GEQ1000 Asking Questions
Economics (Social Science) Segment
Video 2-4
Applying the model

Understanding and manipulating a model can be a fruitful intellectual exercise, but we do want to use the model to understand the real world. So, it is vitally important that a model can be ***applied*** to real world situations.

Can the Prisoner's Dilemma be so applied? Why yes indeed! The Prisoner's Dilemma is a successful model precisely because it and its variants have been applied across many domains, from economics to political science to sociology and even to evolutionary biology. Once you understand the essential insight of the Prisoner's Dilemma, you will see the model in many situations.

Every time an IPhone is released, we see a long queue of people waiting at the stores. Many line up for hours, even days. Now suppose everyone arrives just one hour before the store opens. The chances of getting an IPhone stays the same on average, but people won't have to waste time in queue. If everyone else arrives one hour before the store opens, and *you* show up two hours ahead, you are sure to get an IPhone. The problem is, everyone is thinking the same thing, and so you and everyone else spend ten hours in the queue!

Having everyone arrive one hour ahead is just like (Cooperate, Cooperate) in the Prisoner's Dilemma. It is not going to happen. And everyone arriving ten hours ahead is just like (Defect, Defect). We are looking at essentially a many-person Prisoner's Dilemma!

We can tell a similar story about the use of illegal performance enhancing drugs in sports. Take professional cycling, which is notorious for having several winners of its most prestigious *Tour de France* tournament being stripped of their titles for drug cheating. Each cyclist reasons that he can gain an edge by using drugs. But when everyone uses drugs, nobody gains an edge and all end up suffering side effects and losing professional integrity.

When predictions go awry

However, there are also situations that fit the Prisoner's Dilemma but cooperation takes place nonetheless. Criminal collaborators that are captured and separated do

not always confess. The famous Sicilian Mafia's code of silence worked quite well to keep members of the criminal gang from making confessions when caught by the police.

Behavioural economists and psychologists who have run experiments with people playing the Prisoner's Dilemma also report that around half of their subjects play Cooperate. Even economics students who have studied and understood the game well do not always play Defect, though they do tend to play Defect more than other people.

What does this mean for the usefulness of the model? Should the model be rejected because it failed to predict some outcomes?

Failure does not necessarily sink a model

The answer, as far as economics and the social sciences are concerned, is not to throw the model out. There isn't a model that makes flawless predictions in the social sciences, and there will probably never be one. There are simply too many different influences on peoples' behaviour. We recognize that in some situations, there are other forces that go against the rational self-interest featured in the model.

Indeed, the failures of the model are just as instructive as the successes. After all, if Prisoner's Dilemmas are so common, surely it is important for people to figure out ways to counteract it, and it is important for us to examine how cooperation gets sustained.

The Sicilian Mafia's code is part of the culture that individual members are immersed in from young. In a similar way, morality tales that parents impart to children about the importance of being honest, about thinking of other peoples' interests, are ways in which cultural norms are built to counteract the natural impulse to look out only for our own interests.

Evolutionary biologists believe that humans have in-built tendencies for altruism and reciprocity because these tendencies help humans to overcome Prisoner's Dilemma situations to survive collectively.

Nonetheless, the professional cycling case tells us that norms, culture and biology take us only so far. That (Cooperate, Cooperate) is not a Nash equilibrium in the Prisoner's Dilemma suggests that even in situations when we observe that people cooperate, we understand that this cooperation is potentially fragile, for people are being asked to fight the temptation to Defect.

To build the large complicated economies and societies of today that require a high degree of trust and cooperation, relying on norms, culture and biology is certainly useful but will not be enough. We need to use laws, rules and monitoring to change the payoffs of the games we play. In the case of professional cycling, for example, heavy punishment must be given, and better procedures to test for drug use, are needed to change the incentives of the riders.

What is a good model?

Let us describe some of the features of the Prisoner's dilemma that makes it, in the eyes of economists, a successful model.

The first feature is that it is *simple*. Just two players, two strategies, four outcomes. It doesn't try to do too much. That makes it easy for people to understand how it works and how its assumptions drive the results.

The second feature is that it is *insightful*. The message of how self-interest and strategic interaction can lead to bad outcomes is an important counterpoint to the traditional message of economics. Adam Smith wrote in 1776 about how self-interest, placed in a market system, leads to greater efficiency and economic prosperity for everyone, even though nobody is planning for these outcomes. This is the famous *Invisible Hand* argument for markets, and much of the early work in economics can be thought of as elaborating on his theme. The Prisoner's Dilemma and other game theoretic models show that in many contexts, the *Invisible Hand* result may not hold.

The third feature is that the Prisoner's Dilemma is highly *applicable*. We have already seen several examples where its logic applies.