



Prisoner's Dilemma: Lesson Plan

Topic	
<p>Game theory is the model framework for strategic decision making among individuals, or players. Game theory can be broken down into two categories: noncooperative and cooperative. Cooperative game theory deals with situations where players form groups to collectively work to some particular goal while noncooperative games are competitive. Everyone is working to their own benefit. The prisoner's dilemma is a noncooperative game. It explains how and why people sometimes behave to their detriment.</p>	
Possible subjects/classes	Time needed
Economics, Government, Psychology, Politics, Philosophy	30-35 minutes
Video link:	
https://academy4sc.org/topic/prisoners-dilemma-its-you-or-me/	
Objective: <i>What will students know/be able to do at the end of class?</i>	
<ul style="list-style-type: none"> • Identify two different types of game theories. • Understand why people don't cooperate in a prisoner's dilemma. • Know concrete examples of how to turn competitive games cooperate 	
Key Concepts & Vocabulary	
<p>Game theory, Cooperative vs noncooperative games, Prisoner's dilemma, Cuban missile crisis</p>	
Materials Needed	
<p>Paper and writing implements, internet or printed resources on coop game theory for the Research It activity</p>	
Before you watch	
<p><u>Think-Pair-Share</u>: Do you think humans always make decisions that are in their best interest? What factors might lead to a person making a counter-intuitive decision?</p>	



While you watch

1. What's the most likely outcome to occur in a prisoner's dilemma?
2. What type of game is the prisoner's dilemma?
3. What prevented the Cuban Missile Crisis from perfectly following the standard rules of prisoner's dilemma?

After you watch/discussion questions

1. What's the last time you used or saw game theory used in your life?
2. What are some real life examples of cooperative games?
3. Do you think the prisoner's dilemma is effective at getting suspects to testify, allowing for an indictment to be reached? Why or why not?

Activity Ideas

- Do It!: Have students pair up and try the prisoner's dilemma described in the introduction for themselves. Each student should play the prisoner's dilemma five times, playing with a different partner each time. For each round, give students a moment to secretly write down either "T" for testifying or "S" for staying silent. Have partners reveal their answers at the same time. Continue until all five rounds are finished. What the average sentence was for each round. Did students tend to testify or stay silent? What strategy worked best?
- Think It Through: How could you redesign the prisoner's dilemma to ensure

- partners always stayed silent?
- Research It: Look into cooperative game theory. Compare and contrast an example of cooperative game theory with prisoner's dilemma.

Sources/places to learn more

Basar, Tamer and Geert Jan Olsder. *Dynamic Noncooperative Game Theory: Second Edition*. Society for Industrial and Applied Mathematics, 1999.

Osborne, Martin J. and Ariel Rubinstein. *A Course in Game Theory*. The MIT Press, 1994. ISBN: 0-262-15041-7.

Rabin, Matthew. "Incorporating Fairness into Game Theory and Economics." *The American Economic Review*, vol 83, no 5, Dec 1993, pp 1281-1302.

Roughgarden, Tim. "Algorithmic game theory." *Communications of the ACM*, vol 53, issue 7, July 2010. Doi: 10.1145/1785414.1785439

Zagare, Frank C. "A Game-Theoretic History of the Cuban Missile Crisis." *Economies*, volume 2, issue 1, 2014, pp 20-44. DOI: 10.3390/economies2010020