



Chaos and Harmony: Perspectives on Scientific Revolutions of the 20th Century

By Trinh Xuan Thuan

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For 300 years, Trinh Xuan Thuan writes, since the time of Isaac Newton, scientists saw reality as a giant clock--a sterile mechanism in which one part acts on another in a deterministic fashion. But the discoveries of the last few decades have changed all that, conjuring up instead a universe brimming with unpredictability, creativity, and chance.

Writing with exceptional grace and clarity, Thuan vividly describes these important scientific discoveries, intriguing new theories about chaos, gravity, strange attractors, fractals, symmetry, superstrings, and the strangeness of atoms. Equally important, he reveals how these discoveries have shaped our view of the universe--for instance, how quantum mechanics brought indeterminism to the subatomic universe. Thuan deftly describes quantum mechanics, discusses its relationship to the theories of relativity (which deal inability to accept it. Indeed, throughout *Chaos and Harmony*, he makes clear as never before the mind-bending ideas of modern physics, such as the effect of gravity on time (it slows it down), the impossibility of crossing the speed-of-light barrier (it would actually reverse time), the role of fractals as "the language of nature," and the unreasonable effectiveness of mathematics in understanding the universe.

From the subatomic world to the vast realm of quasars and galaxies, from the nature of mathematics to the fractal characteristics of the human circulatory system, Trinh Xuan Thuan takes us on a breathtaking tour of the universe. With striking examples and clear, plain language, he shows how science has actually restored mystery to the world around us--a world of symmetry *and* chaos, contingency *and* creativity.

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Editorial Review

Amazon.com Review

Trinh Xuan Thuan, whose books of popular science are bestsellers in France, is an astronomer by training. In *Chaos and Harmony*, he reaches well beyond the immediate bounds of that field to consider the explosion of scientific knowledge of all kinds in the 20th century, and he muses on the very nature of scientific inquiry.

The most important aspect of a theory of science, in Trinh's view, is not that it be verifiable experimentally, but that it "allow beauty and truth to emerge into one." General relativity is a hallmark in this regard. Unendingly rich in insight and implication, as well as "inevitable, simple, and congruent with the whole," it has enabled cosmologists to range across the whole of time and to conceive of such phenomena as black holes and curved space. Trinh applies his beauty-and-truth criterion to various problems, such as where the moon--the largest known satellite in the solar system--came from, how chaos theory can properly be applied to economic modeling, and why nature seems to favor symmetry. Along the way, Trinh pauses to remark on episodes in the history of science and to make gentle but provocative asides (for example, gainsaying Einstein to insist that God does indeed play dice with the universe). Elegant and lively, Trinh's book is a fine survey of contemporary scientific ideas and a look ahead at science's ongoing quest for a unifying Theory of Everything. --*Gregory McNamee*

Review

"Thuan's elegant prose vividly captures the interplay of chance and necessity that shapes our universe. An astonishing array of phenomena are woven together in a coherent way. Thuan conveys an appreciation of the complexity and beauty of our cosmos, and the excitement of our ability to understand it."--J. Richard Gott, III, Professor of Astrophysics, Princeton University

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Users Review

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