

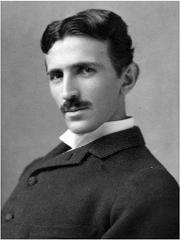
Historical notes and discussion guide

TESLA FROM THE MACHINE

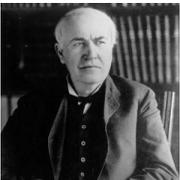
formerly titled "Tesla Ex Machina"

by Ricky Coates presented by Matheatre

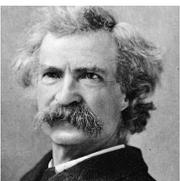
IMPORTANT PEOPLE



Nikola Tesla – Born in Smiljan, Croatia, in the late 19th century, Tesla was an innovative inventor and scientist whose major contributions to electrical engineering are the induction motor and the Tesla coil. He pioneered robotics, wireless transmission, fluid mechanics, among other sciences. His primary project was the transmission of power through the air with the intention of creating a “world wireless system.”



Thomas Edison – An American inventor, businessman, and one-time employer of Nikola Tesla, Edison developed many devices including the phonograph, the motion picture camera, and the long-lasting, practical electric light bulb.



Samuel Clemens (“Mark Twain”) – Samuel Langhorne Clemens, better known by his pen name Mark Twain, was an American writer. Among his novels are The Adventures of Tom Sawyer and its sequel, Adventures of Huckleberry Finn, the latter often called “The Great American Novel”.



Guglielmo Marconi--An Italian nobleman and electrical engineer, credited with inventing the radio. Much of his work depended on inventions Tesla had already patented, and Tesla claimed that a fire which destroyed his laboratory prevented him from being the first to make a long-distance radio transmission himself.

THE SCIENCE

Tesla Coil – A device that allows for the precise control of electrical currents. Tesla used it to produce high-voltage, low-current, high frequency AC electricity. Tesla used the coil to experiment with phosphorescence, x-rays, electrotherapy, lighting, and much more. In *TESLA EX MACHINA*, the Tesla coil is used as a magnifying transmitter, for transmitting power through the air.

World Wireless System – Nikola Tesla envisioned an interconnected system of magnifying transmitters. These wireless stations would allow for instant worldwide communication, the transmission of electricity, and long-distance remote control.

Induction Motor – Tesla’s breakthrough invention was an electric motor that uses a rotating magnetic field to convert alternating electrical energy into rotational motion. In Tesla’s autobiography, the induction motor appeared “fully formed in my mind” after a mental breakdown, during which the smallest sounds were like explosions to his ears. He gradually recovered by exercise, and during one of his walks, he stopped to admire a sunset. The sight reminded him of Goethe’s *Faust*, and as he quoted his favorite poem, the idea for the motor came “like a flash of lightning and the truth was revealed.”

“Egg of Columbus” - Tesla created this device to demonstrate the induction motor’s rotating magnetic fields. A common myth in Tesla’s day was the “feat of Columbus,” wherein the explorer Christopher Columbus made a bet that he could make an egg stand on its end. While this was a feat his opponents could not achieve, he won the bet by cracking the egg’s shell slightly, and according to legend, that’s how he won an audience with the Queen of Spain.

Tesla approached some potential investors with a peculiar question, “what if I could make an egg stand on the pointed end without cracking the shell?”

“If you could do this we would admit that you had gone Columbus one better.”

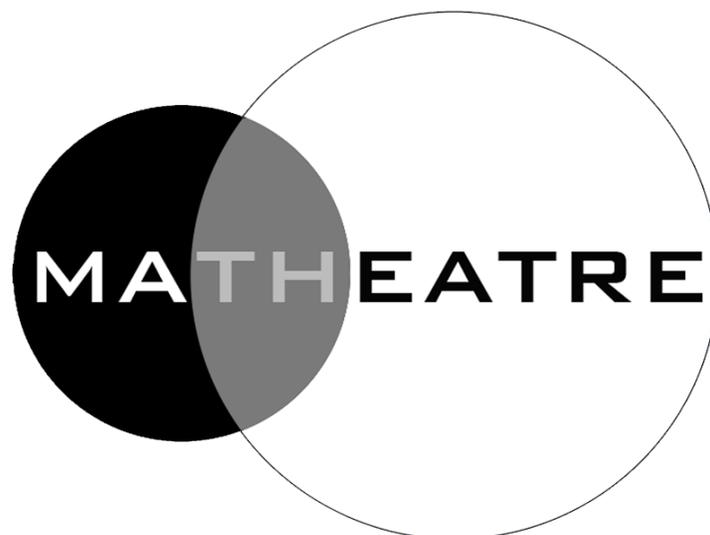
Tesla turned on his induction motor, and using the rotating magnetic fields, made a copper-plated egg spin on its end, winning their financial support.

Teleautomaton - In 1898, Nikola Tesla demonstrated the world’s first radio-controlled robots. They were boats, and one was even submersible by remote control. He used coded pulses via Hertzian waves to send commands to the ships, and the boats’ receivers decoded them into actuating operations. Unfortunately, the public was not ready for these major inventive leaps. Not only had they never seen wireless commands, but the addition of robotics was too much for their belief. Some claimed it was a magic trick, while others thought he had a trained monkey in the boats. While Tesla continued to work on his automatons, he never received investment or support.

QUESTIONS

- 1) In interviews and essays, Tesla says the main problems facing humanity are a lack of food, war, and non-renewable energy sources. Would you agree those problems are still present today, and how has our perspective on them changed?
- 2) As a solution to war, Tesla first wanted to build a robot army to deter nations from fighting, but he later recanted, saying he'd "underestimated the destructive nature of humanity." He then claimed universal wireless communication would bring peace. Still, at the end of his life, he claimed to be building a "death ray." What do you think is the best course for peace? Can science help?
- 3) In an article, Tesla imagined a future with women as leaders, due to their superior intellect. Where did his admiration of women originate, and how is it reflected in TESLA EX MACHINA?
- 4) While sparking brushes spurred Tesla to invent the alternating current motor, the real reason AC won the Battle of the Currents was that its voltage could be transformed higher and lower along a power line. Why is that so important?
- 5) Nikola Tesla gave the world its current electrical system. He pioneered radio, robotics, remote control, radar, wireless power, fluid mechanics, and cosmic radiation. He was well-known and respected in his time, but he died penniless and fell into obscurity until only recently. Why do you think that is?
- 6) We are living in a "wirelessly connected world" about which Tesla dreamed. Do you think the internet has made humanity more peaceful and sympathetic, as Tesla theorized? Why or why not?
- 7) During the Battle of the Currents, Thomas Edison launched a huge smear campaign against alternating current. He had people and pamphlets spreading rumors of its dangers as well as public electrocutions of dogs, criminals, and even an elephant. How have business ethics changed? Can you think of a modern smear campaign?

- 8) While he had university schooling and years of experience, Tesla emigrated to the United States with no money. Can you think of other famous immigrants who made their success in the US and contributed to the country?
- 9) Through most of his career, Tesla was courting private investors to fund his research. How has scientific funding changed? Does that benefit the researcher?
- 10) Tesla believed himself to be a machine. How does one reconcile the concept of “humanity” when they believe themselves a machine?



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