The Comedy of the Commons:
Students' Solutions to Social Dilemmas

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Variations of exercises based on prisoners' dilemmas, or more broadly social dilemmas, are popular in business school courses that span several disciplines and levels of analysis, from organizational behavior to international economics to business and society. The exercises are typically used to demonstrate lessons about cooperation and defection in situations of interdependence, when defection results in superior individual gains—at least in the short-term, and in terms of instrumental payouts—but at the expense of collective gains and social harmony.[1]

Multi-person prisoners' dilemma exercises have been popular in business ethics courses as a means for demonstrating the dynamics underlying Thomas Hobbes Social Contract Theory (ref: Leviathan, originally published in 1651). The games are especially pertinent to this topic because they are microcosmic instantiations of the problem laid out by Hobbes, in which self-interested individuals stand to benefit in the long term only from universal cooperation, but in the face of temptations to defect at the individual level.

Social dilemma games as they are traditionally played are very useful in making manifest for students the precise nature of the interdependence and the tradeoffs implied in cooperation and defection, and the fragility of cooperative social arrangements. By definition, games based on the prisoners' dilemma preclude student communication or collaboration before or during the game, and when communication is allowed, it is typically only after several rounds have been played. Moreover, students are rarely allowed a voice in determining or altering the rules of the game. The result is that cooperation, even if realized early, is rarely sustained throughout the game. Moreover, mid-game attempts to establish cooperation (e.g., by allowing communication and collaboration) are usually unsuccessful. Thus, students learn that cooperation is very difficult to initiate and even more difficult to maintain, but they are frequently so frustrated from the experience that they find it difficult to concentrate during the debriefing. Furthermore, because participants have relatively little control over establishing rules that would ensure cooperation, the experiential learning is mostly restricted

[1] We assume that the reader is familiar with basic game theory concepts, particularly those that apply to social dilemmas. For the uninitiated, an excellent review may be found in Kollock, P. (1998).

to the negative consequences of uncontrolled social dilemmas. In other words, the students are precluded from establishing a Hobbesian social contract.

From the perspective of teaching ethical theory, this leaves quite a bit to be desired. Ideally, an experiential exercise used to teach Social Contract Theory will allow students the opportunity to participate in the establishment of the contract, as well as experiencing the consequences of that contract. Toward that end, we have developed a version of a social dilemma classroom exercise that encourages students to develop, enact, and renegotiate a social contract. The exercise is based on Hardin's Tragedy of the Commons (1968), in which students are presented with a simulated ecosystem (described below) from which they may harvest a self-regenerating resource. We also allow students to return previous harvests, as described below.

As in other commons dilemmas, the collective good is achieved if everyone harvests an amount equal to or less than that necessary to achieve a sustainable level. Thus, a cooperative choice involves harvesting only one's 'fair share' of this sustainable harvest. There is, however, a persistent individual incentive—at least in the short term—to 'defect' by harvesting more than a mutually sustainable level of the resource. Even small scale defection typically leads to cascading defections, a mass breach of the social contract, with its resulting harm to the collective and the individuals within it.

Before the game, the students are provided with two sets of rules. The first set of rules is unalterable, and deals mostly with the regeneration and carrying capacities of the simulated ecosystem and the basic protocols for the game (e.g. played in rounds with simultaneous harvests). The second set of ground rules—dealing with issues such as anonymity, allowable harvests, etc.—are negotiable. Before the game begins and while it is being played, the students are free to collectively determine what the rules of the game are. This may include decisions as simple as waiving the right to anonymity, but may include more elaborate variations, including the addition of rules sanctioning defection. Beyond making it known that the rules are negotiable, little guidance is provided to the students in how they can or should go about doing so. It is in the collective sensemaking, social structuring, persuasion, and enforcement where the deepest learning occurs.

Administering the Game

The commons in the social dilemma exercise here considered consists of a simulated self-regenerating public good—e.g., a marketable fish from international waters. The resource pool regenerates at a peak rate averaging 15%; mirroring a biologically system, however, at low resource levels the regenerative rate is half the peak rate, and there is a maximum carrying capacity above which no further growth is possible. At all resource levels a random factor has been introduced such that the actual rate varies between 5% below and 5% above the set rate—a concession to the variation found in natural systems. Students are allowed to harvest (or return) a proportion of the population in each of a set number of rounds, with the beginning population for each round being the population at the end of the previous round, increased by the regenerative coefficient (and adjusted with the random factor referenced above). The beginning population level is set within the limits for peak regeneration, yet well below carrying capacity. We typically demonstrate the resource pool dynamics over a few rounds with randomly selected harvest amounts to familiarize students with the nature of the game and give them some insights into the parameters involved. Students are not provided with an explicitly stated objective, but are rather encouraged to include this in their discussion.[2]

The state of the population and amounts harvested and returned in each round is tracked in a spreadsheet that is projected for all students to see. Figure 1 shows an example of a spreadsheet for a game after two rounds with ten teams playing a total of 12 rounds. Note that in doing this, even in the case of anonymous harvests, students can see how much individuals teams have extracted after each round. In the example, the beginning population is 700 units (e.g., tons of fish), the regenerative coefficient is .15, and the maximum carrying capacity is 1,500 tons. These are elements of the game that cannot be negotiated by the students. The precise numbers may or may not be provided by the instructor before the game is played, or the instructor may choose to have the students derive the numbers on their own through observing the spreadsheet before the game is

[2] We occasionally provide exogenous incentives, such as making participation grades for the day contingent on their total harvest for the game. In such cases, we add the provision that the final population balance will be divided equally among the teams.

begun (though the introduction of the random factor referenced above makes precision of estimation difficult—true to the real world).

The game is begun by having students discuss the game first within their teams (if used), and then opening class-wide discussion for a set period of time, typically from three to five minutes. In the discussion, the instructor may provide guidance, but the negotiation of rules is up to the students. After the initial rules are set, the individuals or teams of students submit their initial harvests to the instructor, who enters them into the spreadsheet. Students are allowed to discuss the results and any future actions, and are allowed to further alter rules during the game. Iterations of submissions, entries and discussion are repeated until the game has ended—usually with the collapse of the system.

Debriefing the Game

The game is usually introduced into the course immediately prior to a discussion of social contract theory. Immediately following the game, those groups which have either maximized or minimized their extractions from the commons are asked to 'report out' to the class the rationale used in playing the game. Those students choosing to minimize extractions come to realize that their strategy to save the common resource is ineffective absent similar behavior on the part of their classmates. Those students choosing to maximize extractions only reluctantly come to realize that in the long-term their self-interest can only be maximized through cooperating with others. All students understand that in order to create a sustainable system which nets benefits for each over time there must be mechanisms in place which ensure coordination for the good of all. It is at this point that social contract theory comes to be seen as the 'solution' to the tragedy they have faced—providing the ideal opportunity to introduce Hobbes, Hardin (1968), and lastly Rachels (2002): "Morality consists in the set of rules, governing how people are to treat one another, that rationale people will agree to accept, for their mutual benefit, on the condition that others follow those rules as well." Students are challenged to craft a social contract which would serve all their interests were the game to be played over, affording a unique link between abstract ethical theory and real-world praxis.

References

Hardin, G. 1968. The tragedy of the commons. *Science*, 162: 1243-1248.

Kollock, P. 1998. Social dilemmas: The anatomy of cooperation. *Annual Review of Sociology*, 24: 183-214.

Rachels, J. 2002. *The Elements of Moral Philosophy* (4th ed.). New York, NY: McGraw-Hill.

Figure 1. Example of game spreadsheet after two rounds.

	A	B	D	E	F	G	H	I	J	K	L	M	N	O	P
1		Pop.	Max.	Teams										Pop.	
2		Begin	Harvest	1	2	3	4	5	6	7	8	9	10	End	Harvest
3	1	700	70	10	0	0	30	0	10	5	20	5	0	620	80
4	2	713	71	-10	10	0	10	10	0	0	-20	20	0	693	20
5	3	797	80	0	0	0	0	0	0	0	0	0	0	797	0
6	4	916	92	0	0	0	0	0	0	0	0	0	0	916	0
7	5	1054	105	0	0	0	0	0	0	0	0	0	0	1054	0
8	6	1212	121	0	0	0	0	0	0	0	0	0	0	1212	0
9	7	1394	139	0	0	0	0	0	0	0	0	0	0	1394	0
10	8	1500	150	0	0	0	0	0	0	0	0	0	0	1500	0
11	9	1500	150	0	0	0	0	0	0	0	0	0	0	1500	0
12	10	1500	150	0	0	0	0	0	0	0	0	0	0	1500	0
13	Total Harvest			0	10	0	40	10	10	5	0	25	0		
14															
15	Regen. Coef.		0.15						Distributed Fin. Pop.						150
16	Max. Pop.		1500												