# Lessons from the Collective Action Game

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Political scientists commonly use their courses to emphasize the pervasive nature of collective action problems, whereby group interests are undermined by individual incentives to "defect" or "free ride." In a graduate seminar a faculty member may have students read classics in this area, such as Mancur Olson's *The Logic of Collective Action* (1965). Graduate students are often expected to model a collective action problem as a prisoner's dilemma and be able to understand the implications in such areas as establishment of interest groups, voting turnout, budgeting, and military relationships among nations. Even in lower division undergraduate courses political science instructors may integrate concepts from collective action theory. This orientation is also evident in some textbooks. Thus in their introduction to American politics, Samuel Kernell and Gary C. Jacobson (2003) offer an extensive discussion of collective action problems and the role of government, and return repeatedly to this topic throughout their book. Similarly, a focus on collective action problems is at the heart of Walter Stone's introductory American politics text, *Republic at Risk* (1990).

Faculty appear to accept the notion that if students are to understand abstractions such as the prisoner's dilemma model, they need many real world examples. In this regard it is notable that the first chapter of the Kernell and Jacobson text includes a two-page insert describing a prisoner's dilemma involving former President Bill Clinton and former Speaker of the House Newt Gingrich; the insert even includes a hypothetical payoff matrix. Political scientists may also draw on contemporary policy issues such as air pollution and the problems posed by "free riders" engaging in unrestricted driving even though they strongly support the collective end of improving air quality.

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In my experience, discussion of models and real world examples can assist students in understanding collective action problems, but can leave them short of grasping key intuitions and being able to use concepts in different contexts. Something is needed that prompts students to make their own choices in a collective action problem context. For this reason, I have made extensive use of an exercise called "The Collective Action Game" developed by Steven Rosenstone, now professor of political science and dean of the college of liberal arts at the University of Minnesota.

## Overview of the Game

"The Collective Action Game" divides a class into a number of teams, each of which represents an "aluminum ingot authority" for an aluminum producing nation.[1] Each team is charged with determining how many units of aluminum ingots to produce in its country over each of five rounds, with the rounds representing production years. For the sake of simplicity, teams are restricted to five choices as to the amount produced. The instructions state explicitly that each team is to attempt to make as much money as possible during the course of the game; nothing is specified about the desirability of doing better than other teams. The instructor distributes the rules, takes the aluminum ingot production orders, and calculates the world price for the material based on total class production according to a schedule distributed to students. The instructor may also calculate the amount each team has earned over every round based on tonnage produced and world price, less a fixed cost of production for each unit produced. This provides a running tally of how the groups are doing and facilitates inferences about the effects of different production decisions. The rules for the game and schedule for the determining the market price are included as Appendices A and B.

Under the market price schedule provided to students, all teams are advantaged if they act together as a cartel, restricting production to less than the maximum allowed under the rules. This is because reduced production can lead to a substantially higher world market price. However, any individual team maximizes profits as a consequence of producing as much as possible while the other teams cooperate to reduce production. Yet if every group follows such a strategy there is a glut of aluminum ingots, the world market price falls, and profits are low. In short, the game creates the classic N-person prisoner's dilemma in which the incentive for individual players to "defect" can lead to a collective result that is inferior for each team than mutual cooperation.

Aside from illustrating the collective action problem, one of the virtues of the game is its simplicity. The rules cover a single page and students can easily digest enough to play the game (if not to understand its subtleties) within a few minutes. No special equipment is required. The groups spend minimal time on secretarial tasks since their only obligation is to indicate how much they will produce each round. It also places little burden on students to perform well, unlike some other in-class exercises.[2]

I have used the exercise in both a three-hour graduate seminar and a one and a half hour undergraduate class. For the former, I take about an hour to run the exercise, after which I typically devote the remainder of the class to debriefing, reinforcing connections to the literature, and discussing the larger implications of the collective action problem. For the latter, I devote the entire class period to the exercise and debriefing, then devote a portion of the subsequent class to lecture about the collective action problem and its implications.

Students tend to find the exercise fun. I believe this is a good thing in itself, but the main advantage of students' positive experience is that it leads to a high level of engagement in subsequent discussion of collective action related issues.

## Patterns and Lessons

I have used the exercise for about a dozen years and have observed a number of patterns in how students play the collective action game. First, it is common for students to be confused or highly uncertain about strategy through the first round. After the first round's results are announced, most students understand that they will do better if they work together



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to restrict production than if they all produce as much as they want. Naturally this is more commonly true for graduate students, but it may be true for undergraduates as well, in part because the more astute in each group will correctly diagnose the situation for others.

Second, usually at least one team elects to produce the maximum amount possible in the first round, leaving that team with the best relative score. Sometimes the team has made a deliberate choice to be a "defector;" at other times the choice appears to be less strategic. In any event, much of the subsequent dynamic involves how other teams react to the defecting team(s). Do they attempt to convince the group to follow a different path in the future? Do they attempt to punish the defector(s)? Do they ignore the defector(s) and do the best they can? I have seen each of these approaches, sometimes in a single playing of the game.

Third, at some point a student inevitably asks me whether it is okay to talk to the other groups; the exact timing of such an inquiry varies. I then ask the student if he or she observes a rule prohibiting such conversation. Finding no such rule, most students then begin to interact with other groups. However, classes vary dramatically with respect to how intense and systematic these efforts are. In conducting the game himself, Professor Rosenstone has been surprised at how long it often takes teams to talk to one another. He commonly tells students that given the difficulty of achieving cooperation with a highly educated group in a relatively non-stressful situation, they should avoid unrealistic expectations about how long it takes other groups to cooperate.[3]

Fourth, as the game progresses it is common for students to become aware that the last round will be different, since there is no subsequent opportunity to make a different production choice based on what other groups have done in the prior round. Sometimes this awareness contributes to across the board defection in the final round, but this is far from inevitable.

The main lesson from the game probably involves a deeper appreciation of how individual incentives may undermine group interests. The game also offers the following specific lessons:

### *1. Understanding the problem does not eliminate it*

Some students (especially undergraduates) may initially reach the mistaken conclusion that the prisoner's dilemma is driven by misunderstanding rather than perverse incentives. The collective action game helps eliminate any such conclusion, especially with some subsequent guidance from the instructor. This is because students may observe their scores falling even as their understanding of incentives increases over successive rounds: being more knowledgeable does not prevent (and may even encourage) defection. If the game featured a pattern of falling scores, I make sure that students take notice during the debriefing; if not, I raise the question of whether correct understanding eliminates the collective action problem.

### *2. Hobbes lives*

The game commonly underscores how a strong authority may eliminate collective action problems. In some cases students will ask the instructor to act as such an authority (a possibility I do not embrace) or will try to create such an authority on their own. For example, in one graduate class an entrepreneurial student hammered out an agreement across different groups whereby a representative from each would agree to restrict production and submit to him the production order for the coming round, whereupon he would, in full public view, pool the orders and give them to me. In effect, the students created a quasi-government for the game. Unfortunately for him, one group secretly handed me another slip of paper with its "real" order, which called for maximizing its production of ingots. This created a situation in which I needed to choose which offer to recognize; perhaps out of my own mischievous nature, I chose to recognize the higher production order. But even if such a dramatic event does not occur, the game can launch discussion of how government authority may overcome "the war of all against all."

### *3. Envy makes things worse*

In this game students are instructed to enhance their self interest (i.e., "make as much money as you can"), making it different from some experiments placing subjects in a prisoner's dilemma. This charge implies that a group should not be concerned about its position relative to other groups, since the goal is not to beat the other groups but to get the most for itself. Yet it remains hard for students to ignore a group that is "getting ahead" by acting selfishly. Not uncommonly, students will use (if in a joking manner) harsh language to describe a defecting group (e.g., "Who can trust *that* group?"). Sometimes students will talk about how their anger with a certain group prevented them from working with other groups, even though such students knew cooperation might be helpful. Mutual defection may also occur after one group rejects a plan to restrict production. These results are consistent with recent experimental work suggesting that people tend to be "wary cooperators," initially inclined to work together but very sensitive to being played for suckers by others acting selfishly (Hibbing and Alford 2004). The collective action game provides an opportunity to discuss how such concern may aggravate the collective action problem. Yet the game may also show that feelings of trust and sympathy for other groups can develop simply in the course of working together to achieve a utilitarian aim.

### *4. The collective action problem has a light as well as a dark side*

Over the years I have been tempted to modify the game to focus explicitly on a public sector question such a pollution control. But I have avoided doing so in part because the game as currently structured can bring the dark and light sides of the collective action problem into sharp focus. If students are fully engaged at the end of the game they will tend toward seeing cooperation as a "good thing," if difficult to maintain. They can easily lose track of how they may be working together to extract monopolistic profits from the larger public. During the debriefing the instructor can ask students to step back and address the normative implications of cartel behavior. That is, should we be pleased or displeased that cartels tend to fall apart? Students tend to agree that from the vantage of society as a whole we should be glad. This can lead to an interesting discussion of contexts in which society should be pleased that the collective action problem undermines cooperation versus contexts in which we should be displeased with this result, notably those involving the provision of public goods.

## Associated Readings

The lessons from the collective action game can be enhanced with appropriately chosen readings. While I have tried a number of different ones, two seem to work especially well: selections from Robert Axelrod's *The Evolution of Cooperation* (1984), especially the first chapter, and selections from Robert Frank's *Luxury Fever* (1999). Both books use non-technical language and are uncommonly clear in explaining how



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collective action problems work. The Axelrod reading has the further advantages of explaining well the connection between the collective action problem and the prisoner's dilemma representation, introducing the distinction between the single and iterated game, and being widely cited in the literature. The Frank reading has the further advantage of using interesting examples from the public policy world. It should be noted that I have also used portions of Mancur Olson's influential book. However, students tend to find that book tough going. I have found it works as well to lecture about the importance of Olson's arguments while using the other readings as grounding for the game and sources of discussion.

But in the end it is the game that makes a potentially difficult and abstract topic come alive. I urge other instructors to give it a try.

## Notes

1. The original version of the game centered around production of cement. Based on conversations with colleagues suggesting that aluminum was more conducive to a cartel, I changed the game to focus on that product.

2. I am grateful to Susan Catron for this input from a student's perspective.

3. Source: telephone conversation, July 1, 2004. I am grateful to Professor Rosenstone for his observations.

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## Appendix A
## The Collective Action Game[1]

### BACKGROUND

Imagine that there are five major aluminum ingot producing countries in the world (the output from other countries is so minor that it can be ignored). Imagine further that in all five countries aluminum ingots are produced by a single government organization known as the aluminum ingot authority (AIA). Each AIA annually determines how many tons of the commodity will be produced in that country. The price obtained for aluminum ingots is determined by the world market in accordance with the total amount of world production, as shown in the enclosed schedule. In all countries it costs $100,000 to produce a hundred tons of aluminum ingots; the cost per hundred tons does not vary with the amount of ingots produced.

### GUIDELINES

For purposes of this game the class will be broken into five teams, representing the five AIAs. There will be five rounds, each of which represents one production year. During these rounds the members of each team will determine how many hundreds of tons of aluminum ingots they will produce the following year. Groups can decide to produce one, two, three, four or five hundred tons. At the end of every round, each group will hand a slip of paper to the coordinator (your professor) indicating how many tons it will produce the following year.

After receiving all the production orders I will calculate the world price for aluminum ingots, and then calculate how much money each group has made for that round.

### OBJECT

For each team, the object of the game is to make as much money as possible.

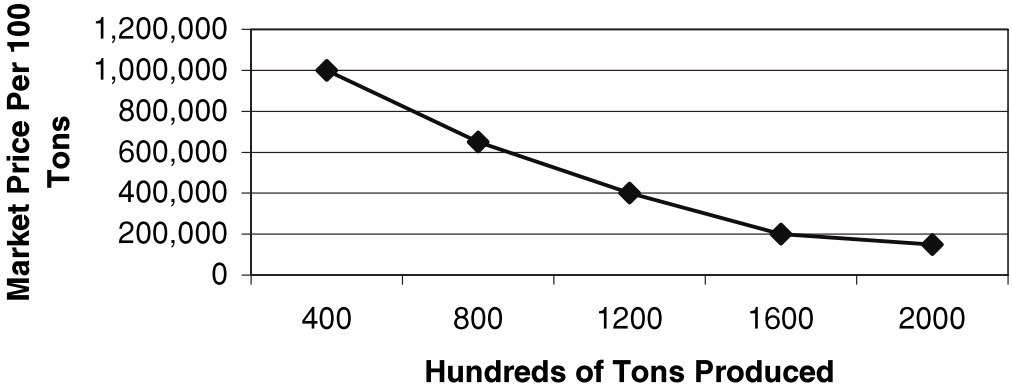
Note

1. This game was created by Steven Rosenstone, professor of political science and dean of the college of liberal arts at the University of Minnesota. It was modified by Professor Lascher for use at California State University, Sacramento.



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## Appendix B:
## World Market PRice for Aluminum Ingots






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