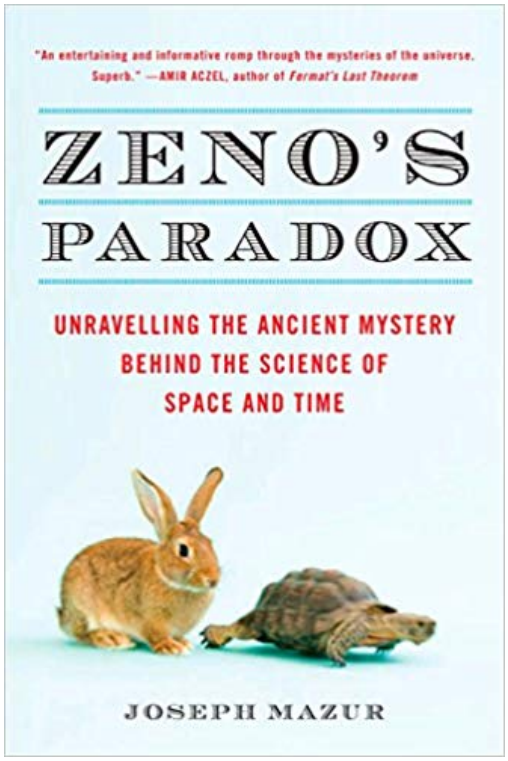
Zeno's Paradox: Unraveling the Ancient Mystery Behind the Science of Space and Time *by* Joseph Mazur



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The fascinating story of an ancient riddle?and what it reveals about the nature of time and space Three millennia ago, the Greek philosopher Zeno constructed a series of logical paradoxes to prove that motion is impossible. Today, these paradoxes remain on the cutting edge of our investigations into the fabric of space and time. *Zeno?s Paradox* uses the motion paradox as a jumping-off point for an exploration of the twenty-five-hundred-year quest to uncover the true nature of the universe. From Galileo to Einstein to Stephen Hawking, some of the greatest minds in history have tackled the problem and made spectacular breakthroughs?but through it all, the paradox of motion remains.

Reviews of the Zeno's Paradox: Unraveling the Ancient Mystery Behind the Science of Space and Time *by* Joseph

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Zeno's Paradox tends to be told from the perspective of the tortoise and the hare. The question is posed with the hare starting behind the tortoise at t=0, each time the hare runs the distance between the two, the tortoise would have moved forward by an amount equal to its slower speed multiplied by the time. As this process goes in ad infitum question becomes how can the hare overtake the tortoise despite the hare being faster? Asked another way, how can an infinite number of steps be finite. Zeno's paradox has a long history of analysis and the formal answer to the initial question was resolved several millenium later when it was realized that an infinite sum might still be a finite number. Joseph Mazur explores the topic yet again by questioning whether calculus based answers tell us what is happening in the physical world. It is an interesting book and does a good job describing mathematical history of analysis and the evolution of many ideas in physics. It is not really about zeno's paradox throughout and some parts are quite long winded but definitely it does a unique job of using an ancient question about the nature of reality and re-apply the logic to our understanding of the physical world today.

The book is split into 4 parts. The first sets the stage with ancient greece and describes zeno's paradoxs, which are several and discusses how the ancient greeks approached and debated the problems. The second part explores pre-calculus Renaissance and how the nature of physical reality and motion starts to be explored more rigorously with Galileo and Kepler. The third section describes the evolution of the math. Analytic geometry is discussed and the stage is set for Newton and Leibniz and the world enters the Enlightenment. The third section goes back to discussing physics and in particular modern theories of physics as well as classical relativity.

The motivation to use Zeno's paradox is, despite it being a mathematical problem, it implicitly asks what is the nature of space and time. How divisible is time, how divisible is space. Is the topology of space the same as the real line, which is the mathematical structure for which the answer to zeno's paradox was answered on? The book is a nice history lesson, as a philosophical enquiry i think its quite weak though. There is no answer's to zeno's paradox in an objective sense, if you assume that zeno's paradox is well posed because you can infinitely divide space and time then calculus gives the resolution. If you ask the question and then asks whether it is how nature really is and if nature isnt really like that, then the original paradox isnt well posed as the hare/tortoise relative steps would not be well posed at a certain point if space wasnt continuous. I enjoyed parts of the book as it is readable and easy to follow and brings up the history of thought on some of math and science's most important ideas. I dont think this is particular thought provoking with respect to Zeno's paradox and its relevance today though.
Alsantrius
Starts good ,gets too technical
Dalarin
Good read--interesting history. I really enjoyed this book.
Jare
and perhaps the book won't overtake you and you won't have to buy it.

I purchased this product some time ago, but didn't feel up to the task of reviewing it. What for? Who heeds bad revs?

It's a bad (or rather, unworthy of its theme), bad book all right. I'll be brief:

1) Its exposure of philosophy is superficial and biased (I don't have the space here to give examples, but trust me).

2) It's repetitive. For example, the stadium paradox is covered at least thrice: in page 4 of the Introduction (where it's stated that Aristotle exposed it as based on a fallacy); in pp. 29/31, where Mazur gives Zeno his due; and in page 41/42, where the book says Aristotle failed to understand the nature of the paradox. The other paradoxes (especially the arrow) are also analized several times.

3) It's incoherently written. For example, in page 132, Mazur writes "The arrow paradox also requires an understanding of limits as a mathematical model for instantaneous velocity, which calculus treats as a derivative, an instrument that creates limits of average changes in a dependent variety in small intervals on an independent variable. The model here is to view each point on the arrow's trajectory as though it were a limit of a sequence of rational numbers on the number line, so the arrow's path is assured a persistent even flow of space in the continuity of time. In effect it assumes, quite correctly, that all numbers on the number line are convergent sequences of rational numbers". Half a page (in the book's oversize font) completely wasted. And don't you think that a reader who understands what "convergent sequences of rational numbers" means would also know what is a real number?

4) Mazur manages to be at the same time irrelevant, at the limit of his knowledge, and a provider of meaningless detail. Now hear this (p. 196)!: "The quantum mechanics story began when a German physicist named Max Karl Ernst Ludwig Planck asked why subatomic particles radiate a blue light when they travel through a non vacuum-medium faster than the speed of light in that medium". Why, Mr. Mazur, methought Cerenkov radiation was discovered much later. What Planck (what would have happened had
he had only three names?) was looking for was a way to avoid the so called "ultraviolet catastrophe" in the black body radiation formula.

Bear in mind that each of these examples could be multiplied almost indefinitely. On the other hand, nothing on supertasks, or the legitimacy of conflating the geometrical and the real number continua, or the conceptual resemblance between Zeno's paradoxes and Kant's antinomies, and the question these place on the possibility of a represtation-based understanding of Nature; ... .

Do you think I'm unfair? But Mazur strikes me as intellectually dishonest in the same sense as Lacan when he equated, before an innocent crowd of bewildered and awed disciples, the phallus with i, the unity of imaginary numbers.

In short, if you think that the story of math and physics consists of knowing that in 1586 Stevin, Maurice & alia often met at a tavern where "water, dripping from cracks in its massive stone walls, kept [it] cool and damp. Candles and torch sconces provided moderate light in the windowless room. An intoxicating smell of fermenting spirits seeped from a whiskey and brandy distillery next door. Beer was cheap", and that they "would often sit together at a long sticky oak table coated with layers of sugars dried from decades of beer spills" (pp. 68/69), or that Dirichlet's names were Johann Peter Gustav Lejeune (p. 116), then you'll learn a lot from this book.

In any other case, avoid this travesty.

Mazur

1. The Knowability Paradox by Jonathan L. Kvanvig
2. The Universal Book of Mathematics: From Abracadabra to Zeno's Paradoxes by David Darling
3. Relativity: The Special And The General Theory by Albert Einstein
4. The Nature of Science: An A-Z Guide to the Laws and Principles Governing Our Universe by James Trefil Physics Professor
5. Zeno: La Coscienza Di Zeno, La Rigenerazione, Racconti E Altri Testi (Biblioteca Dell Orsa) by Italo Svevo
6. Space by Stephen Baxter
7. Artemis Fowl & the Time Paradox Signed E
8. Faction Paradox: The Book of the War by Lawrence Miles
9. A Brief History of the Paradox: Philosophy and the Labyrinths of the Mind by Roy Sorensen
10. Ibn ‘Arabî - Time and Cosmology (Culture and Civilization in the Middle East) by Mohamed Haj Yousef