

Chapter 5

What Is a Complex System?

Is there a single natural phenomenon of complexity found in a wide variety of living and nonliving systems and which can be the subject of a single scientific theory? Is there such a thing as ‘complexity science’ rather than merely branches of different sciences, each of which have to deal with their own examples of complex systems? This chapter synthesises an account of how to think about complexity and complex systems from the examples and analysis of the preceding chapters. Roughly speaking, our answers to these questions are no to the first and yes to the second. There is no single phenomenon of complexity, but there are a variety of features of complex systems that manifest themselves in different ways in different contexts. Hence, complexity science is not a single scientific theory but a collection of models and theories that can be used to study the different features in common ways across different kinds of systems. The following sections consider different views about complex systems, and the penultimate section argues for our view. The final section of this chapter reflects on the broader implications of what has been learned.

5.1 Nihilism about Complex Systems

The most negative view of complexity is simply that there is no such thing. Similarly, it could be argued that ‘complex system’ is a vague and ambiguous term that covers a variety of things and that complexity science is just a collection of techniques and methods that does not have a domain of its own. In this way of thinking, which we can call ‘nihilism’, there are very different ways that different sciences are combined to study complicated systems, and complex systems are just complicated things we study with interdisciplinary science using computers. Anything over and above that is, at best, a conve-