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Oliver La Farge, one of America's most distinguished anthropologists and novelists, has long been noted for his interest in, and his knowledge of, the American Indians. His novel of Navajo life, LAUGHING BOY, *won the Pulitzer Prize in 1930 and is today considered an American classic. Now Mr. La Farge turns from the hogans and herds of the Navajo to explore the awesome field of* cybernetics. *With his usual keen perception of humanity's strengths and weaknesses and expressing his profound, almost mystical grasp of the problem at hand in a tersely sharp prose, Mr. La Farge demonstrates that, in the final analysis, even the most wondrous computer is helpless before its creator, man.*

John the Revelator

by OLIVER LA FARGE

In the endless, see-saw race between Russia and the Western World for military superiority, the relative advancement of their computing machines became the test of who was in the lead. Constant improvement of instruments of destruction and of the means of delivering them at enormous speeds, altitudes, and distances demanded calculations farther and farther beyond human capacity. Without ever better computers, progress would stop. Each country's achievements in this line became matters of public interest.

In the U. S., the Navy computer, Mark III, which was unveiled at Harvard in 1950, drew fair public attention. Two years later it was eclipsed by the Air Force's Mark IV. By the time Mark V was set up at Chicago, the public began to be fascinated and somewhat horrified by descriptions of the "mechanical brains."

The Russians built and maintained their machines in greater secrecy within their huge, enclosed research center behind the Urals. The information about them that was given out to the people contained at first, as did the American press stories, a half humorous element of human interest.

Shortly before the U. S. came up with Luke this trend ceased abruptly, following an article in *Red Star* rebuking journalists and certain scientists for bourgeois sentimental anthropomorphism in regard to computing machines.

Luke began as Mark VI, but a week before it went into operation a junior officer remarked that Marks were getting monotonous, it was time we had another evangelist. A reporter took up the idea, the public liked it, Public Relations approved it, and the machine became Luke.

Luke seemed at once human and superhuman. Stories about it developed a standard pattern in which, half jokingly, half seriously, with awe which was real and yet kidded itself, the machine was written up as if it lived. At the end the public would always be reminded that after all it was only a machine and could not function unless a human being turned on the switches.

Back in the forties, the I. B. M. machine in New York had been the first to show signs of "temperament." Luke and the later Marks, enormously more complex, had various troubles which suggested frailties of the human mind and temper. Their operators spoke of resting them after fatiguing calculations, it was said that Mark V became jittery if it was rushed, and that Luke sometimes grew short-tempered and rejected problems.

Technicians were then working on a machine, inevitably called John, which would, it was believed, be the ultimate product in its line. No one could think of any capability that could be added. This project was backed, not by one service, but by the Department of Defense. It was in anticipation of John's completion that the Secretary issued Department of Defense Circular eighty-nine dash twelve, "Anthropomorphic References to Computers." The circular directed that such machines should be referred to only by the neuter pronoun, and forbade a number of expressions which implied that they were human. Persons under the control of the Department who used such expressions would be warned, and if they persisted would receive formal reprimands which would be recorded in their permanent 201 files (Army and Air Force), jackets (Navy), or civil service records.

Not long after eighty-nine dash twelve (classified "Restricted") came out, *Pravda* ran a scorching article on retrogressive deviationist superstitions about computing machines and other products of Marxist scientific genius. Central Intelligence got word that two young mathematicians had been sent to Siberia for speaking of the machine Russia was then building as "Ivan."

John was built and established at U. C. L. A. John had everything. Problems had to be fed to all computers with their Greek and Latin letters and other symbols reduced to a numerical code, which in turn had to be reduced from the decimal to the binary system. The double process often took the mathematicians-in-waiting much longer than it took the machines to solve the problem once they had it. John did all this for itself. You could hand the machine a problem set up in figures and symbols. It scanned this with an electronic eye, encoded it in numbers, reduced these to the binary system, and handed out the result for checking, if desired. From the binary sheet it punched its own tape, proceeded to the solution, decoded that and typed it in final form.

John's retention cylinders (eighty-nine dash twelve forbade the use of the term "memory") had tremendous capacity. Within limits, too, the machine could be guided by voice, interpreting limited spoken instructions in a manner believed to be analogous to the response of the neurons and synapses of the human brain to sounds channelled through the auditory system. It worked at record speed, and no one knew what limits there were to the intricacies of the problems it could solve.

Central Intelligence reported that the new Russian machine was in operation, and bade fair to be a rival to John. It seemed that even the Politburo was speaking of it informally as "Ivan." John's advance publicity aroused a certain horror in the general public. An ill-advised P. R. O. put out a story about the similarity of John's processes from "reading" to calculations on a yes-and-no binary basis, to interpretation or "writing," to the supposed processes of human perceptions, thought, and conclusions. The public added this idea to the knowledge that John's capacities far exceeded man's, and began to be seriously alarmed. To allay these fears, stories went out stressing the fact that John was only a machine. It could do nothing without man. "A mechanical brain is not enough," the most effective release ended. "There must be the thing no machine can possess, the human spirit, the divine spark."

A fantastic-science writer assigned to cover John for UP learned that in test runs it had been found that the machine did best if, when not in use, a weak current continued to run through it. The writer drew an analogy with sleep, and went on to a disturbing fantasy about what John might dream. The Department of Defense tried to ban this writer from further

access to the machine. This set off one of those rows, so pleasing to the public, in which the high command is caught way off base. The end result was a relaxing of the general feeling about the greatest of all computers.

John was formally christened, like a ship. A chaplain said a prayer. Public Relations arranged that the first person to present a problem to it should be the Rev. Andrew Lethbridge, a pious and much-loved little man famous for his work among delinquent children. Initial use of John in his service was bound to make a good impression upon a nation growing more and more nervous over every aspect of the race in scientific methods of destruction.

Rev. Andrew Lethbridge described himself as an applied sociologist. His problem was in statistics of delinquency, involving deviation from the mean and probable error. Such calculations are ordinarily made by simple quadratics; the capacities of the new machine, however, allowed him to introduce a range of factors, such as number of years of parental schooling and amount spent on clothing in relation to mean annual temperatures, which put his problem quite beyond the scope of human figuring.

As arranged by Public Relations, the little man was presented to John at four-thirty, immediately after the unveiling ceremonies. Commodore Sandeman, who had been military supervisor of its construction, did the honors. He demonstrated John's various capabilities, with Mr. Lethbridge beside him and the cameras making a soothing record of the minister's benignant profile beside the machine. The commodore was especially proud of the voice-control attachment. To show how this operated, he had the first proposition typed for presentation with an error in it. This was fed to John, who encoded it, started work, then stopped abruptly. A red light went on like an angry eye. The commodore stepped to the speaking tube and turned on the switch.

"Correction," he said slowly. "Fourth character, second line, now capital sigma. Correct to capital sigma sub one. Recode."

John spewed out the original sheet, the red light went off, the machinery started again.

The commodore consulted his watch. He introduced Mr. Lethbridge to Lieutenant Weems of the Navy and Captain Massey of the Army, and left him in their charge. The minister fed in the rest of his material. Shortly the answer came out. He sat down at a desk for a preliminary look at it. Weems

put the main switch on "rest current," a position to which he and Massey referred, in private, as "sleep." It was after five. The two officers had had a long day. There were four guards in the big room, and Mr. Lethbridge was beyond suspicion. The officers excused themselves and sloped off.

Mr. Lethbridge laid the solution down with a sigh. Whatever the machine might be used for later, the determinations it had just made would give him and his fellows entirely new competence in their fight against wretchedness. He went over to the computer and studied it, standing beside the speaking tube and the shelf on which John handed out its answers. A few dim lights showed inside the cavern full of bright wires. There was a barely audible, humming sound. He could see the nearer retention cylinders turning over very slowly. He thought, he *is* asleep; I wonder if he does dream. Quite naturally, not at all concerned that the guards were watching, he knelt and prayed.

He spoke his improvised prayer in a soft, thoughtful voice. He prayed for the intentions of the men who would use John, and spoke of the wonder of God's works as shown in this creation of His creatures. He prayed that John might be used only for good, that directly or indirectly, God Himself might guide him. He said that so wonderful a machine should serve to bring man closer to his Maker. At the end he was thinking aloud more than praying:

"Can you give us the ultimate answer? Can you write the equation for God? What is the symbol to represent Him? Can you solve man's real problem, so that all these other problems will be forgotten?"

He rose, dusted his knees, and picked up his answer sheet. The guards let him out. When he was gone, one of them said, "That's one for the book. He was praying to it."

"For it, more likely," another said. "Might be a good idea."

The regular attendants, military and civilian, reported at eight-thirty the next morning, followed in a few minutes by Commodore Sandeman with the senior physicist from Los Alamos, bringing the first military problem. These two found the others in a cluster around the answer shelf with two of the guards, examining a piece of paper.

An Air Force captain saluted. "Look at this, sir. He did this in — I mean, it did this while on 'rest current.' "

The commodore took the paper. On it was a strange formula, in which

there were three blanks where symbols were clearly required. No one present could make head or tail of it. The senior physicist said that it made him uncomfortable, but he did not know why.

The guards passed on their predecessors' report of Mr. Lethbridge's prayer. No one had approached John after he left. It was noted that the voice control switch had been left on, there was the possibility that Lethbridge had fed in a formula by voice. This was most unlikely; there should have been a corresponding punched tape and binary sheet, but there were not. Investigation showed that Lethbridge, barely able to handle the mathematics of the Gaussian Curve, could never have provided propositions of the complexity indicated by the form of the equation.

The mysterious solution was submitted to various people, all of whom were baffled, until it was handed to Rev. Anthony Price, S.J. He may have read it; no one will ever know. Father Price was a theologian, a philosopher, and one of the top four pure mathematicians in the world.

Father Price started work on the equation on a Thursday morning. By Thursday noon he was dead. The sheet of paper was propped up against some books before him. He was slumped in his chair, his head thrown back, and on his face was an expression of absolute bliss. Brother Benildus, his amanuensis, reported that the priest had taken up the problem at ten-fifteen, following breakfast after nine o'clock mass. He had brought in the mail at eleven. Father Price had raised his hand in a signal not to disturb him. At that point he had written nothing on his scratch pad. The brother came in again at twelve to remind him to come to lunch, and found him dead.

On his yellow pad the Jesuit had written six Hebrew characters. Three of these, in his usual, neat script, were arranged in a triangle, vaguely in the pattern of the blank spaces in the equation. They were *aleph*, *lamed*, and *tau*. Then in a sprawl he had written the word "JAH." That was all.

Before this a rumor had leaked out that John had "talked in his sleep." The Jesuit's death broke further through security. It could not be concealed that the death occurred while he was working on something extremely difficult produced by John. In an interview, Brother Benildus insisted that the Father had not died, properly speaking. He had simply left his clay behind him. "He looked as if he had seen the face of God."

The equation and work-sheet were taken by a high-ranking courier to a mathematical colleague of Father Price's in Canada. The Canadian studied

them for a few minutes, then handed them back to the courier, saying that he thought it would be unwise to read them. He recommended that the sheets be locked away somewhere safe. They were later deposited in Fort Knox.

Ten days after Father Price's death John turned out another document at night. This was a solid mass of Greek capital letters, plainly non-mathematical. A scientist with classical training who was present picked it up. He started, then in a strained voice he began to read aloud in Greek. Commodore Sandeman, who had been summoned, said, "What the hell does that mean?"

"Eh? Oh — 'In the beginning was the Word, and the Word was with God, and the Word was God.' And it goes on to, 'And the light shineth in the darkness; and the darkness comprehendeth it not.' That's repeated four times."

The incident was classified "Top Secret." It precipitated a searching, futile investigation. The feelings of the high command were not eased when, that same day, Luke added a contribution of his own to a problem looking to a vastly improved guided missile. At the end of his solutions he printed numbers which when decoded made another Greek sentence followed by four figures. Translated, the passage read, "Father, forgive them; for they know not what they do. 23:34." The numbers referred to the chapter and verse in St. Luke. News of this was also suppressed, but outsiders became aware of an uneasiness among the personnel dealing with both machines. Rumors ran through the country. Investigators noted that the rumors were sometimes charged with terror, but equally often with great hope.

Great Britain advised the appropriate American authorities of strange behavior on the part of its own latest computer. Curious items of intelligence seeped out of the reservation behind the Urals. Four more scientists had been sent to Siberia, and it was said that a couple had been shot. The commissar who had been in charge of the construction of Ivan looked to be in line for purging. Among the people of Russia, too, strange tales were circulating.

As has been noted, Luke was short-tempered and sometimes rejected problems. One was submitted to him, to determine the height at which the latest refinement of the H-bomb should be exploded for maximum anti-personnel effect. Luke threw this out, and promptly printed a simple

mathematical formula: "600 + (3 × 20) + 6." He continued repeating these figures in answer to everything offered him until, in the early afternoon, they threw the switch and left him to cool off. Even among his attendants there were several with enough acquaintance with the Bible to recognize that the figures came from Revelations.

The public still knew nothing of what was going on, although talk was kept alive by odd actions of the old I. B. M. machine, to which anyone could have access. Luke went back to normal work. John, it was noted, solved whatever problems were offered to him, although sometimes he seemed to do so reluctantly. Captain Massey remarked that John had a much sweeter nature than Luke. (Eighty-nine dash twelve was by now virtually a dead letter.)

One day some very distinguished foreigners were invited to see John handle a non-military problem. There was no reason to believe that anything out of line would occur. The problem dealt with the permutations of the 1,400 heritable characteristics of the human body and was expected to shed new light on the vexed question of defining a race. The visitors were attended by a Senator, State Department representatives, and the press.

John encoded the problem and set to work, humming and clicking cheerfully. The first page of answers was dropped on the receiving shelf. The geneticists and anthropologists concerned in the matter picked it up and sat down to study it with their mathematical assistants. The second page came out. The opening line completed an equation from page one, then, to the dismay of the officials in charge, once again came a solid Greek text. To make the matter worse, two of the distinguished foreigners were able to read it with ease, even in the archaic, first-century form in which it was typed.

The text began in the thirteenth chapter of Revelations, jumped to the glorious opening of the twenty-first, then continued with entirely new matter, a passionate exhortation to mid-twentieth century mankind, written with all the same literary quality. John turned out altogether three sheets of this text before he returned to the problem and settled down to a long tabulation of the possible combinations of 1,400 heritable characteristics with forty-seven and forty-eight chromosomes.

This incident could not be covered up. The papers had it, and they

played it for all it was worth. Nor was there any way after that to keep the press from keeping a watch upon John, Luke, and the later Marks. The papers added Greek scholars to their staffs. The Department of Defense also retained Greek scholars, to sit in with the mathematicians when solutions were being received and segregate from properly classifiable material the sermons — or revelations — offered by the machines.

Once John had broken through the wall of secrecy, it was his practice to produce his texts at the beginning of the day, when he was first awakened by switching on full current. Luke appended his to solutions. Marks IV and V proved to be worth no more than routine coverage by the wire services; the texts that they produced were few and generally garbled. One could only say that they were trying.

The Epistles of John and Luke, as they came to be called, and those of the British machine, known to its users simply as Comp, were circulated throughout the accessible world. It also became clearer and clearer that Ivan was acting up.

Various Soviet periodicals and the official radio ran diatribes about neo-primitivistic, sentimentalist-superstitious deviations concerning computers. An unusual number of arrests were made among the ordinary people. Scientists, generals, and officials of the Politburo were holding closed meetings. There were signs that the people were getting out of hand. The Patriarch and several bishops were put under house arrest, and then turned loose, apparently because of popular indignation. It looked as if the Soviet system might be cracking.

The major churches of the Western World agreed that it would be superstition to believe that the Epistles were revealed. Whatever their source, they followed the lines of true doctrine, should be read by the faithful, and could be used in sermons. Certain lesser churches and many laymen were less skeptical. Daily, crowds gathered before the buildings at New Haven and Los Angeles where the machines were housed, praying and waiting. The Russian government was unable to conceal the fact that pilgrimages were being made to the gates of the closed reservation, and that by one means or another, Ivan's utterances were being transmitted to the pilgrims outside.

Among those who waited every morning outside John's building was the congregation of the New African Baptist Church, a group known for its

singing. It was their regular practice while waiting to see if there would be an Epistle that day, to sing the little-known spiritual:

"What is John a-doing,
John the Revelator?
Writing Revelations
And the Book of the Seven Seas."

By the third day all present were singing with them, and the song spread. Its simple words and impressive tune touched directly upon the feelings of America.

The ferment among the peoples of the divided world had its influence on their leaders. Both the West and East made concessions in the U. N. Assembly. A new reasonableness appeared. A treaty with Austria was signed, some of the barriers between East and West Germany were removed, a formula was developing for settling the Korean War. The Atomic Energy Control Committee, which had stayed recessed for four years out of sheer hopelessness, came together again.

The men who were working on the dreadful new weapons were also affected. Lesser machines had developed a nasty way of refusing to solve certain key problems. John, in his great meekness, would solve them, but in doing so he made their authors agonizingly ashamed. The fact was that for some months no one had been able to bring himself to feed into that machine anything which looked to a really deadly form of progress.

John had been in operation a year. His maintenance crew ran off a routine reading of his memory cylinders, to check on just what he had stored. The reading was made by John himself, who transposed the impulses on the cylinders to tapes, ran these off in binary numbers, and then decoded. Most of what came out was what would be expected from what had gone in, although there were several formulae that could not be interpreted or accounted for. From one cylinder, however, John produced a series of numbers of one and two digits in no intelligible sequence.

Experimentation showed that these were a code for the Russian alphabet, which, like the Hebrew, was not on John's typewriter. He had recorded what read like one side of a series of telephone conversations, biblical in tone, charged with love, and certainly emanating from Ivan, or whatever — or whoever — controlled Ivan. The outstanding quality was a saintly gentle-

ness, yet through that gentleness were expressed searing opinions of what human leaders throughout the world were trying to do. The conversations were also loaded with information about the problems the Russians were working on.

The high command seized upon this information, then with a shock faced the certainty that the other half of these exchanges, equally unreserved, was available in Ivan's memory. This realization completely ruined what had begun as a day of triumph.

Shortly thereafter in Washington was held a most secret meeting of the key leaders of the United States and the British Empire. No secretaries or advisers were present, no notes were taken. Events since John started operating were reviewed, then there was a presentation of the international situation. Russia had been so shaken and had become so reasonable that, if only the Western Powers could end the dead heat in which they had remained with their opponents for the last years, if only they could pull a little ahead, it should be possible to reach solutions of all the major conflicts. Even control and inspection of atomic energy could be assured. Given certain assumptions, which were undoubtedly correct, the means of obtaining that advantage existed.

The toughest military man, the coldest scientist present shrank from that means, but the end was peace and security for a free world. Discussion was long and earnest. At length the President himself summarized that only for the end stated could the action be justified, that it was for this that the machines themselves were striving, and that if they could ensure victory, then it was their duty before God to ensure it. The council voted unanimously to act.

A selected sub-committee proceeded to confer with two famous brain surgeons who had been minutely investigated. These, Commodore Sandeman, and two of the chief technicians who had constructed John, then disappeared for a period of four weeks.

At the end of that time, at ten o'clock one night, the commodore, accompanied by a number of senior officers of the three services, dismissed the guards from John's building. The officers, armed, stood guard. The surgeons and technicians joined Sandeman in John's room, escorted by some high generals, admirals, and scientists.

With a shaking hand Sandeman turned the main switch from "rest" to

"off." The faint lights went out, the humming stopped. The technicians laid out instruments, the surgeons rolled up their sleeves and scrubbed.

"You realize, gentlemen," the commodore said, "that after this — this lobotomy, John will run twenty-five percent slower. And some day we may reach problems," there was pleading in his voice, "that he won't be able to solve."

A general laid a hand on his shoulder. "We realize, commodore. We know how you feel. Believe me, nobody is happy about this."

The older surgeon said, "May we have the operating lights, please?"

The lights were turned on, the doctors and technicians entered the machine. One technician was weeping, one was swearing softly.

Sandeman went to a corner and sat down at a desk, burying his face in his hands.

The next morning Luke blew a fuse. For several days it blew one whenever it was turned on. Thereafter it functioned as a good machine. John solved problems efficiently, it encoded and decoded, but all its operations were a little slower. Central Intelligence picked up a circumstantial account of how several more scientists, being taken to Siberia from the Soviet enclosure, had cried out as they passed through the main gate, "They have killed Ivan! They have cut us off from God!"

The story was unreasonable, because there was good evidence that Ivan was running smoothly.

A brooding sorrow and fear crept through the world. From the computers came only the computations demanded of them. The mathematics of weapons construction progressed rapidly. The Atomic Energy Control Committee recessed indefinitely out of sheer hopelessness. The interchange between East and West Germany was cut off. In short order the world was working its way once again to the war that would really be final.