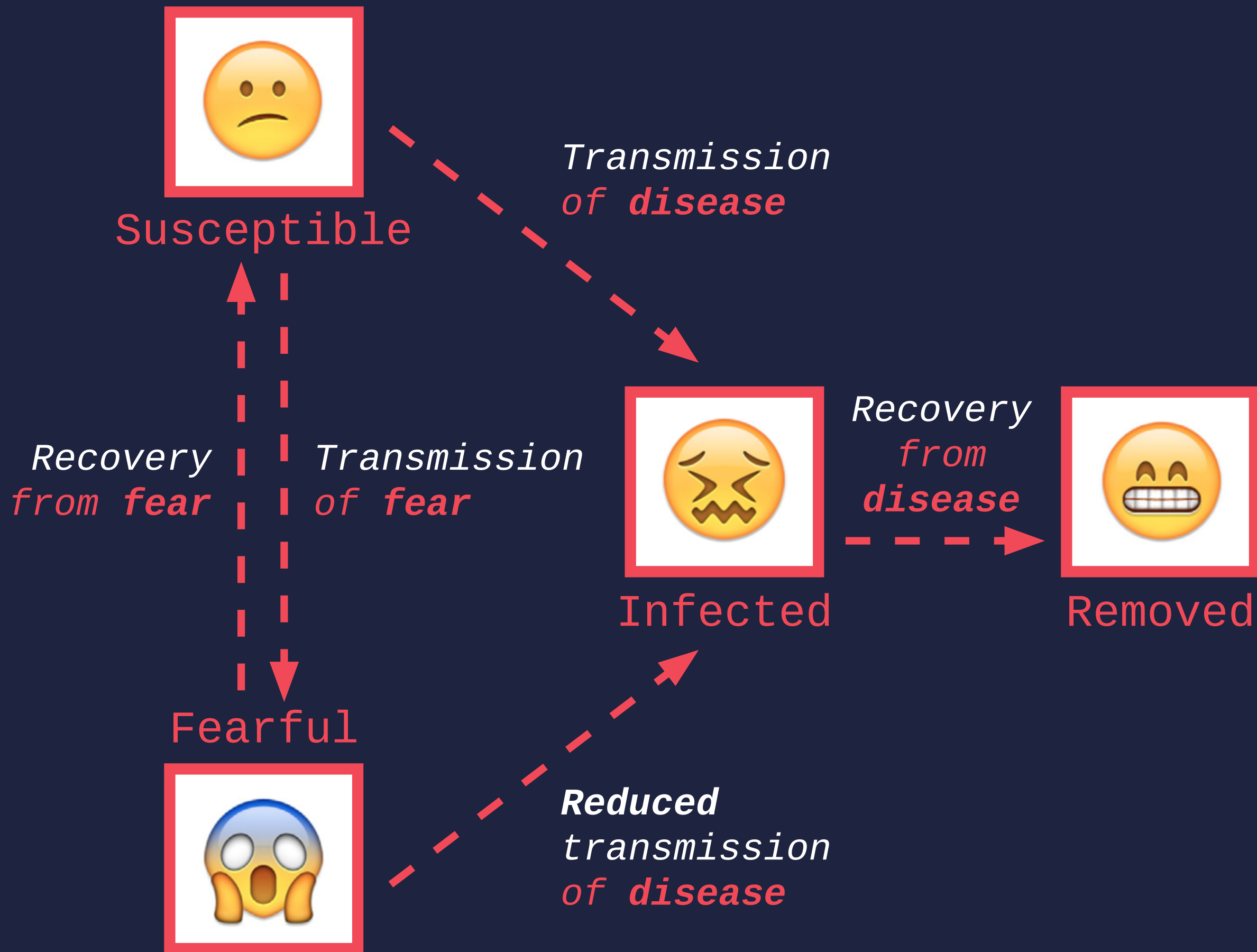
SYSTEM OF DIFFERENTIAL EQUATIONS

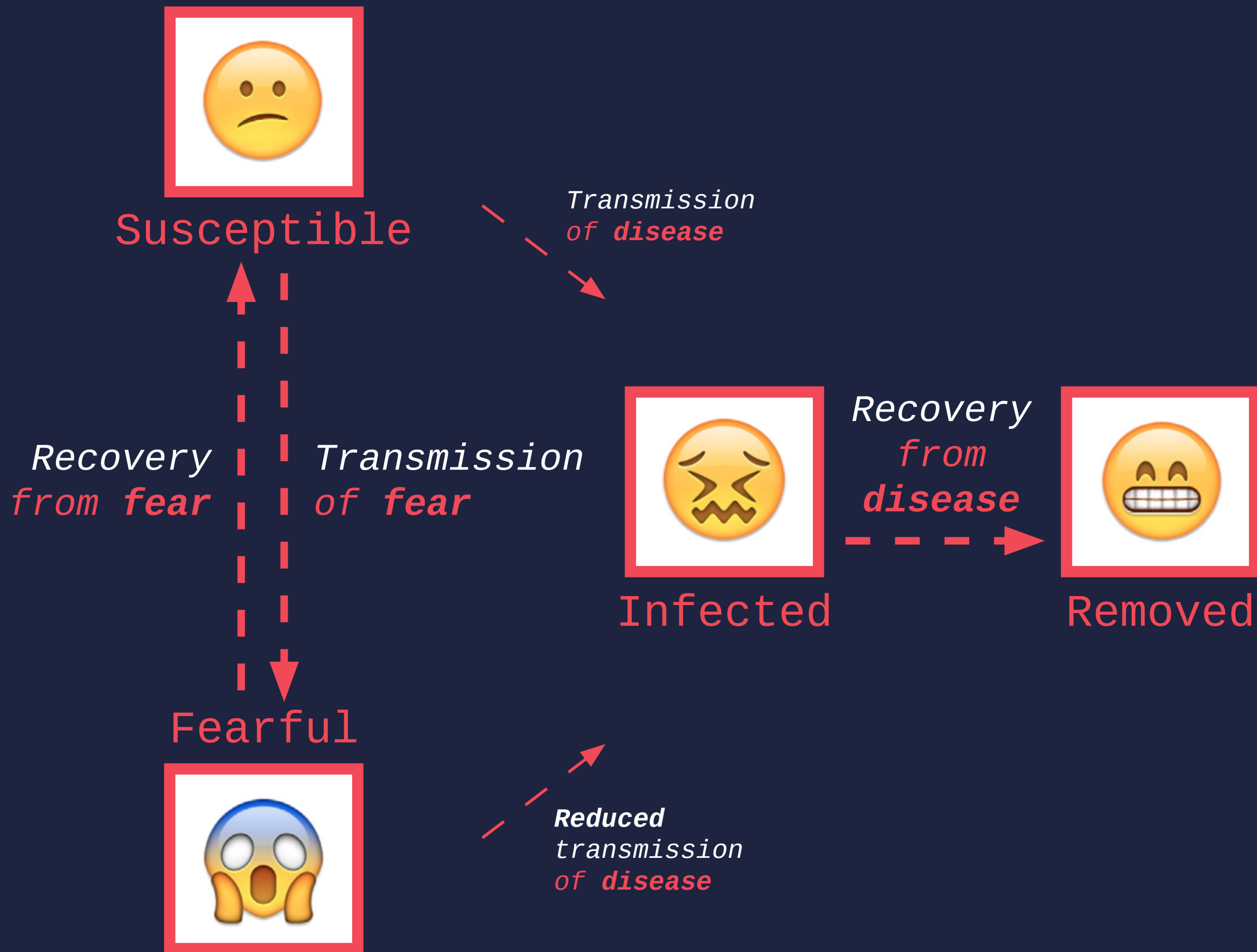




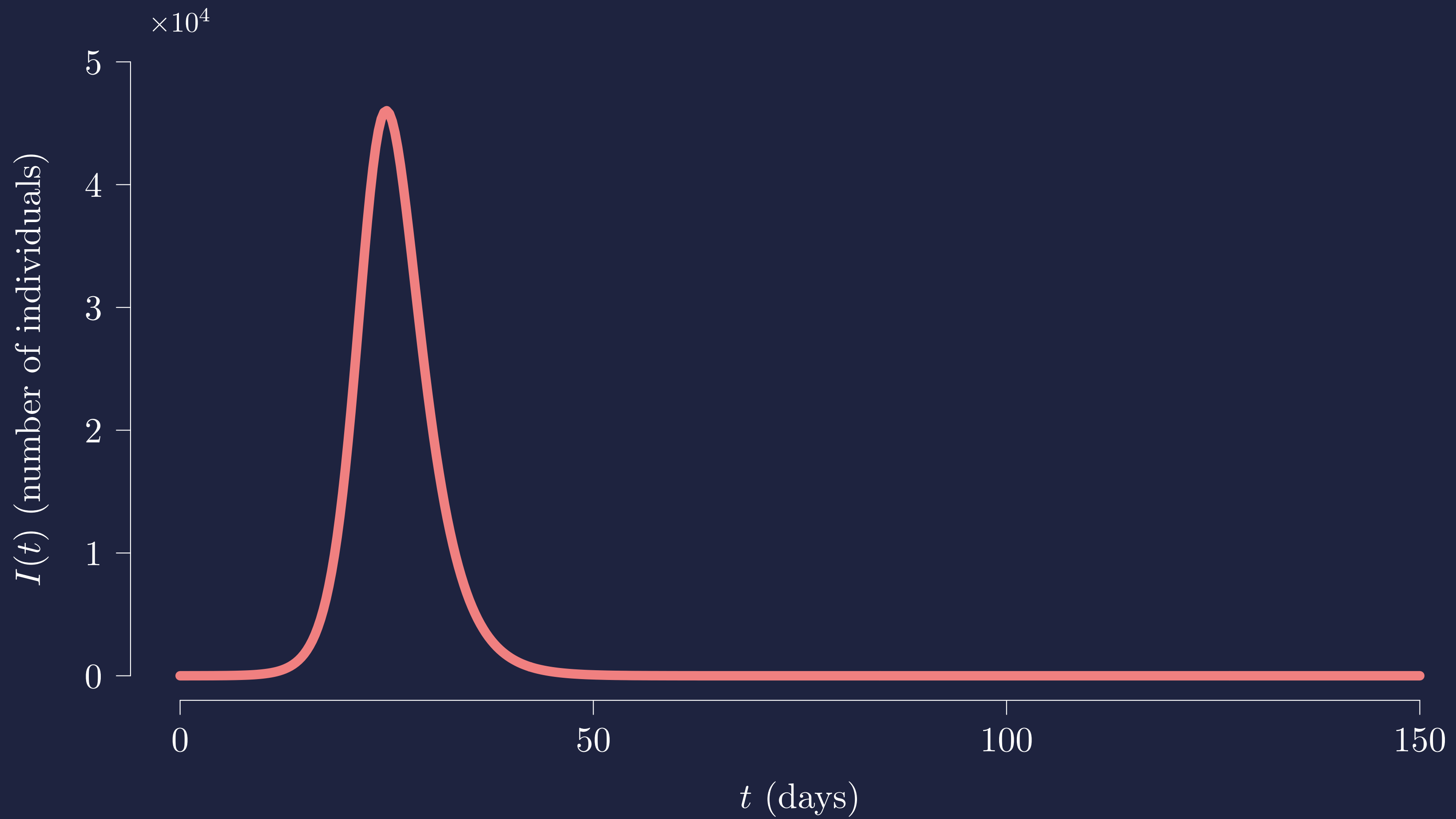
3 POSSIBILITIES

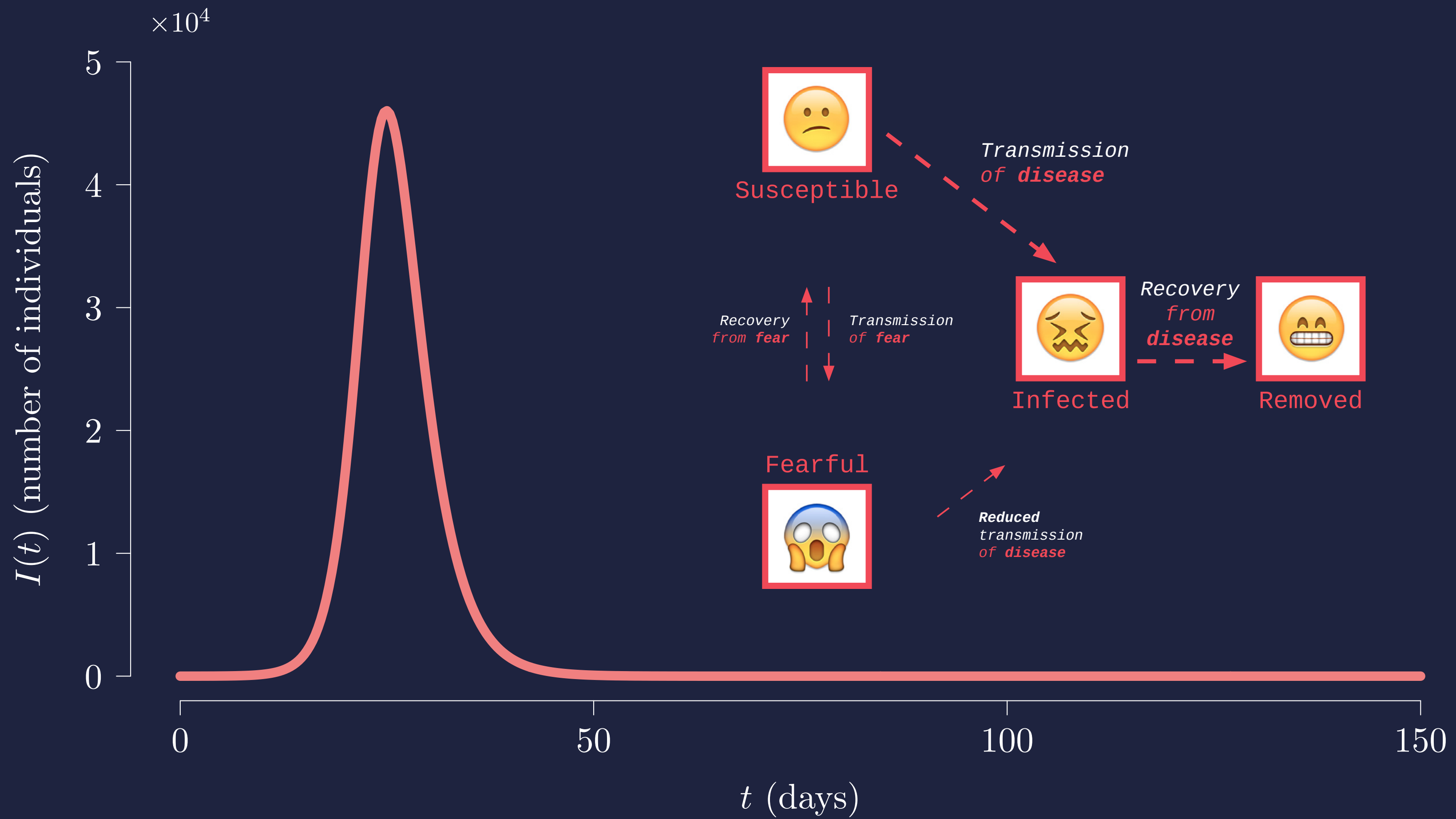
1. NO EPIDEMIC



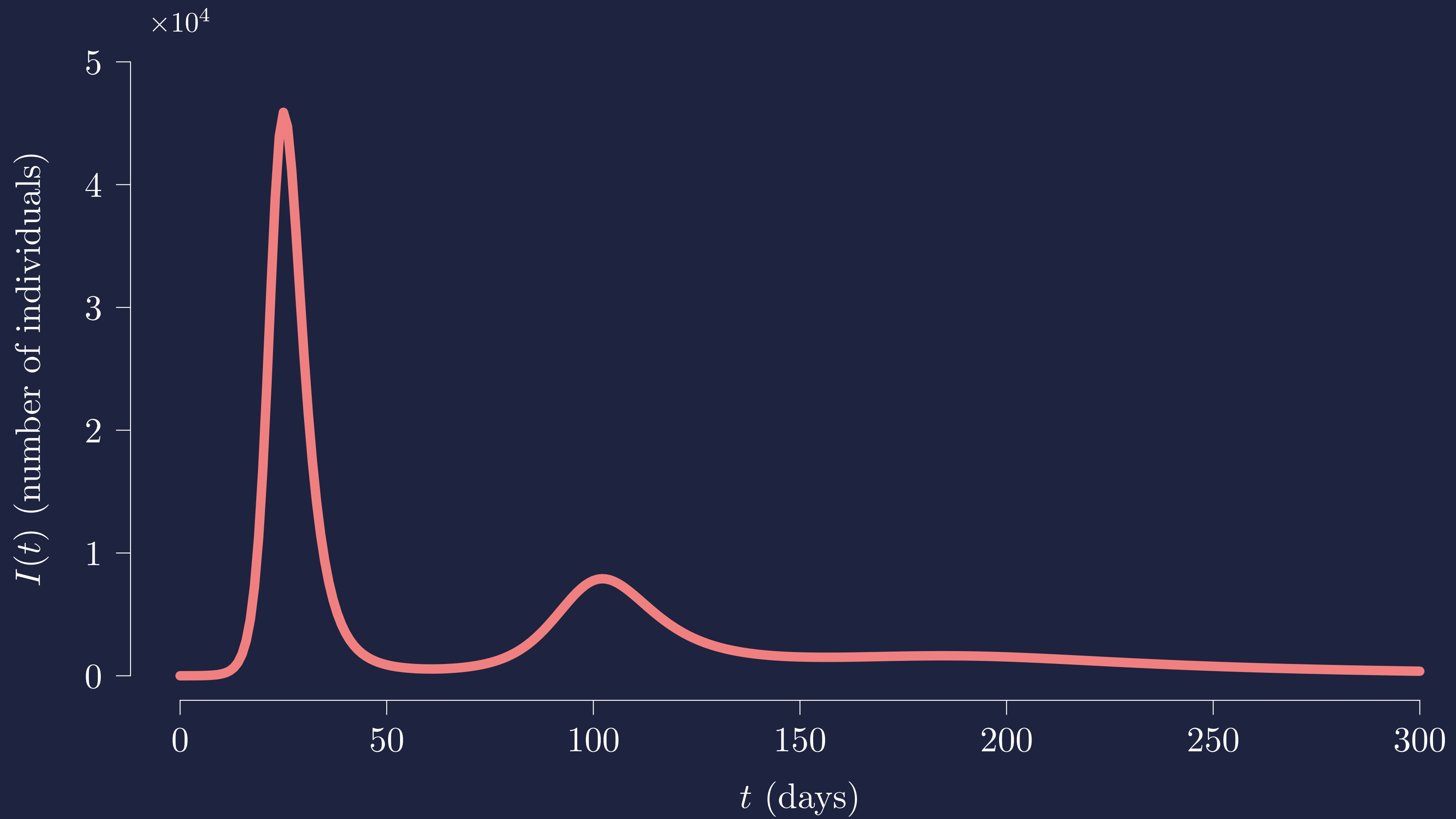


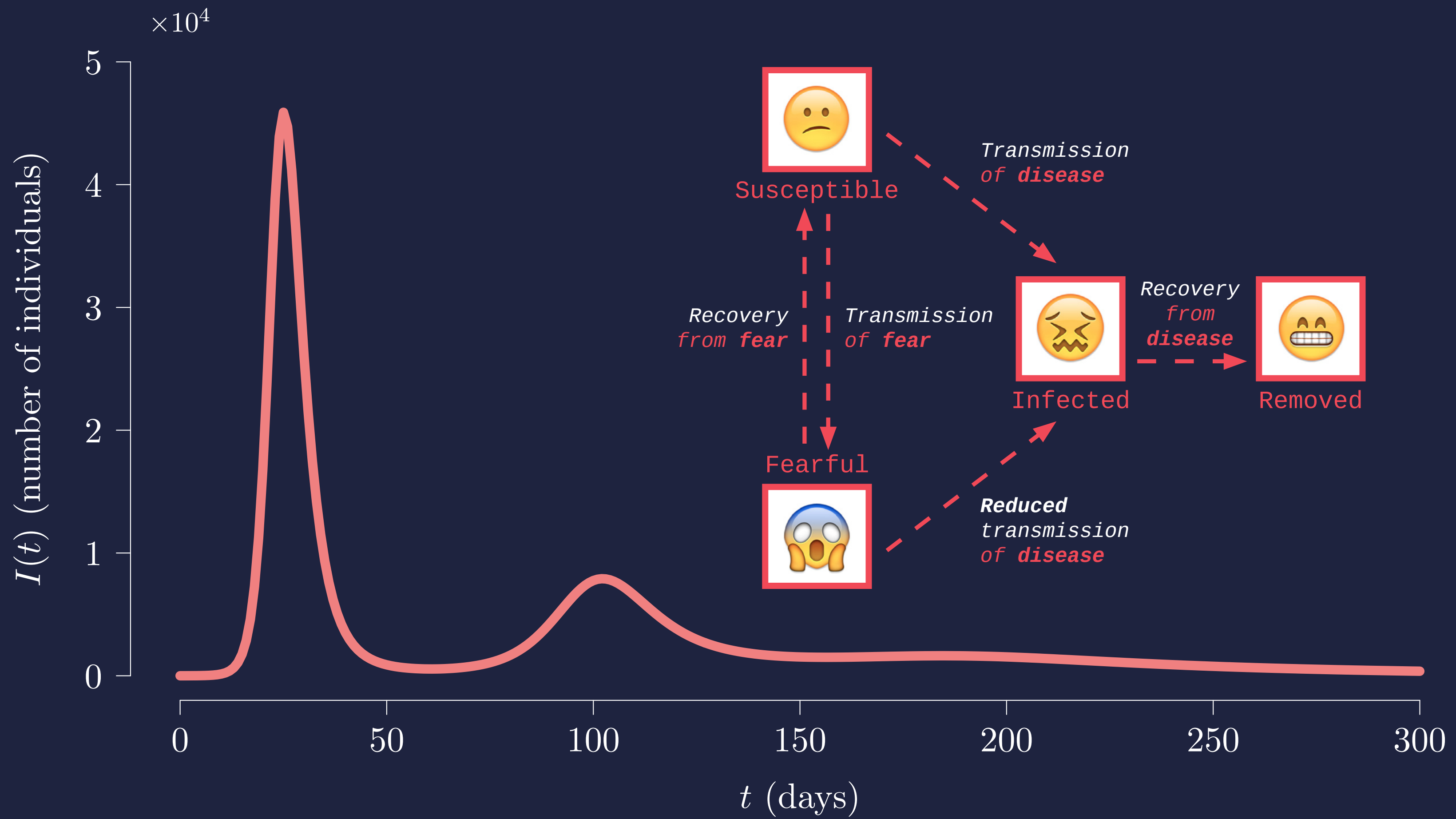
2. ONE EPIDEMIC





3. MULTIPLE WAVES OF INFECTION





Does fear help or hurt?

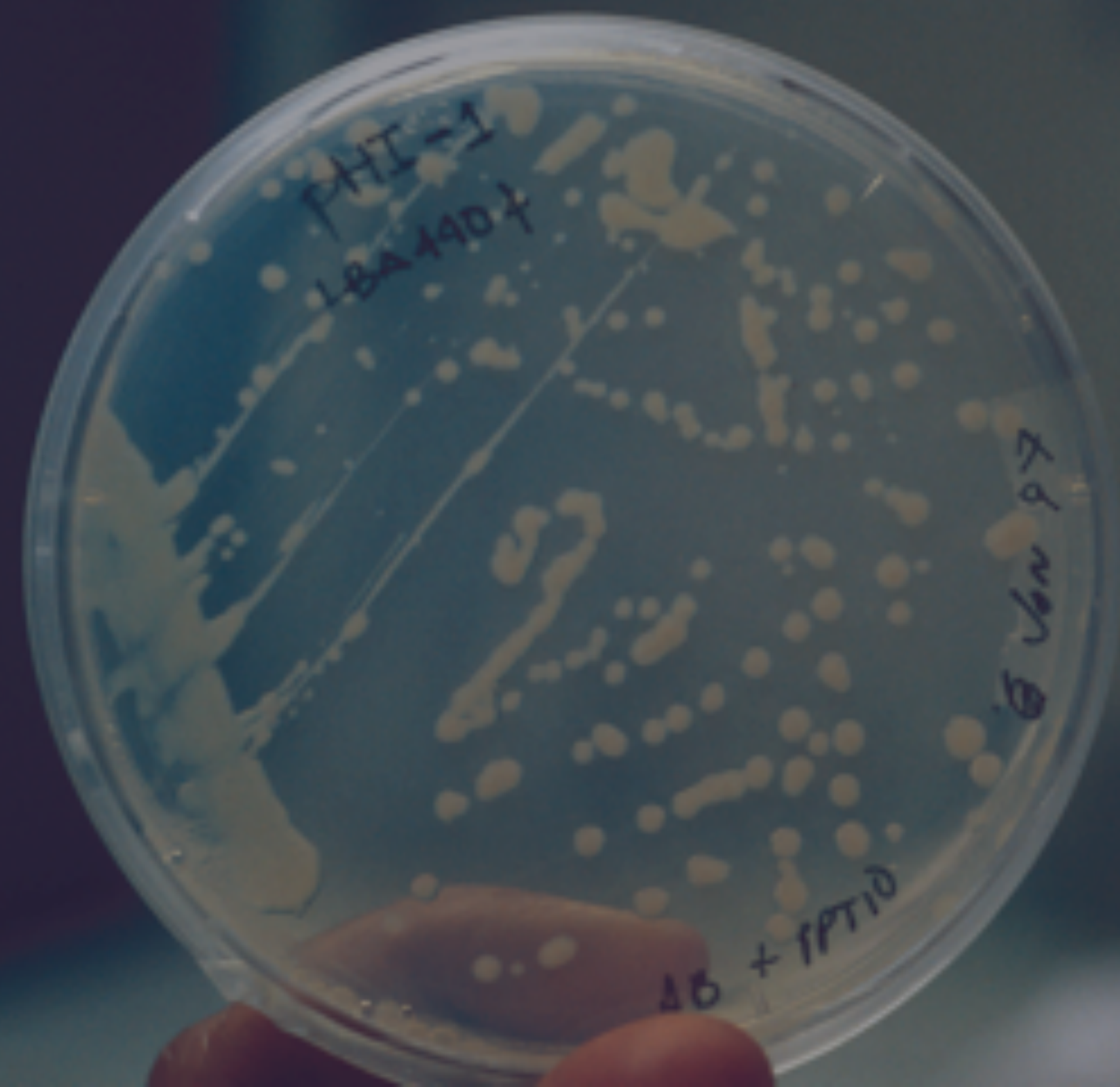
q: Does fear change the final size of the outbreak?



q: Does fear shorten or prolong the epidemic?







PHI-1
LBA 4404

6 Nov 97

AB + IPTG



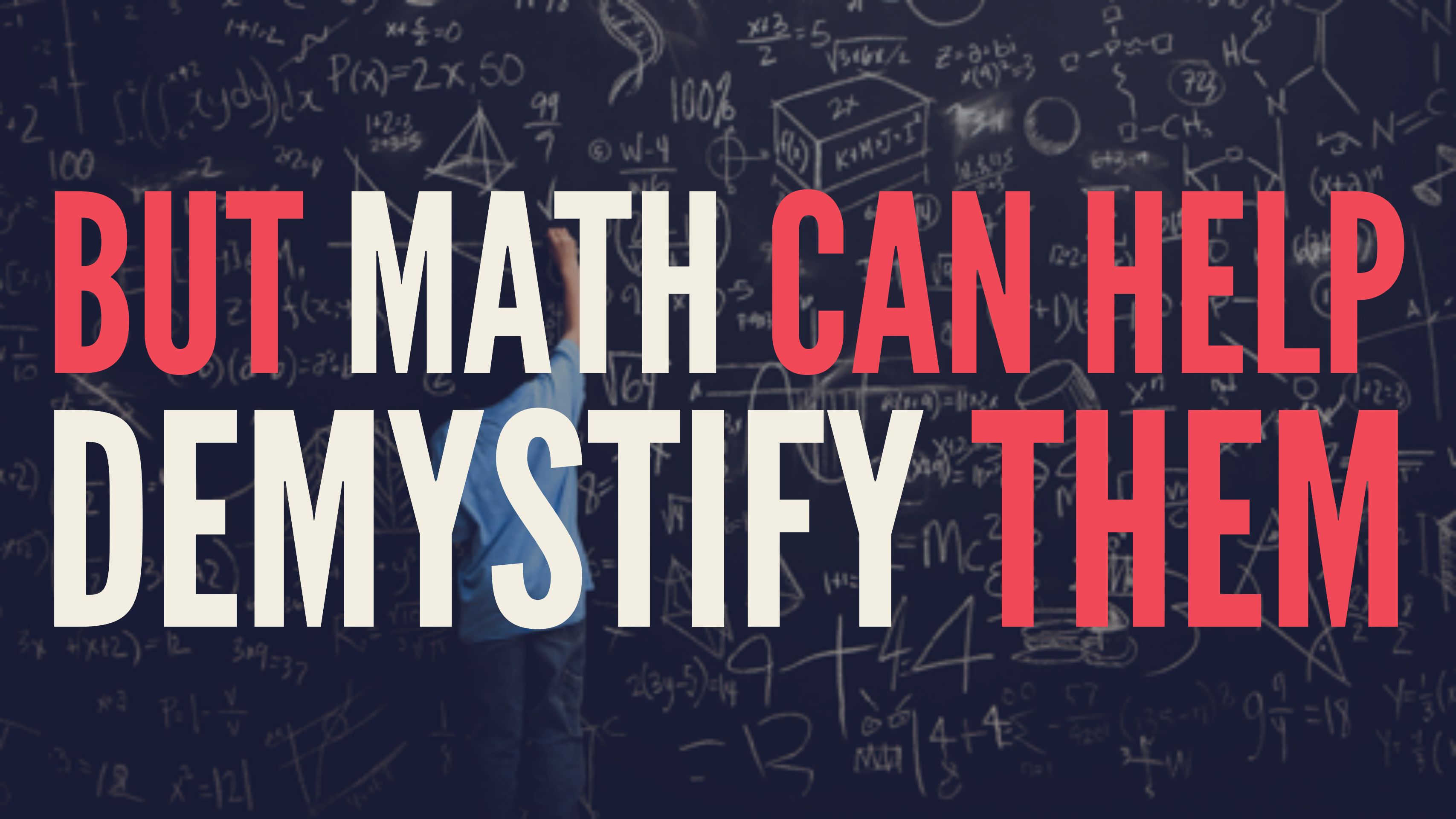
q: Does the peak prevalence change as a result of fear?

The background is a dark, textured composition. It features a central, faint illustration of a person's face, possibly a woman, with a large, glowing orb or light source positioned above it. The overall color palette is dominated by dark blues, blacks, and muted reds, creating a somber and mysterious atmosphere. The text is overlaid on this background in a white, cursive font with a red outline.

q: How could the fear of an infectious disease affect its spread in a population?



**EPIDEMIOLOGICAL QUESTIONS ARE
IMPORTANT AND DIFFICULT**



**BUT MATH CAN HELP
DEMYSTIFY THEM**