Multiagent model is trying to construct a system consisting of agents able to learn and adapt to external world and interact with other agents and the environment. According to Moretti (2002), computer simulation contributes a lot to fill in the gap between the micro individual, whose possible behaviors have been defined , and the macro structures, which we get after several runs but don't include in initial program (p.46). However, there are still some weaknesses for that model. First, the assumptions can be more realistic, understandable, and applicable in the case of limited knowledge. "In particular, theories of rationality need to be extended to learning and adaptation." wrote Moretti (2002, p.46). Second, there is still a long way to go to formalize all the aspects of psychological theories including emotions, motivations, desire, intent, consciousness and so on. Third, the problem of formalization of knowledge is still waiting to be solved.

Cellular automata can be regarded as "a particular kind of multiagent system in which the agents have a specific and determined position in a lattice and are homogeneous in their behavior and in their modality of interaction" (Moretti, 2002, p.47). It has some advantages like simplicity and visualized, but also has some weaknesses. One limitation of cellular automata is each cell is updated simultaneously while in real social processes individuals can change their attitudes and opinions at different moments. This problem can be solved by choosing to modify only some units. Another important limitation is how to define the neighborhood of a unit so that it won't interact with all the elements in the system. Since interactions can take place among individuals who are not "physically" close to one another and the neighborhood can change over time, the boundary of neighborhood is difficult to set.

Moretti (2002) highlights "feedback" as a key characteristic of computer simulation (p.54). A good example given is game theory, which deals with the rational behavior of individuals who aim to gain personal advantages. The model assumes that people interact with others only when they benefit from the interaction. As a result, the evolution assures the survival of those types of interactions that yield the greatest benefit for all individuals. To show why the

model related to “dynamic feedback”, let’s suppose an initial trade between agent A and B becomes less attractive to A so he chose to trade with another agent C. Then that trade may affect other present and future business partners of C, changing behaviors of C and those agents, and leading to more impact on other agents in the model. As for a topic in political science where the underlying system exhibits dynamic feedback, we can consider the recent Sino-us trade war. If more tariffs on China’s products are imposed, China may revenge by imposing more tariff on US products. Those trade costs will cause significant pressure on economy of two countries, which will finally transform into political pressure. If China gives in earlier, then Trump may win more votes in next general election. Or if the negative impact on people’s daily life like the rise of price has a more significant impact, then Trump may lose a lot of votes in next general election. An interesting research question is “What’s the effect of more tariffs on China’s products on the possibility of Trump’s reappointment?” With the theoretical model and computer simulation, we may know more about the answer to that.

Reference

Moretti, Sabrina, “Computer Simulation in Sociology: What Contribution?”, *Social Science Computer Review*, Spring 2002, 20 (1), 43-57.