

Nature (2004) Vol 427 No 6974 pp471-570: Plotting the downfall of society p 488

JOSEPH A. TAINTER reviews Historical Dynamics: Why States Rise and Fall (2003) by Peter Turchin. http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v427/n6974/full/427488a_fs.html

DRW critique of the review in bold. Tainter text in quotes. **URL links are live in pdf.**

“Cyclical theories, like the phenomena they postulate, come and go. They have been espoused by historians from Polybius to Oswald Spengler. Serious historians have long held cyclical theories in disrepute, but now they're back, pushed in part by biologists who are accustomed to cycling or pulsing in such systems as predator–prey relationships and ecosystem development. C. S. Holling, for example, has developed a nuanced cyclical view in his 'panarchy' theory, and Kenneth Watt has explored cycling in population, resources and economics.”

Cyclical? Is that what Figure 4.4 shows? The characterization is a straw-man simplification. Either that or this reviewer has not read the book or not really understood Turchin’s models.

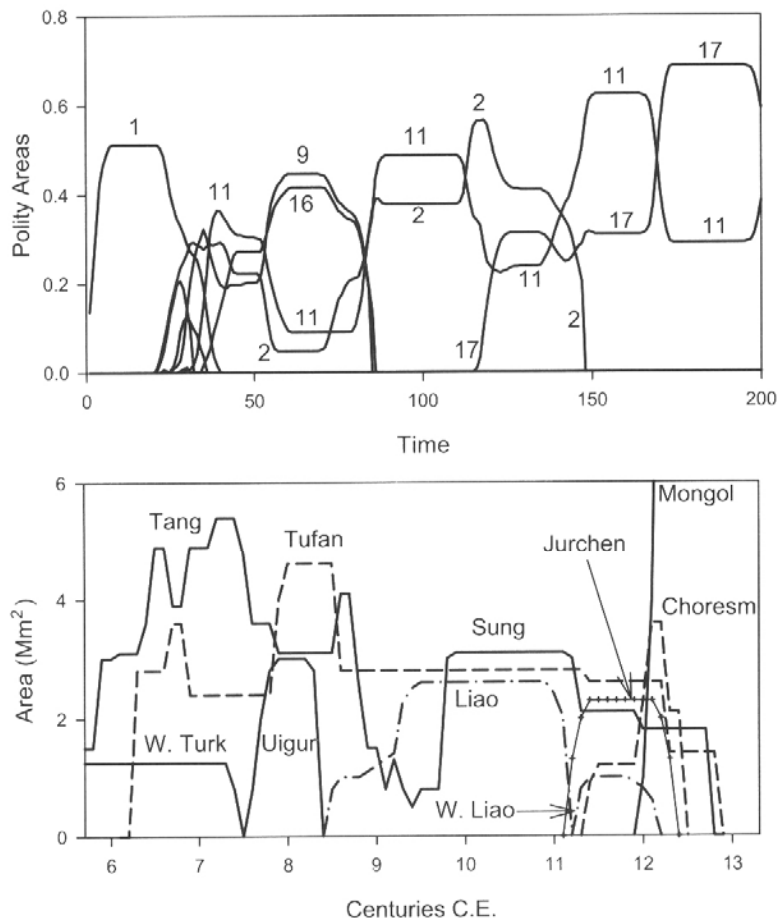


Figure 4.4 (a) Dynamics of the spatial asabiya-area model. Each curve depicts the territorial dynamics of simulated empires (polity area is expressed as a fraction of the total arena occupied). Model parameters are $r_0 = 0.2$, $\delta = 0.1$, $h = 2$, $S_{crit} = 0.003$, and $\Delta_p = 0.1$. Numbers associated with the trajectories are the imperial indices of the polities. (b) Expansion-contraction curves of areas for polities in East and Central Asia, 600–1200 C.E. (Data from Taagepera 1997: Appendix)

“Turchin ignores problems of complexity in large societies, and asymmetrical warfare between states and non-states.”

Turchin explicitly limits his study to agrarian states, a point not noted by the Tainter.

“The quantification is built on ordinal scaling, judgemental assignment of values, and arbitrary cut-offs.”

Turchin’s variables, e.g., those in his metaethnic frontier theory, are in principle measurable ratio scale variables that are no more judgmental than any other form of measurement. This is hogwash. Turchin does provide codes for his variables that are ordinal, but this is a first approximation and a normal procedure for cross-cultural comparisons because of level-of-precision problems. **The cut-offs have to do with selection of the sample with respect of applicability of the theory, e.g., to states with large territories. Turchin selects polities with territories over 10^6 km² for testing the theory, which is a perfectly valid option.**

“Turchin cites archaeological settlement data from Roman Gaul that display two peaks and troughs. The relationship between the number of archaeological sites and population is complex, as Turchin acknowledges. If this pattern reflects population oscillations, he asserts, then unchecked population growth in the first peak led to insolvency and breakdown. In fact, neither peak reflects simple population growth. The first (from the first to the second century AD) came from Romanization and settlement of veterans, the second (in the fourth century) from changes in taxation.”

This is quite unfair and a misrepresentation of what Turchin says (p. 176). He did not assert that all population growth came from endogenous reproduction, nor that the population increases of the fourth century following a period of warfare might not have occurred during a period of tax reform. *Reductio ad absurdum.*

Etcetera. Read the review for yourself. But don’t forget to peruse Turchin’s book itself.

For more detail on Turchin’s metaethnic frontier model, see

Response commentary and questions

by Doug White

<http://eclectic.ss.uci.edu/ResFocusGrp/talks/Afterword2-18-04.pdf>

Re: A new approach to social dynamics (02-18-2004)

by Don Saari:

<http://eclectic.ss.uci.edu/ResFocusGrp/talks/SaariLecture2-18-04.pdf>
presentation for the Social Dynamics and Evolution group of MBS

Tainter is an anthropologist who has taught at UNM and is project leader at the Rocky Mountain Research Station in the USDA Forest Service in Albuquerque. He published with Bonnie Tainter one of the SFI Studies in the Sciences of Complexity, *Evolving*

Complexity and Environmental Risk in the Prehistoric Southwest (1996, Addison-Wesley).

Tainter's new (2003) book, **Supply-Side Sustainability**, (Timothy F. H. Allen, Joseph A. Tainter, and Thomas W. Hoekstra) Columbia University Press 2003 seems well worth examination. Here is the flyer:

“While environmentalists insist that lower rates of consumption of natural resources are essential for a sustainable future, many economists dismiss the notion that resource limits act to constrain modern, creative societies. The conflict between these views tinges political debate at all levels and hinders our ability to plan for the future.”

“Supply-Side Sustainability offers a fresh approach to this dilemma by integrating ecological and social science approaches in an interdisciplinary treatment of sustainability. Written by two ecologists and an anthropologist, this book discusses organisms, landscapes, populations, communities, biomes, the biosphere, ecosystems and energy flows, as well as patterns of sustainability and collapse in human societies, from hunter-gatherer groups to empires to today's industrial world. These diverse topics are integrated within a new framework that translates the authors' advances in hierarchy and complexity theory into a form useful to professionals in science, government, and business.”

Full text of Tainter's Nature review of Turchin:

In one of history's most extraordinary forecasts, the Greek historian Polybius in the second century BC predicted the demise of the Roman Empire some 600 years before it fell. Like others of his time, Polybius held a cyclical view of history in which societies, like biological systems, develop through growth, maturity, senescence and death. Polybius might be more celebrated today had he based his prediction on a different theory. Retrospectively, his forecast was no more challenging than anticipating the death of an ox.

Cyclical theories, like the phenomena they postulate, come and go. They have been espoused by historians from Polybius to Oswald Spengler. Serious historians have long held cyclical theories in disrepute, but now they're back, pushed in part by biologists who are accustomed to cycling or pulsing in such systems as predator-prey relationships and ecosystem development. C. S. Holling, for example, has developed a nuanced cyclical view in his 'panarchy' theory, and Kenneth Watt has explored cycling in population, resources and economics.

Beginning with the aphorism that a discipline usually matures only after it has developed mathematical theory, population biologist Peter Turchin attempts in this book to develop quantitative cyclical theory in two main areas: territorial expansion and contraction in agrarian states, and population growth and decline in relation to political stability. He has taken care to write for historians: the verbal theories and mathematics are clearly presented, and the work is thoroughly researched and erudite.

Turchin bases his 'mature' approach on the work of the fourteenth-century Arab historian Ibn Khaldun, who sought to explain why desert nomads topple North

African dynasties. Ibn Khaldun argued that the founders of dynasties rule well and tax lightly. Succeeding generations, though, develop a taste for luxury, resulting in higher taxation and declining welfare. Late-phase dynasties are challenged by desert nomads who have high degrees of *asabiya*, defined as collective solidarity or a capacity for collective action. Nomads with *asabiya* topple dynasties that lack it, starting the cycle anew. Ibn Khaldun perhaps meant his theory as a critique, but Turchin takes it literally. It might be called the 'team spirit' theory of history.

In his 'metaethnic frontier theory,' Turchin proposes that areas where imperial frontiers coincide with major ethnic boundaries function as '*asabiya* incubators'. High *asabiya* allows a peripheral people to expand as an old empire contracts. Turchin builds this idea into quantitative simulations of expansion and contraction in European territorial history from AD 500 to 1900. The quantification is built on ordinal scaling, judgemental assignment of values, and arbitrary cut-offs.

Like Polybius, Turchin can mimic actual outcomes despite having a dubious social theory. Metaethnic frontier theory is flawed by its primordial assumptions (for example, that ethnic groups are 'quintessential human groups' and that conflict is innate) and by failures of fact and logic. Turchin ignores problems of complexity in large societies, and asymmetrical warfare between states and non-states. States, of course, inculcate something akin to *asabiya* in their armed forces. Ask soldiers why they fight and they will answer: "For my buddies" — rather like nomads. *Asabiya* was strangely ineffective during the centuries when North African nomads failed to expel the Carthaginians, Romans, Vandals and Byzantines. And one wonders about the ethnic solidarity of Renaissance armies that were filled with mercenaries, a matter that Turchin ignores when he simulates European territorial changes.

'Demographic-structural theory' builds on Jack Goldstone's excellent work on population growth and state breakdown, and on Turchin's own experience in population biology. This exercise quantifies how political instability and population interact. Unsurprisingly, Turchin's models show that interaction between population dynamics and a state's fiscal health produces cycles of expansion and breakdown.

This theory is on firmer ground than *asabiya*, but much of the discussion remains simplistic. In his population model, Turchin treats élites like an inert organic mass that expands and contracts with resources, ignoring the organizational aspects of hierarchy. A need for organization may raise the proportion of élite administrators regardless of resources, as in the later Roman Empire.

Turchin cites archaeological settlement data from Roman Gaul that display two peaks and troughs. The relationship between the number of archaeological sites and population is complex, as Turchin acknowledges. If this pattern reflects population oscillations, he asserts, then unchecked population growth in the first peak led to insolvency and breakdown. In fact, neither peak reflects simple population growth. The first (from the first to the second century AD) came from Romanization and settlement of veterans, the second (in the fourth century) from changes in taxation.

Quod non fecerunt historici fecerunt biologi — biologists presume to go where historians hesitate. Social theory is a minefield, even for those experienced in it. The quantification of historical patterns is useful and important, and should have a place in historical research. But sophisticated mathematics will not improve naive social theories.