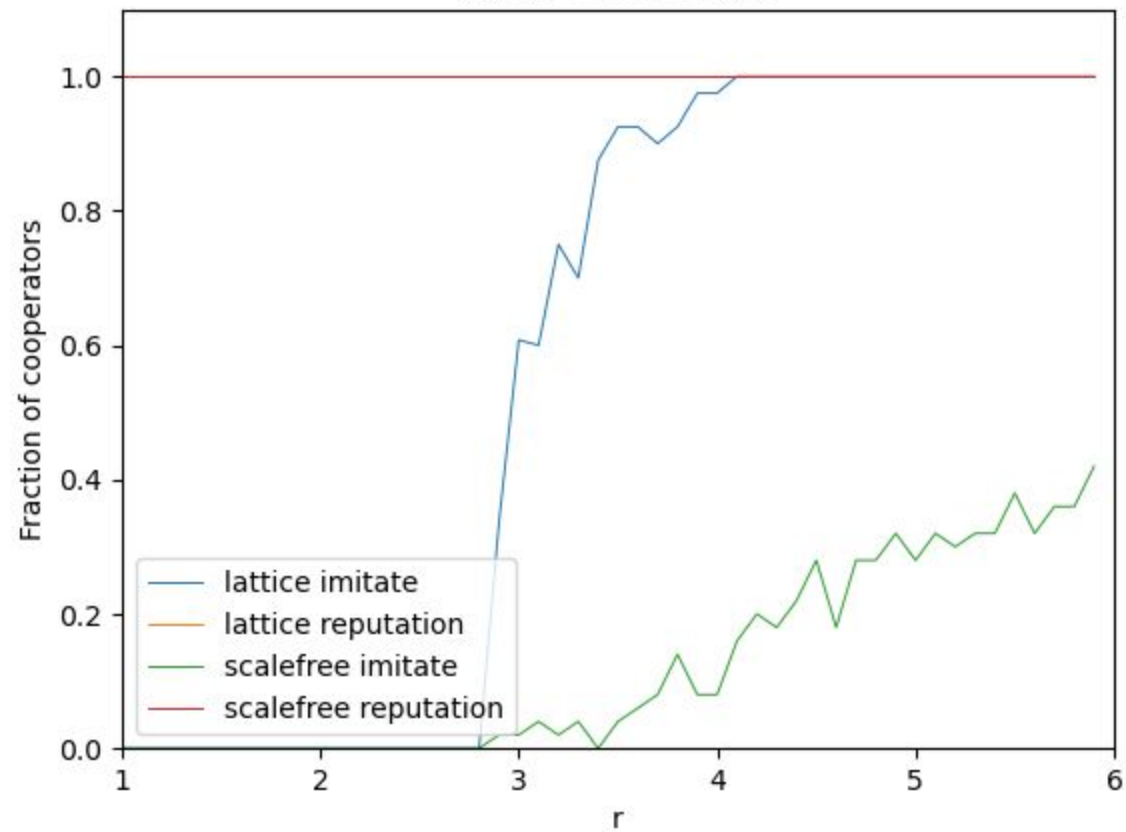


# Applying the Reputation Model

1. Public Goods Game
2. Opinion Dynamics

Public Goods Game



# Opinion Dynamics Model

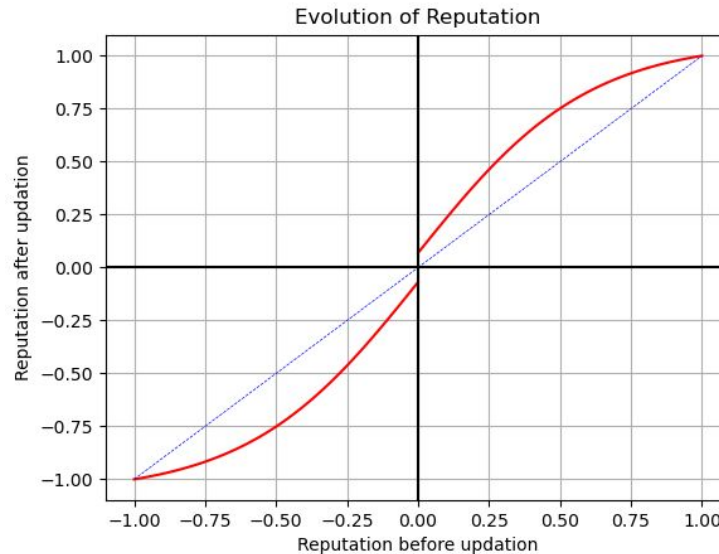
There are 2 (equal) strategies - A and B. The payoff matrix is simply of the form:

|          |   | Player 2 |        |
|----------|---|----------|--------|
|          |   | A        | B      |
| Player 1 | A | 1, 1     | -1, -1 |
|          | B | -1, -1   | 1, 1   |

i.e. interaction with same strategy gives a positive payoff. The game is symmetric. If strategies are evolved by imitation (based on payoffs), then clusters of same strategy agents would be formed (hypothesis)

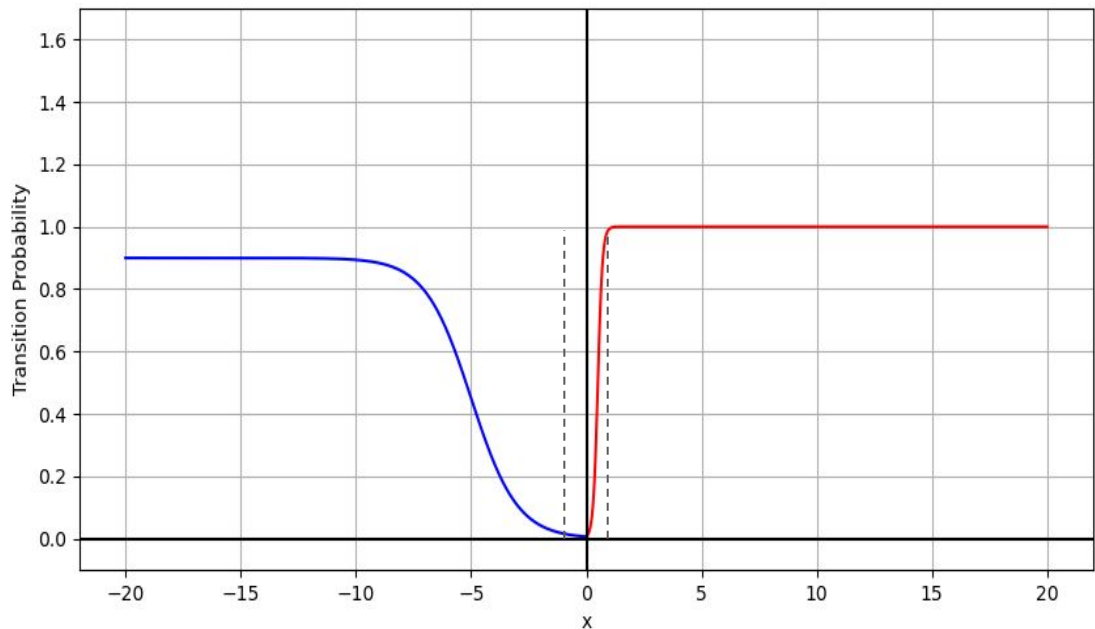
# Opinion Dynamics Model - Reputation

Reputation of an agent lies between  $[-1,1]$ . The initial reputation of an agent is set to be 0. If an agent with positive reputation adopts strategy A, then the reputation of the agent increases. Symmetrically, an agent with negative reputation adopting strategy B will experience a reduction in reputation (higher absolute value of reputation).



# Opinion Dynamics Model - Reputation

Imitation based on reputation (in the local neighbourhood of the agent) is done according to the following transition probability:



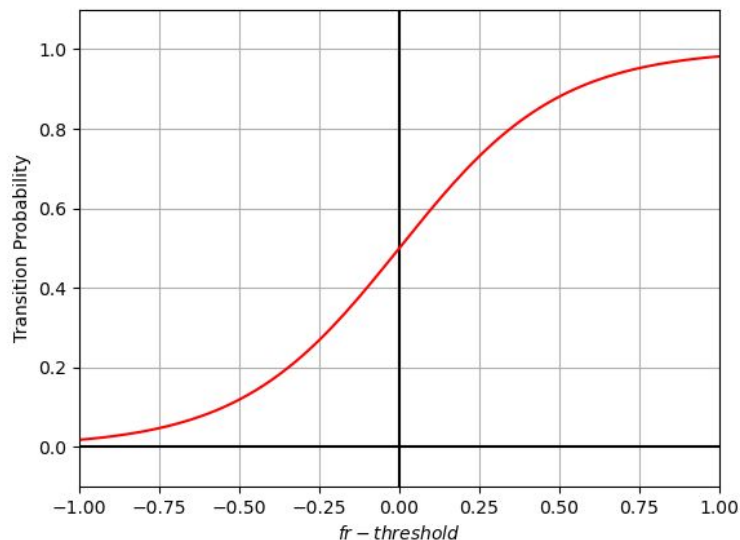
$$x = \text{sign}(s.o) \left| \frac{s}{o} \right|$$

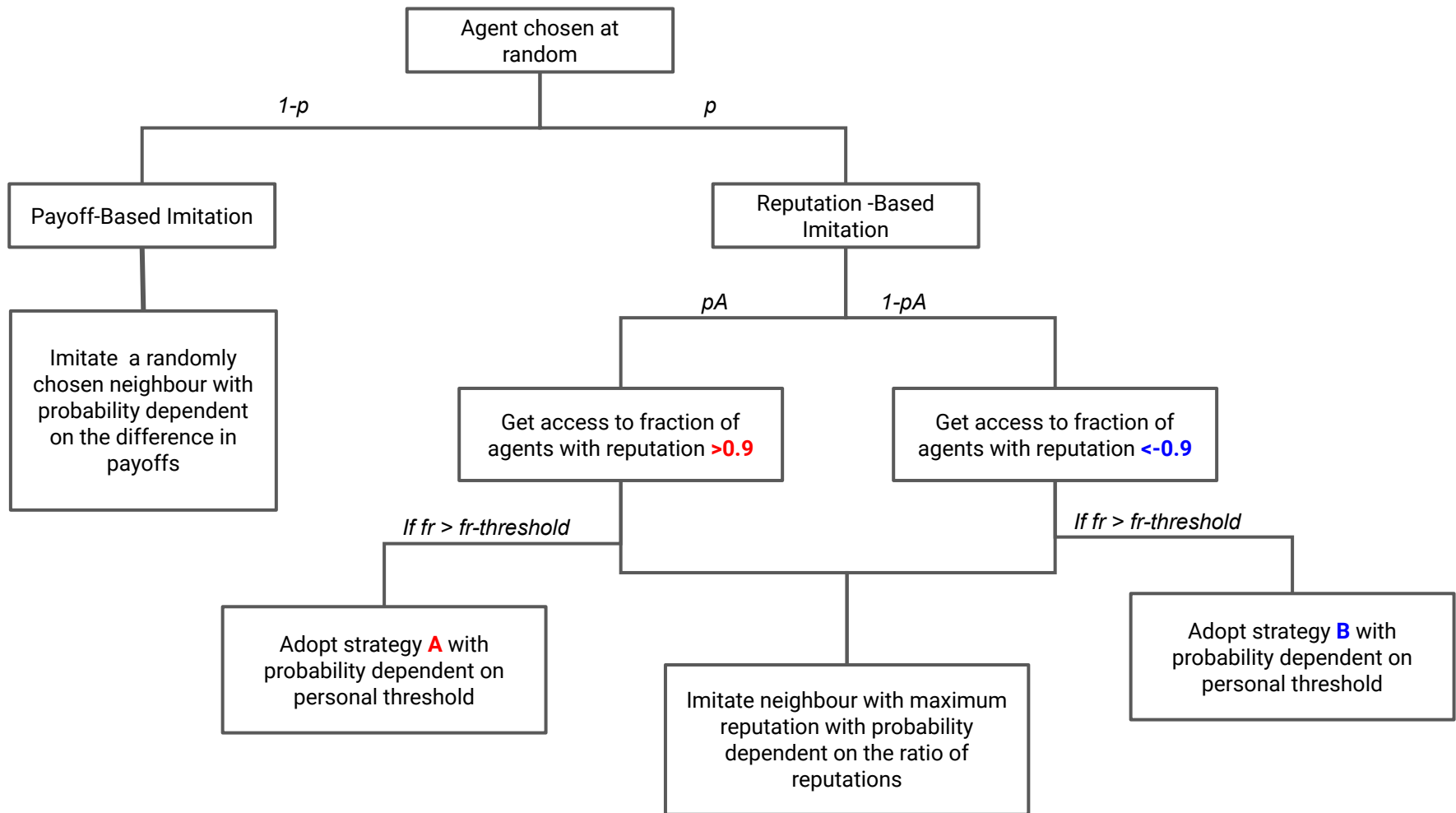
$s$  = self reputation

$o$  = maximum reputation among neighbors

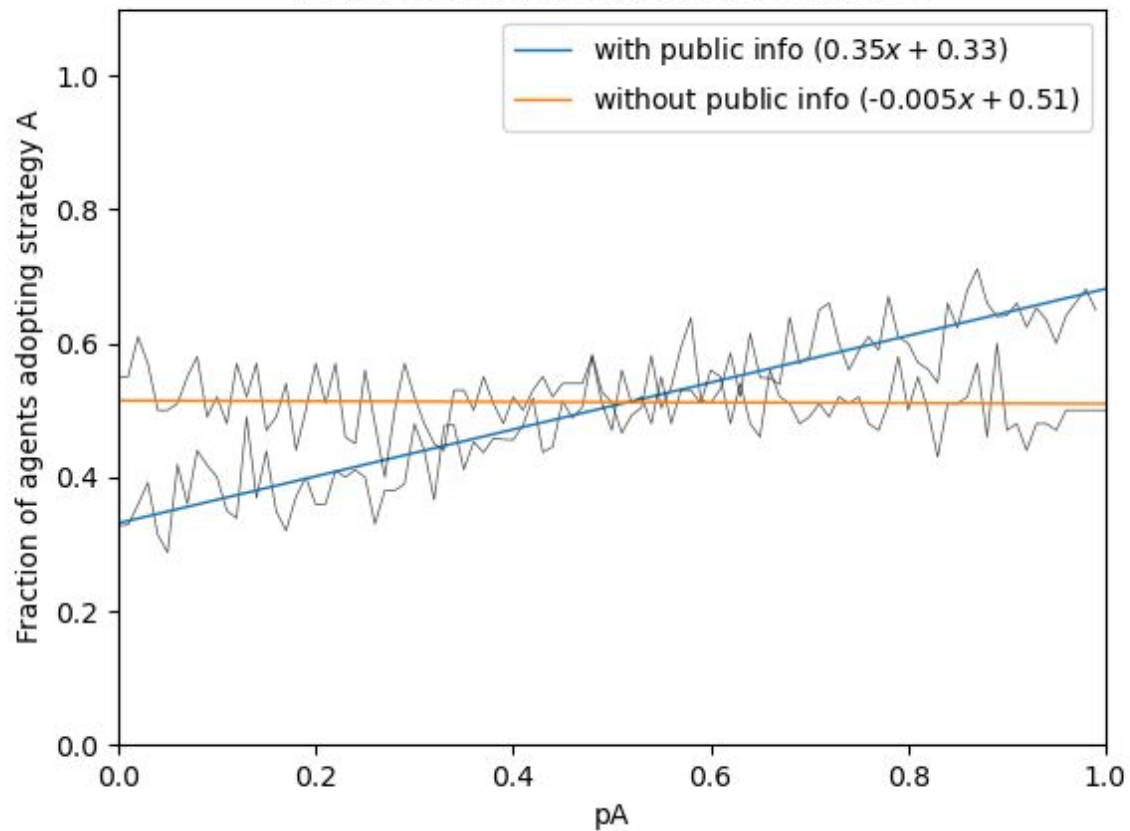
# Opinion Dynamics Model - Public Information

With probability  $p_A$ , the agents are able to access the fraction of population with reputation  $>0.9$ . With probability  $(1-p_A)$ , they have access to the fraction with reputation  $<-0.9$ . If the absolute value of this fraction is greater than the agent's threshold, then the agent adopts that strategy (A or B, depending on the sign of the reputation).





Model: Reputation, Network: Scalefree





Model: Reputation, Network: Lattice

