## Supporting information

The simulation framework for the model described in section 2 is presented as follows. The symbol ‘%....’ is the annotation for the framework. The simulation code was implemented in Matlab (R2015b).

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| Initialization of parameter values ()**for** a given initialization condition **do** *% Repeating experiments to obtain average value of results*GENERATE a scale-free network by Barabási-Albert algorithm ***% (section 2.1)***% Each node represents a game player |
| ***% (section 2.2 begins)***SORT for players according to their degrees ASSIGN a strategy (C or D) randomly to each player *% The initial strategies are randomly assigned among players with equal probability***for** each game time (*t*) **do**  *% Game time t begins* |
| **for** each player *i* **do** *% Each player selects interacting-neighbors sequentially* |
|  **if**  IDENTIFY player *i*’s neighbors who are not his interacting-neighborsIDENTIFY player *i*’s neighbors whose   **if** there is no any neighbor who is satisfied with the above two requirements player *i does nothing in this selection* **otherwise** player *i* SELECTS interacting-neighbors according to a certain selection rules   *% high-degree selection rule according to* *formula (2), or, random selection rule***end****end****end** *% Interacting-neighbors selecting for game time t has been finished***for** each player *i* **do** *% Each player calculates game payoff*  |
|  **if**  *% if player i has interacting-neighbor at game time t*CALCULATE game payoff  according to formula (3) **else**  *%*  *if player i does not have interacting-neighbor at game time t*  **end**   **end** *% Calculating game payoff has been finished***for** each player *i* **do** *% Each player updates strategy* **if** player *i* UPDATEs strategy according to formula (6) **else** player *i* keeps strategy invarible **end** |
| **end**  *% Updating strategy has been finished* |
| **end** *% Game time t ends, returns to blue ‘****for****...****do****’ and game time t+1 begins****% (Section 2.2 ends)*** |
| **end** *% Repeating experiments end* |