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A Research of the Life of Charles Babbage

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## Abstract

If the name of Charles Babbage does not in any way seem familiar, you do not stand alone. Babbage remains one of the most unpopular geniuses in our history, a mastermind of a variety of subjects, including mathematics, engineering, politics, economics, philosophy, and religion. Babbage would create the first "calculating machine," and created blueprints for other machines that could have led to the first modern-day programmable computer in as early as the mid 19th century. However, the story of Charles Babbage is indeed a tragic one: the totality of his projects were not fully completed until the late 20th century, over a hundred years after his death, due to lack of funding. His story is one that brings about fear for the rest of humanity by raising this question: how many of the world's greatest intellectual minds were never given a chance?

## A Research of the Life of Charles Babbage

There are many great faults in the world in which we live. A few come to mind: rain interrupting a beautifully sunny afternoon, a steak that is cooked incorrectly, a broken familial relationship, and the amount of fat calories in a hot slice of pizza. However, one fault of our world overrules all of the previous: the overlooking of an absolute genius. This is perhaps one of the most tragic events in history, and has happened repeatedly. One of these sickening cases is the life of Charles Babbage.

Charles Babbage was born on December 26, 1791 in London, England. Not much is known about his lineage or parentage, even in his own autobiography *Passages from the Life of a Philosopher* (1864). However, he does feel quite fondly for his "excellent" mother, and says nothing degrading of their character in his work. He claims that they, "being born at a certain period of history, and at a certain latitude and longitude, of course followed the religion of their country" (Babbage, 5). Thus, Babbage was raised into the quite popular Protestant Christianity of England. He was baptized as an infant on January 6, 1792. He writes that his mother taught him the usual Protestant forms of daily and nightly prayer, and that his mother and his father were faithful in their prayers and to each other.

Babbage was curious from infancy. Upon receiving a new toy, he would ask, "Mamma, what is inside of it?" (Babbage, 5-6). If the answer did not fit his fancy or did not satisfy his impulse to understand, the toy would be broken open and thus examined appropriately. Babbage's mother would continue to feed his curiosity throughout his boyhood; he can recount his mother taking him to visit numerous "exhibitions of machinery," where Babbage could observe the current strategies of manufacturing, art, and distribution (Babbage, 12).

Somewhere near his elementary school years (even Babbage himself is not specific with the timeframe), he was placed at an all-boys private school in London, which he remained for three years. He finished his pre-university education at an alternative private London school. With his time at University within reach, his family hired a couple of tutors to give Babbage advice on going to Trinity College in Cambridge, neither of which he found helpful. By this point, Babbage had fallen in love with mathematics and could not stop reading of the subject, despite his limited access to purposeful, popular mathematical works.

Upon enrolling at Cambridge, Babbage was exhilarated to find a library full of books begging for his study, to answer his questions, and to fill in gaps of his knowledge left by mediocre math textbooks. However, this task seemed to be much more difficult than first suspected. He needed help. He went to one of his former tutors and asked his mathematical question, only to be met with an unsatisfying response. The tutor essentially told him that the question was not worth asking. He then went to one of the lecturers of the university to ask the same question, and the man treated the question the same way. He went to a third professor, begging for his curiosity to be satisfied, but "the person [Babbage] addressed knew nothing of the matter, although he took some pains to disguise his ignorance" (Babbage, 19-20). Despite his unsatisfied mind, he transferred to Peterson college and graduated with an honorary Bachelor's degree in the year 1814 without taking any of the pre-graduation examinations.

In this same year, Babbage married Georgiana Whitmore. They remained in England the entirety of their marriage. The couple had eight children, but only four survived through childhood. On September 1, 1827, Babbage's wife died. In that same year, he also lost his

father, their second-born son, and their newly born son. Babbage's autobiography is (not surprisingly) silent about these quite consecutive tragedies.

While at Cambridge, Babbage worked alongside brilliant classmates Sir John Herschel and Dean Peacock. According to the author of Babbage's obituary, these men possessed "a knowledge of the refined analytic methods of mathematical reasoning which had so long prevailed over the continent" (Brunskill, 1). The three began by translating and editing the smaller treatise on the Calculus by Lacroix, with notes of their own, and included an Appendix upon Finite Differences. They next published problems and solutions referring to Infinitesimal Calculus. Toward this publication, Babbage contributed an independent essay on a subject quite unknown at this time period: the solution of Functional Equations. Because of his outstanding work at the university, in 1828 he was nominated to the Lucasian Professorship of Mathematics, holding a chair which had once been held by Sir Isaac Newton himself.

In 1812, while again at Cambridge, Babbage had an idea unlike anything the world had ever seen. He called it the Difference Engine. The machine itself is extremely difficult to understand, but it was incredibly innovative for the time. The machine made the process of finding relationships of a series of numbers much quicker. Let me give an example. Suppose we have the series of squares: 25, 36, 49, 64, 81, and so on. The machine would then give the difference between each of the terms of the series: 7, 9, 11, 13, 15, 17, and so on. It would then repeat the process with the new series of numbers: 2, 2, 2, 2, 2, and so on. As it turns out, most common series of numbers "resolve themselves when they are analyzed into orders of differences" (Brunskill, 2). This machine would lay the foundations for future technology unlike ever seen before.

The first Difference Engine was an incredible piece of machinery; even the unfinished version weighed an immense 15 tons and stood over 8 feet high. Once the construction of this machine had stalled due to financial strains, Babbage turned his attention to another machine he termed the Analytical Engine. Had it been realized in the 19th century, Babbage's new machine, using punch cards, would have been the world's first user-programmable computer. However, Babbage's financial woes continued. He had literally spent all of his savings on the building of the first unfinished Difference Engine, he had to turn to other means of financial gain, such as writing, which will be discussed later.

Once construction of the first Difference Engine had stalled and Babbage's money had run out, his engineering genius ended far too soon. Babbage would, however, go on to complete the plans for his Analytical Engine, and even construct plans for a new and improved Difference Engine. Babbage could find the funding for neither of these machines, despite the fact that they could have been the most innovative machines ever created. The second Difference Engine was not completed until 1989-1991 when the Science Museum of London (which housed his blueprints) proved the accuracy of his work to 31 digits. In an 1871 *Scientific American* journal article, the author (who is unidentified in the article) even claims that one can "hardly suppose [his machines] capable of practical realization." The author goes on to describe the old workshops of Babbage:

"No more strange or melancholy sight could well be seen. Around these rooms in Dorset street were the ruins of a lifetime of the most severe and ingenious mental labors perhaps ever exerted by man. The drawings of the machine[s] were alone a wonderful result of

skill and industry; cabinets full of tools, pieces of mechanism and various contrivances for facilitating exact workmanship were on every side, now lying useless."

Even though Babbage's genius was known by his death in 1871, he could not find anyone that trusted his genius enough to fund the greatest machines the world had ever seen.

The mathematical works of Charles Babbage were left unfinished far too early in his life. This is one of the greatest tragedies of our world: a genius whose work was never fully appreciated, and, even more sadly, because of financial circumstances. It is saddening that a genius was left short of his full potential because of something as trivial as money. However, the story does not end there. Although Babbage could not find support (financially or otherwise) through his mathematics and engineering, he did find some through his writing.

Babbage's most popular work was published in 1832 and was appropriately titled *Economy and of Manufacturers and Machinery*. It is a critique of the time period's views on a political economy. This work was highly influential during this time period. The article mentioned above from *Scientific American* can also be quoted with saying "...there can be little doubt that, had he devoted his lofty powers to economic studies, the science of political economy would have stood by this time something very different from its present pseudo-scientific form." He undoubtedly could have been successful at anything he set his mind to do; he was an incredible talent. Babbage went on to publish over 80 articles, essays, and books on a wide variety of subjects.

Not much is known about the personal religious life of Babbage. He remained publicly in Christian circles and certainly believed God exists, but gathered a much more philosophical, questioning view as he aged. He wrote about the existence of God, the brevity of human life,



and even wrote about how the Bible was to be read, studied, and distributed among the church, but not much is known about his own personal faith; he even lacks details of it in his autobiography.

Although the study of religion was not his first passion, his ideas and writings gave him some following and some financial stability that the fields of mathematics and engineering could not provide. In 1837, Babbage began to be frustrated with some of the contemporary scientists and clergymen. The Earl of Bridgewater had payed a large sum of money for the publishing of eight Bridgewater Treatises, each authored by notable British theologians and professors. Babbage was more or less disgusted by what he read in the treatises and produced his own self-published *Ninth Bridgewater Treatise*, attacking the arguments made by the treatises disconnecting the scientific realm from the theological and supernatural realm. Babbage attempted to prove that analysis through mathematics and science with further the cause of Biblical monotheism. He also writes in his autobiography how man can be certain of the existence of God "from the examination of the works of the Creator" (Babbage, 297). As one can see, there was a stark disagreement among groups of people about the relationship between science and religion, and that disagreement, in many cases, still stands today.

Babbage, thus far, has been painted in a rather bright light, speaking only of his brilliant accomplishments and works. However, third-party sources are available calling the man "cranky" (King-Farlow, 209-210) and the like. He was most certainly no angel to some members of society. If someone's beliefs did not perfectly align with Babbage, he did not hesitate to condemn his beliefs and argue for his own. This style of bluntness can be easily seen in all of his

writings, specifically in the *Ninth Bridgewater Treatise* and subsequent works, and can be seen as both an admirable quality and a fault.

Charles Babbage died at the age of 79 in London on October 18, 1871. He was buried in the Kendal Green Cemetery, where his grave can still be visited today.

A couple of topics stood out in my mind while studying the life, work, and faith of Charles Babbage. First, this man displayed unusual perseverance. He experienced four immediate family members' deaths in the span of a year: his father, wife, and two young sons. This kind of trauma could be enough to dispose of a man's future, but, incredibly, Babbage seemingly never missed a beat. Babbage also could have quit when his mathematical and engineering work was not taken at its full worth, even though he knew of its immense value. This kind of perseverance is to be admired. Second, this man stood up for what he believed. It did not matter if the some of the greatest eight theologians in Britain were against him, he still spoke and wrote what he believed to be true. This is the type of boldness I hope to have one day.

In my future field of teaching mathematics at a junior high or high school level, I will need both perseverance and boldness in order to impact the children I teach. If I am going to be a light on my high school campus, I am going to have to shine in places of darkness. My prayer is that I can have boldness to stand my ground and perseverance to fight through the trials of life, just like Charles Babbage did.

Despite having a fair amount of acknowledgement while he was alive, the genius of Charles Babbage was certainly not fully appreciated until long after he had passed. However, the point remains: Babbage left a legacy. Even though his legacy was not fully realized until literally a century after his death, his impact remains. This should be a goal of all of our lives,

regardless of discipline in which we study: to leave a legacy and an impact on the world, and more specifically, we are to leave a legacy and an impact on the world for Jesus Christ.

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