In the last section we learned the essentials of how SIR models function. We saw that compartmental models work by counting the number of people in each compartment at a given time, and we learned that movement between compartments is due either to the interaction between a susceptible person and infected person or to the length of time one is ill. Essentially, between person contact or some characteristic of the disease.

As powerful as this model is, it is not always handy. It doesn't give us the language to talk about how "spready"/ infectious/ transmissible a disease is, and it doesn't give us a standard way to compare how virulent/ dangerous two distinct diseases are.

Fortunately, we do have a convenient way to compare the transmissibility of infectious diseases, the Basic Reproduction Number, R-naught (R_0). A disease's R_0 represent the average number of people who will become infected from 1 case, assuming that everyone in that community is susceptible to the disease. (There is a similar number, R effective, that does take into account people who are immune to the disease, but that will not be addressed here).

[two simulations, one with Ro = idk, 3, and Ro = 7]

As you may suspect, a disease with a higher Ro will infect more people more quickly than a disease with a lower Ro- This is why measles is concerning to epidemiologists, its Ro is ***15***!

[Similar situation as above, but with Ro = 15] [include timer for emphasis?]

Where then, does Ro come from? How do we simplify our results in the model above to a single number?

As we saw in the last section, there are 3 aspects that determine a disease's spread:

1. The probability that during an encounter between an infected person and a susceptible person the disease is transmitted from the infected person to the susceptible person.
2. The rate at which people interact with each other. (In our model it was once per time step)
3. The length of time a person is infectious. (In our model it was 4 days)

Ro is calculated using these 3 pieces of information! Specifically,

[some kind of pictogram? Or short clips from the prior movie?]

Ro = [Probability of disease transmission between S and I] X [The speed at which people interact] X [The length of time a person is ill]

[work in historical examples here?]
TB- needs high contact rate to spread/industrial revolution. Smallpox: long duration of illness and high probability of infection/ Europe and American colonies. Norovirus→ high probability of infection?

Let’s see this equation in action! Below you will find a set of widgets: In the first one we have fixed Ro at X. you can move up to two sliders to see how the third changes as the first two change.

In the second widget, have haven’t fixed Ro, and all 3 sliders can be adjusted at the same time. See how Ro changes as you change the different components of it’s formula!
[INTERACTABLE]

[Ros of familiar diseases activity?]