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The Enchantress of Numbers: Ada Lovelace

Countess Ada Lovelace was the world's first programmer. In the early 1800s, she envisioned uses for preliminary computers beyond that of a calculator—applications in math, science, and music by the invention of "laws for series or formulæ" (Ryan).

Lovelace's career in mathematics and computing began at age seventeen, when she met Charles Babbage—the "father of the computer" (Nevdal). Lovelace became close friends with Babbage, the founder of the first automatic digital computer, and, through his connections, was able to study advanced mathematics with Augustus De Morgan at the University of London. The two corresponded about Babbage's Difference Engine and his latest proposed machine, the Analytical Engine; due to her experience and knowledge about the engines, Lovelace was commissioned to translate mathematician Luigi Menabrea's paper about the Analytical Engine from French to English. Her transcription ended being "three times the length of the original memoir" (Morais) according to Babbage--not because of meandering or incorrect translation but instead because she "entered fully into almost all the very difficult and abstract questions connected with the subject" (Morais) in her added notes. Lovelace drew connections between Babbage's machine and the Jacquard loom, a silk-weaving machine that "automatically created images using a chain of punched cards"; she "described with clarity" how the Analytical Engine could use punched cards to weave a long sequence of Bernoulli numbers, rational numbers defined by a recursive relationship (Morais). This would be the first computer program ever written.

Ada Lovelace understood that machines could be programed not just for simple mathematical computations but even for artistic tasks. In music composition, she explored how the relationship between subsequent notes of a piece could be used by the Analytical Engine to compose “scientific pieces of music of any degree of complexity or extent” (“OK Computer”); her works were the beginning for modern-day algorithmic composition.

Ultimately, Lovelace laid the foundations for modern programming by recognizing the potential of machines such as the Analytical Engine. Her work inspired future engineers and mathematicians, including Alan Turing who developed the basis for artificial intelligence in the early 1950s (Neural Technologies).

Works Cited

Morais, Betsy. “Ada Lovelace, the First Tech Visionary.” The New Yorker, 15 Oct. 2013, www.newyorker.com/tech/annals-of-technology/ada-lovelace-the-first-tech-visionary.

Neural Technologies. “Ada Lovelace – the Legacy of the First Programmer.” *Neural Technologies*, 27 Mar. 2023, www.neuralt.com/ada-lovelace-the-legacy-of-the-first-programmer/#:~:text=Lovelace%20sadly%20died%20at%20the,development%20of%20contemporary%20computing%20technology.

Nevdal, Henrik. “Charles Babbage, the Father of the Computer.” History of Data Science, 7 Sept. 2022, www.historyofdatascience.com/charles-babbage-2/.

“OK Computer: How Ada Lovelace Is Being Brought to Musical Life.” The Guardian, Guardian News and Media, 2 Nov. 2019, www.theguardian.com/music/2019/nov/02/ada-lovelace-emily-howard-composer#:~:text=Lovelace%20valued%20music%20and%20mathematics,they%20might%20even%20compose%20music.

Ryan, Mark. “Ada Lovelace, Her Objection, Turing Tests and Universal Computing.” *Medium*, The Startup, 12 Mar. 2020, https://medium.com/swlh/ada-lovelace-her-objection-e189717bd262.