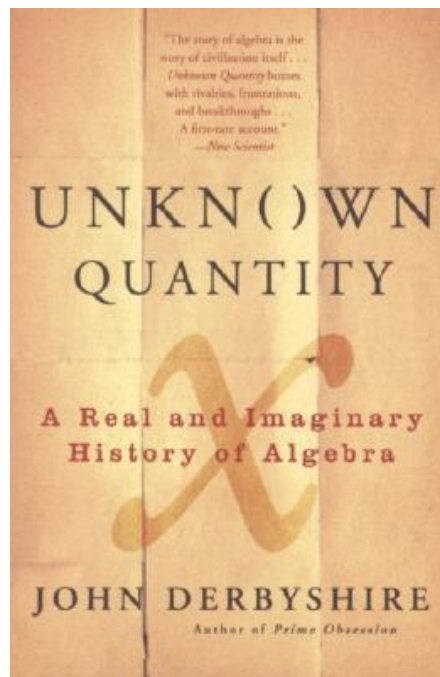




Unknown Quantity: A Real and Imaginary History of Algebra

John Derbyshire

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Perfect for history buffs and armchair algebra experts, *Unknown Quantity* tells the story of the development of abstract mathematical thought.

John Derbyshire discovers the story behind the formulae, roots, and radicals. As he did so masterfully in *Prime Obsession*, Derbyshire brings the evolution of mathematical thinking to dramatic life by focusing on the key historical players. *Unknown Quantity* begins in the time of Abraham and Isaac and moves from Abel's proof to the higher levels of abstraction developed by Galois through modern-day advances. Derbyshire explains how a simple turn of thought from "this plus this equals this" to "this plus *what* equals this?" gave birth to a whole new way of perceiving the world. With a historian's narrative authority and a beloved teacher's clarity and passion, Derbyshire leads readers on an intellectually satisfying and pleasantly challenging historical and mathematical journey.

Unknown Quantity: A Real and Imaginary History of Algebra Details

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Maurizio Codogno says

Nella matematica che si fa a scuola la geometria quanto quanto è comprensibile: le figure almeno le si vede. L'analisi matematica, con derivate e integrali, è appannaggio di pochi (s)fortunati. Ma quello che probabilmente fa odiare a tutti la matematica sono le equazioni e i polinomi; quello che viene chiamato algebra. Un libro come questo, che racconta la storia dell'algebra partendo dai babilonesi per arrivare al ventunesimo secolo, potrebbe essere visto come il fumo negli occhi. Non è così, per fortuna. Il punto di vista di Derbyshire, che fa lo scrittore ma in fin dei conti è laureato in matematica, si può sintetizzare dicendo che l'algebra è il modo che la matematica ha per rendere astratte le cose concrete. Così le formule numeriche babilonesi ed egizie sono i primi esempi "algebrici", ancora legati a esempi assolutamente concreti: col passare dei secoli si è inizialmente riusciti a immaginare che ci possano essere delle incognite, cioè dei valori che non conosciamo ancora ma che possiamo trattare come numeri; dei coefficienti, degli enti che sono sì dei numeri ma non ci interessa quali siano; dei nuovi tipi di numeri, negativi e immaginari; fino ad arrivare alle strutture come matrici, gruppi, anelli che nascono da esempi concreti e poi si iniziano a studiare come enti per conto proprio da cui si può addirittura proseguire nell'astrazione. Gli sviluppi della seconda metà del '900 sono almeno a mio parere incomprensibili e si possono tranquillamente saltare, ma il resto del libro è piacevole, e tra l'altro Derbyshire sembra farsi un punto d'onore a fare conoscere tutti i matematici che hanno fatto scoperte che poi sono state chiamate coi nomi di altri matematici. Questo significa che finalmente non sarete costretti a sorbirvi solo i soliti Abel e Galois: vi pare poco?

Koen Crolla says

Though Derbyshire is a dimwitted douchenozzle on many, many subjects, he managed to write a decent book on algebra.

My original review—before I realised this John Derbyshire was also John Derbyshire, the racist/homophobe/theotard/hypocrite/all-round dipshit who writes for the National Review—was going to mention how the book takes a naïve attitude towards history that's refreshing in this age of nuance and relative rigor (something that's only remotely acceptable because the book isn't about, and doesn't try to make points based on, history), but that feels a bit wry when you realise it's not the delightful innocence of professional deformation that's at the base of it, but plain old right-wing ignorance. The handful of offhand references to race, religion, and antisemitism also take on a more bitter tone; as does the general eurocentrism (though of course he can't get away entirely without mentioning the person algebra was named after, he does manage to avoid talking about any of his work). On the other hand, at least it explains his accusation of "sour anti-Americanism" directed at the French.

In the end, the only thing I can say is that while as popular mathematics books go, Unknown Quantity is by no means a bad or uninteresting book, I also can't recommend that anyone spend money on it, because part of it will go to a bigoted blowhard. If you can find it in a library, by all means go for it, but otherwise, stick to people like Paulos and Stewart. Their books are easily as good, and they managed to write them without being retrograde scumbags.

AJ says

I'm not really sure who the author was considering as the audience for this book. It's too technical at times for a layperson (and even engineers with PhDs apparently) and not detailed enough for the mathematician. Sometimes it's more like a historical biography of mathematicians and other times more like a math textbook. Additionally, the author broke the 4th wall a lot, and while I don't mind when authors do that, he was kind of annoying. He'd interject to say how he loves drawing figures by hand and everybody should, which I think serves no purpose than to be boastful and preachy. That's just one example I can think of out of many.

Jafar Isbarov says

According to Wikipedia, there are 13 branches of math, 6 of which fall into the realm of pure mathematics. Algebra is just one of these. So is there any merit in reading a book about history of this small corner of the mathematical universe? Of course, this is a large understatement on part of algebra – it definitely is not a “small corner” of math. On the contrary, it perhaps the largest and the most interconnected field of it. But it is still not whole of it, right? Why not go for some general math history book? Surely, there are better historians than John Derbyshire outside there?

These were the thoughts on my head when I picked up *Unknown Quantity*. Having finished the book, I have answer to these questions, all in favor of the infamous author, alongside with countless questions unanswered despite hours of enterprise. Let me begin by settling down one thing:

This book is by no means an alternative for math history. If you read it with this expectation in your mind, then you might not get much out of this book. It is a history of algebra. Not mathematics. Period.

Now about the aforementioned question. Is this book worth to read? It is, if you are interested in history of algebra or algebra or mathematics in general. This book introduced me to completely new fields of mathematics and taught me a great deal about their connections.

I am not quite sure who fascinated me more – Derbyshire or the topic itself. There is not much to say about algebra – it is truly...fascinating. Derbyshire is an excellent writer, too: witty and as simple as it gets, as if trying not to confuse readers who are already baffled by algebra.

gargamelscat says

5/10

The book falls between the stools of "popular math" and math treatments but is not rigorous enough to satisfy those interested in the latter and loses those drawn to the former in splurges of (incomplete) equations and hard to follow

On the plus side the potted histories of the various mathematicians encountered are entertaining and the book is reasonably well written.

It did serve the purpose of illustrating the arcane geography of modern algebra but didn't make me interested in it. Somewhat disappointing, I felt that the author was writing for himself rather than the reader.

Nur says

"The story of algebra, is the story of civilization itself..."

I stumbled on this book somewhere at Amazon while searching for books to help me become a better TA in undergraduate Discrete Math class. The class is entirely in Japanese, so imagine studying sets and groups and lattices using symbols (read: kanji) you've never seen and had no clue on the reading and meaning.

I need a good English textbook to keep me sane, and being a fiction-lover, I certainly hope this book could lift my mood in the attempts to befriend Abstract Algebra - both in English, and in Japanese.

Jose Moa says

This book is another good work of John Derbyshire; the history of algebra from the babylonians to our days making things understandable for those with a background of high school, it makes understandable concepts as the complex numbers, vector spaces, quaternions, algebraic structures as rings and gives a very elemental introduction to Galois theory and algebraic topology

Natbas says

I am reading a book on Maths, I am about to finish it, and in this book, I found a superb passage:

"I remain completely confident that the labor I have expended on the science presented here and which has demanded a significant part of my life as well as the most strenuous application of my powers, will not be lost. It is true that I am aware that the form which I have given the science is imperfect and must be imperfect. But I know and feel obliged to state (though I run the risk of seeming arrogant) that even if this work should again remain unused for another seventeen years or even longer, without entering into the actual development of science, still that time will come when it will be brought forth from the dust of oblivion and when ideas now dormant will bring forth fruit. I know that if I also fail to gather around me (as I have until now desired in vain) a circle of scholars, whom I could fructify with these ideas, and whom I could stimulate to develop and enrich them further, yet there will come a time when these ideas, perhaps in a new form, will rise anew and will enter into a living communication with contemporary

developments. For truth is eternal and divine."

Stirring words.

Hermann Gunther Grassman was a high-school teacher, who lived between the years 1810 and 1877. He had studied theology and philology, and then studied maths on his own.

He published his breakthrough in a book, "The Theory of Linear Extensions...". That work laid the ground of what eighty years later became known as the theory of vector spaces. He defined much of its basics, and was instrumental in the invention of the modern concept of "algebra".

But his work did not find recognition. The only review of it was written by Grassman himself, no one else noticed him. He tried his best to promote the book, but Möbius, who read the book, described it as unreadable, though he helped and praised Grassman. Cauchy, to whom he had sent his work for it to be forwarded to Jean Claude Saint-Venant, who had developed similar ideas, failed to do it. Instead, six years later Cauchy published a paper which could have been derived from Grassman's work. Grassman complained, and a three man committee of enquiry was set up. Since one of them was Cauchy himself, we can well know what the finding was. Hamilton praised Grassman's book, but promoted his own method over its.

Eight years later, Grassman reprinted the book again, changing its language to make it more readable.

The quoted passage is taken from the preface he wrote to that edition. But still he went unnoticed.

Disillusioned, Grassman turned to philology, and translated Rig Veda into German: this work was supported by a lengthy commentary, and was a massive 3000 page volume. He found recognition for this achievement: The University of Tübingen awarded him a honorary doctorate.

Seventeen years later, in the year after Grassman's death, William Kingdon Clifford published a paper, "Application of Grassman's Extensive Algebra". These Clifford algebras were applied in 20th century theoretical physics. The modern theory of spinors is derived from them.

All this, I read in this book by John Derbyshire.

His words, "There will come a time when these ideas, perhaps in a new form, will rise anew and will enter into a living communication with contemporary developments. For truth is eternal and divine.",

proved prophetic. His conviction in the value of his ideas, and the faith that truth, which is eternal and divine, will come alive and illuminate the contemporary life of a later age, are moving in face of the discouragement and defeat that he encountered.

For every one of us, these words should ring a message of inspirational tone: we might be neglected and consigned to a dusty corner, but that should not deter us from pursuing our passion- truth, eternal and divine, is certain to rise anew when the times calls for it.

Keenan says

I bought this book 10 years ago to the date with a Chapters gift card I received for my birthday. I've had enough math training in the interim to appreciate what this book tries to offer some perspective into, and thought it would be time to finally open up this dusty novel.

Ultimately this book does a good job for a popular mathematics book, a bit of history, a few interesting anecdotes, good overall approachable descriptions of some tricky concepts in algebra. But as good as the descriptions of some of the introductory material may be, it can all feel like a buildup to nothing when the climax and genius of proofs (like the Abel-Ruffini theorem) are only broadly referred to. If there's one thing this book does really well, it's in outlining the nonlinear and dynamic progress that a once-neglected branch of mathematics had through thousands of years of mathematical history.

Jonathan Peto says

I reached Chapter 12. I noticed reviews by people with stronger backgrounds in math than I have and decided to abandon ship since they too lost focus during the last quarter.

Joe says

I like the history of mathematics... [turns head away in shame, moist eyes brimming with hot tears of disgrace]

Theresa Leone Davidson says

I have written before about my propensity in high school to avoid being challenged in math: once I became intimidated by the work, by 8th or 9th grade, I took the easy way out, never challenged myself, and did altogether poorly in the subject. However, in college I had brilliant professors in the math classes I was required to take and they inspired me to take more than was required and instilled in me a love of the beauty

of numbers, formulas, equations, etc. Algebra has always been my favorite branch of mathematics, I love the polynomials, the algebraic structures and the equations. All that being said, I still found this book difficult. A lot of it was like a refresher course in algebra, and I loved the narratives that explained the people, events, ambitions, and cultures that gave rise to algebra, indeed the history of it was the best part of the book, but there was a lot that was difficult, that I remember only vaguely from college, and while Derbyshire can on many levels write for someone who does not work with algebra every day, there was still a lot that was over my head. I have not read his other book, Prime Obsession, but I will try it. Also, this is just an aside, but it did not take me as long to get through Unknown Quantity as what is suggested by the dates here (although goodness knows it took long enough); I was behind in magazines by a month, so in between chapters of Derbyshire's book, I was catching up on The Nation, Martha Stewart Living and Alfred Hitchcock Mystery Magazine. :)

Jesse says

There's an inherent difficulty in writing a book of this kind; a significant portion of the material that the author is expected to cover is simply out of the range of readers that lack an extensive background in mathematics. It is, in fact, worse than physics, in which metaphors can be used to give the reader some inkling of what's going on, even if they don't completely understand the reasons behind it. That being said, Derbyshire does a worthy job at a devilishly difficult task.

The first half is a sparkingly written account of the early history of algebra going back to ancient times. In the second half the author starts to get into territories that many readers will have trouble following, and finally in the chapter on Alexander Grothendieck, gives up entirely on explaining the math, and sticks to the personal story of its creator. Some of these slower parts might have been enlivened by the stories of the mathematicians themselves, but with a few exceptions, mathematicians tend not to live scintillating lives outside of their work. Still, aside from some more abstruse portions of the latter half, Unknown Quantity should provide fascinating reading for most educated readers.

Adam says

Unknown Quantity is an interesting book about the history of algebra, but I think its major failing is that it concentrates sufficiently heavily on the mathematics that it's hard to read sections if you aren't already knowledgeable about them. It claims to be aimed at the non-mathematician, but even as someone who has good knowledge of algebra, there were portions of the book (such as the topology sections) that I got very little out of because I wasn't already familiar with the particular branch of algebra being discussed. The Math Primer sections are helpful for reviewing subjects you've already been exposed to, but I doubt they would be sufficient for a non-mathematician to achieve sufficient understanding to understand the rest of the book (which makes sense, since something as intricate as Field Theory just isn't going to be explained in 10 pages).

Rossdavidh says

Subtitle: A Real and Imaginary History of Algebra. This is, more or less, the story of how math got away from us. How it went from a way of counting clay casks of grain given as tribute in Mesopotamia, to a system for analyzing entities which have no physical existence, the nature of which cannot easily be

explained, and the usefulness of which (while often, it is eventually discovered, quite substantial) is not apparent even to those who are working on it. It's basically the history of how math stopped being about the numbers.

This is a problem for an author such as Derbyshire who wants to tell the story of algebra. Contrast it with, say, a writer who wants to tell us the story of physics. If you explain to someone just how weird the consequences of the Theory of Relativity are, for example, you don't normally have to explain first what you're talking about. In the famous story of twins, one of whom gets in a spaceship that travels at near the speed of light, he won't first have to explain what twins are, or even what space flight is.

Derbyshire has a harder task here. In the first few chapters, certainly, he is able to refer to things which an educated reader is probably at least passably familiar with, for example quadratic equations. When we move past that to vectors and matrices, there are still some non-mathematicians who have at least a hazy idea of what that is. Then we are into things like groups, rings, spaces, even algebras, that have very different and specific meanings to mathematicians.

We also hear about people like Galois, who died in his early 20's in a duel (the reason for which is murky at best), Emmy Noether, who was the first woman mathematician to achieve prominence in Germany (perhaps the world), and Alexander Grothendieck, whose mathematical brilliance was rivaled only by his eccentricities, like filling a math lecture with pacifist rants or deciding to live entirely on dandelion soup. But the heart of the tale is how we, the species, piled one abstract idea on top of another, until we left the world of concrete objects not only far behind, but more or less out of sight entirely.

Derbyshire does a creditable job of walking us through all this, and when in the midst of (say) the chapter on rings, I can just convince myself that I know what we're talking about. Once I close the book and sleep on it, however, it becomes clear to me that I haven't any idea. I can still remember that, when some mathematicians were scandalized at the thought of Emmy Noether becoming a full math professor and teaching to male students, Hilbert (one of the biggest names in math at that time, and another teacher there), tried to silence the objections by observing, "after all we're a university, not a bathing establishment". When that didn't work, he just decided to teach the class himself, then paid Emmy Noether to teach in his place, and more or less dared the university establishment to object.

The problem with remembering the math, then, is not Derbyshire's writing (which is sparkling and easy to read when discussing the personalities and history involved), nor his enthusiasm for the topic (which is palpable), but just the basic reality that Math Is Hard. To really understand what rings are, I'd have to be doing some work on (and with) them myself. Someone would probably have to double-check my work, and point out to me when I had erred. Periodically through the book we would need to have a status check, to see if I had gotten everything up to this point.

And you know, if Derbyshire did write textbooks, I'd wager they'd be better than the ones I used in school. This book, however, does something else. It tells us a bit about how, even in the field of mathematics, the prejudices and predispositions of the human beings involved can take generations to overcome. Imaginary numbers, irrational numbers, even negative numbers were first used as a bit of a stopgap, just a convenient mental prop until we figure out how things actually work. Fast forward a generation or two, and it is accepted that that IS how the math works, irrational or imaginary as it may be. Math is still a human field, and overcoming a bias towards integral numbers took nearly as long as overcoming a bias towards men in the field. Derbyshire shows both aspects of this mental struggle, the mathematical and the social, and as a result we understand each one just a bit better.