The Difference Engine
Samantha Hunt

Two Theories, One Train

On a train crossing England in the mid 1800s Charles Babbage watched as a common house fly traveled into the future. Bumbling from the rear of the carriage to the front, the fly stopped atop a lady's floral hat and regurgitated. It is what flies do when they aren't flying. At that very instant when the creature ceased moving forward, Babbage thought that the moments of time the fly had just flown through, like slices of bread, moments that the fly imagined he had left in the past, slammed into the creature yet a second time as the train gained on London and caught up with the fly's flight. "Wonderful", Babbage thought even if it wasn't entirely correct.

Mr. Louis Pasteur, another passenger on this mythic train, twisted his paper into a sword and swatted at the fly. The be-hatted woman screamed as Pasteur hit his mark. "Madame", he excused himself, "forgive me", and began to explain how the secret regurgitations of house flies are repositories for germs. The woman quickly changed seats, fleeing the madman. As Pasteur was just then on his way to share his theory with the Royal Society, his confidence was shaken. He had been considering how to best phrase it. He had rehearsed, "The reason why so many people are dying is because the air and the water are filled with tiny, lethal beings that we cannot see". The woman notified the conductor and so Pasteur's stomach sank. He did not need to travel into Babbage's future to know how his ideas would be received in town.

At the junction of the Romantics and the Victorians, poetry permeated math and science. New theories and technologies traveled at warp speeds even if sometimes they were moving in the wrong direction. My nostalgia for this era resides in the arabesque grace and the velocity of scientific thought, a velocity where a few individual scientists such as Pasteur were plucked up into the bosom of history while scores of brave but failed scientific wrecks were left by the roadside. It is these wrecks I am most interested in.

Imaginary Numbers

Charles Babbage, whose full title is ESQ., M.A., F.R.S., F.R.S.E., F.R.A.S., F. STAT. S., HON. M.R.I.A., M.C.P.S., COMMANDER OF THE ITALIAN ORDER OF ST. MAURICE AND ST. LAZARUS, INST. IMP. (ACAD. MORAL.) PARIS CORR., ACAD. AMER. ART. ET SC. BOSTON, REG. OECON. BORUSS., PHYS. HIST. NAT. GENEV., ACAD. REG. MONAC., HAFN., MASSIL., ET DIVION., SOCIUS. ACAD. IMP. ET REG. PETROP., NEAP., BRUX., PATAV., GEORG. FLOREN., LYNCEI. ROM., MUT., PHILOMATH. PARIS, SOC. CORR., ETC. was the father of the computer, inventor of the heliograph, the cowcatcher, the first speedometer, occulting lights for lighthouses, standard railway gauges and screw threads, a device for walking on water that almost worked, an expert picker of locks as well as being an extra-ordinary thinker and tinkerer.

In 1833 Babbage, 42, met Ada Byron, 17, daughter of Annabella Milbanke and everyone's favorite depraved poet Lord Byron. Soon after Ada's birth, after Byron's alleged incestuous affair with his sister, Annabella took her five month old daughter away from her father beginning a lifelong project of rooting the Byronic from not only Ada but indeed, the world. Annabella fed Ada on a diet of reason, strict morality, manipulation and math resulting in Ada's appropriate response: she conducted her first love affair at the tender age of 13 with her math tutor. She loved math.

Four years later, when she met Babbage, he was intensely interested in both stomach pumps and the railway as they illustrated reversals of nature. They contained a germ of Babbage's

favorite theory, one he perhaps had explained to Ada this way, “I believe that if you know for certain a number of facts about an object you should be able to, via computation, just like addition, travel these conditions into the future and know how the object exists there”, as if he could ride a train into the by-and-by and return later that night with a forecast.
“You mean”, Ada asked, “through math you can predict the future?”
“Not predict. Know for certain”.
“Anything?” she asked.
“Anything that can be translated into numbers”, he said as he thought that he had yet to meet an object that could not be rendered numerically.
“For example”, Ada asked, “which horse will take first place in Saturday’s race?”
Charles and Ada locked eyes and each smiled that certain warm smile that comes from stacks and stacks of gold coins piling up in the imagination.

Charles needed the money badly. For years he had been developing a machine he called the Difference Engine, a large apparatus, never wholly constructed in Babbage’s life time but that even in skeleton form could tabulate terrifically and even more importantly, Charles saw a way that it could store the knowledge it had learned and act on it the next time. The Difference Engine, and a second version, the Analytical Engine were, in the 1850s, computers or they would have been had Charles ever had the money to complete their construction.

Babbage had a natural head for numbers excluding those in his bank account. To Babbage, numbers were the very stardust of the universe. Everything was numbers. A horse was the number of teeth in its mouth, the measurement of its mane, the variety of dapples, how fast it could run or even the number of maggots its carcass would produce in death.

“Small pieces of horse flesh are piled up. In a few days the putrid flesh is converted into a living mass of maggots. These are sold by measure: one horse yields maggots which sell for 1s. 5d. The rats which frequent the fresh carcass of a horse are innumerable. 16,000 rats were killed in one room in four weeks, without any perceptible diminution of their number. The furriers purchase the rat skins at about 3s the hundred”.

To Babbage the expression, “I feel like a number”, was not a bleak statement decrying anonymity but rather more similar to saying, “I feel like a flower. I feel like a butterfly. I feel like every wondrous thing in the universe even the tenacious, if disgusting maggot”.

Ada was mesmerized. Not with love – there was never romance between the two – but by Charles’ view of the world that made room for both the strict mechanical morality of Annabella and the wild curves of Byron. Ada set to work publishing articles on the wonders of the Difference Engine, drafting the very first “programs” for the engine to run on and ultimately, though much of the written evidence of Ada’s “gaming fever” was veiled or destroyed by Annabella, it seems that she, with Babbage’s help, developed a formula to render racehorses as numerics: weight, speed in past races, places won, jockey’s height, horse’s leg length, horse’s age – values which could be calculated or fed like grain into the Difference Engine that in turn produced what would today be called odds. Hypnotized by the wonder of numbers, it does not appear that Ada considered these odds to be odd at all but rather mathematical certainties as solid as 2 + 3 = 5.

Dr. Frankenstein
Tucked away in the Quantock Hills of Somerset England a scientist toiled. In the converted ballroom of a grand house known as Fyne Court a man named Andrew Crosse distilled stinky solutions into a number of beakers, skipped meals, tore at his hair, grew mineral crystals in bone china teacups, made lightning-fueled Leyden jar batteries in the house’s old organ loft and spoke to himself in verse

Crosse, yes Crosse will be selected, When he in turn makes life electric!

A true mad scientist, Crosse was responsible for temporarily revivifying a notion of spontaneous generation. He harkened back to the good old days, pre-Enlightenment, pre ex-ovo omnia, when folks believed life could come from nothing save a bolt of electricity.

Crosse dripped a chemical mix over pumice stone that he then battered with an electric charge. The pumice soon began to produce stalactite precipates and in a few more days wiry insects, Acari electricus crawled from the pumice. Life! he thought. He had made life from nothing. Faraday was fascinated. Mary Shelley was inspired to write *Frankenstein*, modeling her doctor on Andrew Crosse. But sadly, spontaneous, the bugs were not. Crosse was wrong however terrifically, wonderfully so.

Ada was entranced by Andrew Crosse due in part to the fact that she was painfully in love with his troublesome son John. Troublesome as both she and John were married to other people. Still John became Ada's lover and an active member of her gambling syndicate, an assemblage that drew on both her aristocratic connections as well as her seedier ones. The syndicate included John Crosse, Richard Ford, William Nightingale (father to Florence) as well as two mystery men known as Fleming and Malcolm.

For Charles and Ada to proceed with their gambling venture Ada had to secure a letter of permission from her husband William, that would allow her to gamble. Though the money they lived on was hers, as a woman Ada was not allowed to own things – a restriction that could certainly explain her attraction to wagering in the first place. Permission was granted and with that Ada struck on what she believed was a brilliant idea. She would act as a bookie for her crew.

Ada's favorite horse Voltigeur, was named with a nod to both his sire Voltaire and the Italian electrical physicist Alessandro Volta. Love of literature meeting science in a pattern that ran parallel to a the tumult raging inside Ada's heart. So with the most important race in England approaching, the York Derby Day of 1851, both the Difference Engine and her heart told Ada that Voltigeur would win. She felt so sure that she took the money she'd been given from her gambling syndicate and placed it at a double risk. She bet the same funds twice, once with herself and once with a professional bookie.

Sadly math and science had other forces to contend with on Derby Day – such as flesh and bone. Voltigeur was not made from pure numbers. Voltigeur lost the race.

In an instant Ada's debts opened before her as a chasm. They were tremendous even by today's standards, particularly for a woman who had no income. Within days of the race Ada was being blackmailed by Malcolm for his losses. She pawned her family's jewels so that she and John Crosse could continue gambling. When the hocked items were discovered and recovered by Annabella, Ada pawned them a second time.

It was not long after the Derby disaster that the real dark streak attacking Ada was diagnosed. It was not her father, or her gambling but a uterine cancer gone too far, a diagnosis that Ada's husband decided to keep secret from her.

It seemed Charles and Ada were done and without funding, the Difference Engine would not be finished until long after Charles and Ada were gone, not until 1991 proving far, far too late that Charles Babbage invented the computer and Ada Lovelace wrote the first computer programs.

In the Department of Defenses
Great failures in science such as Charles and Ada's failures with wagering, or Andrew Crosse's failure to generate life spontaneously, or even Ada's doctor's failures to cure her cancer with the medicines they prescribed – huge quantities of red wine and opium – have all been proven to be scientifically wrong-headed and yet it seems that science and technology owe an unpaid debt to these failures who were courageous enough to take risks in the first place.

Here in 2004 I wonder where their kind has disappeared to because I know many, many people who are nobly working on novels or plays or poems in their off hours but I don't have even one friend who is developing a device for teleportation or grafting human DNA with the great blue heron's in her basement after work.

And here is a worry. Could this be because it is becoming nearly impossible to operate a laboratory in this country without receiving money and meddling from either a large corporation or the US Department of Defense? Charles and Ada make me nostalgic for a time when such travesties against the imagination were less blatant.

A year after Voltigeur's defeat, when Ada died at the young age of 36, Babbage began to work on his most astounding and beautiful project yet. It was a formula that would haunt him for the rest of his life because he never could get it quite right. Its poetry is unmatched. The formula was a tool for predicting what the chances were that someone dead would come back to life. Strange and haunting but stranger still is that, in some way Byron's daughter did come back to life. In 1971 the dreaded US Department of Defense created a computer language. This language is named ADA after her and what are the chances of that?

In order to raise the visibility of media arts practice in and around the capital, NODE.London [Networked, Open, Distributed, Events. London] has worked as an open organisation, using consensus decision-making and pooling ideas, resources and even people. It has sought to fortify existing media arts networks and to encourage production and experimentation, whilst assisting in the articulation of such innovative artistry to a wider audience

NODE.London is also publishing a critical reader during February 2006. "Media Mutandis: A NODE.London Reader" is a survey of media arts, technologies and politics which aims to provide a critical context for NODE.London's activities as an evolving media arts production and infrastructure-building project. 1000 publications will be printed initially and sold at a low price at the events of the March season. Contributing authors and artists include: Armin Medosch, Simon Yuill and Chad McCail, Adam Hyde, Sabeth Buchmann, Michael Corris, Matthew Fuller, Graham Harwood/ Mongrel, Richard Barbrook and Neil Cummings.

The publication is engineerd via the Print On Demand system by NODE.London partner OpenMute. It will be available as a printed and bound volume, a PDF document on the publication website and the texts will be made available in formatted versions individually for editing and recompilation by readers, who can either order a printed and bound version of their selections through Print On Demand or simply print them off at home. Readers can also become 'agents,' or distributors - please see www.metamute.org for a fuller explanation of the magic potential of POD.

•NODE.London
http://nodel.org/