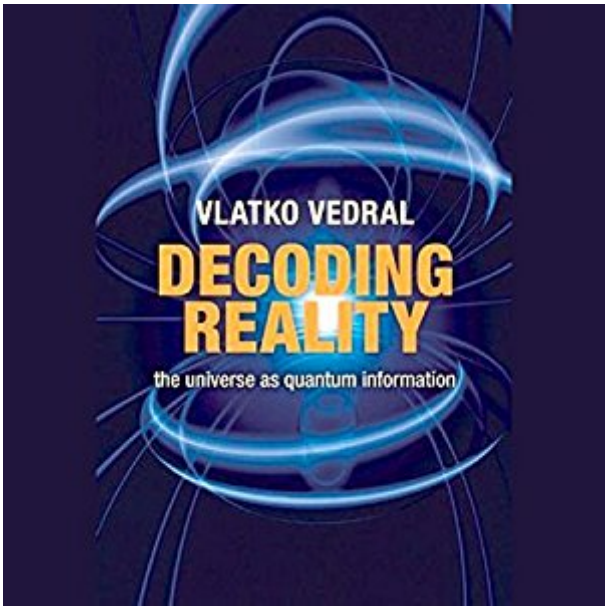
Decoding Reality: The Universe As Quantum Information



Synopsis

In Decoding Reality, Vlatko Vedral offers a mind-stretching look at the deepest questions about the universe--where everything comes from, why things are as they are, what everything is. The most fundamental definition of reality is not matter or energy, he writes, but information--and it is the processing of information that lies at the root of all physical, biological, economic, and social phenomena. This view allows Vedral to address a host of seemingly unrelated questions: Why does DNA bind like it does? What is the ideal diet for longevity? How do you make your first million dollars? We can unify all through the understanding that everything consists of bits of information, he writes, though that raises the question of where these bits come from. To find the answer, he takes us on a guided tour through the bizarre realm of quantum physics. At this sub-sub-subatomic level, we find such things as the interaction of separated quantum particles--what Einstein called "spooky action at a distance." In fact, Vedral notes, recent evidence suggests that quantum weirdness, once thought to be limited to the tiniest scale, may actually reach into the macro world and make teleportation a real possibility. It is in quantum physics, he writes, that we really can find the answer to the ultimate question of life, the universe, and everything. Vlatko Vedral is one of the key researchers in quantum science. In this book, he offers a mind-bending account of this leading-edge field. --This text refers to an out of print or unavailable edition of this title.

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Customer Reviews

An ambitious book, as it purports to answer nothing less than the ultimate questions of reality: why is there a reality in the first place, and where does it come from? The author intends to provide the

ultimate answer to the infinitely recurrent or regressive questions of reality ("How and why did the beginning (of it all) happen ? If the answer is a Big Bang, then whence the Big Bang? If God, then how did God arise, and so forth, ad infinitum")Does the book succeed ? If it did, it could qualify as nothing short of the greatest advance in physics, or for that matter in any science or philosophy, ever. Let's look at it.First, a note about style.The book is divided up in three parts.The first part is written in a perhaps somewhat overly familar, chatty style, with a sprinkling of oft-lame jokes (e.g. "being insane does not exclude being intelligent, as half of my department can attest to"), overuse perhaps of the words 'I' and 'my', and oversimplifications which, as often happens, muddle up rather than clarify (e.g. " the information content I of an even is inversely proportional to the log of its inverse probability P of occurrence, hence: I= Log (1/P) " . Say again ? This means rather that I= Ã˜(Ã)* Log (1/P) , where Ã˜ is some to be defined lump-all function and Ã a set of tbd variables. Setting a priori Ã˜(Ã) to equal 1 is not warranted. Indeed, further on in the text the author examines some of the contributive influencing factors - the Ã˜(Ã) part of the definition.)Then there is the constant defining or explanation or rehashs of concepts that in 99% of the cases will be long familiar to the reader.

The principle argument of the book is that information is the fundamental element that constitutes our universe - more fundamental than energy, or its condensed offspring, matter. While this is a large claim, the early part of the book is a delight: a simple and clear introduction to the basics of information theory, elaborated with easy-to-understand examples that only occasionally lead the reader mildly astray. The author outlines why the majority of information-bearing systems in nature tend to be digital (digital encoding requires less energy and is simpler to error-correct) but he ignores important exceptions (phenomenon such as pressure waves are analog).Major problems with the author's argument soon appear, however. One problem is that Vedral accepts as axiomatic the notion that less common events convey greater amounts of information in consequence of the fact that they are less common. But a moment's reflection suggests that the story cannot be so simple. Less common events do not necessarily contain more information, nor do they necessarily require more information to describe them. Although the author illustrates his idea by talking about how common words are shorter and less common words are longer, it is merely a generalized tendency towards efficiency that has resulted in the inverse log-proportional distribution of word frequency/word length in many (but by no means all) languages. To see why infrequency per se does not imply greater information content, imagine that there is only one kind of car on Earth, but it can come in two colors: blue and red. Out of every ten cars made, nine are blue and one is red.

The author attempts to explain the universe as emerging from nothingness based on information.The book is split into 3 parts,Firstly an explanation of information theory, which is lightweight but grounded in reality. Along the way he explains how information theory works in different fields, such as biology and financial economics. So far so good.The second section attempts to explain some macro phenomena as quantum information. Unfortunately this is where the thread starts to unravel. The distinction between quantum bits (qubits) and bits is poorly explained, and then the author steps away from quantum computing to suggest that this may be happening at the molecular level. With almost reckless abandon he tosses off a few references to support his idea. Unfortunately in at least one case, his facts are either wrong or poorly stated. For example p 148: "Biological plant efficiency is super-high, around 98% of the radiation that hits teh leaf does get stored efficiently." This nonsense, as the plant would be almost non-reflective and appear quite dark, an obvious error that defies common sense and albedo measurements. Perhaps he meant 98% of the absorbed visible radiation that is trapped by chlorophyll?The last part just goes off into la-la land as speculative philosophy. It may be that the universe is a quantum computer and it may be that information is fundamental to the universe, but the evidence presented is effectively non-existant. The edifice, like much of philosophy is built on logic, not on experimental data, without obvious testable hypotheses (at least as presented to the reader). The end result reads like mysticism, much like Fritjof Capra’s works.

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