

# AMAZING<sup>®</sup> STORIES



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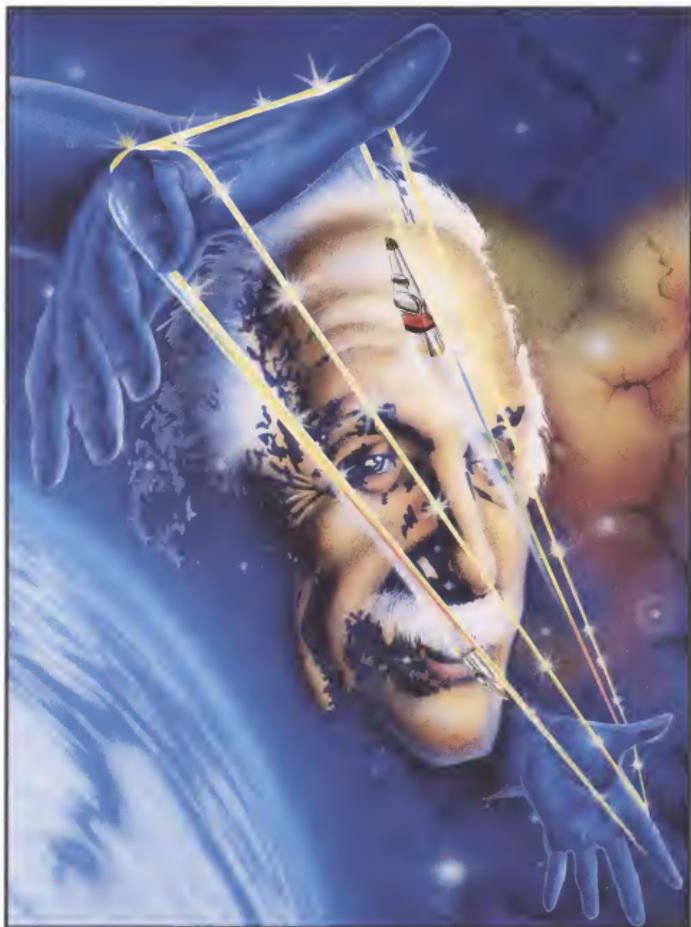
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# Albert's Cradle



Paul Levinson

On April 15, 1955, Albert Einstein entered Princeton Hospital; he had suffered a rupture of an aortic aneurism two days earlier. On April 17 he telephoned his secretary, Helen Dukas, and asked for writing materials.

He died at 1:15 A.M. the next morning.

1

I have spent most of my life trying to coax the truth from nature, and having had some luck in this coaxing, to share the results with my fellow man.

I have achieved a reputation—much of it far beyond what I deserve, some of it having nothing really to do with my accomplishments. (People forget that I am and always was a theorist, not a builder.)

But I feel guilty now—not so much because of what the

Illustration by Paul McCall

world has done with my theories, but because in a sense I haven't been true to my own expectations as a theorist. I have always believed that a scientist must be completely open in laying bare the roots of his theory—for a science clothed in secrecy and lies cannot be validly tested—and yet I have not been completely honest in telling the world how I came up with my theories. In fact, I have left out, and deliberately, what I now see as the most important part.

I propose to rectify that now.

## 2

None of my work would have been possible without Lobachevskian geometry. The common man has much wisdom, but he often does not appreciate the need that the theorist has for expression of his ideas in mathematics. Mathematics, not words, is the natural language of science.

The mathematics of Lobachevski says that two parallel lines can somewhere-someday meet. This still comes as a surprise to most people, who as schoolchildren were raised on the tedious theorems of Euclid. That great Greek wanted to prove that two parallel lines can never meet, but he never did, and so had to settle for an axiomatic statement—a postulate, not a proof. Euclid's parallel postulate.

It was Lobachevski's genius to speculate what happens if we deny this postulate of Euclid's, and construct a whole consistent system of mathematics based on this denial—a system that allows us to describe a space curved and warped by mass.

None of this will be new to those of you familiar with my work. But have any of you ever wondered just what it was that first got me to think along the lines of Lobachevski?

So much of science is explained as originating in lucky, almost accidental insight. I was lucky, yes. But I've come to see that my insight was far from accidental.

It was the result of planning—but not mine—and it came from a child's game.

## 3

I frankly cannot remember who introduced me to Cat's Cradle. I wish I could—in view of the importance I now attach to this game in my life, and the life of our world—but I can't. It could have been any number of little boys whose names I've long ago forgotten.

I do remember when I first made the connection between Lobachevski and the Cat's Cradle game. Lobachevski says two parallel lines may indeed somehow meet. Very well and good. But where on Earth does this happen? The common sense says: nowhere. Euclid's parallel postulate seems to reign on this Earth.

But not in the Cat's Cradle. Are you familiar with this game? Do you know the third position—what children call the pinky crossover? Here we have a configuration of parallel lines—but of course they do meet, because they are in fact all part of one circular string!

So here, I realized all those years ago, here was a real-life demonstration of Lobachevskian geometry. And one right under our noses! (The reader will appreciate that I am here using Lobachevski as a shorthand for the whole series of mathematicians—Gauss and Bolyai and Riemann and the others—who labored on non-Euclidean geometries. But Lobachevski was the first to publish, and the first to write about the intersection of parallel lines.)

The fact that apparently no one had realized this before me had, I must admit with some embarrassment, not really surprised me when I was young. My youthful arrogance and self-estimation could well accept that only I had the insight to see the reversal of the parallel postulate in this child's game. In some way the Cat's Cradle game had prepared my mind to understand the implications of non-Euclidean geometry when I later came in contact with this work, and I've spent most of my life in full pursuit of these implications. But I never mentioned the Cat's Cradle connection—in part, I guess, because I thought the world would think me silly, and the Cat's Cradle origin of my theories even harder to swallow than my theories; in part, because I wanted the glory all to myself; and in part, I know, because I never fully understood the relationship between the Cat's Cradle, Lobachevskian geometry, and my theories of relativity.

I cannot pretend that I understand this relationship in its entirety even now. But I think I know a bit more. Why does the Cat's Cradle provide such a demonstration of Lobachevski? The key, it seems to me, is that the Cat's Cradle is not a natural phenomenon—it is not a crystalline or atomic structure whose formations speak the language of nature to those of us who will listen. No—Cat's Cradle is a humanly created game, which means that its lessons are humanly created ones, information that one generation wanted to pass on to others.

Which means what? That some ancient people understood relativity and sought to instruct us, the future, in its ways, and I am just a conduit of this ancient knowledge? This thought, I must be honest with you, makes my ego reel. But it may be true.

And that is not all. I have been thinking lately that there may be another lesson in the Cat's Cradle.

## 4

I will now make a brief digression—though perhaps not such a digression after all, as I will soon explain.

The magazines have portrayed me very unfairly, though I can well understand their error. I am not the Father of the A-Bomb. True, I did write to the President when I thought that Hitler might soon develop such a weapon. My pacifist friends were furious with me, and I can understand their fury. But what should I have done? Remained passive in the face of someone who was quite prepared to destroy our planet in satisfaction of his insane ambitions?

And when I saw that Hitler had no bomb, and when he was destroyed, I did not write a second letter to the President, pleading with him not to use the bomb. But he

died with the letter unopened on his desk, and his successor—the haberdasher—did not have the President's sensibilities.

And now the General's in charge. In truth, I think he's a man of peace. But we're involved now in a war of nerves with the Russians, and each side has the capacity to destroy our planet with their weapons, and so I wonder what would happen were I to publish my next theory now—one that I have of late learned from the ancient Cat's Cradle, and one that is as beyond general relativity as general relativity was beyond Newtonian mechanics.

If used for good ends, starplanes could ensue; if used for ill, I shudder at the consequences.

But the knowledge is there for all to see who are prepared to see it—it is there in the Cat's Cradle played by a million young hands. So if I keep quiet about my new theory, what good would that ultimately do? Is it not better that I should bring it forth now, with at least a glimmer of an understanding of what it might hold for humanity? You see my quandary.

## 5

How old is the game of Cat's Cradle? I believe it is far older than most people realize.

Imagine, if you will, a people with intelligence every bit the equal of ours, yet without the wonderful invention of writing. Possessed of such intelligence, these people would be able to beckon many secrets from nature. But without writing, how would these people tell others about these secrets?

Yes, I suppose they might not want to share their knowledge. Cultures can be base and selfish. But an individual, learning some new knowledge, is driven by a fire, quite irresistible, to share this knowledge with others—to bask in its light.

Ancient songs are no doubt one way the non-literate shared their knowledge. But the verbal can only convey so much—and certainly the twists and turns of space and time under pressure of mass and acceleration outstrip the ability of any singer to communicate, however gifted.

The Cat's Cradle can convey the third and fourth dimensions. Imagine, then, our letterless ancient people, possessed of a mathematics they could not write. But they could render the mathematics in the lines and shift positions of the Cat's Cradle. Each cross a number, each space a vector, each shift the expression of an acceleration into a new system. I confess that even now I have little more than a vulgar understanding of what these people were doing.

But once a long time ago they knew. Once they conveyed with astonishing precision and simplicity the movement of the heavens and more. Yet time dulls precision. Who knows how long the equations in the strings were passed on from generation to generation with accuracy, with their meaning understood? The accuracy

likely is with us still; but the meaning has been gone a very long time for most of us. It lasted centuries, millennia maybe. Yet eventually those who taught others to do the Cat's Cradle knew only the moves, and not the mathematics they represented. And so these vessels of great equations became little more than childhood rhyme, playthings of all technique and no content, kinesthetic mantras. . . .

And then I came along. Or perhaps I wasn't the first, who knows? Maybe Leonardo's equations in the mirror were reflections of his boyhood tutoring in the strings. Maybe others. Who can say? But Leonardo's writings led to submarines and airplanes, and mine have led to this wretched bomb. So perhaps the world would have been better had we not come along, or not understood.

## 6

I never liked the subjective interpretation of quantum mechanics—information does seem to travel faster than the speed of light in these tiny precincts, yes; but the explanation of Bohr and Heisenberg that this speed is somehow a function of our observation has always struck me as too easy, an incomplete theory. Somewhere in reality, quite independent of our observation, a hidden variable must exist that accounts for such quantum mechanic phenomena.

I know what a wet blanket I've been all of these years in not accepting the subjective Copenhagen Interpretation of quantum mechanics. And I know I haven't been a very good scientist in all of this—offering no proof or evidence or even theory of my own against QM, only my own cranky misgivings.

What have these misgivings been based on? I know now that I must have acquired them in the Cat's Cradle games—in code that was right alongside the shapes and twists that long ago led to me to special and general relativity. And I know now that these codes express the workings of a much greater theory—the unified theory that explains cosmic and quantum mechanical phenomena alike, the theory that has long tempted and eluded, but has been staring at me from the face of my childhood all this time.

Should I now present this theory to the world? Will our species use it wisely—to go out to the stars—or will they try to create from it a worse atom bomb, a worse hydrogen bomb, one that could destroy not only this planet but the entire cosmos?

## 7

I realize that anyone reading this will find many more questions than answers. Who were these people who wrote to me of the universe via the Cat's Cradle? What is the outline of my unified theory that can take our species to the stars?

I'll try to answer these questions tomorrow. ✦