# The Concept of Proposed model of Game theoretical studyon Human behaviour in a Society

1. **Ashok Kumar**

Research scholar, Department of maths, B.R.A.B.U. Muzaffarpur

2. **Dr ( Prof.) B.P. Kumar**,

University Department of Maths, B.R.A.B.U.Muzaffarpur

**Abstract:-** In this paper we have studied the concept of proposed model of Game theoretical study on Human behaviour. Auman R.J. (1964) 'Mixed and behaviour strategies in infinite extensive games', in MDresheret al. Advances in Game theory, Annals of mathematical studies (1).

A model has been obtained of such behaviour in conflict situations with the help of game theory. To understand human behaviour in a situation in a society, we consider the behaviour of allthe members of the society in all possible situations simultianeously.Game theory can solve all such problems.

**Key work:-** Proposed model of Human behaviour, Basic model of Humanbehaviour, social norm, norm equilibrium, social standard of behaviour, stage game, status level, Game theory.

## 1. Introduction:-

### Social norm and norm equilibrium:-

### Definitions:-

(a) The rules of behaviour in particular situations are called social norm. Forexample, in all societies, there are norms which define acceptable male and female dress. There are norms about driving on the road. Thus normsexist in all areas of social life.

(b) A social norm is called norm equilibrium if each individual in the societyfinds it in his interest to follow the social standard of behaviour and the distribution of status levels in the society is stationary.

(c) A triplet $(\beta^*, p^*) = (\tau^*, \sigma^*, p^*)$ is called a norm equilibrium of $\Gamma^\infty(\delta)$ if thefollowing holds:

(i) $\beta^*$ is stationary at $p^*$, and

(ii) For all i = 1, 2, $x \in X_i$ and $s_i \in S_i$,

$$v_i^\infty(x, \sigma_i^* ; \beta^*, p^*) \geq v_i^\infty(x, s_i ; \beta^*, p^*)$$

## 2. The concept of proposed model of human behaviour:-

In large societies, norms will provide coordination for individuals involved in conflict situations. A norms for a society will provide a social standard of behaviour that will proscribe to a player in a conflict situation withanother player a particular action. The term status will be used here a describean individual’s relevant characteristics.

A social standard of behaviour will prescribe an agent’s action as a function of his and his opponent’s status. Since the predicted action of theopponent is specified by the social standard of behaviour, an individual’s problem is a simple maximization problem of choosing an optimal action.

An individual will not treat an conflict situation in isolation. His choice inthis situation will affect his position in future encounters. The impact of present actions on future possibilities by changing his status is modelled as a function ofwhat he does in each encounter.

The following are the problems for an individual in a conflict situation:

(a) Choose an action that will maximize his life long payoff consisting theimmediate payoff.
(b) The transition mapping that associates each action taken with a newstatus level.
(c) The distribution of the status level of the other players he may meet in thefuture.

We call a pair consisting of social standard of behaviour and a transition mapping a social norm. Every social norm can not be maintained. As in game theory, we assume individuals act in their own self-interest. They calculate whether they are better off following the social norm or violating it. The decision will depend on, among other things, the distribution of the status levelsof the others in the society.

A social norm is called a norm equilibrium if:

(a) Each individual in the society finds is in his interest to follow the socialstandard of behaviour,

(b) The distribution of status levels in the society is stationary.

In this interpretation of individual behaviour, we can distinguish between two kinds of information that a decision-maker needs. He needs local informationabout the immediate situation, including the status of his opponent, and knowledge of the social norm and the current status distribution.

It is found that the entire society need not be common knowledge. A decisionmaker need not even have complete information about many

aspects of society. What is needed in our formulation is the prevailing socialnorm and the underlying status distribution. We formalize these idea in an extremely simplified society in which two classes of individuals are matchedrandomly to play a symmetric stage game in each period.

**2.1. Basic model of human behaviour:**

The basic model begins with a random matching model. A society will consist to two sets $P_1$ and $P_2$ of players. $P_1$ and $P_2$ are assumed to be of same size. In each time t(=1, 2, 3, ….), each player from one set is matched randomlywith a player in another set to play a game. A stage game G (say) has been taken. Players sets are assumed to be continuum. The probability distribution over opponents in each period is assumed to be uniform.

The players of both types i(= 1 & 2) seek to maximize the expecteddiscounted sum of stage game payoffs. There is a discount factor $\delta \in (0,1)$which is common to all players.

The stage game is a pair $\Gamma = \{A, \pi\}$, where$A = A_1 \times A_2$

and $\pi : A \longrightarrow R^2$

$A_i$ is the set of actions available to a player of type i in the stage game and $\pi_i(\alpha)$donates the stage game payoff to a player of type i when action pair $\alpha \in A$ is chosen.

Payoff to a player of types i, $\pi_i$ , is said to be individually rational if it isat least as large as the level he can guarantee for himself, that is

$\underline{u}_i = min_{\alpha j \in Aj} . max_{\alpha i \in Ai} \pi_i(\alpha_i, \alpha_j)$

Throughout this chapter the set of individually rational payoffs is assumed to bebounded.

We denote a random matching game by $\Gamma^\infty(\delta)$ when its stage game is Γ,its discount factor is $\delta$ and $I_i$ is a continuum.

In each period t, each player of $I_i$ is assigned an element x of a finite set$X_i = \{x_i, \dots , x_k\}$ which we will refer to as his status level.

The status assignment $\chi$ is a pair $(\chi_1, \chi_2)$ where $\chi_i$ is a function $(\chi_i(h))_{hgIi}$, specifying the status level $\chi_i(h)$ that the player h $\epsilon I_i$ possesses at particular time.

Let us assume that when a pair is matched, their status levels will be common knowledge to the pair.

In particular , their action choices will typically be functions of the pairof status levels.

A player's status level x $\epsilon\ \chi_i$ is updated in each period by a predetermined rule, The transition mapping $r_i : X \times A_i = X_i \times X_j \times A_i \rightarrow X_i$

i.e $r_i$ specifies the status level of a player of type i in the next period, $r_i(x, z, \alpha) \epsilon X_i$, when his current status level is x $\epsilon X_i$, the matched player's currentstatus level is z $\epsilon X_j$ $(i \neq j)$ and I's current action is $\alpha\ \epsilon A_i$ .

we write $r = (r_1, r_2)$.

There is a status distribution $p_i \in \Delta_{Ki-1}$, in each period, a probability measure on $X_i$ or an element of the $K_i - 1$ dimensional simplex specifying theproduction of the population of status x $\in X_i$ by $p_i(x)$ in that period.

Let us denote $P = (P_1, P_2) \in \Delta = \Delta_{K1-1} \times \Delta_{2-1}$

**2.2. Theorem 1:-**

If $\pi_i(\alpha^*, \alpha^*)_i = \underline{u}_j$ for i = 1, 2, then $(\alpha^*, \alpha^*)$ is supported as a norm equilibrium outcome with two status levels when $\delta$ is sufficiently close to 1.

**Proof:-** Let $X_i = \{G, B\}$.

We define $\alpha_i^i$ and $\alpha_j^i$ so that $\underline{u}_i = \pi_i(\alpha^i_i, \alpha^i_j)$.

Let $(q_1^*, q_2^*)$ be the stage-game one-shot (possibly mixed strategy) Nash equilibrium where $q_i^*(\alpha_i)$ denotes the probability of playing $\alpha_i$. For any arbitrarypair $(\alpha_i^*, \alpha_j^*)$,

Let us suppose that

$$r_i(x, z, \alpha) = \begin{cases} G & \text{if } (x, z, \alpha_i^*) = (G, G, C) \\ B & \text{otherwise.} \end{cases}$$

$$\sigma_i(x, z) = \begin{cases} \alpha_i^* & \text{if } (x, z) = (G, G), \\ \alpha_i^j & \text{if } (x, z) = (G, B), \\ \alpha_i^i & \text{if } (x, z) = (B, G), \\ \alpha_i \text{ with probability } q_i^*(\alpha_i) & \text{if } (x, y) = (B, B). \end{cases}$$

$$P_i(G) = 1 \quad \text{and } p_i(B) = 0 \qquad I = 1, 2.$$

Clearly, $v_i^\infty(G) = \pi_i(\alpha_i^*, \alpha_j^*) / (1 - \delta)$ and

$v_i^\infty(B) = \underline{u}_i / (1 - \delta)$.

If follows that the triplet $(r, \sigma, p)$ is a norm equilibrium. By allowing coordination through time, any strictly individually rational payoff vector,

including convex combinations, can be approximated as the average payoffoutcome with two status levels when $\delta$ is sufficiently close to 1.

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