**Assignment 3**

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**1. Simulation in Sociology, Moretti (2002)**

In the article the author discusses about the potential weaknesses in validity regarding to multi-agent systems and cellular automata that is the feature of synchronism and the connection with the empirical word. Even though multi-agent systems and cellular automata can better simulate the social phenomena, using the synchronous updating of states might not be able to perfectly represent the real world since the behavior of individual would not updated simultaneously. In addition, computation simulations in general derive the verified behavior of agents from the theory, and theory might not be an accurate representation of reality. In other words, the consequence of the simulation is only based on the changes of variables or assumptions of the theory. Therefore, the simulations produced by multi-agent systems and cellular automata are still not able to perfectly represent the social phenomena in the real world.

To illustrate the characteristics of dynamic feedback in computer simulation, the author mentions some research about the model of dynamic social impact, which explores the necessary and sufficient conditions for the clustering and the polarization of opinions. In a multi agent systems, the researchers can change the initial configuration of the environments or the features of each agent, then observe how those changes change the subsequent interaction and how the behavior of agent crossover and mutate. During the process, the researchers can get the dynamic feedback and realize how the changes of parameters can stimulate different behaviors.

Within Political Science, theories of international relations are difficult to test. For example, the topic on the preference of a country towards cooperation when a strong military country starts building up its military power would be hard to experiment. Therefore, using the dynamic feedback here would be helpful to discourse the possible outcomes. First, we could evaluate the military power among different countries and classify them into, for example, strong, not so strong, and least strong. When a strong country decides to enhance their military power, then a least strong country might choose to cooperate with other stronger countries. In response to this cooperation, some of not so strong countries might consider collaborating with those which are also not so strong or go with a strong country. However, if the not so strong countries decide to join the strong countries, they might need to become subordinate to the stronger one. This result might influence other not so strong countries’ decisions to cooperate. On the other hand, if many of the weaker countries decide to cooperate, then the strong country might consider to cooperate with others as well. As a result, different choices might lead to different outcomes. Through the computer simulation in multi-agent systems, cellular automata, or genetic algorithm, we can use the dynamic feedback to better evaluate the possible outcome of the topic in the real world based on the changes of parameters and the environments.