Imitation Dynamics and Absorbing Sets

In any situation with many players, each of whose payoffs at any given time are reliant upon those players around him, there are many ways for that player to respond. The most intuitive reaction is Best Response, i.e. analyzing what the surrounding players are likely to do in the next round, and choosing how to react based on that assumption. A different mechanism for deciding, however, is called Imitation Dynamics. Imitation Dynamics do not take into account what the surrounding players are likely to do, or even what might best help your payoff in the next round. Each player has a set number of 'neighbors', the number of players around him that he affects and that affect him. In this specific case, every player is either an 'egoist' or an 'altruist' (there is a third type of player 'hooligan', but it was not used in my implementation). Egoists do not affect their neighbors, but as such lose no energy from the interaction, and therefore lose no payoff. Altruists affect their neighbors with positive 1 payoff, but at a cost of c, where $c < .5$ (in this case .3). Each round, every player asses the payoffs of their neighbors. If the average amount received by the other type of player in your neighborhood is higher than the average payoff of those that are in your current state, you switch in the next round. Otherwise you stay the same.

You have reached an 'Absorbing Set' when none of the players want to switch their identity from round to round. For instance, if all players are in the same state, no one *can* switch because everyone's neighborhood is full of the same identity as each player. There are other absorbing sets as well, but the game that I implemented focuses

just on the two where all players are the same. If you reach a state of all egoists, you have lost and must try again. If you reach a state where everyone is an altruist, you have won the game!