The Immune System Game

Rules for everybody

- You cannot lie.
- You should not reveal your identity, unless an activated B cell (in Round 2) requires you to do so.
  - After you play RPS, you quietly reveal your identities to each other to determine what each person's fate is.
- If you are challenged to RPS, you must play.
- You cannot challenge the same player to RPS two times in a row. (i.e. after playing, go find a different person to play against!)

Game play

- The game is played over two rounds: **innate** and **adaptive** immunity. In round 1, only healthy cells, infected cells, and macrophages play.
- The game mechanism is rock paper scissors (RPS).
  - “Rock paper scissors shoot” [reveal on shoot]
- Walk up to another player, “challenge” them, play RPS, and then reveal identities to decide each player’s fate!
- When you reveal your identities & determine your cell fates, you can be as secretive or not secretive as you want. You never know who is paying attention!

Innate Immunity Round:
Virus-Infected cells VS Healthy Cells + Macrophages

- The goal of the infected cells is to infect all healthy cells by winning RPS against them.
- The goal of the healthy cells is to avoid being infected by winning RPS against infected cells.
- The goal of the macrophages cells is to eliminate infected cells by winning RPS against them.
- However… you don't know who is who!
- The game is over when:
  - All healthy cells have been infected
  - All infected cells have been eliminated
  - After the round time is over, whoever has more players (healthy vs immune) wins.
- The adaptive immunity cells don't play round 1; they hang out in the "lymph nodes." But they can strategize and decide who wants to be each cell type.

Round 1 end

- Was it easy to complete your goal?
- What was your strategy for this round?
- How did this mirror what cells in the body look like under threat from a viral infection?

Adaptive Immunity Round:

- Macrophages have a NEW role. When they win RPS, they eliminate an infected cell AND can go activate a helper T cell.
- When a helper T cell gets activated, they can choose to activate a B cell or a killer T cell.
- When a B cell is activated, their goal is to label infected cells by telling others to reveal their identities. If they find an infected cell, they can announce it- “I found an infected cell!”– and give them a sticker label.
  - Note, you can only ask others who are not actively playing RPS.
- When a killer T cell is activated, they:
  - Automatically eliminate any **labeled** infected cell by tapping them on the shoulder
  - Win ties in RPS against **unlabeled** infected cells.

Round 2 end

- How did this round compare to round 1?
- What was your strategy for this round?
- How did this mirror what cells in the body look like under threat from a viral infection?