

## Shall We Play a Game?

**Objective/Learning Outcomes:** *An introduction to game theory, understanding how cooperation can be beneficial and how our brain predicts the future to maximize our benefits.*

**Warm-up Activity (\_10\_\_ minutes):** Pizza and question box

**The main activity (1 hour):**

[https://www.youtube.com/watch?v=ecPeSmF\\_ikc](https://www.youtube.com/watch?v=ecPeSmF_ikc)

**Prisoner's Dilemma** - Break into pairs, perform a prisoner's dilemma task with tokens that can be redeemed for prizes at the end.

	Cooperate	Defect
Cooperate	3 tokens, 3 tokens	0 tokens, 5 tokens
Defect	5 tokens, 0 tokens	1 tokens, 1 tokens

Discuss the results with the subjects. Focus on why this might be important from a societal level. Introduce basics of social contract ideas. How might one get out of mutual defection? Once this has been sufficiently established as an interesting model, question the students on why this might be interesting from a neuroscientist's perspective. Introduce the machiavellian monkey hypothesis, i.e. the reason we have such large brains is that we are smart enough to predict the future, but so is everyone else. It becomes an arms race to evolve a brain to out think the other people in your tribe.

Do the task again, but 4 times in a row. How does this change your behavior? Explain tit-for-tat policies, and hint at the idea of 'spite' being a useful concept.

Do the task again with repeats, but without telling them how many times the game will repeat. How does that changes the behavior?

**Dictator Game** - One student is given 10 tokens. He or she must divide the tokens with his or her classmate however they see fit. However, the classmate has the ability to refuse the offer, and in doing so stops either player from getting any money

**Public Goods Game/With Punishment** - The entire group plays this one together. Students are given 10 chips. Every round begins with students writing how many chips they want to

donate to the 'public good' on a slip of paper. These are placed in the center, and all are revealed at the same time. Students are then required to contribute those chips to the 'public goods' pot. This pot is then doubled and distributed evenly amongst every player, regardless of contribution. This is iterated for several turns until no one trusts each other. Once no one trusts each other, allow people to punish by spending 1 chip to take away 2 of someone else's. Play the game for several more iterations.

### **Discussion**

In a society in which each individual is seeking the goal of maximizing benefits with minimum effort, how can cooperation help individuals to reach that goal? How do we prevent defection (i.e. people cheating)?

### **Schedule (absolute time):**

4:30-4:40 **Warm-up Activity**

4:40-5:40 **Activity**

5:40-6:00 **Discussion**

### **Materials**

Paper (\$1)

Poker chips as tokens (\$15)

Candy as rewards (\$10)

USB drives as super reward (\$30)