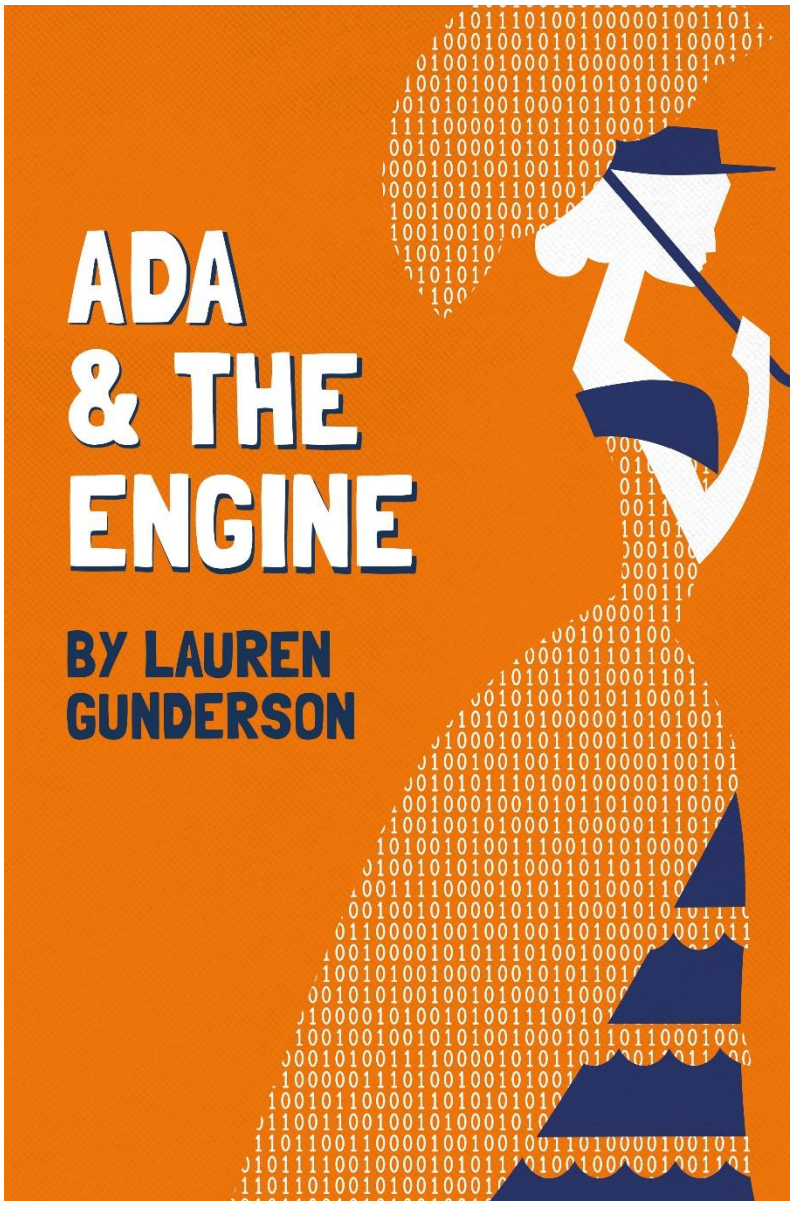
ADA & THE ENGINE



Dramaturgy Packet

By Stephanie Horn

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Ada Lovelace

Augusta Ada Byron was the only legitimate child of poet Lord Byron and Anne Isabella Milbanke. Due to the scandal and mental abuse that Byron inflicted on Annabella, at just one-month-old, Lady Byron gathered up Ada and fled the household. Ada would never meet her notorious father; he died in 1824 when she was eight years old.

Annabella was often away on health retreats, leaving Ada mostly in the care of her grandmother, tutors, and nannies. Often when Annabella would come back, Ada barely recognized her.

Concerned that the Byron blood within her veins would result in her leading a life as scandalous as her father, Anabella, who had also studied mathematics, decided that that would be Ada's sole focus in life. Anything that could invoke imagination was immediately cast out of the house. If any nannies or tutors encouraged Ada to dream or use her imagination, they were often promptly fired. Sometimes, even Annabella herself took over her education. While her sole focus was mostly maths, she was interested in music throughout her life, learning to play the piano, flute, violin, and harp. It is this interest that eventually enabled her to visualize the connections between music and technology.

Ada grew up very lonely, with usually only her tutors and mother for her companions. Her mother often did not want anything to do with her. To Anabella, Ada was a reminder of where she had failed in life: her marriage.

When Ada was young, she started to invent a device that would let her fly like a bird. She had illustrated plans to construct a winged flying apparatus before she developed thoughts about When Ada wrote to her mother about her plans, her mother instantly became concerned that Ada was not focusing on her math and science studies. While visiting Ada on a trip home, she quickly discouraged and chastised her for her creation and promptly took it away.

One of her first flings as a young woman was with her young tutor William King. They fell head over heels in love with each other. They almost succeeded in running away together. They got as far as his nearby home before her mother intervened. After this incident, Ada began to ride horses, an activity recommended by a therapist for young women with high sex drives.

Ada was often sick as a child and was once bedridden for three years, unable to move.

When she had recovered, she became a debutante and presented for the social season.

She met Charles Babbage at a get-together on June 5, 1833, when she was seventeen years old.

When Babbage demonstrated a small working model of the Engine, she was instantly fascinated with it.

For a while, she put aside her mathematical studies for marriage and motherhood. In 1835 she married Willian King, the future Earl of Lovelace. They had a happy marriage, and he

supported her work, but she was often disappointed with his lack of motivation and ambition. They had three children together.

In 1841, she began to work on mathematics again and was given advanced work by Professors of the University College of London. In 1842, at the request of Babbage, she published a translation of an article on the Analytical Engine by Italian military engineer Luigi Menabrea titled *Sketch of an Analytical Engine*.

The article included the first published description of a stepwise sequence of operations to solve mathematical problems and speculate on how the Engine could act upon things besides numbers. For example, if it could compose elaborate and scientific pieces of music of any degree of complexity or extent. She was the first person to explicitly articulate this notion, showing that Ada saw further than Babbage when she envisioned the Engine's potential.

When the British government scrapped the idea to sponsor Babbage, Ada offered to take up the Analytical Engine's marketing. At the same time, Babbage focused on the technical part, but Babbage was not supportive of this notion. Ada decided to fund the Analytical Engine from her purse. However, Anabella made sure that Ada didn't have access to her family property, so Ada got help from her friends as debts and started to gamble in horse races. She believed that the races had a pattern in which she could figure out and win. Unfortunately, she lost most of the games and owed the races huge debts.

She became increasingly unwell after she wrote the translation. Ada died of uterine cancer, at the age of 36, on November 27, 1852. She was in pain for several years and was given opiates such as laudanum and opium by her physicians to help her cope. Ada also drank copious amounts of alcohol. The mix of opiates and alcohol caused her personality to change in her final year. She also often suffered from hallucinations.

Ada's contribution to the world of computer science was unknown for decades. It wasn't until mathematician Alan Turing discovered Ada's work and brought it to the light of day. Alan Turing used Ada Lovelace's notes and found her first program to decode the Enigma code in Bletchley Park.

During the 1970s, the US pentagon named a programming language that they developed as ADA. Today, we use ADA in aviation, health care, transportation, financial, infrastructure, and space industries.

Charles Babbage

Charles Babbage was born in Walworth Surrey, on December 26, 1791. He was an English Mathematician and inventor considered the "father of the computers" and has been given credit for inventing the first mechanical computer, the Difference Engine. While the place of Babbage's birth is a mystery of sorts, most historians and biographies will say he was born at 44 Crosby Row, Walworth Road, London, England. Today, you can find a blue plaque on Larcom Street and Walworth Road that commemorates this. Charles was one of four children of Benjamin Babbage and Betsy Plumleigh Teape.

While he was, for the most part, tutored as a child, he attended King Edward VI Grammar School, but he eventually had to return to being educated by private tutors at home after his health took a toll. Later, he joined the Holmwood Academy, whose library prompted Babbage's love of mathematics.

Even though Babbage kept journals throughout his life, he neglected to write anything about his years as a teenager. To this day, what happened during those years of his life remains a mystery. By the time he arrived at Trinity College, Cambridge, he was self-taught in parts of contemporary mathematics. As a result of this, he ended up disappointed in the classes available at the university.

While there, Babbage and a few of his friends (such as John Herschel & George Peacock) formed the Analytical Society in 1812. He was also a member of The Ghost Club and The Extractors Club (dedicated to liberating its members from the nuthouse should any of their members be committed to one.)

In 1812, Babbage transferred to Peterhouse, Cambridge, where he was the top mathematician.

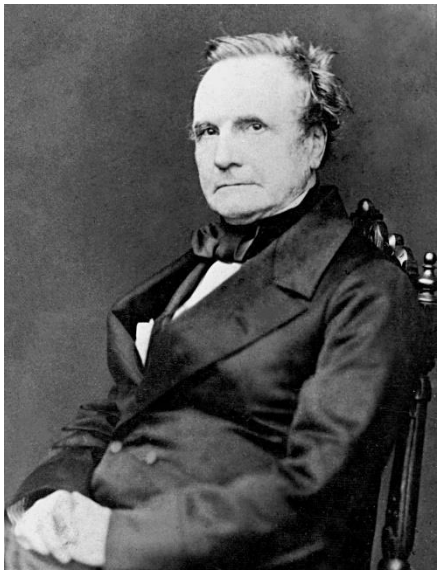
In 1814, he married Georgiana Whitmore. Together, they had eight children, but only three lived beyond childhood. Georgiana herself died in 1827, the same year he lost his father, their second son, and their newborn son.

After Cambridge, he became a lecturer on astronomy at the Royal Institution, and in 1816, was elected to become a Fellow of the Royal Society. In 1820, Babbage founded the Astronomical Society, and in the year 1824, he won the Gold Medal for his invention of an engine for calculating mathematical and astronomical tables. From 1828 to 1839, he was a Lucasian Professor of Mathematics at Cambridge University. In 1832 he published *On the Economy of Machinery and Manufactures.* A book on the organization of industrial production. In 1837, he published, *On the Power, Wisdom, and Goodness of God, as Manifested in the Creation.* A book on national theology.

His machines were among the first mechanical computers but, due to funding problems and clashes of personalities with others in the Royal Society, the machines were never fully built. He directed the building of steam-powered machines that achieved modest success, suggesting

that calculations could be mechanized. For more than ten years, he received government funding for his project, but eventually, the Treasury lost confidence in him.
He began work on the Difference Engine in 1822, a machine made to compute values of polynomial functions and to calculate a series of values automatically. After this attempt fell through, Babbage worked to design a more complex machine, The Analytical Engine, marking the transition from mechanized arithmetic to fully-fledged computation. The Engine was not a single physical machine, but rather a succession of designs that Babbage toyed with until he died in 1871.

Babbage lived and worked for over 40 years at 1 Dorset Street, Marylebone, where he died at 79 on October 18, 1871, of renal inadequacy.



Anabella Milbanke

Anabella Milbanke was born at Elemore Hall, Pittington, on May 17, 1792. She was the only child of Ralph and Judith Noel Milbanke. Her parents raised her to be concerned for the workers and tenants of the estates. She went on to help establish a school in Seaham. Sparking a love for reading at an early age, she was especially interested in mathematics and astronomy, and a Professor from Cambridge University tutored her. Anabella was a cold and prim woman. She developed into a stiff, religious woman with strict morals. She knew she had a strong intellect and did not hesitate to demonstrate it in her society.

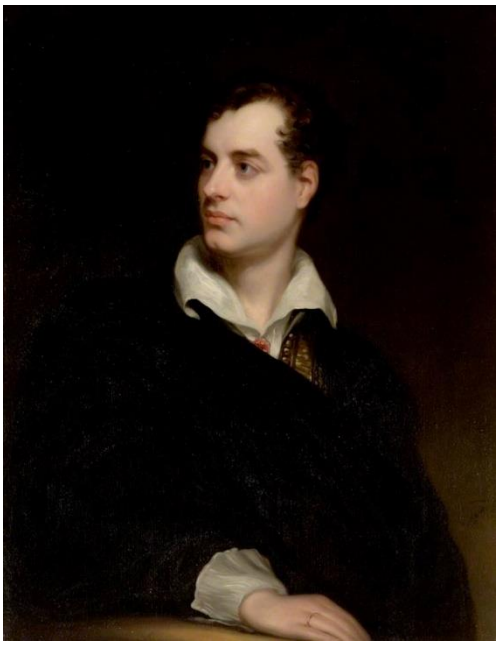
In her first two Seasons, she rejected several eligible suitors. She met Lord Byron in 1812. She rejected his first proposal but accepted his second in 1814, and they were married on January 2 of 1815. Later that year, in December, Ada was born. Not a month after, Anabella left Byron, taking their daughter with her, and began proceedings for a legal separation. Despite her hatred for Lord Byron, she was often on good terms with his half-sister, Augusta. With whom he had an affair and whose child was his. She often helped Augusta raise her daughter as if it were her own.

Afterward, Anabella returned to her ambitions to help the poor and ignorant. She was a supporter of the Brighton Co-operative Society and helped establish a branch in Hastings. Anabella also often lent the ground floor of her house in Brighton to the mechanic's institute for educational purposes. She even established the Ealing School that provided lessons in Carpentry, Masonry, and marketing gardening.

She was very active in the anti-slavery movement and attended the World Anti-Slavery Convention held at Exeter Hall in London in 1840. She became involved in improving slum conditions and discussing rights for women. She worked closely with Mary Carpenter, the pioneer worker in reformatories for girls. She started a vocational school at Ockham.

When it came to her daughter, Ada, Lady Byron feared she would inherit Lord Byron's behaviors and dark moods. She schooled her daughter in science and mathematics and discouraged literary study and the use of her imagination. She often saw Ada as a representation of where she failed in life.

She died of breast cancer on May 16, 1860.



Lord George Gordon Byron

"Mad, Bad, and Dangerous to know" George Gordon Byron was born on January 22, 1788, to "Mad Jack" John Byron and a wealthy Scottish woman, Catherine Gordon, in London, England. When his father squandered most of his wife's fortune, Catherine Gordon left her husband and moved with young Byron to Aberdeen, Scotland. It was only when his great uncle passed away in 1789, and George Gordon Byron, at the age of ten, inherited the title of Lord Byron and his estates that they returned to London.

Lord Byron was born with a clubbed right foot. A deformity of the foot and lower leg, giving it the appearance of a thin calf and a small foot. His deformity was something his mother often mocked him about, and he had to endure painful treatments during his childhood that failed to correct it, and he often wore special boots to help him walk.

In 1808, he attended Harrow, one of England's most prestigious schools. During his time there, he excelled in oratory, wrote verse, and played sports.

In 1803, he halted his education for a term to be near his distant and engaged cousin, Mary Chaworth, with who he had fallen deeply in love. In 1804, he began an intimate correspondence with his older half-sister, Augusta Leigh.

In 1805, Byron attended Trinity College, Cambridge. There, he piled up debts and an astounding rated and often indulged in the vices of undergraduates. Byron remained there until July 1808; received an MA degree. He called his time at Cambridge "the most romantic period of his life." for he had experienced a "violent, though pure, love and passion" for choirboy John Edleston.

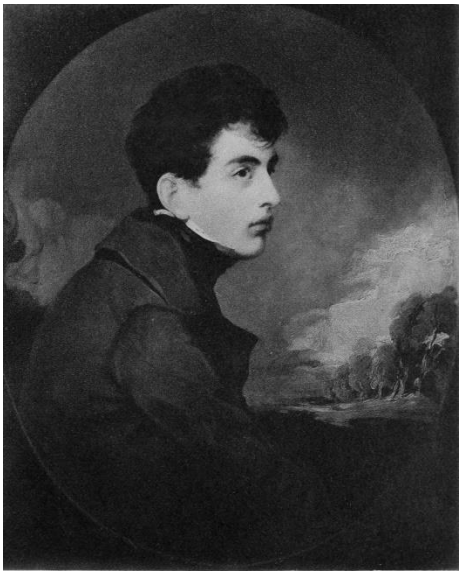
After Cambridge, Byron began to amass the debts that would follow him for years to come. Instead of pursuing intellectual activities, he often found London diversions such as fencing, theatre, boxing, and gambling more appealing.

In 1907 he first published a volume of poetry, *Hours of Idleness*. This work gained him his first recognition.

He had always dreamed of traveling abroad. Though he was in debt, he gathered together what he needed to begin a tour of the eastern Mediterranean sea. He wanted to capture his experiences on paper and thus began writing an autobiographical poem on October 31, 1809, in Ioannina, Greece. It was this poem that would eventually become *Childe Harold's Pilgrimage*.

Upon returning, he met the spirited and impulsive Lady Caroline Lamb, who would go on to coin the term "mad, bad, and dangerous to know." Lamb and Byron had a summer fling until he rejected her. She transformed their relationship into the subject of her gothic romance novel *Glenarvon*.

One good thing to come from the relationship with Lady Lamb was that Bryon came to know her mother-in-Law, Elizabeth Milbanke Lamb, Lady Melbourne. Through her, he met her niece, Annabella Milbanke. Byron immediately saw her as a way of escaping Caroline.
Anabella, who was happy with her domestic life, and believing that she would never fully love Byron, refused his proposal. Byron was relieved by this response and immediately began conducting an affair with another woman.
In 1813, he began his affair with his half-sister, Augusta. She had become his last remaining close relative. While there is no legal proof, there is evidence in letters that strongly suggests an incestuous relationship with Augusta. In the middle of this, Byron received another letter from Anabella Milbanke, confessing her mistake in rejecting his proposal and was looking to renew their friendship.
On April 15, 1814, Augusta gave birth to a little girl, Elizabeth Medora, believed to Byron's daughter, although he never acknowledged the paternity. While he spent most of that summer with Augusta, he continued to correspond with Anabella. In September of that year, he proposed again. This time she accepted. They married on January 2, 1815, after many postponements and hesitation, many of his makings.
Throughout their marriage, financial problems and heavy drinking drove Byron into a rage or irrational behavior and often took it out of his pregnant wife. On December 10 of 1815, she gave birth to Ada Byron, then called Augusta Ada Byron. Early in the morning, of January 15 of 1816, not just over a month later, Lady Byron and Ada left London and Byron behind. Byron never saw them again, although Byron often received letters from Anabella asking him to join her at her current residence. However, after revealing how he treated her to her parents, her father wrote Byron on February 2 to propose a separation. On March 17, Byron accepted the terms for the legal separation. On April 21, Lord Byron signed and finalized the divorce.
Byron went abroad once more. While traveling, he continued to rack up debt and having multiple affairs, resulting in a second illegitimate child with Claire Clairmont, Clara Allegra.
For years he continued to travel and write. In 1823 wanting to search for a new adventure, he became an agent of the London Committee which, had been formed to aid the Greeks in their struggle for independence from Turkish Rule. He left for Cephalonia in July. He made valiant efforts to unite the various Greek factions, but an illness weakened him. On April 19, he died from a fever. His body was returned to England and laid to rest in his family vault.



Mary Sommerville

Mary Fairfax was born to Vice-Admiral Sir William George Fairfax and his second wife, Margaret Charters. on December 26, 1780.

Her siblings died in infancy. She grew up in a state of poverty in Burntisland, Fife. Her father was often away at sea, and her mother to make up for the meager pay her father was receiving by growing and selling vegetables, maintaining an orchard, and keeping cows for milk.

She was a wild child growing up. Her father was often away, and her mother only required that she learn to read The Bible and recite the Calvinist Catechism. When she was not spending her time studying, she played outside in the gardens and beaches. When her father finally returned, he commented, "This kind of life will never do, Mary must at least know how to write and keep accounts." Ten-year-old Mary was then sent away to an expensive all-girls boarding school in Musselburgh for a year, where she learned the first principles of writing, rudimentary French, and English grammar. Mary Sommerville was a shy and timid child with poor memory, and she felt the difference of station between herself and her schoolmates. She remained until she was eleven.

Throughout her childhood life, she spent her winter months in Edinburgh and her summers in Burntisland. When she was 13, her mother sent her to a writing school in Edinburgh; and while she was visiting an uncle in the same area, she attended a dancing school, where she learned manners and how to curtsy. When she was back in Burntisland, she taught herself Latin, a task encouraged by her Uncle, Dr. Thomas Sommerville. It was here that she had access to elementary books on algebra and geometry. She spent the summers learning to play the piano and learning Greek. When she returned to Edinburgh, she was allowed to attend the academy Alexander Nasmyth. She continued participating in the traditional roles of a daughter and woman of the times, attending social events, and was even nicknamed "The Rose of Jedburgh" among Edinburgh socialites. When a tutor came to stay with her family to educate her younger brother, Henry, Somerville asked him to purchase elementary books on algebra and geometry for her. He gave her Euclid's *Elements* and *Algebra* by John Bonnycastle.

Mary married in 1804 when she was 24 years old to a man named Samuel Grieg. She was 24 years old at that time. Samuel died three years after their marriage. Mary had given birth to two sons during the time, and she returned to Scotland with them after his death.

She remarried in 1812 to William Somerville. William was the son of her aunt Martha and her husband Thomas Somerville, whose home she had been born. Unlike Samuel, who never cared about her desire to study, William was just as interested in science and was supportive of her endeavors.

In 1826 Mary Somerville published her first paper, *The Magnetic Properties of the Violet Rays of the Solar Spectrum*. In 1827, Lord Brougham of the Society for the Diffusion of Useful Knowledge requested that Sommerville translate Laplace's, *Mecanique Celeste.*

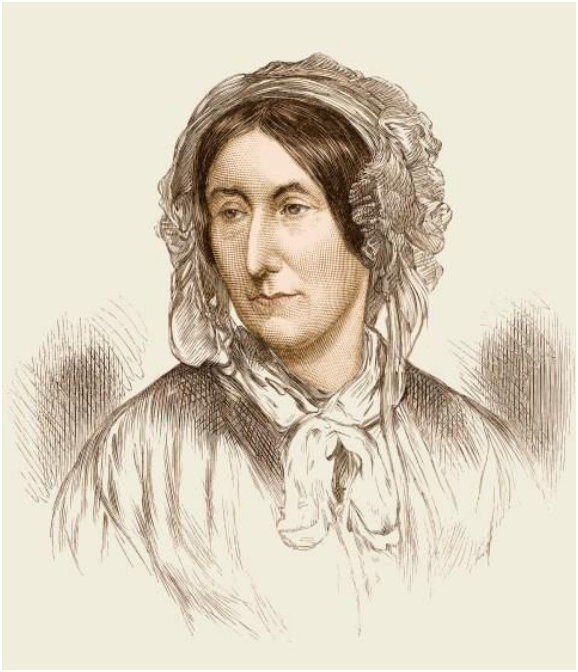
The translation, titled *The Mechanism of the Heavens*, appeared in 1831 and was an immediate success.

After the success of her book, she spent her time abroad. Mostly, in Paris, working on another book and reconnecting with old mathematician friends. One of these being Lady Byron, estranged from her husband at the time. Upon returning to London, Mary helped Lady Byron by tutoring her daughter, Ada, in her studies.

When her husband's health took a turn for the worse, the family went to Italy, where she continued to write. Her most successful text was *Physical Geography*, published in 1848 and used by schools and universities until the 20th Century.

When her husband's health took a turn for the worse, the family went to Italy, where she continued to write. Her most successful text was *Physical Geography*, published in 1848 and used by schools and universities until the 20th Century.

Mary Sommerville lived in Naples until she died in 1872 at the age of 92. A year after, her autobiography, *Personal Recollections*, was published, a book she had been writing over the last few years of her life.



Lord Lovelace

William King, 1st Earl of Lovelace, was born February 21, 1805, in Great George St. London, England. He was the eldest of four children had by Peter, the 7th Lord King, Baron of Ockham, and Lady Hester King.

Like Byron and Babbage, William attended Eton and Trinity College. Afterward, he acted as a secretary under Lord Nugent, the Lord Commissioner of the Ionian Islands. At the age of 28, William inherited the title of 8th Lord King in 1833 when his father died. Soon after he inherited his title, he was also given the title Justice of the Peace for the County of Surrey.

With his marriage to Ada Byron and her connection to Prime Minister Lord Melbourne (her cousin), William King created Viscount Ockham and the 1st Earl of Lovelace.
In 1840, William became the Lord Lieutenant of Surrey, the highest social and political position to which most men aspired to be in the English society.

Later on in his life, he became famous for the arched trusses in the collar roof of his banqueting hall, created by steam heat. He delivered a paper on the process in 1849 to the Institution of Civil Engineers. Another one of his projects was the Ockham brickworks. He won a medal for brickmaking at the Crystal Palace, during the Great Exhibition.

He married Ada Lovelace in 1835. While he had limited knowledge of his wife's obsession, he adored her and supported her dreams. Together, they had three children: Byron King- Noel, Lady Anabella Isabella King-Noel, & Ralph Gordon King Noel Milbanke. After Ada died in 1852, he married a woman named Jane Jenkins. He had one son with her, Lionel Fortescue King.

Lovelace died in December of 1893 at 88 years old.

Timeline

01-22-1788: The birth of George Gordon Byron
08-02-1791: John Byron dies, and George Gordon Byron becomes the sixth Lord Byron.
12-26-1791: The birth of Charles Babbage
05-17-1792: The birth of Annabella Milkbanke
1804: J.M. Jacquard invents apparatus to automate looms.
02-21-1805: The birth of William Noel King
07-01-1805: Lord Byron travels to Cambridge to become a student at Trinity College
1810: Babbage wins a place at Trinity College at Cambridge University
1814: Babbage graduates from Cambridge.
07-02-1814: Charles Babbage marries Georgiana Whitmore
01-02-1815: Marriage of Annabella and Lord Byron
1815: Babbage gives a series of lectures on Astronomy to the Royal Institution.
12-10-1815: The birth of Augusta Ada Byron
01-15-1816: Annabella takes Ada and leaves Lord Byron.
1816: Babbage was elected to be a member of the royal society.
08-06-1816: Charles & Georgianna have a son, Benjamin Herschel Babbage.
04-25-1816: Lord Byron leaves England to escape the scandal and debt revolving around him.
07-17-1818: Charles & Georgianna welcome their only daughter, Georgianna.
12-15-1819: Charles and Georgianna welcome son Edward Stuart
1821: Babbage begins work on automatic calculating machines.
06-01-1821: Charles & Georgianna welcome Francis Moore
03-13-1823: Charles & Georgianna welcome Dugald Bromhead
04-19-1824: Death of Lord Byron
09-16-1824: Charles & Georgianna welcome Henry Prevost
1829 – 1832: Ada becomes bedridden with a paralyzing illness.
06-05-1833: Ada meets Charles Babbage.
09-30-1834: Babbage's daughter, Georgiana, dies.
07-09-1835: Marriage of Ada Byron and Lord Lovelace
05-12-1836: Ada and Lord Lovelace's son, Byron, was born.
1837 – Victoria comes to the throne.
09-22-1837: Ada and Lord Lovelace's daughter, Annabella, was born.
1838 – Oliver Twist is published
People's Charter advocates social & political reform
Abolishment of Slavery in the British Empire.
London – Birmingham line opens & a railway boom starts.
1839 – Prime Minister Melbourne resigns & sparks a political crisis.
07-02-1839: Ada and Lord Lovelace's final child, Ralph, was born.
1840 – A postage rate of one penny is introduce.
Introduced Vaccinations to the Poor
1843 – The Church of Scotland splits over separation of the Church & State
1847 – The world's first municipal park opens in Birkenhead, Merseyside.
05-01-1851: The Great Exhibition opens at the Crystal Palace in Hyde Park, London

11-27-1852: Death of Ada Lovelace
05-16-1860: Death of Annabella Milkbanke
10-18-1871: Death of Charles Babbage
12-29-1893: Death of Lord Lovelace

Ada & Babbage

Ada Lovelace and Charles Babbage met at a party on June 5, 1833, when Ada was seventeen years old. They saw the only completed portion of the Difference Engine in action: one-seventh part of it.

She was immediately entranced when Babbage demonstrated the small working section of the Engine to her. Twelve days later, Babbage received Ada and Lady Byron in his home. Ada fell head over heels in love with the machine and became a close friend of Babbage. While it's not known how their friendship progressed, it is quite clear from the correspondences that remain (Lady Byron destroyed most after Ada's death) that Babbage and Ada were very close and even had a romantic friendship. While it was not a physically intimate romantic relationship, it was about as close to a love affair as it could have been.

In 1842, at the request of Babbage, she published a translation of an article on the Analytical Engine by Italian military engineer Luigi Menabrea titled *Sketch of an Analytical Engine*. While Charles Babbage was called the father of the computer, it was Ada who was the mother. Babbage only saw his machine as a mathematical calculator. Ada saw "poetical science" and brought a poetic imagination to her analysis and thoughts that Babbage would have never conceived. She believed that the Analytical Engine could be applied to all sorts of processes, even composing music. When you read her writings about the Analytical Engine, you can tell that Ada saw the future. She saw computers making our world today possible.

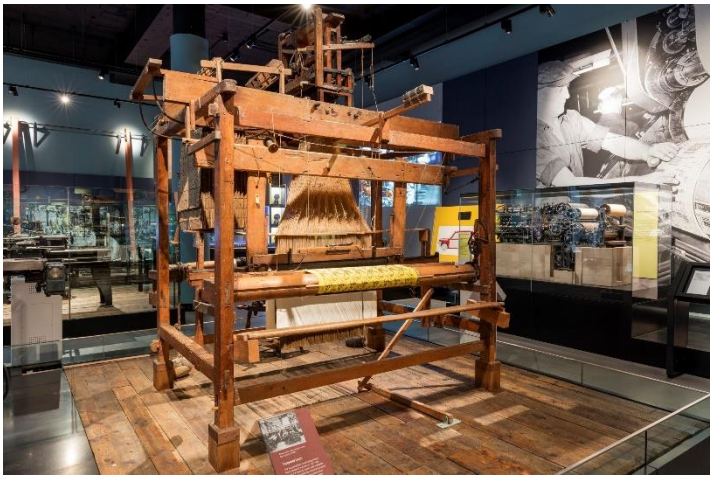
In 1843, she wrote a letter to Babbage offering to help him with the project. She was aware that he was hopeless at diplomacy and influencing the influential and wealthy people who could back this project and make this creation come to life in the 1840s or 1850s. Babbage, however, rejected Ada's help.

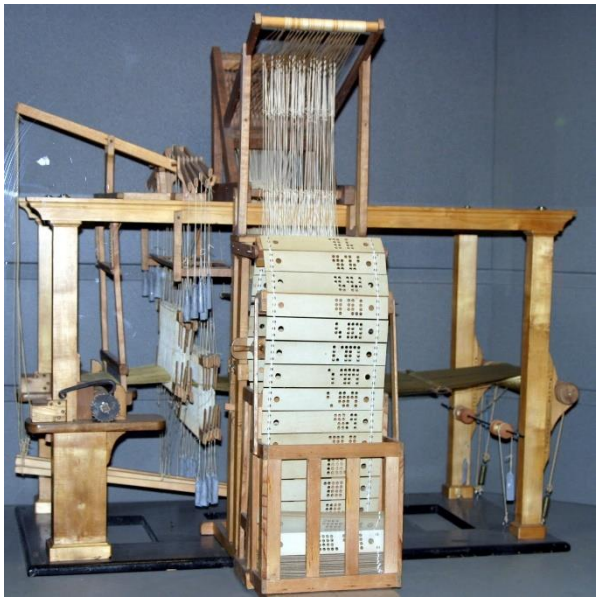
The Jacquard Loom

Joseph-Marie Jacquard was born in Lyons on July 7, 1752 and died in Oullins on August 7, 1834. While Jacquard didn't invent a whole new loom, he did create a head that attaches to the loom and allows the weaving machine to create intricate patterns, improving the original punched-card design of inventor and artist Jacques de Vaucanson's loom of 1745. Any loom that uses the attachment is called a Jacquard Loom.

The Jacquard loom enabled decorated fabric to be woven about twenty-four times more quickly. Before this invention, even the most skilled weaver and draw-boy duo could only manage two rows (or picks) of woven fabric every minute. With the attachment, a skilled lone weaver could fit in an average of about forty-eight picks per minute of working time.

The punch cards (one card for each row of the design) allowed the worker to control which threads lifted to make the design appear with astounding precision and speed. The design is created first on gridded paper. Then, a workman takes the drawing and translates the design onto a punch card. Each column and row corresponded to a specific square of the design pattern. These cards are then stitched together into a belt and fed into the loom. With these punch cards, the operator can control the motion of the threaded rods within. These rods, allowed to fall through the holes in the punch cards, would lift vertical threads and allow the horizontal shuttle to pass through; the blocked holes remain in place.





Babbage's Machines

The Difference Engine was an early calculating machine on the verge of being the first computer. It was a machine designed and partially built during the 1820s and 1930s by Charles Babbage. As a member of the Royal Astronomical Society, Babbage had seen a need to design and build a device that could automate long and tedious astronomical calculations.

Tables at the time often contained errors, which could be a life-and-death matter for sailors at sea. Babbage wrote a paper titled "*On the Theoretical Principles of the Machinery for Calculating Tables,"* which he presented to the society later that year. Babbage argued that automating the production of the tables could assure their accuracy. With the society's support, he turned to the government for funding, obtaining one of the first government grants for research and technological development in the world.

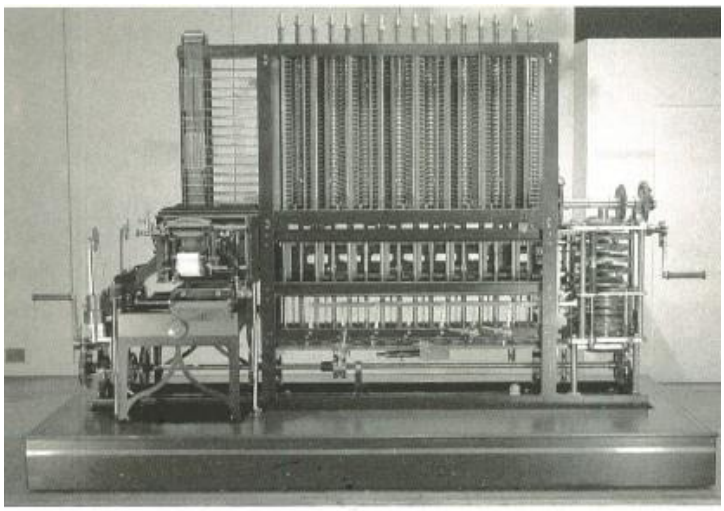
Calculations were rarely more than six digits, and Babbage had plans to produce twenty- or thirty-digit results. The Difference Engine operated on discrete, decimal numbers (0-9) rather than smooth quantities, represented by positions on toothed wheels, rather than binary digits. This machine, though, was more than a calculator. Like modern computers, the Difference Engine had storage where data was held temporarily for later processing and designed to stamp its output into soft metal, used later to produce a printing plate.

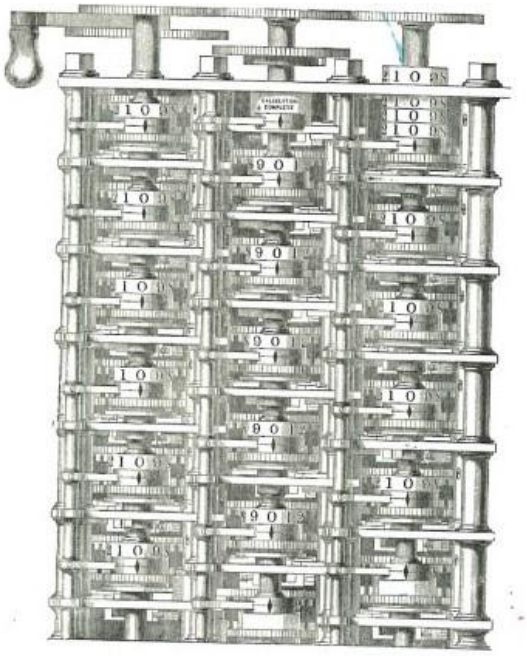
Despite still working on the Difference Engine, Babbage was already beginning to imagine ways to improve it. He often thought about generalizing its operations so that it could perform other kinds of calculations. By 1833, when funding ran out for his Difference Engine, he had conceived the Analytical Engine: a general-purpose, fully program-controlled, automatic mechanical digital computing machine. The goal was that it would be able to perform any calculation set before it. Its design consisted of four components: The Mill, the Store, the Reader, and the Printer. These components are still essential to every computer today. The Mill was the calculating unit. The Store holds the data before processing, and the Reader and Printer are the input and output devices. Babbage wanted to automate the process as much as possible, right up to producing printed tables of numbers.

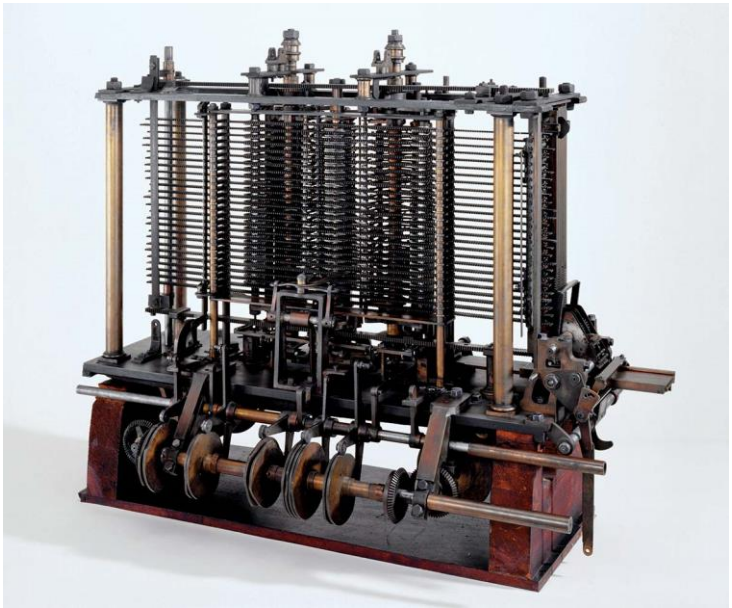
The Reader was a new feature of the Analytical Engine. Numbers were to be entered on punched cards, using the card-reading technology of the Jacquard loom. The use of these instruction cards would make it a programmable device and far more flexible than any machine in existence. Babbage was hoping that it would be able to execute instructions in other than sequential order.

The machine would have been the first computer had it been finished, but Babbage ran into implementation problems. His ambitious design was deemed infeasible due to the current technology, and he had failed to generate the promised mathematical tables with his Difference Engine. This info damped the enthusiasm for further government funding and caused work on the Engine to cease, although Babbage never stopped designing and dreaming of his machine.

A completed portion of the original Difference Engine is on display at the Science Museum in London.







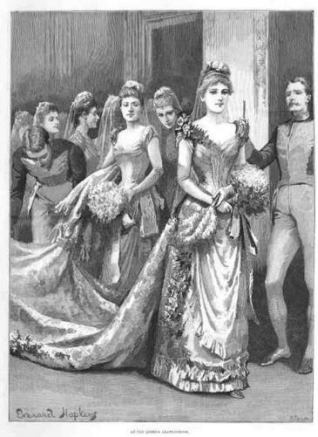
The 19th Century

Also known as the Victorian Era, the period between 1820 & 1914 corresponds roughly with Queen Victoria's reign. The Victorian society functioned by hierarchy. Race, religion, region, and occupation were all significant parts of ones' identity and status. The central organizing principles of Victorian society, though, were gender and class.

Victorian gender ideology revolved around the "doctrine of separate spheres," stating that men and women were different and meant to do other things. For men, sex was essential, while for women, your life lay in reproduction. The idea of a family dominated this period. It was expected of women to stay and home and bring up the family.

The 19th Century saw the world's first Industrial Revolution, political reform, and social changes. It saw Charles Dicks and Darwin, a boom in railways, and the first telephone and telegraph. It was a century of rapid development and changed far swifter than any century before it. England changed from a rural, agricultural country to an urban and industrialized one. It took many years for both the government and the people to adjust to the new conditions.

A positive outcome of the revolution was the development of skilled labor, which led to a middle-class ride consisting of newly educated industrial technologies experts. The rise of the middle class put pressure on the upper levels for increased representation, which resulted in reform acts giving commoners increased representation in parliament. It also gave people the incentive to think more scientifically and educate themselves to solve problems.



Debutantes

The idea that a young lady had reached maturity, completed her education & was ready to be presented to society for marriage.

Society can use various forms of entertainment to present a woman. The most elaborate of these (mostly reserved for those with immeasurable wealth and connections to essential people) was a Debutante ball. There were also afternoon teas with dancing, little dances, a small tea without music, and the sending out of the mother's visiting card with her daughter's name engraved below her own, announcing to the world that her daughter is eligible for invitations.

The London social season often ran from April 11 to August 12, with some events held in the winter months. It was expected for a young lady to be married within three seasons at the most, or else she was considered a failure. Due to England's life expectancy in the 1850's being 40 years of age, if a woman was not married before 30, she was labeled a hopeless spinster.

Courting

In the 19th Century, courtship is more of a career move than a romantic interlude for a young man, as all of a woman's property reverted to him upon marriage. Marriage was encouraged only within one's class.

The lower class had opportunities to socialize at Sunday Service, Church Suppers, and Holiday Balls, while the upper classes held their social events through balls and other various parties.

Until 1832, the legal age in England for marriage was 21 years for both men and women. After 1823, a male could marry a woman as young as 14 without parental consent. Most girls were married between the ages of 18 & 23.

The Great Exhibition

The Great Exhibition of 1851 was Prince Albert's (Queen Victoria's husband) vision to display industry wonders worldwide. Born out of the concern that Britain lacked training in art and industry, Albert wanted the Exhibition to help Britain compete with other nations in the manufacture and show the world that technology brought uplifting changes to society. Britain led the race into the future.

The Exhibition was held at Hyde Park and opened on May 1, 1851. The Crystal Palace, the building that housed it, covered 19 acres and had around 100,000 displays from over 15,000 contributors from 25 different countries.

The Exhibition's biggest draw was the 27 ft fountain that stood at the building's heart, crafted from 4 tons of pink glass.

In March of 1850, Prince Albert announced an international competition for the Exhibition building. Architects from around the world submitted over 254 designs. The board members rejected every last one of them and made a horrible design of their own. In the end, gardener and greenhouse designer Joseph Paxton came up with the idea both beautiful and could speed up the process by using prefabricated glass and iron sections. On July 15, 1850, Albert officially selected Paxton's plan, and the building began.

While the Exhibition had the Royal Family's support, it didn't have any government funding. Fundraising, subscriptions, & dinners raised money to build The Crystal Palace.

The Crystal Palace at Hyde Park, from its conception, was going to be temporary. However, due to the building's popularity, it was relocated & rebuilt on top of Sydenham Hill in 1854. It remained as a cultural center for South London until it burnt down on November 30, 1936.

If Albert had not been so passionate about the project, The Great Exhibition would not have been on the same intellectual scope it was.

You can find a memorial celebrating the Exhibition's success today behind The Royal Albert Hall.

Illnesses & Treatment

In the 19th Century, epidemics like smallpox, cholera, and TB existed, and the life expectancy of a living being during the time was around 80 years old. However, Children were lucky if they survived to see their fifth birthday. People believed that bad smells were the cause of most diseases. In poorer districts, where the air was foul, the death rate from diseases was high. Meanwhile, in the country or suburbs where there were no smells, there was apparently, no disease. Between 1832 & 1853, when most of the population was suffering from cholera, it took Dr. John Snow years to persuade the world that cholera is a water-born disease and had nothing to do with bad smells.

The growth of towns and cities in Britain after the industrial revolution produced terrible problems of public health. Those that lived in overcrowded slums with insufficient and contaminated water were subject to endemic diseases, such as smallpox, typhoid, tuberculosis, and killer epidemics like cholera.

Between 1838 and 1864, bedside medicine and treating the sick person changed, but drug therapy was still heavy.

At the time, cancer was known as a "women's disease" due to the observation that women were liable to Breast and Uterine cancer because of their biological role in reproduction. While cancer had been around since ancient Egypt, the cancer treatments hadn't changed. These often consisted of a diet, bloodletting, and laxatives. Surgery was an option at the time, but general anesthesia and antiseptics were not available until the 1840s and 1860s, which made surgeries extremely painful. Some alternative treatments were Dock Root, Turkish figs (both due to the laxative effect) & Lead, and brimstone (combined and injected into the tumor until the tumor disappears).

The 19th Century saw the development of effective medicines in small doses, such as opiates and strychnine. The Victorians took not only alcohol and opium, but cannabis, coca, mescal, and with the invention of the hypodermic needle in the 1840s, morphine, and heroin, most of which you could get over the counter without a prescription. Side effects of laudanum are euphoria, dysphoria, sedation, constipation, psychological dependence, physical dependence, and overdose, resulting in severe respiratory depression and death. By 1868, you could only purchase laudanum by registered chemists in England, and the product had to have a label indicating it as a poison.

Glossary

Philandering – (of a man) readily or frequently enter into the casual sexual relationships with women.

Ne'er-Do-Well - a person who is lazy and irresponsible.

Debut – a person's first appearance or performance in a particular capacity or role.

The Lucasian Chair of Mathematics – a mathematics professorship in the University of Cambridge, England.

Salon – a gathering of people held by an inspiring host.

The Method of Finite Difference - The finite difference method (FDM) is an approximate method for solving partial differential equations. It has been used to solve a wide range of problems. These include linear and non-linear, time independent and dependent problems. This method can be applied to problems with different boundary shapes, different kinds of boundary conditions, and for a region containing a number of different materials.

Socialite - a person who is well known in fashionable society and is fond of social activities and entertainment.

Luddite – a person opposed to new technology or ways of working.

Effervescent – vivacious and enthusiastic.

Uncouth – lacking good manners, refinement, or grace.

Punch Card – a piece of stiff paper that can be used to contain data represented by the presence or absence of holes in predefined positions.

Luigi Menabrea – an Italian general, statesman, and mathematician who served as the Prime Minister of Italy from 1867 to 1869.

The Bernoulli Number – a sequence of rational numbers which occur frequently in number theory.

Michael Faraday – an English scientist who contributed to the study of electromagnetism and electrochemistry.

Laudanum – a tincture of opium containing morphine and codeine

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