

PLAY GAMES, MAKE POLICY

:: Mishita Mehra

A

lot of people watched the Anna Hazare drama unfold; many with optimism, some with scepticism, yet others with trepidation. Bruce Beuno de Mesquita was probably the only one who took it all in with disappointment. “I followed the case and

thought, too bad I don’t have the data to analyse this. It would have been a perfect opportunity to apply my model,” says Mesquita.

The model in question is a computer algorithm that uses game theory – the mathematical tool used by strategists everywhere from the war room to the boardroom – to focus on problems featuring the dynamics of negotiations, in the face of an opportunity, or a threat or coercion. And the man behind it, Mesquita, is the chairman of the political science department at NYU, and a senior fellow at the Hoover institute at Stanford University. As a consultant to the CIA, the Pentagon, foreign governments, and big corporations, over the past 30 years, he has been known to have made countless accurate predictions on political events in more than 25 countries. For example, he predicted Iran won’t finish its nuclear weapons programme, going against conventional American opinion. And he predicted the time Pervez Musharraf would quit his dictator’s job in Pakistan.

India Inspired

The good news is that India, although a late entrant, has started taking theoretical techniques like game theory seriously while framing policies or analysing practical problems. For instance, a very sophisticated program was used to design the 3G auctions, using consultants from Britain.

Says the chief economic adviser, Kaushik Basu: “India is beginning to enter this arena... There is enough evidence now that common sense is important but not good enough for economic policy; you do need scientific evidence and deductive reasoning.”

National security is a rich subject for game theory. The aim is to deploy limited available resources (security personnel) in a manner that minimises the probability of an adverse event like a terrorist attack. This basic idea has spurred economists to don their thinking hats.

Milind Tambe, a professor at the University of Southern California, for instance, has written papers on how randomised checkpoints can be set up in Mumbai (or any other city). “Humans tend to fall into predictable patterns and checking in a randomised fashion can be applied to

any situation, say, like drug trafficking and this has great potential for controlling corruption and crime,” he says. Tambe has also addressed several police officers and Central Industrial Security Force personnel at a seminar at the Mumbai airport in June 2010.

What makes him an authority on the subject? Tambe developed a model using game theory that is currently deployed at various airports and ports in the US. According to him, policy-makers want a security strategy that is unpredictable, yet covers important targets more frequently, and simultaneously takes into account how the adversary will react. “Game theory provides a mathematical solution to this problem. It’s like mathematically solving a problem where they give me the basic parameters, and I just use

my computer science expertise to give them an answer based on their own inputs,” he adds.

Push from the West

Given that game theory has been around a lot longer in the West – after all John Nash, so ably played by Russell Crowe in the Hollywood hit, *A Beautiful Mind*, was talking about it back in the 1950s – most of the eyebrow-raising work is taking place there. Consider Alvin Roth, professor of economics and business administration, Harvard. Roth has helped design a number of market systems that are deployed in diverse fields, from clearing houses for labour markets (say, for doctors) to kidney exchange, and assigning children to schools in New York and Boston.

Game theory is also being used by several defence agencies across the world. For instance, the Dutch Defence

Academy uses game theoretic models to analyse how terrorists organise themselves in a cell within a large network. According to Roy Lindelauf, researcher at the academy, the research is about “how terrorists cooperate and allocate resources, and how this determines the importance of several of those players in a bigger network”.

Some economists, like VS Subrahmanian (mentioned in the earlier story) are using game theory to analyse how to reduce terrorist activities. He is in the process of analysing the Indian Mujahideen and other terror groups in the country. “The process is basically like first studying textbooks and other course material and then testing how much you know. In six months we will analyse India; it will take that much time to assemble data,” he says.

It’s not just the covert side of affairs that has come under the game theory scanner. Indian

THE THEORY BEHIND THE GAME

Watch *A Beautiful Mind*, *The Dark Knight* and *Rebel Without a Cause*. The first tells you how John Nash, the über game theorist, did his thinking. In the second film, the Joker (Heath Ledger) plays the prisoner’s dilemma game in the ferry sequence. And in the third film, James Dean literally enacts the chicken game in the “Chickie Run” sequence. These are two classic games in the theory. Here’s a synopsis of the games:

PRISONER’S DILEMMA

Two murder suspects are told if they both confess, they’ll get favourable treatment. If neither confesses, they’ll spend a short term in jail – as long as it takes for court to hear the case. The evidence is not strong. However, if one confesses and the other doesn’t, the squealer walks, while the other gets the maximum penalty. The best outcome for them is that both keep mum. But if they don’t trust each other, both will confess. And both will be worse off. That’s what game theory predicts. The insight: individuals can try to be better off and end up being worse off. In policy terms, this means good guys must learn to trust each other.



CHICKEN GAME

Two cars are going to collide unless one driver chickens out and swerves. The best outcome for each driver is that the other one chickens out. A crash is the worst outcome for both. Game theory predicts either both drivers will refuse to chicken out or both will play chicken. Neither driver trusts the other to chicken out. So, neither can assume the crash won’t happen. The insight here is that in a real confrontation, players can up the ante even if one of them backing down can mean he and everyone will be better off. In public policy, this leads to rules that can anticipate if or when bad guys will back down.



military think tanks, be it the Institute for Defence Studies and Analyses or the Defence Research & Development Organisation, have recently set up small teams that are trying to apply game theoretic principles to international relations with neighbours like Pakistan.

India’s problem is lack of enough data. This can change with projects like the National Intelligence Grid (Natgrid), which got Cabinet approval in July. Under Natgrid, 21 sets of database will be networked to achieve speedy and safe access to information for intelligence agencies. According to GK Pillai, the former home secretary, “In around 18 months when phase I for the project is complete, techniques like game theory will be used and this will come under the National Counter Terrorism Centre.”

The Spanner in the Works

In the late 80s and early 90s, the New York Police Department carried out a strange experiment, all monitored using secret cameras. They cleaned up and beautified spots where a lot of mugging took place, and discovered something new in the psychology of muggers: people are less prone to criminal behaviour in clean atmospheres. The crime rate went down dramatically when the police beautified the city’s toughest areas. That’s behavioural economics for you. “NYPD used it successfully. If Indian government offices were nicer, petty corruption may go down,” says Basu.

But why would a thief care about ambience? Because rational behaviour is not a given. This violates a crucial assumption of game theory. And “irrationality” has spurred a lot of research.

Researchers have also started realising the crucial role social networking sites like Facebook can play in mapping behaviour more accurately. A recently started “social-network games” project by Microsoft Research, Cambridge, is a good example. The project aims to improve systems by understanding why, and when, individuals, big corporations, and governments behave irrationally.

Pushmeet Kohli, a researcher with the project, says the global presence and popularity of Facebook allows them to study how people from all over the world, not just the West, behave in practice. “We hope this information could be useful for governments and economists,” he adds.

Researchers at the psychometrics department of University of Cambridge have also developed a Facebook app called “myPersonality” which has already been used by over 6.5 million people.

“The data connects personality types with ‘Facebook Likes’. We have investigated how this data can be used to infer which personality types prefer what: people, places, websites. We can estimate a group’s average personality,” says Kohli.

The Way Forward

“I think game theory is very useful...[but] using game theory for policy purposes involves lots of careful modelling and attention to detail,” cautions Harvard’s Roth.

All models are simplifications of reality; they can go wrong on occasions if their assumptions fit poorly with real-world conditions or if the data quality is low. But then, as Mesquita says, this problem is true for any approach. “Game theory makes strong but open, transparent and explicit assumptions while many other means of making forecasts are purely judgemental and not transparent,” he adds.

India may have been slow off the blocks but is trying to catch up. Many organisations have begun research in the field. For instance Tata Consultancy Services’ innovation lab in Delhi is doing game theory-related research. The company declined to comment on the details of the research.

This reticence is fairly common among India’s few practitioners of game theory’s public-policy applications and it is largely informed by the nascent stage of research. But there could be plenty to talk about soon. ■