Rational Choice and Mental Model

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Techniques for Rational Analysis Lecture 12

Nash Equilibrium as a Local Optimum

Self-Reinforcing Nature of Stable Social Norms



Figure: Micro-Macro Feedback Loop of Stable Social Norms [1]

Nash Equilibrium as a Local Optimum

Social Norm and Coordination

Example (Which Side to Drive?)

Table: Driving Game			
$1 \setminus 2$	Left	Right	
Left	1	0	
Right	0	1	

Social Norm as the Automatic Alternative

Example (A Native's Frame on the Driving Game in UK)

If the decision maker knows the correct answer, the set of alternatives along with the can be a singleton set.

1 2	Left	Right
Left	1 , 1	0, 0
Right	0, 0	1, 1

The British natives know the rule "you have to drive on the left side".

$$\forall i \in N[domP_i = \{(Left, Left)\}]$$

Social Norm as the Best Response

Example (A Foreigner's Frame on the Driving Game in UK)

2(natives)	Left	Right
1(foreigner)		
Left	1 , 1	0, 0
Right	0 , 0	1, 1

A stranger (foreigner) may not be sure which side to drive but they can observe the natives driving on the left side. If he does not want to crush into the natives, it is optimal for him to drive on the left side.

- $\forall i \in Foreigners[domP_i = {Left, Right} \times {Left}]$
- $\forall i \in Natives[domP_i = \{(Left, Left)\}]$

Change in the Environment

Restricting the decision frame may cause inefficiency in the long-run.

Example (UK connected with France via EURO Tunnel)				
1 2	Left	Right		
Left	1, 1	0, 0		
Right	0, 0	1.2, 1.2		

Restricting the perspective to the extant way, that is $domP_i = \{(Left, Left)\}$, deprives the decision makers from a better opportunity of driving on the right side.

- A list of strategy profiles $(s^{i*})_{i \in N}$ (that is each player $i \in N$ imagines an equilibrium in her mental model) of an extensive game with perfect information is a self-confirming equilibrium iff $\forall i \in N$:
 - s_i^{i*} is a best response to s_{-i}^{i*}
 - On player j's decision node reached by the play, $s_j^{i*} = s_j^{j*}$

Hypergame

Definition (Simple Hypergame)

 $(G^i)_{i \in N}$, where G^i is a subjective game of player *i*.

Definition (Consistent Subjective Nash Equilibria)

Let s^{i*} be a Nash equilibrium of subjective game G^i . The list of subjective Nash equilibria $(s^{i*})_{i \in N}$ is consistent with experience iff $\forall i \in N \forall j \neq i, s_j^{i*} = s_j^{j*}$.

For hypergames with only payoff misperceptions, the following theorem is easy to prove.

Theorem

All consistent subjective Nash equilibria are also a Nash equilibrium of the base game.



Masahiko Aoki.

Toward a Comparative Institutional Analysis. MIT Press, Cambridge, 2001.

Drew Fudenberg and David Levine. Self-confirming equilibrium. *Econometrica*, 61:523–545, 1993.