
Preface

Complexity, and its kindred notion, simplicity, are such abstract ideas that if we try to discuss them in a completely general way we are not likely to find anything worthwhile to say. These notions can be of value to us, but only after we have specified an interpretation as to what sort of item it is, the complexity and simplicity of which are to be considered, and how varying degrees of complexity and simplicity are to be estimated. Many different interpretations can be spelled out, relevant to different issues in diverse fields of study, such as metaphysics, aesthetics, logic, mathematics, and the sciences.

In the history of philosophy these abstract notions have been of considerable importance to metaphysicians. Plato suggests that the Demiurge, in creating the cosmos, intended to harmonize complexity with simplicity. Leibniz, committed to viewing ours as the best of all possible worlds, adds that, in order to be so, it must exhibit the maximum overall combination of complexity with simplicity. This will amount to great simplicity in its universal laws, together with great variety in its particular details. Kant extended this outlook into philosophical aesthetics by claiming that to experience an object as beautiful is to be aware of it as having an inexhaustible complexity of detail, combined with the greatest compatible simplicity in its formal structure.

Philosophers of science also have invoked the notions of complexity and simplicity, especially in connection with their accounts of scientific reasoning. To be sure, some of them had clung to Francis Bacon's principle of induction by simple

enumeration, imagining that this could be the logical basis of all scientific method. Others, however, recognized that Bacon's principle fails to account for many important scientific inferences, such as those involved in curve-fitting. Kepler sought to find the orbit of a planet by fitting a curve to a series of particular observed points along its route. Innumerable, very different curves are mathematically consistent with the observations, however, and the principle of enumerative induction offers no adequate basis for choosing among them.

Kepler unhesitatingly chose as the likeliest solution the simplest curve compatible with the observations. What justification is there for proceeding thus? C. S. Peirce in writing of this matter takes the view that of course Kepler was thinking in the scientifically correct manner, but that in order to make sense of such thinking we must presuppose that there is a supernatural power who designed the universe and who preferred simplicity to complexity in its laws. A good many other philosophers have said the same.

Yet, on the other hand, those wishing to evade theological assumptions may prefer to say merely that it is a basic feature of correct empirical reasoning that simpler hypotheses, if they are consistent with observations, are likelier to be true than are more complex hypotheses. In any case, complexity and simplicity need to figure prominently in our account of how science reaches its explanations. We must grant, of course, that the notions of complexity and simplicity, as they relate to scientific method, are not susceptible to strict formal definition; but neither are many other important notions that we understand and use, and we should be willing to accept some vagueness in our notions, despite the intense yearning for exact definitions that animates much traditional philosophy.

Dr. Peter Baofu has now taken up the notion of complexity, and will trace it through many of its modern variations. He will give it his own distinctive interpretation, and in his own way will seek to spell out the implications of this elusive yet essential notion.

Dr. Baofu is an unusual scholar. He has worked in many fields, lived in many countries, and written many books. In his extensive writings he has ranged over the natural sciences, the human sciences, politics and modern life, and prospects for the future. We must welcome this, his latest intellectual exploration, in which he confronts complexity.

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