

# HOW ADA LOVELACE LEAPED INTO HISTORY

by Kathleen Krull

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Ada Lovelace (1815–1852) grew up in a seriously unusual way. It was more like a science experiment than a childhood: How could her mother, Lady Annabella Byron, raise Ada to be as unlike her notorious father as possible? 1

Ada never knew her dad, who left England when she was still a baby. Annabella refused to tell her daughter anything about him until after he had died in Greece, when Ada was eight. Lord Byron may have been England’s most famous poet, but he was also—in the words of a former girlfriend—“mad, bad, and dangerous to know.” There was even a term—“Byronic”—for someone who was wild, dark, dramatic, rebellious. Just the opposite of a proper person in the stuffy Victorian era. 2

Annabella’s wealthy friends were appalled when she married Byron, and soon so was she. During their brief marriage, he dubbed Annabella the Princess of Parallelograms for her love of geometrical shapes. She was a well-educated woman for her day, especially in math and science, logical to a fault. Not particularly affectionate to her daughter, she was even known to refer her as “it.” 3

Annabella kept an iron grip on her daughter’s days from the moment Ada awoke at 6 a.m. until bedtime. She hired an army of top-notch scholars to educate Ada at home on every subject—except poetry. The emphasis was on facts, logic, and all branches of math, as well as languages and other subjects useful to know. Anything to squelch flights of fancy and prevent her from becoming a poet. 4

Poor Ada had no siblings or playmates. Instead she was watched over by several close friends of her mother, all unmarried. If she showed any rebelliousness or bad behavior, like talking too much or riding her horse too often, they reported back to her mother. Ada called them “the Furies” and hated them. 5

If she had a moment to herself, she could be found on the lawn outside the family's elegant estate, her cat Puff on her lap, reading a tome like Bingley's *Useful Knowledge*. 6

Even her diet was controlled, chiefly mutton (sheep) oozing grease, with fruits and vegetables served only rarely. 7

Ada decided early on she was a genius. She dabbled in drawing, music, and other fields, including—gasp—poetry. By age eight, she was definitely in love with numbers. Equations and calculations became her focus, as well as the latest news in science. 8

One day when Puff dragged in a bird he had killed, 12-year-old Ada carefully studied its wing. For the next year, she did experiments and research on bird anatomy. She became obsessed with getting humans to fly, even designing wings for herself of paper and wire. She was trying to invent a new branch of science, which she called Flyology. 9

At 13 she completed the drawing of a "Planetarium," a comprehensive map of the stars. At 17 one of her tutors raved that with her math talent Ada could become "an original mathematical investigator." Ada felt she was destined for a brilliant future in science—it was just a matter of focusing. 10

The following year, through another tutor, she met Charles Babbage, professor of mathematics, prolific inventor, and social butterfly. Every Saturday afternoon he invited a glittering crowd to his home to marvel at his amazing machines. Soon Ada, wearing one of her bright-colored dresses, was attending. 11

One of his marvels was the "Silver Dancer," a beautiful metallic figure that performed elegant dance moves according to its clockwork mechanism. Visitors loved the life-like dancing, but Ada was more interested in the coils and cogs inside. 12

Other machines of his were more practical. Babbage was wonderstruck at the gas lamps, the steam engine, the electricity revolutionizing England. He was also inspired by a French weaver who had invented the Jacquard loom. Using a sequence of cards with holes systematically punched in them, looms were being automated, "programmed" to weave beautiful patterns in fabrics. Babbage envisioned machines that would work in a similar fashion 13

to do automatic calculations, with a goal of improving accuracy in British navigation and engineering.

People were calling his creations “thinking machines,” but had little idea of what that meant or how they would work. The word computer wouldn’t be coined for another hundred years. Indeed, Babbage’s ideas were so ahead of his time that hardly anyone knew what he was talking about. 14

Ada was an exception. She asked him for copies of his plans for machines that she could study. 15

Babbage, in turn, was impressed by Ada’s brain, and especially her math skills. He called her the “Enchantress of Numbers.” They took long walks together, discussing science and math. 16

At 20, Ada married a gentleman approved by her mom, the Earl of Lovelace, a bit of an amateur inventor himself who tinkered on his two country estates. Having three children didn’t slow Ada down, and she kept up her math studies and visited Babbage whenever she could. 17

To his dismay, the English government was balking at the amount of money it would cost to fund his latest machine. “A very costly toy . . . worthless,” sniffed the prime minister. Babbage’s research stalled. 18

Then he was invited to Italy to lecture on the machine. An Italian engineer wrote up Babbage’s speech in French—a language that of course Ada knew. Babbage turned to her to translate the paper into English, and then asked her to add her own notes to it. 19

Ada Lovelace’s claim to fame rests on the nine months she took to carry out his request. 20

Her notes, published in 1843, were much longer than the original paper. She took it upon herself to explain how Babbage’s new machine differed from his others, a challenge that had defeated other scientists. 21

Ada did get frustrated, needing Babbage’s help with the algebra, not her strongest suit: “I am in much dismay at having got into so amazing a quagmire & botheration with these Numbers.” But she persisted until she understood the new machine—and presented a sample set of rules for it to carry out. It was a method for calculating a complicated set of numbers, and it was also the world’s first 22

computer program. It would weave “algebraical patterns just as the Jacquard loom weaves flowers and leaves,” she wrote.

Ada is often credited with being the first computer programmer. 23  
She didn’t really invent programming, but rather the idea of it. A way of testing it didn’t exist yet. But she could look at Babbage’s plans and see the possibility of something entirely new—a logic machine.

## Babbage’s Engines

The “Difference Engine” was Babbage’s first attempt at a computing machine. It could do one simple task: process numbers in sequences. He succeeded in getting government funding to build one and started showing it off. Ada was fascinated by the way it looked—like the inside of a clock, but on a much bigger scale, with hundreds of interlocking cogs and wheels.

His next attempt was the “Analytical Engine,” which he claimed would be able to solve math problems. Powered by steam, it would have required 25,000 parts and been 15 feet high and 20 feet long—the most complex machine ever built. He never did succeed in getting the funding to build one.

Finally, in 1991 the Science Museum of London used his diagrams to build an Analytical Engine—and it worked.

Then she leaped ahead of Babbage. 24

With startling insight, she foresaw the ability of his device to do a lot more than crunch numbers. She envisioned all kinds of general uses, from producing new music to figuring out how much fabric to buy for a gown to determining what proportions were needed to build a flying machine. “It can do whatever we know how to order it to perform,” she declared. She was talking about the modern computer in a way no one else was at the time. It was all about information, not just numbers. This was an imaginative leap worthy of her poet father.

She took a moment to congratulate 25  
herself. She boasted that she had become her own role model at 28: “a completely professional person.”

Alas, plagued by illnesses, her life was short and mostly 26  
unhappy. She used her math skills to try to predict the outcome of horse races, got addicted to gambling, and ran up huge debts. She died of cancer at 36 in 1852, still mostly under the thumb of her mother, who lived to be 68. According to Ada’s request, she was buried in the Byron family vault next to the father she had never known.

It took almost 100 years for Ada’s work to move forward. During 27  
World War II, a gigantic machine called the Automatic Sequence Controlled Calculator was used to break enemy codes and help win

the war for the Allied Powers. Another woman, U.S. Navy officer Grace Murray Hopper, was one of its first programmers.

As computers took over our world, the United States Department of Defense created a new computer language in 1980 and called it Ada—in honor of Countess Ada Lovelace. 28

*Source:* Courtesy of Kathleen Krull.