

The addict

It is a cliché that power is a drug, and most of us know someone who is addicted to it. But did you know that algebra is the Arabic word for power? And did you know that algebra is also addictive? Perhaps you don't know any algebra addicts personally, but then how could you tell? The symptoms of this addiction are not easy to spot, and are often mistaken for the symptoms of other maladies. The addict may become withdrawn and unsociable; he may forget to eat, and become thin and emaciated; he may drink uncontrollably in a desperate attempt to overcome the fearful withdrawal symptoms caused by a denial of his fix of algebra; in extreme cases, he may actually go mad and be locked away for his own protection.

The other day I met an addict for the first time, and he told me the story of his addiction. This salutary tale I want to share with you. He was less than entirely sober when we began, and he became less and less sober as we went on, so you must excuse the sometimes rambling and disjointed prose.

"I am an addict," he began. "It's not a failure, it's a disease." He paused. "A mental illness. A curse.

"Can you guess what I am addicted to?"

The answer seemed obvious—we were standing at the bar in a pub in the middle of the afternoon, and he was already half drunk.

"Alcohol," I said.

"NO! Far worse than that. I am addicted to algebra." He waited for this to sink in.

I did not react. He seemed disappointed.

"I see you do not know what algebra addiction can do to a man. It eats his brain from the inside until he is nothing but a shell. The algebra takes over everything until he cannot do anything for himself any more. He cannot even tie his own shoelaces." I looked down at his shoes. He was quite right—the laces were undone.

Perhaps I should apologise for the sexist language my new acquaintance used—but I merely reproduce his own words. I did discover later that algebra addiction in women does exist, though less commonly than in men. There are famous examples from ancient Greece, from revolutionary France, and from other periods in history. But I hope you will forgive me if I continue to tell the story as closely as possible to how I heard it.

He continued: “Do you want to know how I became addicted?” To be honest, I was not sure I really wanted to know, but it sounded intriguing, so I said, “Why not?”

“I was fed algebra as a child. It ought to be illegal, giving dangerous drugs to children, but you won’t credit the stupidity of our so-called education system. They actually gave me algebra every day after lunch at school. At first it was just small doses. They gave me things like $(a + b) \times (a - b)$ and I worked it out step by step: $a \times (a - b) + b \times (a - b) = a \times a - a \times b + b \times a - b \times b$, and then I knew that $3 \times 4 = 4 \times 3$ and so on, so it was a small step to saying $a \times b = b \times a$, so now I had $a \times a - a \times b + a \times b - b \times b = a \times a - b \times b$. What a high that gave me! $(a + b)(a - b) = a^2 - b^2$. Doesn’t that send shivers down your spine? Don’t you feel the tingling in your toes? Doesn’t your brain start to sing?”

I had to admit I felt a small jolt of electricity, as his excitement was so infectious, even if I didn’t understand exactly where it was coming from.

“Well,” he said, “that was only a small dose. Maybe you need something a bit stronger.” I hesitated. The phrase “Just say no” popped into my mind. I didn’t want to get hooked on algebra, and I didn’t know how much was required to trigger an addiction. But I pushed the thought aside, and told myself that just one more fix of algebra couldn’t do me much harm.

“They gave me Pythagoras’s Theorem, and there’s nothing wrong with that. It is purest geometry, nothing better for a growing lad. Grow up nice and healthy, you will, on a diet of pure geometry, laid down thousands of years ago and matured into the finest brain-food available. But then they turned it into algebra, and wrote $a^2 + b^2 = c^2$. That’s a bit like turning your finest vintage wines into vinegar. No, it’s more like distilling them into brandy. You can give your children watered-down wine if you like, but you really shouldn’t be giving them brandy!

“It went straight to my head, of course. I wanted to force this equation to do my bidding. That’s what algebra means, you know, in Arabic—*al-jabr*—‘forcing’. But I was wrong to think I could force the equation to do anything—on the contrary, it was forcing me. If I’d known then what I know

now, I'd have realised I was already in its power. That realisation came much later, after I'd joined Algebraists Anonymous.

"Where was I? Oh, yes. $a^2 + b^2 = c^2$. Whole numbers, of course. No fractions. So $a^2 = c^2 - b^2 = (c + b)(c - b)$, as we already know. We might as well assume that $c + b$ and $c - b$ have no divisor in common,"—here I began to lose the thread a bit, but I didn't want to interrupt him in mid-flow—"so both of them are squares and we can introduce new numbers x and y so that $c + b = x^2$ and $c - b = y^2$. And the algebra *forces* (as its name implies) $c = \frac{1}{2}(x^2 + y^2)$ and $b = \frac{1}{2}(x^2 - y^2)$ and $a = xy$. Do you see?" (I said I did, which was not entirely honest of me.) "It's so beautiful you should frame it and put it on the wall. It's more beautiful than a Renoir; it's more valuable than the finest diamonds. There is no treasure in the whole of the Louvre that can compare with this. For they are all finite and this is infinite. You can start with $x = 3$ and $y = 1$ so $c = 5$ and $b = 4$ and $a = 3$. As if by magic, you get $3^2 + 4^2 = 5^2$: try it yourself if you don't believe me: $9 + 16 = 25$. Let's try another one, how about $x = 27$ and $y = 11$? That gives $c = \frac{1}{2}(729 + 121) = 425$ and $b = \frac{1}{2}(729 - 121) = 304$ and $a = 297$. I wave my magic wand, and out pops the equation $297^2 + 304^2 = 425^2$. I bet you couldn't do *that* without the power of algebra!"

He paused and took a large swig of beer. The talking had made him thirsty.

I didn't want any more algebra. I'd had enough of this strange and powerful drug, and I knew my limits. I'd already begun to see how it could become addictive. Its effects were almost hallucinogenic, in that it made abstract things seem real, and made real things seem fuzzy and insubstantial. It was quite a surprise to find that my beer mug was still solid, and the beer was still wet. I'd had a glimpse of the infinite, and numbers were dancing in front of my eyes, getting longer and longer all the time.

The effect on my companion seemed rather different. He had gone strangely quiet, and was staring at a distant part of the ceiling with a childlike smile on his face. I can only imagine what must have been going on in his head, but it seemed clear from his expression that a fairly hefty slug of endorphins was coursing round his bloodstream.

I tried to take advantage of the situation to make my excuses and leave. But he would have none of it. "I haven't finished my story yet," he said. "Let me buy you another beer." At any rate the beer seemed less dangerous than the algebra, so I agreed. I found us a free table while he paid for the beers, and we sat down to continue the conversation.

“I promise I won’t give you any more algebra,” he went on. “It can have unpredictable side-effects if you’re not used to it. I knew a man once who took an overdose: spent all day imbibing algebra and when it came to the evening he couldn’t stop. He stayed up all night with the stuff, and it kept him awake all through that night, and the following day, and the night after that. About 6 in the morning he suddenly jumped up, having had no food or sleep for two days and two nights, and screamed as though he was being stung by a thousand wasps, then ran out of his house straight into the path of a double-decker bus. The coroner recorded a verdict of misadventure, but I think it was murder. I think he was sold some adulterated algebra, and the mistakes in the algebra led him to a monstrous contradiction, from which the only way out was suicide.”

“Hang on a minute. You just said it was murder, and now you’re saying it was suicide. It can’t be both.”

“Why not? Didn’t I just tell you it was a monstrous contradiction? A man who cannot hold two contradictory opinions at the same time is not worthy of being called a man. Life isn’t mathematics, you know!”

“Alright, alright. But you were going to tell me your story.”

“Yes, yes, I’m getting round to it. Where was I?”

“You were being force-fed algebra at school.”

“Yes, yes. Well, not really force-fed, because I started to enjoy it. Algebra is a bit like marmite, you know—you either love it or you hate it. I hate marmite, but I love algebra. And once I’d started to love it, I couldn’t get enough of it. What they gave me at school wasn’t enough—it was supposed to last an hour, but I’d finish it all in five minutes. I turned to the black market for my supplies. My friends were only too willing to sell me their meagre rations, but even this didn’t satisfy me. I took to frequenting public libraries and other unsavoury places, where if I was lucky I might find, hidden in a dark recess, a long-forgotten book, unborrowed for forty years, containing algebraic treasures the like of which I had never seen before. I went to the biggest bookshop in town, and haunted the mathematics section looking for algebra. But I couldn’t afford the prices, so when I thought no-one was looking I would sneak one of the books into my school-bag. It didn’t seem like stealing—I had to have my fix, and if I couldn’t afford to buy it, what else was I supposed to do?”

“A boy of fourteen is easily led astray in such places. There was a man I saw there occasionally, who looked scruffy, usually unshaven, but he had a kind face. One day I plucked up courage to ask him to buy a book for me.

‘You shouldn’t accept gifts from strangers, you know,’ he told me, but I said ‘it won’t be a gift, because you won’t give it to me, I’ll take it from you, and in any case I’ve seen you before so you’re not a stranger.’ Maybe not a very convincing argument, but he bought me the book anyway.

“The next time we met he asked me what I’d thought of the book. I told him it had kept me occupied for a week, but now I needed more. He offered to lend me some of his books, and it seemed perfectly natural to accept his invitation to go round to his house to pick out two or three.”

“Good God!” I said. “You didn’t really go round to a stranger’s house to look at his books, did you? He could have done anything to you!”

“He did. I was 14. I wasn’t stupid. I knew what it meant when a stranger invited you to his house. I wanted algebra. He wanted sex. Seemed like a fair trade to me. Besides, I wanted sex too. I was 14 after all.”

I was shocked. I guess I’d lived a very sheltered life myself, and I found these new revelations all a bit too much to take. I knew that hard drugs and prostitution tended to go together, but it had never occurred to me that there might be a connection between algebra and underage gay sex. To buy myself some time, I went to the bar and bought us each another pint.

When I got back, he seemed to have forgotten about the story, and started off instead on a new theme. “Algebra is power,” he proclaimed. “If you can master algebra, you can master anything.” I wasn’t going to argue with him—since I could *not* master algebra, this seemed like an empty statement. “To the ancient Greeks there were two types of mathematics: algebra and geometry, or as we might say today, the discrete and the continuous. Actually, that’s not true, there were four, but nowadays we don’t count music and rhetoric as parts of mathematics. More’s the pity. But algebra and geometry were chalk and cheese to the Greeks—ne’er the twain should meet. It was only in the 17th century that Descartes turned geometry into algebra by writing down *equations* for lines and circles. And do you know, there are still geometers alive today who despise algebra as vapid, a mere tool to be used in geometry? What these people do not understand, though, is that geometry does not exist any more. It is all algebra. Algebra is not a tool for doing geometry, algebra *is* geometry. Algebra has taken over geometry, geometry has taken over physics, physics has taken over the world. Ergo, algebra has taken over the world.”

Perhaps the effects of the drink were beginning to show. I had to admire the broad sweep of his argument, the grand declaration of his conclusions, but I couldn’t help feeling he might be slightly overstating his case.

“Algebra has taken over the whole world,” he repeated. “It is a powerful drug, it is a drug of power. Governments should wake up to it—it is more insidious than heroin, more addictive than cocaine, more widespread than marijuana.”

“That may well be true,” I admitted, “but I’m more interested in the personal aspect, rather than the political. Tell me more about your own struggles with algebra.”

“Well, to begin with I didn’t see that I had a problem with algebra, apart from the fact that I wanted more of it. But by the age of 14 I was hooked, even if I wouldn’t admit it. I was perfectly happy with my habit for many years. Of course, I tried to keep it secret—it’s not the sort of thing you want to be too widely known. But it wasn’t until my mid-thirties that I began to notice little things that suggested not all might be as rosy as it appeared.

“Like many drugs, legal or illegal, algebra is fine in small doses. But after a while you need more and more of the stuff to get the same highs, and it becomes more and more difficult to stop taking it. I began to find that I was doing so much algebra it was affecting my health. A day of algebra followed by a night’s sleep would result in a hangover the next day—a headache far worse than you can get from beer. But the real problems came when I couldn’t stop doing algebra at the end of the day. That’s when I decided I needed to tackle the problem, and I joined Algebraists Anonymous.

“You’ve heard of Alcoholics Anonymous? A group of alcoholics trying to shame each other into not drinking. Well, they tried the same thing with algebraists. We got together and we introduced ourselves. ‘Hello, I’m Mark and I’m an algebraist.’—you know the sort of thing. ‘I keep leaving equations around the house that I can solve when I get caught short.’ He had the problem pretty bad, did Mark. We tried giving up algebra one day at a time. It was difficult. No, who am I trying to fool?—it was impossible.

“The only way we ever found of conquering an algebra addiction was to replace the drug with another drug. Alcohol was the most effective, because it would make the letters in the equations move about mysteriously when you weren’t looking at them. Or even when you *were* looking at them. Come to think of it, *especially* when you were looking at them. This would make the algebra come out all wrong, and instead of giving you a high, it would give you a low. But as soon as you took the addict off his alcohol fix, the algebra would work beautifully again, and he would be back to his old habits worse than before.

“So now you know why I am in the pub all day. I’m not an alcoholic, I’m

a recovering algebraic.”