

MACHINES WHICH  
(OR WHO?) THINK  
CHAPTER 16

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Historical Perspectives

# Introduction

- ▣ “Professor von Neumann has proved that in theory machines can reproduce themselves, but no one has yet explained this to a machine, and so far, they have never shown any signs of taking the initiative” –B.T. Bowden, 1953

# Alan Mathison Turing

## 1912-54

- ▣ Well educated family
- ▣ Out of the ordinary
- ▣ “Unclubbable personality and periscopic mind”
- ▣ Ingenuity & intuition



# His Contribution

- Paper he wrote in 1936 about computable numbers
- Some numbers cannot be worked out by any definite fixed process
- Invented a test: if a number cannot be calculated by a computer...

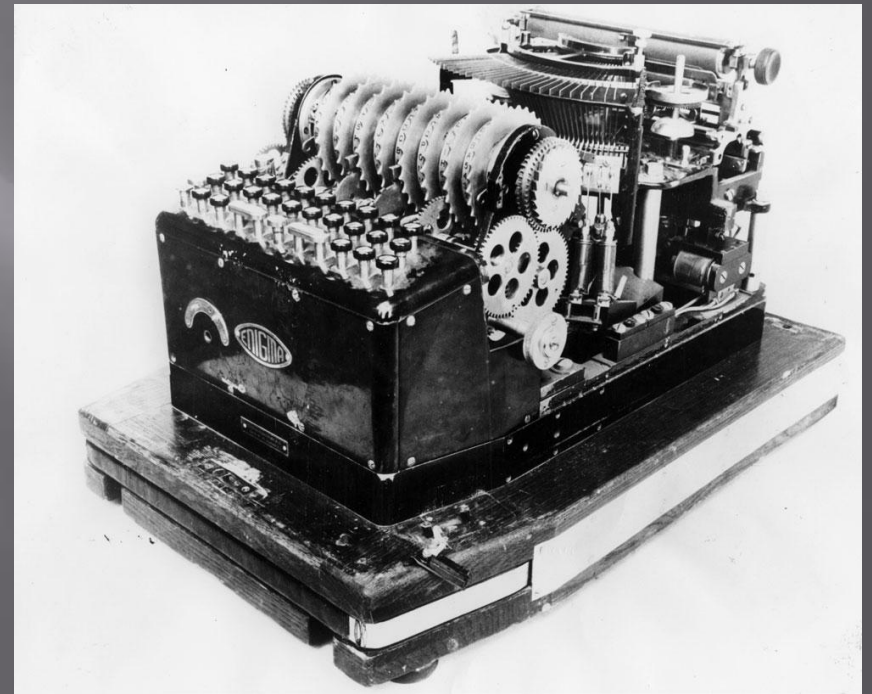


# More

- ▣ 'Turing Machine' is the computer that we talk about
- ▣ Went on and made the first electronic computers
- ▣ Ace
- ▣ Calculators as the only thinking machines

# The Enigma Project

- ▣ War broke out in 1939
- ▣ Secret work on a coding machine to decipher enemy signals
- ▣ German High Command using automatic
- ▣ Turing's job
- ▣ Actually a Turing machine

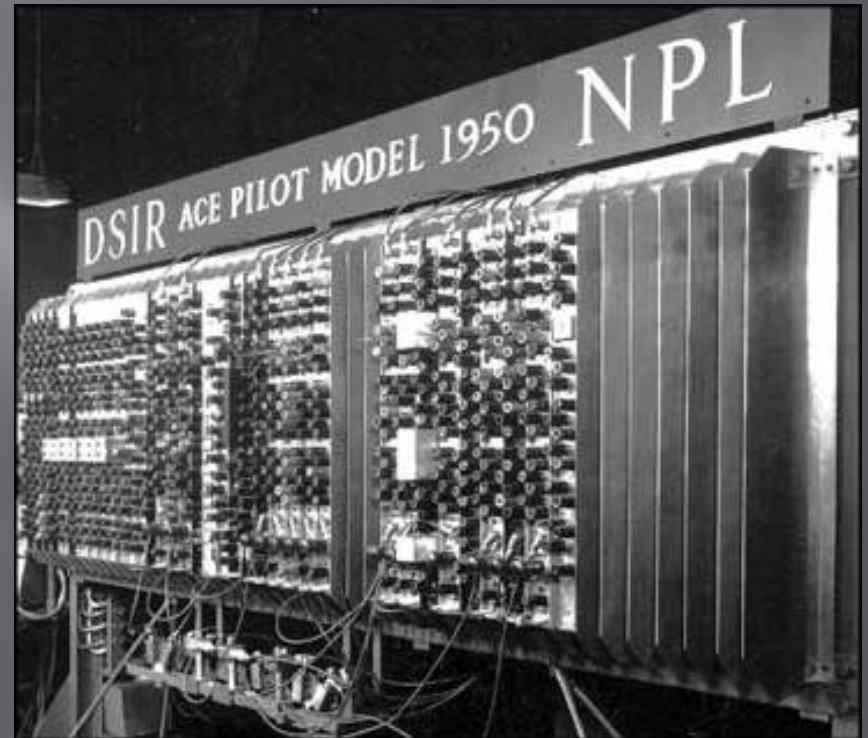


# How?

- ▣ To break codes, used a recursive algorithm, guessing the first number
- ▣ Machine calculates the square of the guessed answer and compares it to original number
- ▣ Estimates the error and adjusts first guess
- ▣ Gets closer and closer to real value
- ▣ Can start with any number, since it is a self-correcting process

# The Turing Machine

- ▣ Fixed and definite process = the essence of an algorithm
- ▣ We have to: break the problem down into simple steps, work out for each step clear instructions for the machine to follow, and then stand back



# The Computer as Counsellor

- ▣ Can we make a machine that can respond to questions in such a way that it is impossible to tell that it is a computer and not a human being responding?
- ▣ Counseling sessions
- ▣ Conclusion: Quite possible for a machine to duplicate human (verbal) responses

# Machines with Feelings

- ▣ Could we make a machine that would have, or would manifest, the same feelings as human beings?
- ▣ Answer: Yes
- ▣ Awareness of the nature of the computer and the nature of humans
- ▣ Washing machine example

# Closing Thoughts

- ▣ The scientific model of a neuron or brain cell is the same as the model for an electrical relay
- ▣ The brain has a strong capacity, thousands of times greater than the largest computer
- ▣ Computer works several times faster than the brain
- ▣ Living matter vs. nonliving matter
- ▣ Organic unity in the brain, the computer has accumulation of parts