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Review Article

How Game Theory Prevent Brain Stroke

Saeed Seyd Agha Banihashemi*

Department of Science and Technology, School of International Relations, Iran

***Corresponding Author:** Saeed Seyd Agha Banihashemi, Department of Science and Technology, School of International Relations, Iran.

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Abstract

Brain stroke is a Waste which cause problem for people and society both mentally and economically every year in the world in this article and since major factor of Brain stroke is stress and blood pressure which happen from daily from difficulty which people facing in family, school, university and workplace in this article. Game theory duty is to show best strategy which one or company can choose for facing the problem and prevent people from difficulty. In the first part we introduce very simply Game theory which everyone can use and second part about brain stroke and in third section how game theory can prevent Brain stroke.

Keywords: Dominated Strategy; Nash Equilibrium; Brain Stroke

Introduction

In this article in first part introducing Game theory in second part I explain Brain stroke in the last part how game theory Can prevent brain stroke. Many people in this world daily die from Brain stroke. Game theory job is to help people, companies and organization to choose best strategies for going on. In this article we prove that if people knowing game theory they will not take bad decision with facing daily life problems. Bad strategy in life makes people happy and healthy with life span.

Game theory

In this part we do not want to teach Game theory only basic knowledge to use Game Theory after reading article. Game theory is the study of the ways in which interacting choices of person or agents produce outcomes with respect to the preferences (or utilities) of those person or agents, where the outcomes in question might have been intended by none of the agents. The meaning of this statement will not be clear to the non-expert until each of the italicized words and phrases has been explained and featured in some examples. Doing this will be the main business of this article. The focus of game theory is the game, which serves as a model of an interactive situation among rational players. The key to game theory is that one player's payoff is contingent on the strategy implemented by the other player. The game identifies the players' identities, preferences, and available strategies and how these strategies affect the outcome. Depending on the model, various other requirements or assumptions may be necessary.

Game theory has a wide range of applications, including psychology, evolutionary biology, war, politics, economics, and business, international relations, religion. Despite its many advances, game theory is still a young and developing science.

Part 1: Game theory

Definition

Any time we have a situation with two or more players that involve known payouts or quantifiable consequences, we can use game theory to help determine the most likely outcomes. Let's start

out by defining a few terms commonly used in the study of game theory:

- **Game**: Any set of circumstances that has a result dependent on the actions of two or more decision-makers (players).
- **Players**: A strategic decision-maker within the context of the game.
- **Strategy**: A complete plan of action a player will take given the set of circumstances that might arise within the game.
- **Payoff**: The payout a player receives from arriving at a particular outcome (The payout can be in any quantifiable form, from dollars to utility).
- **Information set**: The information available at a given point in the game (The term information set is most usually applied when the game has a sequential component).
- **Equilibrium**: The point in a game where both players have made their decisions and an outcome is reached.

The Nash Equilibrium: Is an outcome reached that, once achieved, means no player can increase payoff by changing decisions unilaterally. It can also be thought of as "no regrets", in the sense that once a decision is made, the player will have no regrets concerning decisions considering the consequences [1].

Types of game theory

Although there are many types (e.g., symmetric/asymmetric, simultaneous/sequential., *et al*.) of game theories, cooperative and non-cooperative game theories are the most common. Cooperative game theory deals with how coalitions, or cooperative groups, interact when only the payoffs are known. It is a game between coalitions of players rather than between individuals, and it questions how groups form and how they allocate the payoff among players [2].

Non-cooperative game theory deals with how rational economic agents deal with each other to achieve their own goals. The most common non-cooperative game is the strategic game, in which only the available strategies and the outcomes that result from a combination of choices are listed. A simplistic example of a real-world non-cooperative game is Rock-Paper-Scissors [3].

In Grade game me and opposite side are players and α,β are strategies in game. We may have several strategies we need matrix form for keeping our data means according to my action and opposite side it is most important part of game theory if we give rung number or value to actions sure we will not take correct output if our value to action are correct up to 90% our prediction will be correct, rest is so essay only to compare the numbers and values consider first matrix which belong to me explanation of this matrix is such as fallow [4,5]:

If I choose α strategy opposite side choose α strategy I will get and if I choose β strategy I will take and if I choose α strategy and opposite side choose β i will get C and if I choose β and opposite side choose β I will get . In same way we can do foe Matrix form of opposite side.

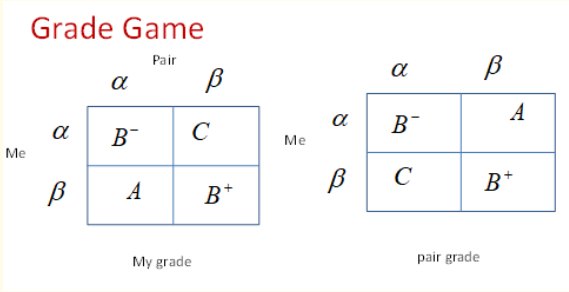

Figure 1

Then we to stick together two matrix we get

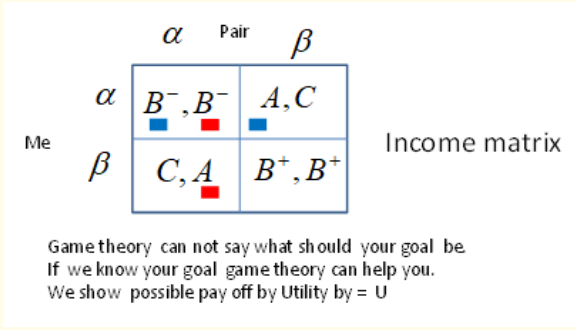

Figure 2

In this part we conclude in this manner: comparison between and C which one has bigger value sure and among A and sure A is better which we will show by blue mark in conclusion for me best strategy is α. Now for opposite side between and C which one is bigger value sure and between A and which one has greater value

sure A which we will show by red in matrix. We can conclude that best strategy for opposite side is α in this way we predict the action of our opposite side. Specialist in Human science Criticism the game Theory that we cannot digitize human action which is completely rung consider flowing axis [6].

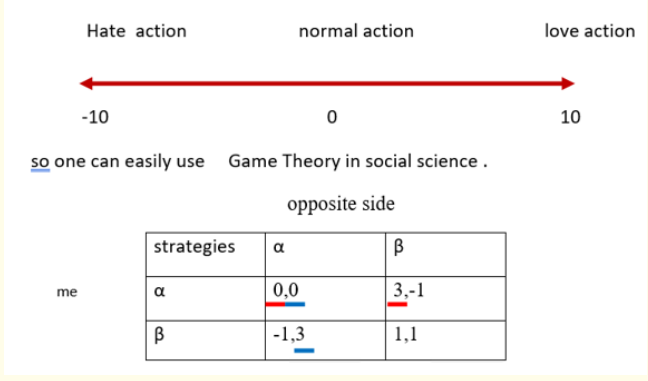

Figure 3

In this game dominated strategies for both side is α that means if they do β will lose in relation, economy, international relation, war and so on. Software which can help applicant is Gambit which work with it is easy which we show bellow the Gambit answer to this game [7].

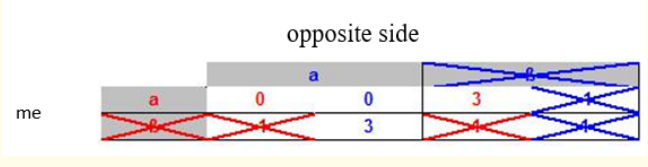

Figure 4

Another version of tools are extension form which is available in Gambit

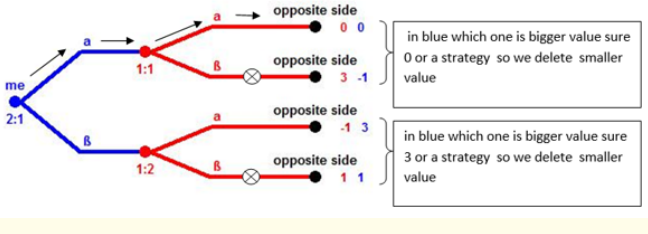

Figure 5

Now in red in two reaming strategy sure 0 is greater than -1 so dominated strategy will be α,α for both player when so many strategy is there we use extension form. Again I emphasis that these digit are very important for making decision, these digits will be made from information which one have about the subject we must collect these information or help from an expert in that field [8].

In next example we view another condition which is different from last example.

Definition: We say my strategy α strictly dominate my strategy β if my pay off α is strictly grater than β.

- Lesson 1: do not play a strictly dominated strategy.
- Lesson 2: Rational choice can beat to out come that suck.

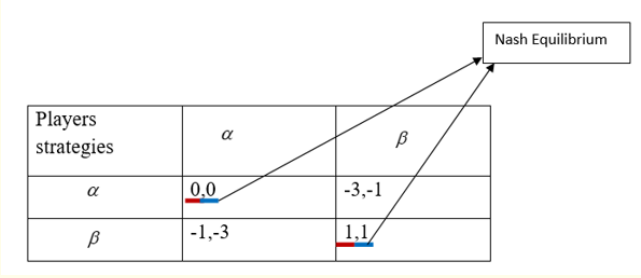

Figure 6

In this example one will proceeds as before but here there is not dominated strategy since red are not in one horizontal line and blue are not in one vertical line. In game theory we say that there is Nash equilibrium that means none of player will not get maximum out put something in the middle for example if it is trade we say there is not maximum benefit for both side in this trade but one things is very important is that if the not following Nash equilibrium the will not get this middle output also. But in this example we have two Nash equilibrium which one is better? [9].

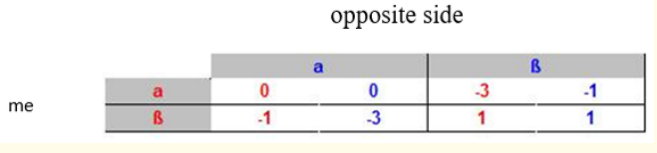

Figure 7

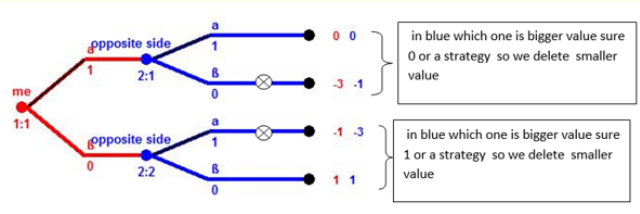

Figure 8

Now in red 1 is bigger than 0 so β, β is better strategy than α, α so α, α is weaker Nash equilibrium.

In the last section we observe that there is no dominated strategy and no Nash equilibrium.

opposite side

me	Players strategies	α	β
	α	0,0	-1,1
	β	-3,3	1,1

Figure 9

In this example we use from Best response (BR) form that means if my opposite side choose I must choose and if he choose strategy I must use otherwise I will lose the game. Up to her is enough for those how want use Game theory for daily life for more complicated problems one must go for Game theory course [10].

Part 2: Brain stroke: types

Approximately 15 million people worldwide suffer from stroke each year. In Iran, stroke is the second leading cause of death. But death is only one consequence of a stroke. Stroke is a major cause of motor, neurological and cognitive disabilities in the world. In the United States, 700,000 people have a brain stroke each year.

Sources reported a decrease in the age of stroke and younger people and said: "The older you get, the higher the number of heart attacks" [11].

Ischemic stroke

Most strokes (87%) are ischemic strokes.[1] An ischemic stroke happens when blood flow through the artery that supplies oxygen-rich blood to the brain becomes blocked.

Blood clots often cause the blockages that lead to ischemic strokes.

Hemorrhagic stroke

A hemorrhagic stroke happens when an artery in the brain leaks blood or ruptures (breaks open). The leaked blood puts too much pressure on brain cells, which damages them.

High blood pressure and aneurysms—balloon-like bulges in an artery that can stretch and burst—are examples of conditions that can cause a hemorrhagic stroke.

There are two types of hemorrhagic strokes [12,13]

- **Intracerebral hemorrhage** is the most common type of hemorrhagic stroke. It occurs when an artery in the brain bursts, flooding the surrounding tissue with blood.
- **Subarachnoid hemorrhage** is a less common type of hemorrhagic stroke. It refers to bleeding in the area between the brain and the thin tissues that cover it.

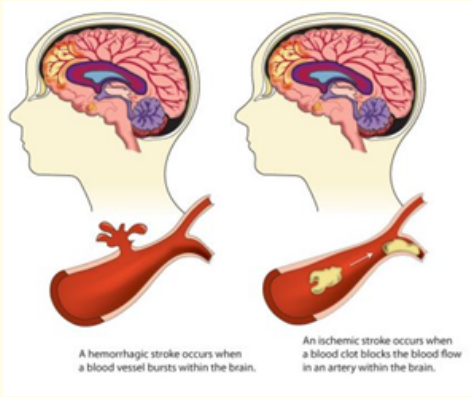

Figure 10

First question is why brain stroke.

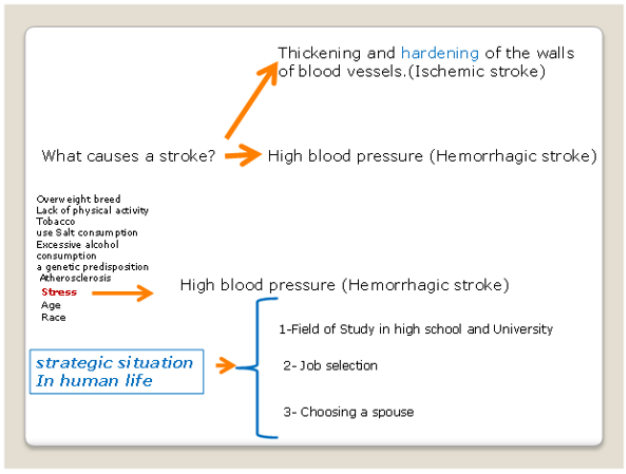

Figure 11

Will happen every country suffer from this problem In Iran every year146000 people suffer from brain stroke if we study economical aspects in the following calculation.

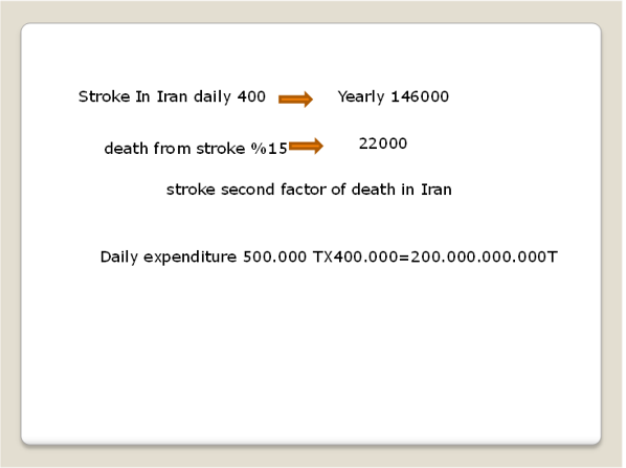

Figure 12

We can understanding from above information which from all factors stress and blood pressure are more important especially in industrial cities. All us we have problems in family, in office with Colleagues or Boss and so on in third part we are calming how Game theory reduce Brain stroke [14,15].

Conclusion

If we take correct decision in each part of our life in future we are not facing such problems but since people does not know Game theory the will take rung strategy against the persons which is facing so outcome sure will be bad when you have bad output in family, school, university, office, workplace one face stress which cause blood pressure and in the end Brain stroke.

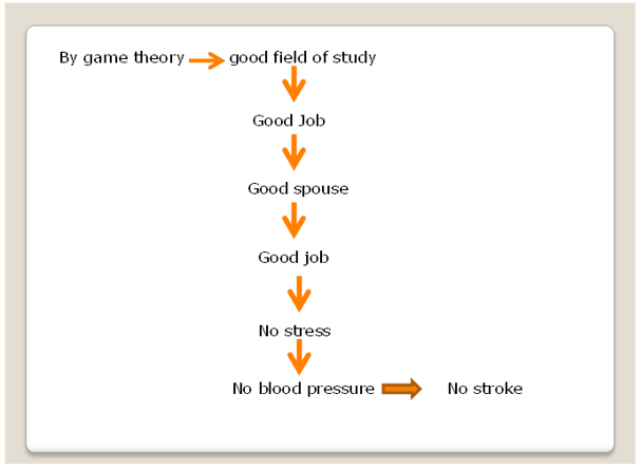

Figure 13

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