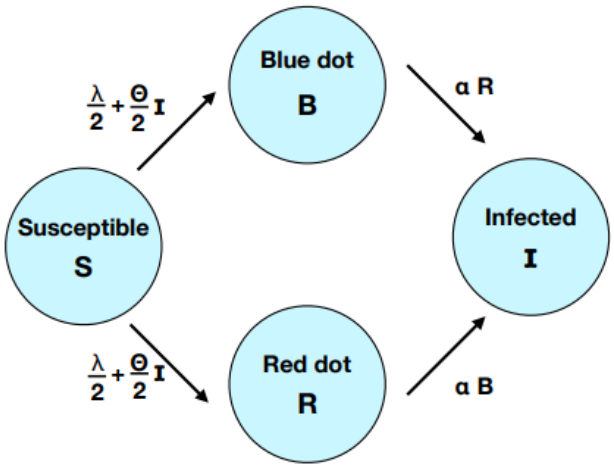
SMB at the USA Science and Engineering Festival
Modeling an Infectious Disease

The 5th USA Science and Engineering Festival took place this past April in Washington, DC. This year's theme *STEM Can Take You* allowed attendees to discover how STEM can take you into the deep blue, into nature, inside the human body, into cyberspace, into outer space and more. A diverse crowd of over 370,000 attendees over the course of the three day festival explored this theme through talks from Marine Biologist Danni Washington, exploring the moon and life of an astronaut with NASA, coding skills activities with Schlumberger, and Who Wants to be a Mathematician hosted by the American Mathematical Society. These were just a few of over 650 exhibitors. The SMB booth endeavored to show that mathematics can take you on an exploration of biology and medicine through hands-on simulation of the spread of an infectious disease. While mathematics is not always an accessible or appealing topic for a general audience, the combination of math and biology, and more specifically infections, proved to be relatable and intriguing to participants. Visitors of the booth were able to partake in two activities that modeled the spread of an infection.

In the first activity, an Epidemic Card Game, players flipped cards from a standard deck into two piles based on color. If at any point the top cards of those piles matched in face value, they were said to be infected and that pair was placed aside. The player then introduced the next card in the stack to one of three extra piles, before continuing to flip cards into the red and black piles. These extra piles provided an additional opportunity to match, or infect, a card. Each time a match was made, a card was added to an extra pile if one was available. Once participants had flipped through the entire deck of cards, their total number of infected pairs was tallied and the data recorded. Through this simple exercise participants were able to understand how the presence of one infection can quickly lead to the spread of disease, while also understanding how we as mathematicians can simulate such an event and use the resulting data to study outcomes.

While many festival attendees were drawn to the SMB booth by the oversized playing cards used for the Epidemic Card Game, they also participated in a second activity that was to be played throughout the festival. The goal of this larger activity was to track the spread of the SEF (Science and Engineering Festival) Bug throughout the Convention Center. First time visitors of the SMB booth were given a red and a blue sticker and asked to place one on their shirt and the other in a pocket for safe keeping. As they made their way through the convention center, if they met another attendee wearing a sticker of the opposite color, they were to exchange their second stickers and place them on their shirts, thus becoming infected. These 'infected' attendees wearing two stickers were asked to return to the SMB booth to be recorded as infected and collect more stickers so that they could go out and 'infect' other attendees. Volunteers were able to explain how mathematicians could simulate such an activity with a simple system of differential equations, while participants were asked to hypothesize what factors could be added or changed to improve the model.



The SMB booth was staffed by a variety of volunteers including graduate students from the University of Maryland and undergraduate students from Marymount University. Visitors of the booth included K-12 students primarily drawn in by the Epidemic Card Game, as well as parents and teachers that got involved with the SEF Bug. Most people that stopped by the booth were interested in learning how math applied to such activities and were more generally curious about the combined study of math and biology.

To find out more about the USA Science and Engineering Festival: www.usasciencefestival.org
For more information on the SMB Exhibit: https://n1b.goexposoftware.com/events/uss2018/goExpo/exhibitor/viewExhibitorProfile.php?__id=473