

"But you two discussed the poisoning business in the play—"

"We did. But we discussed lots of other points about that play and compared it with other presentations we have seen, and oh, you're too absurd to hang a murder on that woman, just because she saw a murder on the stage—or, rather, heard the description of one!"

"But that's the coincidence! She *did* hear that murder described, fully. She *did* talk it over with you. She *did* show a special interest in it. Then, a week or so later, her husband is killed by identically the same method, she and she alone, except for a mild old lady, has opportunity to do the deed, the instrument of death is found in her cupboard, and she flies into a rage at the first hint of accusation of the crime!"

"By the way, if as you hint, one of those men did it, would they leave the medicine-dropper that conveyed the poison, in Mrs. Embury's rooms? Would they want to bring suspicion against the woman they love? Answer me that!"

"There might be another solution." Fifi nodded her wise little head thoughtfully.

TO BE CONTINUED NEXT WEEK. Don't forget this magazine is issued weekly, and that you will get the continuation of this story without waiting a month.

"Perhaps whoever did it tried to throw suspicion on Miss Ames."

"That makes him a still more despicable villain. To implicate falsely, a harmless old lady—no, I can't think that."

"Yet you think Mrs. Embury did!"

"I don't know. Perhaps the two women worked in collusion. Or Miss Ames might have wakened and learned the truth, and agreed to keep the secret. In fact, Miss Ames confessed that she committed the murder, but we know she was not telling the truth then. However, she knows who did do it—I've no doubt of that. Well, Mrs. Desternay, I can't subscribe to your original if rather impossible suggestions, but I thank you for this interview, and I may say you have helped me."

"I have! How? Not against Eunice?"

"Never mind, ma'am. I must get off by myself, and straighten out my notes. Will you telephone Mrs. Embury again?"

"No! If she wants me, let her call me up. I did my part, now I'll subside. But, I'll wait further developments before I decide just where I stand in regard to Eunice Embury!"



# Mathematician

# Proof

by Ralph Ellison  
de Castro

**T**HADDEUS RANDOLPH, B.A., M.A., Ph.D., stood perhaps five feet four in his socks, and weighed, *au naturel*, somewhere in the neighborhood of one hundred and fourteen pounds. He was

of the two-pair-of-spectacles, brown derby, preoccupied type, which at once stamped him as a lecturer, poet, or college professor of the old school.

He was a living embodiment of absent-

mindedness, yet, reposing beneath his seven and three-eighths hat was a brain which astounded the scientific men of the decade by its marvelous preciseness.

Thaddeus was a mathematician, and lived for, by, and because of mathematics. He had the binomial theorem for breakfast, lunched on integral calculus, and for his evening meal considered attempts at the solution of the age-old squaring of the circle. His book on elementary algebra was used by school children, and his *Theories of Permutations and Combinations* was the reference book for the mathematicians of the world.

The latter study was Randolph's pet. At almost any hour of the night a dim light could be seen issuing from his room on the top floor, patent evidence that he was about to startle the mathematical circles of two continents by a new contribution to science.

At stated intervals a queer, arabic-looking manuscript would be deposited in the post-box on the corner, addressed to some scientific magazine, and two weeks later Randolph would receive a check for two or three hundred dollars, and the mathematicians of the country would sit up and try to understand what it was all about. The result would be a request for a lecture, whereupon Thaddeus would draw a dusty swallow-tail coat from a closet, don a high hat—vintage of '88—fill a leather briefcase full of papers, and fare him forth to elucidate. This formality having been dispensed with, he again went into seclusion, and—figuratively speaking—retired into the arms of Pythagoras.

He was supreme—without an acknowledged equal—in the study of mathematics. Almost daily he received offers of chairs of mathematics in the various colleges, and almost daily he rejected them. His unvarying reason was that he needed the time to study!

There were perhaps three hundred men in the entire country who could really understand all of Randolph's published works, but not one of them approached him in his power of research, and his creative ability. Yet he had an uncanny ability in lecturing; the most difficult theorems vanished into thin air, and everything was clear,

lucid, and simple under his extraordinary power.

Billy, the janitor in the hall in which Thaddeus was wont to lecture, explained in a few words the entire theory of the famous lecture on "Mathematical Theorems in Relation to Permutations and Combinations" one night after Thaddeus had finished a short talk.

"It's like this," Billy said to Jake, his assistant. "This bird has 'em all stopped as far as I can see with the naked eye. He can take any bunch of figures—the combination of a safe, for instance, and quicker than you can add up last week's pay, he will make them figures turn inside out, turn a double flap-jack, and sit up and talk. If I got the true dope on him, all he's gotta do is know how many numbers in the five minutes he'll tell you every possible combination of aforesaid safe, and inside of combination which could be devised for the thing!"

Thaddeus Randolph had been born with the bump of mathematics perceptibly evident on his infantile brow. Instead of playing with blocks and toys, at the age of seven he was already dabbling into the mysteries of the multiplication tables. Stamped as a prodigy and a coming genius, he entered high school at the age of eleven, on a special dispensation of the board of education. Even at this age he was acknowledged the equal of almost any teacher in the school.

Graduating from high school three and a half years younger than the average boy, he entered college, and at once proceeded to live up to his advance notices as the wonder of the age, and bewilder his professors almost to stupefaction at his extraordinary keenness. He kept almost entirely to his room while in college, never indulged in the sports of his fellows, yet was universally respected and liked.

He graduated from college with highest honors, then took two years of a post-graduate course in mathematics. Having completed this he went abroad for another two years, came home, placed his physical self in oblivion and appeared to the world only in the form of  $X^2$  plus  $Y^2$ .

Roland McMutrie, chairman of the Board of Directors of the Madison Trust Company, held the floor at the annual meeting. The directors, earlier in the year, had voted an expenditure of one hundred and fifty thousand dollars for the construction of a new safe, and McMutrie was, *ex officio*, chairman of the board appointed by himself to place the order for the construction of the safe.

He stood before them holding a rather thick pamphlet, entitled, "*The Design of Safes in Relation to Theories of Permutations and Combinations*," a new work of Thaddeus Randolph, who was at the time exploding all preconceived notions as to the correct procedure in construction of steel vaults, more particularly their combinations. Roland McMutrie felt that he should have been voted an increase in salary by the board at its earlier meeting, but unfortunately, he had not received it. He had taken this opportunity to demonstrate his extraordinary value to the bank.

"Gentlemen," he said slowly, as if he were weighing each word before it dropped from his lips, "with the assistance of the other members of the committee I have decided on a radical departure in the design of the new safe, and as my guidance have carefully studied this paper I have in my hand"—he held it up so that they might see the title. "No doubt some of you have heard of this well-known dissertation, or perhaps may be more or less acquainted with part of the theories of Thaddeus Randolph, the famous mathematician.

"Fortunately, I had the pleasure of being a classmate of this gentleman in college, and he therefore has been kind enough to aid me in my endeavor to provide the Madison Trust Company with the most impregnable safe that human ingenuity can devise. In justice to Mr. Randolph, however, I must state that we had a serious difference, which may be accounted for by the fact that the gentleman is *entirely theoretical*, while I have had to consider practicality as well as theory."

He beamed upon his audience, as if expecting a murmur of assent.

"To continue," he resumed, "we have followed Randolph's theory in part, except

for this difference of opinion in one instance, and I think you will agree with me that practicality is to be desired in addition to mere theory."

This time he received his murmur of assent.

After the meeting one of his fellow directors approached him.

"What sort of man is this Randolph?" he asked.

"Queer sort," McMutrie answered. "Takes himself very much to heart. He got very excited when I dared to differ with him. I gave him a parting thrust that seemed to get under his skin. I told him that our safe was to be proof against mathematicians as well as burglars."

McMutrie smiled.

"That hit him in a vital spot. 'Mark me well, my friend,' he said. 'You say your safe is proof against mathematicians as well as burglars. That, no doubt, is intended as a thrust at me.' He grew very excited. 'Let me tell you this,' he went on, 'I could open that safe in ten minutes—there is a flaw in it somewhere.' I laughed, of course. 'That's all right, friend Thaddeus,' I said to him; 'you may *think* you can, but remember what I have just said—proof against mathematicians as well as burglars.'"

The contract for the construction of the safe was given out, and work was started. The Rotary Safe Company, to whom the job was intrusted, did its work nobly. They spent two months on its design, three months on its manufacture, and five weeks in its installation.

The *pièce de résistance* consisted in a gigantic steel globe, which, when the two outer doors were closed, revolved. Two separate combinations were necessary to open the outer doors, after which a special combination, constituted of a problem in geometrical progression, was needed, simply to stop the globe revolving. Then the real work began, for when the revolutions of the globe were stopped it became charged automatically with electricity, which could be turned off only from the room of a special watchman.

McMutrie got his anticipated raise in his yearly pay, and settled back to bask in the

sunshine of the publicity he received as the chairman of the committee responsible for the design of the safe.

"*The Design of Safes in Relation to Theories of Permutation and Combination*" found a resting place in the ash barrel, and gradually wended its way to the municipal dumping ground.

Thaddeus Randolph was worried. His sensitive nature had resented the jibes of McMutrie, and strangely enough his entire being seemed affected. He could not sleep—dreams troubled him; dreams in which a gigantic safe pursued him up a hill, gaining at every step, meanwhile shouting "Proof against mathematicians and burglars."

Then in his self-abstraction he began to talk to himself.

"I know I am right," he murmured. "McMutrie misses the whole point of my argument. It would be useless to try to correct him—in the first place, he could not understand me, and again, if he did, it would be too late to correct his error. There is a flaw in that safe, I could prove it myself—I could open it myself!" Startled by his own thoughts he tried to take his mind off the subject.

The days immediately following sent him lower and lower in the depths of despair. Each day brought bundles of letters asking his opinion on the qualities of this new safe. His telephone rang at intervals—the same question. His nerves were being worn to shreds.

Then suddenly he bent again over his desk. Consulting illustrations of the famous safe, he jotted figures down on paper.

"I'm first going to prove absolutely to myself that I can open it," he said, "and then—" He did not finish.

The cashier of the Madison Trust Company, according to the testimony he gave at the inquiry of the Board of Directors, had entered the building at the usual hour, and had gone at once to the safe, to draw out some securities which were to be called for at the opening of the day.

To his astonishment, the door of the safe was wide open. He had caused a count to

be made at once, and found exactly seventy-five thousand dollars to be missing, which, considering the denomination of the bills, was about all one person could conceal on his person without its presence becoming noticeable. He had no absolute theory—either it had been done by some one inside the bank, or—but no, he really had no theory. Yes, he had at once notified the bank's detectives.

Thaddeus Randolph was rolling rapidly toward the Pacific Coast. His eyes searched restlessly from side to side—it was evidently that he wished to avoid recognition by anyone. He shifted nervously from one side of his seat to the other, then got up and walked forward into the smoking car.

The directors' meeting of the Madison Trust Company was again in progress. Roland McMutrie had the floor.

"Gentlemen," he said, "at your request I have worked hand in hand with the detectives on the case of the robbery, and we have narrowed down our suspicions of all possible persons who could have done the job, to but two. One of them is Lanzius Williams, perhaps the most skilful bank robber this country ever knew. Williams has just finished a term of eleven years in the Illinois State Penitentiary for his daring robbery of the Fifth National of Detroit. We have him in custody now, and he is in the process of proving an alibi.

"Before I mention the other man whom we suspect I must bring back to your minds the happenings of a couple of months ago, when I interviewed Thaddeus Randolph, the mathematician.

"As you will remember, my views were at variance with his, and when I chided him good-naturedly he took it quite to heart. At the time he said to me earnestly these words: '*I could open it myself.*' Of course I paid no attention to this, but when I first heard of the robbery my theory was as follows:

"Excluding Lanzius Williams, no professional safe-cracker in this country has the ingenuity to open that safe. Williams, of course, is a well-educated man, and has the

experience of a long career of this kind of work. But no other criminal has the necessary mathematical backing to understand this perplexing combination of ours.

"Then, for some reason, I suspected Thaddeus Randolph. Why? In the first place his pride was hurt by my remark; his sensitive nature was wounded—and, *he made the threat I have just mentioned*. I knew he was supposed to have lectured before the Mathematical Society of America last night, so I called them on the 'phone, and was told that Randolph had not appeared, and had sent no word! The first time in fifteen years that such a thing had happened.

"I then called up his house, and was informed that he had disappeared—no one knew where he had gone. I then visited his house—armed with a search-warrant—and rummaging through his papers I found some illustrations of the safe, which I had carelessly left on the occasion of my visit, and on the illustrations were figures which made it seem that Randolph was trying to figure its combination.

"My theory is this: Randolph did the job, not intending to steal any money, but weakened at the sight of so much wealth before his eyes, and took the seventy-five thousand dollars that are missing. We have kept this from the papers, of course, and our detectives have been able to find out that Randolph boarded a train for the West. We shall make every effort to find him, meanwhile holding Lanzius Williams."

The town of Los Perros, California, had never seen quite the like of the show that was being put on in the main square every night for a week. Professor Haldane Lawrence, "Lightning Calculator," was holding forth. It cost absolutely nothing to see him, and watch him do his marvelous figuring. Not even a collection was taken.

No one could understand. Some one advanced the theory that the professor intended to settle down in Los Perros, and run for mayor, but this was not generally credited. But with the aid of a special assistant, who did the introductions, and wrote the answers down on a blackboard after the professor had done the figuring mentally,

Haldane Lawrence was causing Los Perros to rub its brows in amazement.

The largest crowd of the week was there on Saturday night—the last night of the great exhibition, and Jimmy Blake, assistant, and announcer extraordinary, was doing himself proud.

"La-a-a-dies an' gen'lemen," he proclaimed, "you see here before your eyes the greatest mathematician the world has ever known—Professor Haldane Lawrence—famed from coast to coast as the 'Lightning Calculator.' He has the greatest brain in the world, and it is our intention, right here in this humble but beautiful village of Los Perros, to prove to all, that nowhere is there the equal of my friend the professor.

"We have stood nightly on this platform, amazing you by the greatest display of genius you will see in your lifetime, and this evening—the last of our great exhibitions, we propose to startle you even further. Are you ready, professor?"

Lawrence nodded.

"The professor will now take the stage; prepare for the most marvelous exhibition in mental agility that ever was shown to the public."

Lawrence rose from his chair and went to the blackboard. He performed a few examples in addition, division and multiplication, figuring the answers rapidly in his head, writing down his results on the board for the audience to verify. He then resumed his seat and the official announcer again took the floor.

"Now, ladies and gentlemen," he said, "you are to see the most startling demonstration you have yet witnessed. I ask any man, woman or child in this audience to put a problem to Professor Lawrence. This problem may be in any branch of the entire scope of mathematics. The professor will figure the answer, in his head, three times more rapidly than any one in the audience can do on paper.

"If he fails to do this he will forfeit five hundred dollars to the person who beats him. We await your pleasure."

A man from the rear of the crowd edged his way forward.

"Here's one," he shouted, and shot a series of figures at the professor.

"Ah," said Lawrence, "my favorite branch of mathematics—permutations and combinations!"

He repeated the numbers to make sure he had received them correctly, then concentrated in thought. In a short while he announced his answer. A voice came from the back of the crowd, high-pitched, nervous, but clear with conviction.

"You're wrong! You have made three distinct errors!"

The crowd made way for the speaker, who came reluctantly forward.

"You have made three separate and distinct errors," he repeated; "you did not square your 'X plus Y,' there should be a minus sign before your 'L-cubed,' and your addition of the first six figures is atrocious and inexcusable."

Professor Lawrence leaned over and whispered to his assistant. Blake came down quietly from the platform, followed by Lawrence, who first made an announcement to the crowd:

"The speaker will accompany us in our automobile to our offices," he said, "where we will go over the problem in detail. If we find he is correct we will at once pay him the five hundred dollars."

Pleased with himself, but mildly protesting, the "speaker" was induced to get into the automobile. Blake and Lawrence got in with him, one sitting on each side of him. The car started down the road. Blake turned and looked his guest full in the eyes.

"Thaddeus Randolph," he said, "we have a warrant for your arrest for entering the safe of the Madison Trust Company of New York!"

"Arrest—safe—why, sir, I know nothing about it."

"You can tell that to the jury! Why in the name of all that's holy did you beat it from home to these sequestered parts, if you didn't do the job?"

"I came here for a rest—I needed it—I was all worn out with the strain of too much work."

"That'll sound good in print. In the meantime, my warrant gives me authority for your arrest. You will spend to-night in jail, and we will arrange for extradition papers to get you back to New York."

Thaddeus Randolph fell back in his seat, and the car was driven rapidly to the telegraph station. Leaving Blake to guard Randolph, Lawrence went in to wire New York of the capture. The operator handed him a telegram, which he read with a sheepish grin on his face. He returned to the street and handed the yellow sheet to Blake.

"Read it, Jimmy," he said.

Blake took it and let his eyes glance over it. It ran:

HALDANE LAWRENCE, Los Perros, California.

Abandon search for Thaddeus Randolph. Lanzius Williams has confessed.

Both men turned toward Randolph.

"Mr. Randolph," said Blake, "we owe you our apologies, both in our own name, and in the name of the Trust Company. We hope you can forget this error in the knowledge that we were acting in the interest of justice."

Thaddeus didn't answer. He stepped from the car in a daze.

"Proof against mathematicians," he said to himself. "And a plain, ordinary safe-breaker opened it! I believe I'll go back East now; my case seems to be proved—I knew that safe must have a flaw!"

## CROSSED PATHWAYS

BY JEANIE PEET

OH, grief, thou hast blessings, when sorest!  
 Oh, joy, thou hast dangers, when won!  
 Your pathways are crossed in the forest;  
 But all may lead out to the sun.