Prologue

None of the crises described in this book are beyond the capacity of Americans to solve. It would be entirely possible for the United States to implement a modern electoral system, to restore the legitimacy of the courts, to reform its police forces, to root out domestic terrorism, to alter its tax code to address inequality, to prepare its cities and its agriculture for the effects of climate change, to regulate the mechanisms of violence. All of these futures are possible. There is one hope, however, that must be rejected outright: the hope that everything will work out by itself, that America will bumble along into better times. It won't.

This book targets the last of these seven crises: to regulate the mechanisms of violence. It's goal is to bring modern mathematics, specifically catastrophe theory, to bear on the problems of social polarization, division, and the onset of civil war in the United States of America at the time of writing, Fall 2022. We will try to connect catastrophe theory to these problems with a minimum of mathematical mystification.

Catastrophe theory

Dynamical systems theory is the branch of modern mathematics dealing with the trajecctories of evolving systems. During its eaarly days in the 1060s, it discovered

chaotis behavior in these systems, so it also also known as chaos theory. Efforts to develop applications of chaos theory to the sciences in the 1970s by the mathematicians Rene Thom and Christopehr Zeeman gave birth to catastrophe theory, which provides a small number of well-defined strategies for such applications.

One such application, to the outbreak of war, enjoyed a wave of popularity in the 1980s. This book is inpired by that stream of literature.

Polarization

Sociak and political polarization are processes of aggregation in which a population migrates into two or more subpopulations. Frequently a polarization process evolves further into tight concentrations of well separated groups, or factions or divisions. And sometimes, violent behaviors develop between two factions, leading to civil war. In American politics today, this entire sequence seems to be playing out rapidly.

The plan of this book

Our plan for this book is to locate catastrophe theory in the idea space of cybernetics, system dynamics, and the history of the mathematical modeling of social and political behavior, ending up with a three-dimensional map of the behavior of polarization, division, and the onset of civil war, and the control factors of factions and social mediaa. The book has three parts.

Part A locates our work in the history of peace science, along the time-lines of early cybernetics and the system sciences, catastrophe theory, models for peace and war, the

cybernetics of Norbert Wiener, the action research of David Loye, and the cultural evolution of William Irwin Thompson.

Part B begins with an optional chapter on the vocabulary of chaos theory. The main target is the notion of bifurcation, which is fundamental to this book. Then we delve into the foundational ideas of the madness of crowds, the social science of civil war, and the two control facctors we have chosen for our mathematical odel.

Part C concludes the book with a nontechnical description of our models for political violence and the outbreask of civil war, based on catastrophe theory.

10   Schismogenesis