Source: *Reading Digital Culture*, ed. David Trend (Blackwell, 2001), pp. 14-16.

"ada"

Sadie Plant

Sadie Plant is the author of *Zeros and Ones: Digital Women + The New Technoculture* (Doubleday, 1997). In this essay, Plant discusses the dilemma faced by nineteenth-century mathematician Charles Babbage, who developed his computational device called the "Difference Engine," only to then develop a newer version which rendered the original obsolete.

In 1833, a teenage girl met a machine which she came to regard "as a friend." It was a futuristic device which seemed to have dropped into her world at least a century before its time.

Later to be known as Ada Lovelace, she was then Ada Byron, the only child of Annabella, a mathematician who had herself been dubbed Princess of Parallelograms by her husband, Lord Byron. The machine was the Difference Engine, a calculating system on which the engineer Charles Babbage had been working for many years. "We both went to see the thinking machine (for such it seems) last Monday," Annabella wrote in her diary. To the amazement of its onlookers, it "raised several Nos. to the 2nd & 3rd powers, and extracted the root of a quadratic Equation." While most of the audience gazed in astonishment at the machine, Ada l "young as she was, understood its working, and saw the great beauty of the invention."

When Babbage had begun work on the Difference Engine, he was interested in the possibility of "making machinery to compute arithmetical tables." Although he struggled to persuade the British government to fund his work, he had no doubt about the feasibility and the value of such a machine. Isolating common mathematical differences between tabulated numbers, Babbage was convinced that this "method of differences supplied a general principle by which *all* tables might be computed through limited intervals, by one uniform process." By 1822 he had made a small but functional machine, and "in the year 1833, an event of great importance in the history of the engine occurred. Mr. Babbage had [p. 15] directed a portion of it, consisting of sixteen figures, to be put together. It was capable of calculating tables having two or three orders of differences; and, to some extent, of forming other tables. The action of this portion completely justified the expectations raised, and gave a most satisfactory assurance of its final success."

Shortly after this part of his machine went on public display, Babbage was struck by the thought that the Difference Engine, still incomplete, had already superseded itself. "Having, in the meanwhile, naturally speculated upon the general principles on which machinery for calculation might be constructed, *a principle of an entirely new kind* occurred to him, the power of which over the most complicated arithmetical operations seemed nearly unbounded. On reexamining his drawings...the new principle appeared to be limited only by the extent of the mechanism it might require." If the simplicity of the mechanisms which allowed the Difference Engine to perform addition could be extended to thousands rather than hundreds of components, a machine could be built which would "execute more rapidly the calculations for which the *Difference* Engine was intended; or, that the *Difference* Engine would itself be superseded by a far simpler mode of construction." The government officials who had funded Babbage's work on the first machine were not pleased to learn that it was now to be abandoned in favor of a new set of mechanical processes which "were essentially different from those of the Difference Engine." While Babbage did his best to persuade them that the "fact of a new superseding an old machine, in a very few years, is one of constant occurrence in our manufactories; and instances might be pointed out in which the advance of invention has been so rapid, and the demand for machinery so great, that half-finished machines have been thrown aside as useless before their completion," Babbage's decision to proceed with his new machine was also his break with the bodies which had funded his previous work. Babbage lost the support of the state, but he had already gained assistance of a very different kind.

"You are a brave man," Ada told Babbage, "to give yourself wholly up to Fairy-Guidance! — I advise you to allow yourself to be unresistingly bewitched..." No one, she added, "knows what almost *awful* energy.8c power lie yet undevelopped in that *wiry* little system of mine."

In 1842 Louis Menabrea, an Italian military engineer, had deposited his *Sketch of the Analytical Engine Invented by Charles Babbage* in the Bibliothèque Universelle de Géneve. Shortly after its appearance, Babbage later wrote, the "Countess of Lovelace informed me that she had translated the memoir of Menabrea." Enormously impressed by this work, Babbage invited her to join him in the development of the machine. "I asked why she had not herself written an original paper on a subject with which she was so intimately acquainted? To this Lady Lovelace replied that the thought had not occurred to her. I then suggested that she should add some notes to Menabrea's memoir; an idea which was immediately adopted."

Babbage and Ada developed an intense relationship. "We discussed together the various illustrations that might be introduced," wrote Babbage. "I suggested several, but the selection was entirely her own. So also was the algebraic working out of the different problems, except, indeed, that relating to the numbers of [p. 16] Bernoulli, which I had offered to do to save Lady Lovelace the trouble. This she sent back to me for an amendment, having detected a grave mistake which I had made in the process."

> "A strong-minded woman! Much like her mother, eh? Wears green spectacles and writes learned books...She wants to upset the universe, and play dice with the hemispheres. Women never know when to stop..." William Gibson and Bruce Sterling, *The Difference Engine*

Babbage's mathematical errors, and many of his attitudes, greatly irritated Ada. While his tendency to blame other bodies for the slow progress of his work was sometimes well founded, when he insisted on prefacing the publication of the memoir and her notes with a complaint about the attitude of the British authorities to his work, Ada refused to endorse him. "I never *can* or *will* support you in acting on

principles which I consider not only wrong in themselves, but suicidal." She declared Babbage "one of the most impracticable, selfish, 8c intemperate persons one can have to do with," and laid down several severe conditions for the continuation of their collaboration. "Can you," she asked, with undisguised impatience, "undertake to give your mind *wholly and undividedly*, as a primary object that no engagement is to interfere with, to the consideration of all those matters in which I shall at times require your intellectual *assistance & supervision* & can you promise not to *slur & hurry* things over; or to mislay & allow confusion & mistakes to enter into documents &c?"

Ada was, she said, "very much *afraid* as yet of exciting the powers I *know I have over others*, & the *evidence* of which I have certainly been *most unwilling to admit*, in fact for a long time considered quite fanciful and absurd... I therefore carefully refrain from all attempts *intentionally* to exercise unusual powers." Perhaps this was why her work was simply attributed to A.A.L. "It is not my wish to *proclaim* who has written it," she wrote. These were just a few afterthoughts, a mere commentary on someone else's work. But Ada did want them to bear some name: "I rather wish to append anything that may tend hereafter to *individualize it & identify it*, with other productions of the said A.A.L." And for all her apparent modesty, Ada knew how important her notes really were. "To say the truth, I am rather *amazed* at them; & cannot help being struck quite *malgré moi*, with the really masterly nature of the style, & its Superiority to that of the Memoir itself." Her Work was indeed vastly more influential—and three times longer—than the text to which they were supposed to be mere adjuncts. A hundred years before the hardware had been built, Ada had produced the first example of what was later called computer programming.

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