We study the evolution of internal reward systems, of internal preferences. There is a game with two strategies, A and B. There is an external ("real") payoff matrix

$$\begin{array}{cc} & \begin{array}{cc} A & B \end{array} \\ \begin{array}{c} A \\ B \end{array} & \begin{pmatrix} a & b \\ c & d \end{pmatrix} \end{array}$$

There are two types of players, $i = 1, 2$. Type i has the internal payoff matrix

$$\begin{array}{cc} & \begin{array}{cc} A & B \end{array} \\ \begin{array}{c} A \\ B \end{array} & \begin{pmatrix} a_i & b_i \\ c_i & d_i \end{pmatrix} \end{array}$$

His belief system (or internal programming) leads to a transformation of the external matrix into the internal one.

We put all types of players and strategies on a social network.

Each node can be one of the following: A_1, B_1, A_2, B_2.

Players interact with their neighbors using best response dynamic. They choose the strategy that maximizes their internal payoff given the current strategy of their neighbors.

Occasionally, players update their type. In this case they "ask" their neighbors which internal matrix they have and they adopt the matrix proportional to that neighbor's external payoff sum. Thus the belief system is updated in a death-birth (DB) setting using external payoff.

We can study a variety of different games and transformations.

A first example would be the external matrix (with $b > c > 0$)

$$\begin{array}{cc} & \begin{array}{cc} C & D \end{array} \\ \begin{array}{c} C \\ D \end{array} & \begin{pmatrix} b-c & -c \\ b & 0 \end{pmatrix} \end{array}$$

Type 1 players have the actual external matrix also as their internal one.

Type 2 players have the internal matrix (with $a > c$)

$$\begin{array}{cc} & \begin{array}{cc} C & D \end{array} \\ \begin{array}{c} C \\ D \end{array} & \begin{pmatrix} b-c+a & -c+a \\ b & 0 \end{pmatrix} \end{array}$$

On a (quasi) k-regular graph, I expect the (deluded) type 2 players to win if $b/c > k$.

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