Game Theory

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Nash Equilibrium

In terms of game theory, if each player has chosen a strategy, and no player can benefit by changing strategies while the other players keep theirs unchanged, then the current set of strategy choices and their corresponding payoffs constitutes a Nash equilibrium

Prisoner's Dilemma

Al Capone and Pablo Escobar are caught by FBI. FBI doesn't have sufficient evidences against them. So they interrogate them separately and give them options.

1. If both stay silent, both go to jail for 1 year.

2. If both betray each other, both go to jail for 2 years.

3. If Capone betrays and Escobar keeps silence, Capone is free and Escobar goes to jail for 3 years and vice versa

THE PRISONER'S DILEMMA

	B stays silent (cooperates)	B betrays A (defects)
A stays silent (cooperates)	Both serve 1 year	A serves 3 years, B goes free
A betrays B (defects)	A goes free, B serves 3 years	Both serve 2 years

Better Payoff - Dominant Strategy (Betraying)

Less Payoff - Dominated Strategy (Silent)

Real Life - No clear Dominant Strategy (Adopt Mixed Strategy)

Mixed Strategy:

- Choice is based on opponent's choice
- Payoff desired

To fight or not to fight, that is the question

What is Optimal Strategy:

- Opponent's choice of strategy
- Communication
- Game iteration with finite or infinite repetitions

Cuban Missile Crisis

In October of 1962, it was confirmed that the Soviet Union was building nuclear missile bases in Cuba, well within striking range of most of the United States.

The US policy makers had following strategies:
1. **A naval blockade (B)**, or "quarantine" as it was euphemistically called, to prevent shipment of more missiles, possibly followed by stronger action to induce the Soviet Union to withdraw the missiles already installed.
2. **A "surgical" air strike (A)** to wipe out the missiles already installed, insofar as possible, perhaps followed by an invasion of the island.

The Soviet Union had following strategies:
1. **Withdraw** nuclear stockpile.
2. **Maintain** nuclear stockpile.

Payoff Matrix of Cuban Missile Crisis

	Soviet Union	
	Withdrawal (W)	Maintenance (M)
United States — Blockade (B)	Compromise (3, 3)	Soviet Victory, US Defeat (2, 4)
Air strike (A)	US victory Soviet Defeat (4, 2)	Nuclear War (1, 1)

Why do competitors open their stores near each other?

WHY DO COMPETITORS OPEN THEIR STORES NEXT TO ONE ANOTHER?

TEDEd

Power Sharing

Four major companies, let Amazon, Berkshire, JPMorgan and Alphabet joins a venture of healthcare be *Universal Health.* They have certain shareholding according to their investment. Now it is required to form an Executive Board which will exercise power over working of the new entity. Any coalition that comes up with 51% of total shareholding will form Exec Board.

Shareholding Distribution

Amazon Inc.	45%
JPMorgan & Chase Co.	25%
Berkshire Hathaway Inc.	15%
Alphabet Inc.	15%

Shareholding And Payoffs

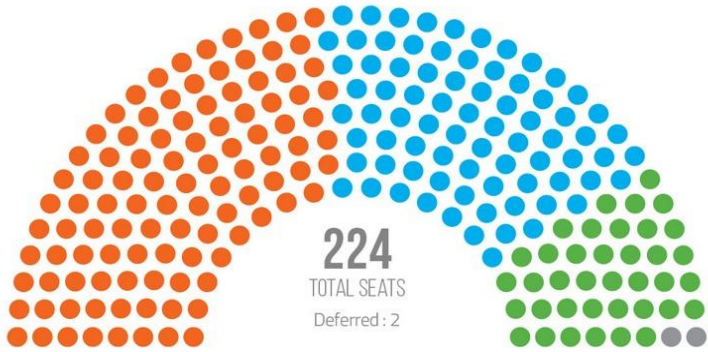| Scenario	Coalition	Total Shareholding	Payoffs
1	JPMorgan + Berkshire + Alphabet	55%	40, 30, 30
2	Amazon + Berkshire	60%	75, 25
3	Amazon + Alphabet	60%	75, 25
4	Amazon + JPMorgan	70%	71, 29
5	Amazon + JPMorgan + Alphabet + Berkshire	100%	50, 16.66, 16.66, 16.66

Just as the Nash Equilibrium proposes the optimal strategy for an individual player, the Shapley Value proposes the most fair allocation of resources or payoffs to the members of a coalition.

The word *"Fair"* does not imply equality. Fairness means that the members holding the most power in a coalition gets the highest proportion of payoffs.

BATTLE FOR KARNATAKA

BJP vs INC vs JD(S)
THE SEAT SHARE

224
TOTAL SEATS
Deferred : 2

104	78	38	02
BJP	INC	JD(S)	OTHERS

SEATS IN 2013

| 122 | 40 | 40 | 22 |

#BattleForKarnataka

NEWS18 creative

COLD COMFORT FOR BJP

PARTY	SEATS CONTESTED	SEATS WON	% AGE OF VOTES POLLED	TOTAL VOTES
BJP	157	53	24.4	92,85,574
RJD	101	80	18.4	69,77,094
JDU	101	71	16.8	63,96,164
CONG	41	27	6.7	25,39,638

Source: TNN

TIMESINTERNET

The Game of Trust

GameLink

Take Away from all of the Game Theory

What the game is, defines what the players do.

The game defines the players. But in the long run, it's us players who define the game.