SCIENCE OF SHARING : ACTIVITY 6

CRIME AND PUNISHMENT

This is a game based on the *Prisoner's Dilemma*, a scenario about communication and trust studied by psychologists, and political scientists. It is most often played as a two-person game, but if you have a large group, you can play the game with two large teams or break the class into two-person pairs. The game can be played once, but is more effective and interesting when played in several rounds.

Briefly, players are told to imagine that they have both been caught in a criminal act, that they cannot communicate, and they must each decide whether to stay silent under interrogation (to "cooperate") or to confess and inform on their partner (to "defect"). The best outcome for both players happens when both stay silent, but the worst outcome for each player happens when that player stays silent and one confesses. If both confess, both receive poorer outcomes than they could have received by staying silent. Although players know how to achieve the best outcome for both, self-protection and lack of trust often lead both to confess, leading to poor results for both.

This activity draws upon participants' analytical skills, but also prompts consideration of how we predict the behavior of others, develop trust, and act when personal gain and community outcomes are in tension. It is thus an ideal introduction to topics in psychology, social or environmental studies, or international relations. The game requires about 30 minutes of setup time.

PROCEDURE

MATERIALS

- A "payoff matrix" showing how players' choices lead to different outcomes. One example is provided here; there are many ways to modify the chart, some of which are provided in the Variations section.

		PLAYER 2	
		SILENT	CONFESS
PLAYER 1	SILENT	2 YEARS, 2 YEARS	10 YEARS, 0 YEARS
	CONFESS	0 YEARS, 10 YEARS	6 YEARS, 6 YEARS

- It is not necessary to write or print the chart in color, but using colors may help clarify the matrix for players: Player 1's choices and outcomes are shown in red, Player 2's in blue.

- Two cards for each player, one with the word SILENT and one with the word CONFESS.

PREPARATION

If you have only two players, place two chairs on opposite sides of a table. If you are using a large group, determine how to break the class into pairs, and set up enough two-person stations with chairs on opposite sides of desks for the entire group. Write the payoff matrix on a white/blackboard, or print copies of the chart for each.

PROCEDURE (CONT'D)

INSTRUCTIONS

Tell the players:

> "You have both been caught robbing a bank. You are at the police station, in separate interrogation rooms. You cannot speak to one another. A detective tells each of you that you have two options: You can confess and implicate your partner, or you can stay silent. What happens to you depends on what you both do. All possible outcomes are shown in the chart:
>
> - If you both stay silent, you both get 2 years, because we haven't got enough evidence to give you more time.
> - If you confess but your partner stays silent, you go free, but your partner gets 10 years in prison.
> - If you stay silent but your partner confesses, your partner goes free, and you get 10 years.
> - If you both confess, you'll both get 6 years in prison. You're both guilty, but you're also both admitting it.
>
> Each of you has to decide whether to confess and implicate your partner, or stay silent. Each of you has 1 minute to decide what to do. Then, you'll hold up your cards so that everyone can see them. Remember, you cannot talk to your partner!"

When the minute is up, ask players to show their cards. With a large group, you can walk around the room and announce what happened with each pair, or ask the pairs to announce their decisions and outcomes and write them on a white/blackboard so everyone can see them.

You can begin a discussion at this point (see Discussion Questions for prompts), but, ideally, you will play the game again. When players know that they will only play a single round, they may decide that the optimal strategy is to confess, as they don't yet know what to expect from their partner. But when playing multiple rounds, players may realize the value of maintaining a situation in which both players consistently cooperate. Playing multiple rounds can thus prompt reflection on how players' strategies can change over time (e.g., once they know they cannot trust their partner to stay silent, are they themselves more likely to confess in future games?) and allow you to use a different payoff matrix to see how that affects player choices (see Variations). You can also ask players to pair with new partners and play more rounds.

DISCUSSSION QUESTIONS

- How did you make your decision about whether to confess or stay silent? What factors did you consider?
- Suppose you had been able to talk to your partner. How would that have changed the game, or the way you made your decision?
- How could *reciprocity*—"I scratch your back, you scratch mine"—come into play in this game? Suppose you played with the same partner for many rounds. How might your and their behavior change over time?
- What situations or events in the real world does this game remind you of? (The Prisoner's Dilemma has been studied as a means to understand many real-world challenges, including arms races. Can you get the group to link specific aspects of the game to actual historical events? Researchers have also programmed computers to play against each other for many rounds to determine which strategies are successful over time. (See Resources for more information.)

VARIATIONS

- Allow players to negotiate before making their decisions. Does this change the likelihood of defection? (Before initiating this variation, ask players how they *predict* it will change behavior. Are their predictions confirmed?)
- If you play with a large group of pairs, set up areas in the room for different outcomes—a 2-year area, a 6-year area, a 10-year area, and a free area. Instead of asking players to announce their outcomes, ask them to move to the area corresponding with their outcome. This will give a humorous visual illustration of the choices made by players.
- Instead of breaking a large group into numerous pairs, simply break the class into two groups and have them play against each other. Give each group 10 minutes to discuss their choice and ask them to determine how they will turn their discussion into a decision—they could, for example, designate a leader who will make a final ruling, or they could decide based on the will of the majority. Each group should have a private area in which they can discuss their options before making their decision.
- Modify the terminology of the game to reflect your group or classroom. For example, "years in prison" could be translated to "hours in detention."
- Vary the amount of time players have to make their decisions. We recommend starting with a long deliberation period (e.g., 1 or 2 minutes for pairs of players, 5 or 10 minutes for teams), then using a shorter time period (5 seconds or 1 minute) to see how that affects decisions. Are players more trusting when they have more time?

VARIATIONS (CONT'D)

- Behavior in the Prisoner's Dilemma is highly sensitive to the relative and absolute values of the outcomes. It's easy to change values in the payoff matrix to make cooperation or defection better or worse. Below are several different payoff matrices. Once the group is familiar with the game, you could present a new matrix and ask them to predict how using it might change game behavior.

(1) This matrix includes much more severe punishments. Are players less trusting when potential penalties are harsher?

		PLAYER 2	
		SILENT	CONFESS
PLAYER 1	SILENT	2 YEARS, 2 YEARS	25 YEARS, 0 YEARS
	CONFESS	0 YEARS, 25 YEARS	15 YEARS, 15 YEARS

(2) A British game show created a version of the Prisoner's Dilemma in which players decide whether to "split" a pot of money evenly or to "steal" it for themselves. Suppose players in your group have to decide how to split a $100 pot. How do they make decisions in this situation?

		PLAYER 2	
		SPLIT	STEAL
PLAYER 1	SPLIT	$50, $50	$0, $100
	STEAL	$100, $0	$0, $0

VARIATIONS (CONT'D)

(3) This matrix is based on a game called Stag Hunt, a variation on the classic Prisoner's Dilemma. In Stag Hunt, players imagine themselves as hunters. Each player must choose whether to cooperate with others to hunt a large game animal, such as a stag (or deer), or to hunt for a hare on their own (i.e., defect). A stag will feed many people for days, but it requires both players to hunt together. A hare is easy for one player to catch, but it is much less valuable. If one player chooses to hunt stag and the other chooses to hunt hare, the player choosing stag gets nothing, because he cannot catch a stag on his own.

		PLAYER 2	
		HUNT STAG	HUNT HARE
PLAYER 1	HUNT STAG	6 points, 6 points	0 points, 1 point
	HUNT HARE	1 points, 0 points	1 points, 1 point

(4) In this matrix, players imagine themselves as shipwreck survivors in a rowboat. Each must decide whether to help row (cooperate) or rest (defect). Here, if one player chooses to row while the other chooses to rest, the rowing player actually *loses* points, because he or she uses up valuable energy reserves in addition to covering less distance.

		PLAYER 2	
		ROW	REST
PLAYER 1	ROW	1 point, 1 point	-1 points, 0 points
	REST	0 points, -1 point	0 points, 0 points

RESOURCES

Rock, Paper, Scissors: Game Theory in Everyday Life (2008)
Len Fisher's easy-to-read guide outlines the core concepts of game theory and how they apply to many everyday situations.

Prisoner's Dilemma **(1993)**
William Poundstone's biography of mathematician John von Neumann sheds light on the core ideas behind the Prisoner's Dilemma and gives insight into its implications for real-world situations involving trust and conflict.

Prisoner's Dilemma
en.wikipedia.org/wiki/Prisoner%27s_dilemma
A Wikipedia article describing research on the Prisoner's Dilemma.

plato.stanford.edu/entries/prisoner-dilemma
Stanford University also provides an engaging overview of the Prisoner's Dilemma.

Game Theory
en.wikipedia.org/wiki/Game_theory
Game theory explores how people make strategic decisions under conditions of uncertainty, which is the situation confronted by players in a Prisoner's Dilemma and other social dilemmas. Wikipedia's article on game theory gives a good general overview of research in this area.

gametheory.net
This website for both educators and students provides information about game theory and materials for developing additional activities.

This material is based upon work supported by the National Science Foundation under Grant No. 1114781. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.