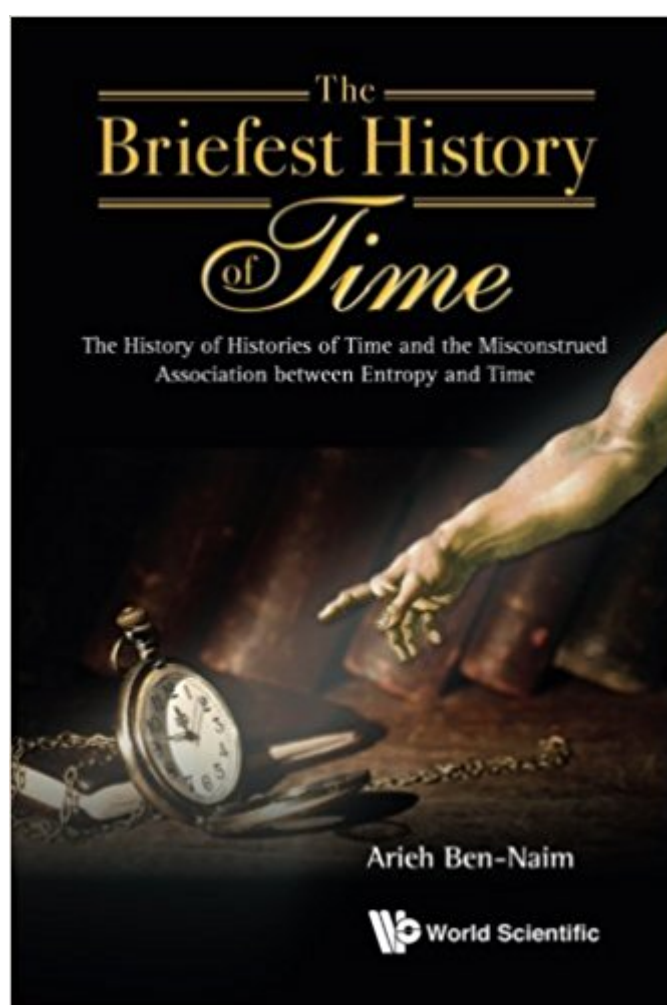


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# The Briefest History Of Time: The History Of Histories Of Time And The Misconstrued Association Between Entropy And Time



## Synopsis

The aim of this book is to explain in simple language what we know about time and about the history of time. It is shown that the briefest (as well as the lengthiest) history of time can be described in one or two pages. The second purpose of the book is to show that neither entropy, nor the Second Law of Thermodynamics has anything to do with time. The third purpose is to educate the lay reader how to read popular science books, critically. Towards this goal, detailed reviews of four books on time are presented. There are many popular science books on Time, on the beginning of Time and the end of Time. This book is unique in the following two senses: It explains in simple terms what Time is, and why it is not related to entropy. It critically reviews a few popular science books which perpetuate all kinds of unfounded ideas about the relationship between Time and the Second Law.

Readership: Interested lay public, students of any of the sciences, scientists, teachers and researchers.

## Book Information

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## Customer Reviews

Ben-Naim goes up against the greats with common sense. A real eye opener whether you're a physicist or layman.

Now, from the brilliant mind of Professor Arieh Ben-Naim comes a bold and powerful look at a subject we are all interested in: TIME. Through the ages, philosophers, scientists and physicists alike have tried to explain Time. Is it real or an illusion? Is it a substance or a thing? Can it be born or die? If so, is it alive or is that just plain nonsense? Can we travel back and forth through Time?

How is Time related to the Second Law of thermodynamics? These questions and many others tantalize and stimulate our imagination. But where do reality and imagination meet? Ben-Naim provides answers while courageously, challenging the works of charlatans who twist science to sell their books. Ben-Naim rebukes and debunks their silly theories about time and entropy with REAL science. With great respect to US, the consumer, Ben-Naim's book is actually about Time, not fanciful tangential fiction or some modified history of physics and cosmology! This is a fast pace, entertaining and exciting book. The illustrations are superb, quality printing and the elegant deep chocolate color of the cover make this a must have addition to your library. Students of philosophy and science finally have a fresh reference regarding Time thru the eyes of an exceptional intellect. Everyone who reads this marvelous work about Time will enjoy thinking about the concepts for weeks, months or even years. Please give this book a read and tell your friends also. Since this book uses real science, it is educational as well. This book is now my favorite Ben-Naim literary work and I'm quite sure it will become one of your favorites also.

What can be truly special in science happens when you find an author who sees things deeply while explaining very very simply. Ben Naim's books can be compared to Richard Feynman's classic "Feynman Lectures on Physics" which many people know as a wonderful place to learn about the true heart of nature. Although the topics Feynman discusses are powerful and deep laws of nature, his explanations are straightforward and play well on the mind. Physicists and physics students who read Feynman invariably come away feeling refreshed and with renewed enthusiasm for their subject. Feynman's writing and teaching were not at all independent of his quest as a physicist - his desire was to gain as clear and concrete a grasp on things as he possibly could. "To find out what the hell is really going on" seems to be the aim. Such a quest means putting aside all preconceptions and truly getting a top to bottom understanding of things - not simply remembering what some authority has said, but to know it for oneself. One gets the feeling that Ben Naim approaches physical science with this same sort of honesty and openness. As Feynman's comprehension of Physics was deeper than just about any physicist, so Ben Naim has a profound grasp of entropy and the second law, as well as its relation to information theory. He has proven this in book after book, each one giving a clarity to be found nowhere else. Okay, then, you ask: 'Well, why is entropy important in explaining time?' The answer is this: Entropy is important when considering the nature of time, since many authors today are making a crucial error and binding the two together in a confusing and misleading way. To learn the true relation ( or lack of relation ) between entropy and time, it only makes sense to turn to one of the top authorities on entropy, Arieh

Ben Naim. And, in a manner similar to Feynman, Ben Naim goes to great lengths to make his points as carefully and gradually as possible, adding style and flair to keep the reader relaxed along the way. I once had a professor who said to us "Anything written by Feynman, you should read!" I would add that, for all those concerned with Entropy, Information theory and issues of the Arrow of Time: "Anything written by Ben Naim, you should read!"

Is a catchy title enough to engage readers in a critical assault on popular books by authority figures with the stature of Stephen Hawking and Sean Carroll? Does a retired professor of physical chemistry have the credentials to scold beloved authors? Given his experience using entropy in his own field, Ben-Naim is quick to notice and criticize inaccurate, sloppy, imprecise, and speculative uses of that concept. Still, this book is a brash effort by Ben-Naim whose most popular book sold 4,000 copies compared to Hawking's approximately 10,000,000 copies of *A Brief History of Time*. Professor Ben-Naim's professional experience includes studying the folding of proteins and the anomalous entropy effects of argon in water but not cosmology. He does not share confidence in many of the mainstream ideas of cosmology including the Big Bang. Ben-Naim also asserts the entropy of the universe is undefined. For example, Ben-Naim writes "The reader should be informed that the Big Bang is a highly speculative idea based on extrapolating back into the past, using theories that might not be applicable to such an extreme state of the universe." So it is no surprise that he criticizes authors who accept the standard model of Big Bang cosmology. Ben-Naim has previously written more technically detailed books on the topic of entropy and the second law of thermodynamics (e.g. *Entropy and the Second Law*). He has tried to bring rigor to an area that has become casual and careless. For example, he criticizes many of the common descriptors for entropy as inaccurate or imprecise. Describing entropy as "disorder" is an annoying scientific offense because there are many cases where this is not appropriate. Example: mix two distinct ideal gases from containers of volume  $V$  in a container of the same volume, keeping the temperature constant. The entropy change is zero despite the fact that the combined gas mixture seems more disordered. Ben-Naim's precise definition of entropy is based on the more general concept of Shannon's Measure of Information, SMI, which requires knowing only the probability distributions involved. When a system reaches equilibrium, the SMI is maximal; this is equivalent to the entropy of the system (up to a proportionality constant and switching to natural logarithms). If you apply the SMI formula to the Maxwell distribution of velocities and a random distribution of molecular locations at equilibrium, the result is the entropy for an ideal gas. In the preface of *Briefest*, Ben-Naim sets out four ideas he

wants to convey to readers. 1. Time is basically timeless, and has no history. 2. Neither entropy nor the second law has anything to do with time. 3. The history of a substantial thing is a list of events occurring at points in space and points of time. 4. It is almost impossible to tell the history of an abstract concept such as beauty, a mathematical theorem, or time.

The first chapter reviews the concept of time and the pervasiveness of time in figures of speech. The point is that time is a challenging and elusive subject to analyze scientifically. The second chapter discusses in a critical way what is required by a "history" in general and of an abstract concept. He even includes a history of himself. His point is that the term has been misused in the title of Stephen Hawking's two books. The two-page third chapter is "The Briefest History of Space". Here he applies the points of the previous chapter to show how terse the proper history of a concept can be. Similarly, chapter four is "The Briefest History of Time". It is three pages long. We find here an example of Ben-Naim's style. On the question of whether one may ask what happened before the Big Bang, he says, "In other words, I think that it is meaningless to claim that it is meaningless to ask about the time preceding the Big Bang." This might be a reasonable reaction, but where does it take the debate or how does it convince the reader? Ben-Naim reviews entropy and the second law of thermodynamics in the fifth chapter. It is condensed material from several of his earlier books. The real purpose of the book is the full frontal attack on specific books by Hawking, Carroll, and Frampton that is contained in the sixth chapter. He devotes many pages to A Brief History of Time, going chapter by chapter through it. On the Brief History of Time, the author concludes, "Over 90% of the book is irrelevant to the history of Time. This part is poorly written and most of it is incomprehensible to the lay reader. The remaining 10%, relevant to Time, is mostly meaningless and nonsensical." Out of 187 pages in Hawking's Brief, Ben-Naim counted 164 pages that do not mention Time, 21 that mention Time but are not relevant to the History of Time, and 2 that are relevant to the history of Time. Ben-Naim is similarly critical of Sean Carroll's From Eternity to Here. Regarding Carroll's essential thesis of the Past Hypothesis, Ben-Naim is mocking: "We do not know the fact (fact?) that the early universe began in a low-entropy state. This is not a fact, but meaningless, fictitious nonsense! This 'fact' and the corresponding Past Hypothesis appear so many times throughout the book that I felt I would soon start to worship the Past Hypothesis." To test the reader's critical skills, Ben-Naim provides ten quotes in the Epilogue to be dissected. The authors include Greene, Deutsch, Bruce, Schneider and Sagan and others. The Briefest History of Time should provide fodder for debate about popular science writing as well as foundational concepts and facts upon which our current theories are based.

Ben-Naim strives to challenge orthodoxy like Ernst Mach did, but does so in his own mocking way.

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