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Emergent Actors in World Politics: How States and Nations Develop

Lars-Erik Cederman
Princeton, NJ: Princeton University Press
1997
Cloth: ISBN 0-691-02149-X

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Emergent Actors is an excellent book. At its core is what I would view as a right-minded attempt to dislodge the state from the sacred spot it holds in international relations (IR) theory. Drawing liberally on literatures of development, IR theory and philosophy of science it lays out a methodology to deconstruct - and then reconstruct - the state, outlining a modelling approach that I hope will be built on by future scholars.

There are three major parts to *Emergent Actors*. The first part lays the philosophical groundwork for the application of a particular type of simulation approach - complex adaptive systems (CAS) - to social phenomena, and, in particular, to the study of IR. The next two parts develop two applications of CAS to social phenomena: the balance of power and nationalism.

The first section of the book is an exposition on theorising in IR, in particular critiquing the reification of the state in IR theory, and pointing to theorising where the state is endogenous. In particular, Cederman develops the basis for his application of CAS models to IR. A complex adaptive system is defined as "... an adaptive network exhibiting aggregate properties that emerge from the local interaction among many agents mutually constituting their own environment." (p. 50) Cederman asserts, essentially, that the state system is a phenomenon that emerged out of a primordial mix of smaller actors, and that to understand the state system one needs to understand the process by which the system emerged.

In the first application, Cederman develops a simulation model of state development. The artificial world he develops is a 20 x 20 lattice of mini-states jockeying for position. Initially the world is made up of some ratio of predator and *status quo* states, where for each period a state is given a random quantity of resources for attack and defence. Predator states, given some ratio of advantage in overall resources with respect to a neighbour, will attack, and, given some ratio of local resources, conquer. In this artificial world, Cederman manipulates the rules for state decision making, as well as the rules for victory and defeat. It is therefore possible to run "history" thousands of times to evaluate the impact of underlying parameters on the probability of particular outcomes. The striking finding that Cederman induces in the first simulation model is that factors which Realist theorists in IR identify as stabilising for the international system are in fact destabilising in this primeval soup of proto-states: defensive alliances and defence dominance. The reason for this is that while these mechanisms slow the growth of predator empires, they also pave the way for a hegemonic take off of a *single* predator empire, because once one empire has reached a critical mass it has the field clear to itself, because the system has blocked the growth of potential rivals.

This is one of those elegant findings, fairly compelling after the fact, that turns conventional wisdom on its head. It is a particularly strong critique of the neo-realist tradition following Kenneth Waltz; less strong, I would argue, of the Realist tradition following Gilpin, Organski and Carr, which characterises the world as hierarchic rather than anarchic, and treats great power war as a battle over the rules of the system.

I would note two limitations to this finding. First, is the question of whether this finding holds in a world that is made up of great powers. The Realists that Cederman is critiquing are focussed on the relatively small *n* world of great powers - like that which existed in the 19th and 20th centuries. Cederman asserts that one needs to understand the process by which such a world emerges. Nonetheless, it would be useful to take the subset of worlds in his simulations where a small number of great powers emerge and thus to see whether his finding might apply to our world. A second question regarding hegemonic take off concerns whether there are natural and human boundaries to state expansion that reduce the likelihood of the emergence of unipolarity - such limits were clearly in evidence in the development of the German and Italian states. Cederman does extend his model in this direction by assuming in a variant simulation that larger states extract fewer resources per unit of size than smaller states do. He does not however incorporate into his model the physical and ethnic geography on which the growth of empires is based. (The model of nationalism that Cederman produces in the latter half of the book offers promise in exploring the latter phenomena.)

The nationalism section contains two rather different models. The first is a Markov model that Cederman rather neatly uses to summarise three families of IR theories that relate modernisation and nationalism. This chapter is a useful synthesis and representation of existing ideas regarding nationalism. The second modeling effort is a rather ambitious attempt to model the ecological process by which the myriad of nationalist movements that might come to exist actually succeed or fail. In this model, a multinational empire is made up of subordinate cultures that are represented by two digit binary strings ruled by dominant centre represented by 1?. Movements of type 00, 01, 0?, ?0 and ?1 may rise up to challenge the centre, where a ? is a "wild card" that is compatible with either a 0 or a 1. The last three movements are thus more inclusive than the first two. It is this inclusiveness versus exclusiveness of incipient movements on which the model pivots. This modelling approach captures some of the essential dynamics of the ecology of nationalism, and I think will be an enduring contribution of the book - although, unlike the balance of power model, Cederman does not produce any particularly novel propositions from this model.

Now for a methodological non-sequitur: A decade ago I had the opportunity to observe Christopher Langton, one of the founding figures of Artificial Life, attempting to videotape students at a Santa Fe Institute Summer School being used as cellular automata in Conway's Game of Life. His objective was to use a 10 x 10 grid of people to replicate some of the intriguing patterns that arise in the Game of Life, given certain starting points. The attempt to replicate these patterns was an utter failure - because out of the 100 cells someone was always getting it wrong, and these patterns turned out not to be very robust to a small amount of noise. Langton gave up after almost an hour of attempts.

The general question that this story raises regarding modeling is one of robustness - might slight changes to the model of no apparent substantive importance greatly change the observed dynamics? This is particularly a concern where there are assumptions embedded in operational decisions regarding the simulation. For example, Cederman assumes that each square produces a certain quantity of resources, and that the total resources that a state produces are the sum of the independent products of its constituent "building blocks." One implication of this is that the resource level of large states will be far more stable than that of small states. An implication of that, in turn, is that a world of two large predators facing each other will be far more stable than two small predators, controlling for size ratio.

Empirically, this may or may not be true - the question from a modeling perspective is whether it matters to the results that have been induced.

This is not meant as a criticism of Cederman - who exceeds "industry standards" at considering alternative specifications of the model. Nor is it a criticism of computer simulation as a tool to study social phenomena. Rather, it is a call to producing extensive robustness tests of propositions that are produced with simulations - a possibility created by Moore's law. It is, of course, impossible to test a proposition against an entire parameter space, since that space (for continuous variables) is infinite. However, it is possible for most simulations to test a significant (if infinitesimal) sample of a parameter space. If the proposition is "increasing x will increase y" then it should be possible to extensively sample the parameter space to examine whether this relationship holds (or if not now, 10 years from now this will be true, when computers are 100 times faster, or if not in 10 years, 20 years when they will be 10,000 times faster...) Cederman is clearly aware of robustness issues - and in fact warns against "exaggerated confidence in the robustness of the results ..." (p. 134) And certainly an important part of the examination of the robustness of any study is the process of accumulation of research on a topic - if Cederman's research has an impact then variants of his models will be examined, and the literature will explore how his findings are contingent on particular parameter values and model specifications. (The follow up research to Axelrod's *Evolution of Co-operation* is a case study of this process.) However, it is increasingly possible through brute computational force to explore the parameter space of a particular model. In fact, doing so reduces one of the advantages of deductive mathematical modelling over inductive simulation methods - that findings deduced from such models can fully describe the model's parameter space.

In any case, Cederman has produced a book for the field of IR to build on. Cederman accomplishes three things of note in this book: (1) he makes an excellent case for the application of a completely novel methodology to the study of IR; (2) he produces a simulation model of state formation and "balance of power" from which he induces novel and important hypotheses regarding state formation and systemic stability; and (3) produces a valuable modelling framework for the study of the rise and fall of nationalist movements.