

**Dr. Alan Turing**  
**Father of Computer Science and Philosopher**

By Paul Conn

Computer Science is a field of study that few would equate with philosophy. After all, code, algorithms, and variables are viewed as coldly as a 1040 tax return. What many do not see is the logic behind the decisions made in these algorithms. As we have learned, logic and reasoning are at the very heart of philosophical thinking. Alan Turing, the father of Computer Science, used such thinking to examine how computers might evolve and interact with humans. He questioned whether computers could ever think, and if so, would they overtake man in intelligence. We will examine his life, his writings, and their impact on society today.

Alan Turing was born on June 23, 1912 in London. He showed immense talent at a young age and before his death in 1954 he made major contributions to mathematics, philosophy, biology, cryptanalysis, and had a profound effect on the future of Computer Science and Artificial Intelligence. The modern computer is modeled after his universal turing machine. (Turing, Copeland 1)

After completing his Ph.D at Princeton University, he returned to England in 1938, and was called into the services of England during World War II as a code breaker and analyst. It was here that he was the principal designer of the ‘bombe’, a high-speed code breaking machine, that many have said reduced the war by as much as two years. “I won’t say that what Turing did made us win the war, but I daresay we may have lost it without him”, proclaimed Jack Good, a colleague at Bletchley. (Turing, Copeland 2)

After the war, Turing was recruited to the National Physical Laboratory (NPL), where he worked to develop an electronic digital computer and worked on computer programs that could be used

with such a machine. Around 1947 he founded the field now known as ‘Artificial Intelligence’ and delivered the first known public mention of computer intelligence. A couple years later his famous article ‘Computing Machinery and Intelligence’ proposed what is now known as the Turing Test to test the ability of machines to think. (Turing, Copeland 2)

Turing’s life takes an unfortunate detour at Manchester, in 1952. Alan Turing was gay, which was illegal in Britain, and he was prosecuted and sentenced to twelve months of hormone ‘therapy’. Britain has recently admitted their error and have posthumously pardoned not only Turing, but many others who were prosecuted under this unjust law. (Turing, Copeland 3)

Turing committed suicide in 1954, at the age of 42, decades before he would see much of his work bear fruit. Regardless, there is no doubt that Turing was a seismic figure, the type that only comes around once in a generation to shake the foundation of human history and inexplicably moves mankind to that next step in technological and societal evolution. The ideas he pursued still shape our world even to this day. In important ways, Alan Turing was the first philosopher of Computer Science and Artificial Intelligence, or AI. (Turing, Copeland 4)

His idea of an electronic digital computer that could store data and perform most any task programmed by its human has shaped the computer age in ways that even he could not have fathomed. He based his idea of the digital computer on the idea that the human brain was simply a computer that stored information, executed instructions based on various inputs and followed rules to properly execute these instructions. As he put it, “A man provided with paper, pencil, and rubber, and subject to strict discipline, is in effect a universal machine.” (Turing, Ince 134)

His paper in 1950, “Computing Machinery and Intelligence”, was perhaps his most famous. Not by coincidence, his paper was featured in the quarterly philosophy journal *Mind*. “I propose to consider the question, Can machines think?”, Turing began. What a profound philosophical question, one that has taken on greater meaning recently with the advent of self-learning algorithms and software based on Artificial Intelligence engines. (Turing, Ince 133)

He went on to outline the Turing Test, which “is really the philosophical statement that since I have no idea whether you are conscious, except by observing your conversational behavior, I should extend the same criterion to the machine”. The test involved a question and answer session between an interviewer and two unknown subjects. The object of this ‘game’ was to see if the machine could trick the human interviewer into believing it was having a conversation with a human instead of a machine. The thinking was that if a machine could trick a human then that machine passed the test and displayed human intelligence. Interestingly, this idea touches on the Mind-Body dualism thesis put forth by the ancient philosopher René Descartes and still debated to this day. (Zeldes, “Alan Turings Earthshaking Philosophical Insight”)

*“Of course machines can’t think as people do. A machine is different from a person. Hence, they think differently. The interesting question is, just because something, uh... thinks differently from you, does that mean it’s not thinking?” – Alan Turing, Computing Machinery and Intelligence*

This quote raises the question of human thinking and how they reason. He wondered if a machine thought differently than a human, does that mean it is not intelligent like humans, or if it is indeed intelligent, but not in the way that a human may think.

In addition to logic oriented tasks that computers excel at, Turing also examined the idea of machines that worked less mechanically and more like a brain by trying to simulate 'initiative' or intuition. He thought it possible for a computer to teach itself through training and having a mesh of networks that worked together. Not surprisingly, his ideas have come to fruition with neural network style computers and self-modifying algorithms that adjust as it examines more data. (Hodges, "Alan Turing")

Alan Turing was a unique mind that challenged thoughts of what is intelligence and who may possess it. He brought up ethical questions around technology and how it should be used. Today's programmers are increasingly confronted with questions of ethics in their algorithms and logic based systems like self-driving cars. Computer scientists programming automated driving systems must decide how no-win scenarios play out. If a car is confronted with a situation where someone will be injured or even killed, who does it save? The car owner? The pedestrian? These scenarios will undoubtedly arise as these self-driving vehicles take over our roadways. The world will need more philosophical thinkers like Alan Turing to steer these technologies towards ethical good and away from discrimination and injustice.

## Works Cited

- Hodges, Andrew. "Alan Turing", *The Stanford Encyclopedia of Philosophy* (Winter 2013 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/win2013/entries/turing/>. Accessed February 2016
- Turing, Alan Mathison, and B. Jack Copeland. *The Essential Turing: Seminal Writings in Computing, Logic, Philosophy, Artificial Intelligence, and Artificial Life, Plus the Secrets of Enigma*. Oxford: Clarendon Press, 2004. Web.
- Turing, Alan Mathison, and D. Ince. *Mechanical Intelligence*. Amsterdam: North-Holland, 1992. Print. Collected works of A.M. Turing.
- Zeldes, Nathan. "Alan Turing's Earthshaking Philosophical Insight". <http://www.nathanzeldes.com/blog/2012/10/alan-turings-earthshaking-philosophical-insight/>. Accessed February 2016.