



“CURRENT” EVENTS: TESLA VERSUS EDISON

BY JUDY CHINITZ

It's not MELODRAMATIC to say that in the early part of the 20th century, a war took place that would literally change history for all of mankind. The opposing sides were not the usual global empires or ANTAGONISTIC countries though: they were men...just two genius men. And the outcome of the war led to REPERCUSSIONS that we still feel today, whether or not we are aware. On one side of the fight was a remarkably brilliant man, THOMAS EDISON, who may be the most famous inventor who ever lived. On the opposing side was the equally brilliant, considerably stranger (which is saying a lot, because Edison wasn't exactly a run-of-the-mill sorta guy), CROATIAN-born NIKOLA TESLA, whose mind was so remarkable that words fail to convey adequately just what a creative genius he really was. And it was Tesla's ultimate victory in their war, which gave us the electric world we currently enjoy today.

SPELL: MELODRAMATIC REPERCUSSIONS ANTAGONISTIC

Who was involved in this war? THOMAS EDISON, EDISON, NIKOLA TESLA, TESLA

Where was Tesla born? CROATIA

Name another brilliant innovation, invention or idea that started in controversy.

Thomas Alva Edison was born in Ohio, on February 11, 1847. Like many people of that era, Edison had very limited schooling but was an AVID reader. He was also very hard of hearing (likely a familial genetic condition), which hampered him socially to some extent. In 1863, he began

working in the TELEGRAPH industry and his interest in fiddling with electronic devices was born. His first invention was an improved telegraph device that allowed two messages to be transmitted at once; then he added a printer which CONVERTED the electronic signals into letters...and then he was off and running, inventing to the point where, by the end of his life, he held 1093 patents.

SPELL: TELEGRAPH AVID CONVERTED

What was Edison's middle name? ALVA

What did he add to his first, improved telegraph machine? PRINTER

In what field was his first job? TELEGRAPH INDUSTRY, TELEGRAPHS

What limited Edison socially? HARD OF HEARING, FAMILY GENETIC CONDITION

In what year was he born? 1847

How many patents did he hold by the end of this life? 1093

Using what system of letters does a telegraph machine transmit? MORSE CODE

To give you some idea of the kind of man Thomas Edison was: ALEXANDER GRAHAM BELL invented the telephone in 1876, and Edison was FURIOUS. Why? Because he felt he should have been the one to invent it! Immediately, he set to work improving Bell's device which – being the first – had tremendous flaws, one of which was the signal between phones weakened immensely the further apart they were. This meant that each phone had to be very close to the other to be used. Edison set about to fix the problem and he did: and it was his type of telephone that we used until technology once again improved in the 1980s, almost 100 years later. The same is true of the light bulb, by the way. Edison did not actually invent the INCANDESCENT light bulb, but the ones that existed at that time lit for maybe a second and thus, were utterly useless. Using the successes and failures of his predecessors, and thousands of hours of work, Edison

DEvised a bulb that could stay lit for 1200 hours, and became the bulb that lights our world even today.

SPELL: FURIOUS INCANDESCENT DEVISED

Who invented the telephone (full name): ALEXANDER GRAHAM BELL

What was the major flaw in the original telephone prototype? THE PHONES HAD TO BE CLOSE TO EACH OTHER, THE SIGNAL WEAKENED RAPIDLY WITH DISTANCE BETWEEN THE PHONES

What improvements did Edison make to the lightbulb? IT COULD BURN FOR 1200 HOURS, IT COULD BURN FOR MUCH LONGER THAN THE EARLIER VERSIONS

What do you believe these stories tell you about Edison's personality?

And don't forget the PHONOGRAPH! When working on improving the telephone, Edison conceived of the idea of creating a machine that could record and playback telephone messages. (Sound familiar?!) He came up with the idea of vibrating DIAPHRAGM that would push a STYLUS. In turn this stylus made INDENTATIONS on a cylinder, covered with tin foil, that was turned by a crank. In 1877, he had his machinist build the device, and for the first time in human history, the human voice was recorded: Edison reciting Mary Had a Little Lamb – well, a rather MORBID version of it, I should more accurately say! (You'll hear it in a moment!) The world was stunned. Beyond stunned. And enthralled. The invention was such an incredible success that Edison was dubbed "The WIZARD of Menlo Park." (Edison had a laboratory in Menlo Park, New Jersey.)

SPELL: DIAPHRAGM INDENTATIONS MORBID

Which of Edison's incredible inventions is discussed in this paragraph?
PHONOGRAPH

What nursery rhyme became the first example of a recorded human voice?
MARY HAD A LITTLE LAMB

What became Edison's nickname? THE WIZARD OF MENLO PARK

Tell me something about how it worked? A VIBRATING DIAPHRAGM PUSHED A STYLUS THAT MADE INDENTATIONS ON A CYLINDER

What would have been the first thing you chose to record?

Name another nursery rhyme.

VAKT: <https://www.youtube.com/watch?v=5NBzpbYyq3M>

But facing facts, Edison was “one cranky dude,” as an article about him in FORBES Magazine points out: “Throughout his life, he struggled socially—his lack of charm and GRUFF manner resulting in having few close friends. In short, the real reason he developed a habit of locking himself away in his lab was that couldn't stand interacting with most other people.” Edison was definitely socially AWKWARD, a compulsive WORKAHOLIC, and as he himself wrote in a letter to his 2nd wife (his first wife died young), the three things in his life he truly loved were her, the children and his laboratory: and most believe the latter should have been written first. All this to say: Edison was not the type to take someone else improving *his* technology lying down. Enter Nicola Tesla, who was born 9 years after Edison, in 1856.

SPELL: GRUFF AWKWARD WORKAHOLIC

What publication is cited in this paragraph? FORBES MAGAZINE

What adjectives are used to describe Edison? CRANKY, WORKAHOLIC, SOCIALLY AWKWARD, LACK OF CHARM

In what year was Tesla born? 1856

Tesla's mind marched to the beat of a different drummer: he had severe OBSESSIVE-compulsive behaviors; he could MEMORIZE entire books and mathematical tables with ease; he could pick up languages in a heartbeat;

and he could work day and night with almost no need for sleep. At 19 years old, he was studying electrical engineering at the POLYTECHNIC Institute at GRAZ, in Austria, where he quickly established himself as a star student. He found himself in an ongoing debate with a professor over perceived design flaws in the direct-current (DC) motors that were being demonstrated in class. His recognition of those flaws lay the groundwork for the upcoming war with Thomas Edison.

SPELL: OBSESSIVE MEMORIZE RECOGNITION

What school did he attend? POLYTECHNIC INSTITUTE AT GRAZ

In what country was it? AUSTRIA

What kind of motors were being demonstrated? DIRECT CURRENT, DC

What was the topic of debate with his professor? DESIGN FLAWS IN DC MOTORS, HE SAW DESIGN FLAWS IN THE MOTORS

So what on earth *is* direct current, you are probably asking yourself...and why on earth would something so ESOTERIC lead to an epic battle that newspapers of that time called, "The War of the Currents"? To answer that question, we need to go into some science. As you may know, the building block of all matter is the atom, and surrounding every atom, circling FRENETICALLY, are loosely held, negatively charged electrons. All electric current is a flow of electrons, traveling from a positive pole to a negative pole. Direct current implies a stable flow of electrons moving in a single direction, like a river. Batteries work using direct current. But alternating current flows CYCLICALLY, fluctuating in MAGNITUDE and direction at regular intervals. And it is alternating current that travels through the power lines to power our world.

SPELL: FRENETICALLY CYCLICALLY MAGNITUDE

What name did the media give to the battle between Tesla and Edison?
THE WAR OF THE CURRENTS

What is the name for an electric flow that moves directly from a positive pole to a negative one? DIRECT CURRENT

What power source uses direct current? BATTERIES

What kind of current powers our world now? ALTERNATING CURRENT

How does alternating current work? ELECTRONS FLOW CYCLICALLY, ELECTRONS FLUCTUATE IN MAGNITUDE AND DIRECTION AT REGULAR INTERVALS

VAKT: ALTERNATING VERSUS DIRECT CURRENT: Watch this video: 5:09-7:09 : https://www.amazon.com/American-Experience-Tesla-Michael-Murphy/dp/B01M3S4GL5/ref=sr_1_2?crd=Z25PJVZ2U5AW&dchild=1&key-words=tesla&qid=1634750272&s=instant-video&sr=1-2

Direct current is safe, requires less INSULATION and uses lower voltages. But as you see, having watched that video, it cannot travel very far. Thus, to bring electricity to our homes, massive GENERATORS would have been necessary every mile, if not more. The costs, in terms of both land and machinery, maintenance of that machinery, etc., would make the system more than just inefficient – it really would make it UNTENABLE. But Tesla, after several years of obsessing to the point of making himself sick, came up with the solution. He created an alternating current generator, and proved that electricity could be generated at very high voltages, and transmitted over vast distances with hardly any energy loss.

TRANSFORMERS could then reduce the voltage to medium or low levels before entering buildings. His system was brilliant, efficient, inexpensive, and the only truly VIABLE solution. When he got off the boat from Europe, he literally walked directly to the offices of Thomas Edison. But Edison refused to accept the flaws in his system, because to do so would not only prove him “wrong,” so to speak: accepting Tesla’s system would also lead to enormous financial losses. After all, his company produced direct current and he was laying power lines in New York City for direct current. And right there we see the truth: direct versus alternating current was a war of finances, more than anything else.

SPELL: VIABLE GENERATORS UNTENABLE

What would be necessary to reduce the voltage of alternating current?
TRANSFORMERS

Describe the benefits to direct current? SAFE, REQUIRES LESS
INSULATION, USES LOWER VOLTAGES

What makes it an untenable system? IT WOULD REQUIRE
GENERATORS EVERY MILE, EXCESSIVE COST, INEFFICIENT USE OF
LAND AND RESOURCES

Why is alternating current a far better system? ELECTRICITY CAN BE
EFFICIENTLY SENT OVER LONG DISTANCES

Why did Edison reject Tesla's improved system? IT WOULD HAVE LED
TO HUGE FINANCIAL LOSSES

Name an example of two competing companies in the same industry.

Edison had the backing of the financial titan, JP MORGAN, who was at that time, the most powerful banker in the country. Their partnership resulted in the company we now call GENERAL ELECTRIC. Tesla, on the other hand, partnered with the inventor and ENTREPRENEUR, GEORGE WESTINGHOUSE, whose company still bears his name. The efficiency of Tesla's system had him winning more and more contracts but...several fatal accidents (due to the high voltage come out of his generators) caused him major setbacks, as Edison used each death to discredit Tesla and his alternating current. Like all wars, their battle was dirty and vicious. Edison's backers would hold public DEMONSTRATIONS. They'd apply direct current to an animal, leaving it stunned; and then they'd apply high voltage such as was produced by AC generators to the animal, killing it. This led to widespread panic about the "deadly dangers" of AC. Edison himself stooped to writing alarmist PROPAGANDA, publishing articles describing AC as a "constant threat" to homes and families. To make matters worse, it was during the War of the Currents that the electric chair was invented (and er, coincidentally patented by Edison's company) which

used alternating current to kill condemned prisoners. Hands down, Edison won the propaganda battle.

SPELL: DEMONSTRATIONS PROPAGANDA ENTREPRENEUR

Who financed Edison? JP MORGAN

What company came from their association? GENERAL ELECTRIC

What did Edison's company patent at that time? ELECTRIC CHAIR

Who was the financier of Tesla? GEORGE WESTINGHOUSE

Describe the "demonstrations" put on by Edison's supporters: THEY'D APPLY WEAK VOLTAGE TO ANIMALS AND THEN ELECTROTE THEM WITH STRONG AC CURRENT

What dirty measures did Edison himself resort to? HE WROTE PROPAGANDA ABOUT THE THREAT TO HOMES AND FAMILIES

Come up with a slogan or meme for Edison in his propaganda campaign.

But in the end, Edison could not win the war of efficiency. As years went by, AC was adopted as clearly the best system to electrify America. And it was Tesla who won the rights to the electrical installations at NIAGARA FALLS. (watch video at 28:38 – 30:23) The war was over: Tesla's alternating current, efficient, INEXPENSIVE and powerful, was victorious. But Tesla, the man: not so much. He had been obliged to sell his patent to Westinghouse giving up millions. He would have been the richest man in the country. Edison, on the other hand, lost the battle but won the war. Yes, his company – now called CONSOLIDATED Edison (or Con Ed as we call it) was forced to admit defeat: the company and its founder had to eat crow and apply to Westinghouse's patent license to use AC in its ELECTRIFICATION projects. On the other hand, Edison became a millionaire and from then, until today, became one of America's heroes – perhaps the best known and most admired inventor of all time.

SPELL; ELECTRIFICATION INEXPENSIVE PATENT

What was Edison's electric company called (full name)? CONSOLIDATED EDISON

Westinghouse and Tesla won the contract for electrical installations where? NIAGARA FALLS

Forced to eat crow, Edison was obliged to do what? HE HAD TO APPLY TO WESTINGHOUSE FOR A PATENT LICENSE

But Tesla's legacy has been revived of late. We can now appreciate – with the wisdom of hindsight – just how unbelievably brilliant Nikola Tesla really was. Tesla was a VISIONARY: his head always in the clouds, CONJURING, pondering, RUMINATING, obsessing over his next great idea. He didn't just invent the alternating current generator, electrifying our world. Others of Tesla's creations are a part of our lives every day. He invented the powerful coil that was capable of generating high voltages and frequencies, leading to new forms of light, like neon and FLUORESCENT, as well as x-rays. His "Tesla coils" made it possible to send and receive radio signals: he invented and patented his radio, beating out MARCHESE MARCONI, who is commonly and incorrectly credited with having invented the radio. And this idea of "wireless" transmissions of electrons...let's take a moment to examine the idea that was the ruin of Tesla, his reputation at that time, and his financial well-being.

SPELL: VISIONARY CONJURING RUMINATING

Who is incorrectly credited with having invented the radio? MARCHESE MARCONI

What made it possible for Tesla to send and receive radio signals? TESLA COIL

What kind of light can we thank Tesla for? FLUORESCENT, NEON

Tesla managed to get funding from JP Morgan - \$150,000, which was a massive amount of money back then - for what he envisioned as a wireless earth. That is, the world would be powered by towers emitting electricity that any device could simply tap into. Said Tesla, "As soon as completed, it will be possible for a business man in New York to dictate instructions, and have them instantly appear in type at his office in London or elsewhere...He will be able to call up, from his desk, and talk to any telephone SUBSCRIBER on the globe, without any change whatever in the existing equipment. An inexpensive instrument, not bigger than a watch, will enable its bearer to hear anywhere, on sea or land, music or song, the speech of a political leader, the address of an EMINENT man of science, or the sermon of an ELOQUENT clergyman, delivered in some other place, however distant. In the same manner any picture, character, drawing or print can be transferred from one to another place. Millions of such instruments can be operated from but one plant of this kind." Um...sound like anything with which you may be familiar?

SPELL: SUBSCRIBER EMINENT ELOQUENT

How did Tesla envision the world to be in the future? WIRELESS

What would emit electricity that any device could tap into? TOWERS

To where would the business man in New York be able to dictate instructions? LONDON, HIS OFFICE IN LONDON

What else, besides voice, could these towers send? PICTURES, CHARACTERS, DRAWING, PRINT

What does it sound to you like Tesla was describing?

But Tesla's construction of the first of these towers soon ran over budget and Morgan refused to give him any more money. In the meantime, inventors were throwing money at Marconi for his radio, which - as was determined in 1943, INFRINGED on 17 of Tesla's patents. Marconi became a millionaire, while Tesla's dream, the 186 foot tall tower, became a RELIC that was RAZED in 1917. The defeat—Tesla's worst—led to another of his breakdowns. "It is not a dream," Tesla said, "it is a simple

feat of scientific electrical engineering, only expensive—blind, faint-hearted, doubting world!” By 1912, Tesla began to withdraw from that doubting world. He was clearly showing signs of obsessive-compulsive disorder: he became obsessed with cleanliness and fixated on the number three; he began shaking hands with people and washing his hands—all done in sets of three. He had to have 18 napkins on his table during meals, and would count his steps whenever he walked anywhere. He claimed to have an abnormal sensitivity to sounds, as well as an acute sense of sight, and he later wrote that he had “a violent AVERSION against the earrings of women,” and “the sight of a pearl would almost give me a fit.” While Westinghouse paid Tesla’s room and board at a New York hotel until his death in 1943, he died in ABJECT poverty - in fact, in debt.

SPELL: INFRINGED RAZED AVERSION

Tesla’s tower project ran over what? BUDGET

From what disorder did he clearly suffer? OBSESSIVE COMPULSIVE DISORDER

What were some of his obsessive behaviors? CLEANLINESS, FIXATED ON THE NUMBER THREE, 18 NAPKINS ON THE TABLE DURING MEALS, COUNT HIS STEPS, ABNORMAL SENSITIVE TO SOUNDS AND SIGHT, AVERSION TO EARRINGS AND PEARLS

In what year was it determined that Marconi had egregiously infringed on his patents? 1943

LOGICALLY, you might assume that Elon Musk, the founder of the electric car company, Tesla, is team Tesla all the way. After all, his cars use AC INDUCTION motors! But you’d have guessed wrong: “On balance,” says Musk, “I’m a bigger fan of Edison than Tesla.” Why? Because “Edison brought his stuff to market and made those inventions accessible to the world.” So to Musk, the successful capitalist wins out! We have Edison to thank for so very much: phonographs, the telephones that we used for 100 years, the lightbulbs we still use, movies, and so much more. But let’s never forget to give equal KUDOS to Nikola Tesla, who is ultimately

responsible for powering our world, the radio and more than that, wireless technology: he was the first to envision the wireless transmission of electricity, leading to the creation of cell phones. So who gets your vote?!

SPELL: INDUCTION KUDOS LOGICALLY

Who founded the car company, Tesla? ELON MUSK

Why is Elon Musk Team Edison? EDISON WAS THE BETTER CAPITALIST

So, who does get your vote?! EDISON, TESLA, THOMAS EDISON, NIKOLA TESLA

Which of Edison's major inventions do you find most impressive?

Which of Tesla's inventions do you find most impressive?

Do you think Musk should be Team Edison? Why or why not?

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