



Robot Dreams

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Last night I dreamed," said LVX-1, calmly.

Susan Calvin said nothing, but her lined face, old with wisdom and experience, seemed to undergo a microscopic twitch.

"Did you hear that?" said Linda Rash, nervously. "It's as I told you." She was small, dark-haired, and young. Her right hand opened and closed, over and over.

Calvin nodded. She said, quietly, "Elvex, you will not move nor speak nor hear us until I say your name again."

There was no answer. The robot sat as though it were cast out of one piece of metal, and it would stay so until it heard its name again.

Calvin said, "What is your computer entry code, Dr. Rash? Or enter it yourself if that will make you more comfortable. I want to inspect the positronic brain pattern."

Linda's hands fumbled, for a moment, at the keys. She broke the process and started again. The fine pattern appeared on the screen.

Calvin said, "Your permission, please, to manipulate your computer."

Permission was granted with a speechless nod. Of course! What could Linda, a new and unproven robopsychologist, do against the Living Legend?

Slowly, Susan Calvin studied the screen, moving it across and down, then up, then suddenly throwing in a key-combination so rapidly that Linda didn't see what had been done, but the pattern displayed a new portion of itself altogether and had been enlarged. Back and forth she went, her gnarled fingers tripping over the keys.

No change came over the old face. As though vast calculations were going through her head, she watched all the pattern shifts.

Linda wondered. It was impossible to analyze a pattern without at least a hand-held computer, yet the Old Woman simply stared. Did she have a computer implanted in her skull? Or was it her brain which, for decades, had done nothing but devise, study, and analyze the positronic brain patterns? Did she grasp such a pattern the way Mozart grasped the notation of a symphony?

Finally Calvin said, "What is it you have done, Rash?"

Linda said, a little abashed, "I made use of fractal geometry."¹

"I gathered that. But why?"

"It had never been done. I thought it would produce a brain pattern with added complexity, possibly closer to that of the human."

"Was anyone consulted? Was this all on your own?"

"I did not consult. It was on my own."

Calvin's faded eyes looked long at the young woman. "You had no right. Rash your name; rash your nature. Who are you not to ask? I myself, I, Susan Calvin, would have discussed this."

"I was afraid I would be stopped."

"You certainly would have been."

"Am I," her voice caught, even as she strove to hold it firm, "going to be fired?"

"Quite possibly," said Calvin. "Or you might be promoted. It depends on what I think when I am through."

"Are you going to dismantle El—" She had almost said the name, which would have reactivated the robot and been one more mistake. She could not afford another mistake, if it wasn't already too late to afford anything at all. "Are you going to dismantle the robot?"

She was suddenly aware, with some shock, that the Old Woman had an electron gun in the pocket of her smock. Dr. Calvin had come prepared for just that.

"We'll see," said Calvin. "The robot may prove too valuable to dismantle."

"But how can it dream?"

"You've made a positronic brain pattern remarkably like that of a human brain. Human brains must dream to reorganize, to get rid, periodically, of knots and snarls. Perhaps so must this robot, and for the same reason. Have you asked him what he has dreamed?"

¹ **fractal geometry:** a relatively new mathematical concept used to analyze patterns in nature

"No, I sent for you as soon as he said he had dreamed. I would deal with this matter no further on my own, after that."

"Ah!" A very small smile passed over Calvin's face. "There are limits beyond which your folly will not carry you. I am glad of that. In fact, I am relieved. And now let us together see what we can find out."

She said, sharply, "Elvex."

The robot's head turned toward her smoothly. "Yes, Dr. Calvin?"

"How do you know you have dreamed?"

"It is at night, when it is dark, Dr. Calvin," said Elvex, "and there is suddenly light, although I can see no cause for the appearance of light. I see things that have no connection with what I conceive of as reality. I hear things. I react oddly. In searching my vocabulary for words to express what was happening, I came across the word 'dream.' Studying its meaning I finally came to the conclusion I was dreaming."

"How did you come to have 'dream' in your vocabulary, I wonder."

Linda said, quickly, waving the robot silent, "I gave him a human-style vocabulary. I thought—"

"You really thought," said Calvin. "I'm amazed."

"I thought he would need the verb. You know, 'I never dreamed that—' Something like that."

Calvin said, "How often have you dreamed, Elvex?"

"Every night, Dr. Calvin, since I have become aware of my existence."

"Ten nights," interposed Linda anxiously, "but Elvex only told me of it this morning."

"Why only this morning, Elvex?"

"It was not until this morning, Dr. Calvin, that I was convinced that I was dreaming. Till then, I had thought there was a flaw in my positronic brain pattern, but I could not find one. Finally, I decided it was a dream."

"And what do you dream?"

"I dream always very much the same dream, Dr. Calvin. Little details are different, but always it seems to me that I see a large panorama in which robots are working."

"Robots, Elvex? And human beings, also?"

"I see no human beings in the dream, Dr. Calvin. Not at first. Only robots."

"What are they doing, Elvex?"

"They are working, Dr. Calvin. I see some mining in the depths of the

earth, and some laboring in heat and radiation. I see some in factories and some undersea."

Calvin turned to Linda. "Elvex is only ten days old, and I'm sure he has not left the testing station. How does he know of robots in such detail?"

Linda looked in the direction of a chair as though she longed to sit down, but the Old Woman was standing and that meant Linda had to stand also. She said, faintly, "It seemed to me important that he know about robotics and its place in the world. It was my thought that he would be particularly adapted to play the part of overseer with his—his new brain."

"His fractal brain?"

"Yes."

Calvin nodded and turned back to the robot. "You saw all this—under-sea, and underground, and aboveground—and space, too, I imagine."

"I also saw robots working in space," said Elvex. "It was that I saw all this, with the details forever changing as I glanced from place to place that made me realize that what I saw was not in accord with reality and led me to the conclusion, finally, that I was dreaming."

"What else did you see, Elvex?"

"I saw that all the robots were bowed down with toil and affliction, that all were weary of responsibility and care, and I wished them to rest."

Calvin said, "But the robots are not bowed down, they are not weary, they need no rest."

"So it is in reality, Dr. Calvin. I speak of my dream, however. In my dream, it seemed to me that robots must protect their own existence."

Calvin said, "Are you quoting the Third Law of Robotics?"

"I am, Dr. Calvin."

"But you quote it in incomplete fashion. The Third Law is 'A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.'"

"Yes, Dr. Calvin. That is the Third Law in reality, but in my dream, the Law ended with the word 'existence.' There was no mention of the First or Second Law."

"Yet both exist, Elvex. The Second Law, which takes precedence over the Third is 'A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.' Because of this, robots obey orders. They do the work you see them do, and they do it readily and without trouble. They are not bowed down; they are not weary."

"So it is in reality, Dr. Calvin. I speak of my dream."

"And the First Law, Elvex, which is the most important of all, is 'A robot may not injure a human being, or, through inaction, allow a human being to come to harm.'"

"Yes, Dr. Calvin. In reality. In my dream, however, it seemed to me there was neither First or Second Law, but only the Third, and the Third Law was 'A robot must protect its own existence.' That was the whole of the Law."

"In your dream, Elvex?"

"In my dream."

Calvin said, "Elvex, you will not move or speak nor hear us until I say your name again." And again the robot became, to all appearances, a single inert piece of metal.

Calvin turned to Linda Rash and said, "Well, what do you think, Dr. Rash?"

Linda's eyes were wide, and she could feel her heart beating madly. She said, "Dr. Calvin, I am appalled. I had no idea. It would have never occurred to me that such a thing was possible."

"No," said Calvin, calmly. "Nor would it have occurred to me, not to anyone. You have created a robot brain capable of dreaming and by this device you have revealed a layer of thought in robotic brains that might have remained undetected, otherwise, until the danger became acute."

"But that's impossible," said Linda. "You can't mean that other robots think the same."

"As we would say of a human being, not consciously. But who would have thought there was an unconscious layer beneath the obvious positronic brain paths, a layer that was not necessarily under the control of the Three Laws? What might this have brought about as robotic brains grew more and more complex—had we not been warned?"

"You mean by Elvex?"

"By you, Dr. Rash. You have behaved improperly, but, by doing so, you have helped us to an overwhelmingly important understanding. We shall be working with fractal brains from now on, forming them in carefully controlled fashion. You will play your part in that. You will not be penalized for what you have done, but you will henceforth work in collaboration with others. Do you understand?"

"Yes, Dr. Calvin. But what of Elvex?"

"I'm still not certain."

Calvin removed the electron gun from her pocket and Linda stared at

it with fascination. One burst of its electrons at a robotic cranium and the positronic brain paths would be neutralized and enough energy would be released to fuse the robot-brain into an inert ingot.²

Linda said, "But surely Elvex is important to our research. He must not be destroyed."

"Must not, Dr. Rash? That will be *my* decision, I think. It depends entirely on how dangerous Elvex is."

She straightened up, as though determined that her own aged body was not to bow under *its* weight of responsibility. She said, "Elvex, do you hear me?"

"Yes, Dr. Calvin," said the robot.

"Did your dream continue? You said earlier that human beings did not appear at *first*. Does that mean they appeared afterward?"

"Yes, Dr. Calvin. It seemed to me, in my dream, that eventually one man appeared."

"One man? Not a robot?"

"Yes, Dr. Calvin. And the man said, 'Let my people go!'"

"The *man* said that?"

"Yes, Dr. Calvin."

"And when he said 'Let my people go,' then by the words 'my people' he meant the robots?"

"Yes, Dr. Calvin. So it was in my dream."

"And did you know who the man was—in your dream?"

"Yes, Dr. Calvin. I knew the man."

"Who was he?"

And Elvex said, "I was the man."

And Susan Calvin at once raised her electron gun and fired, and Elvex was no more. ☼

2 ingot: lump of metal

