

# Mind, Computing Machinery and Intelligence By A.M.Turing

Presentation for AI course by Koo sang jun

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# About Alan Mathison Turing

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- ▶ was born in 23. June. 1912
- ▶ was died in 7. June. 1954
- ▶ is Mathematician, Logician, Cryptanalyst, Computer Scientist
- ▶ is famous as inventor of Turing test in field of AI

# Introduction of Imitation game

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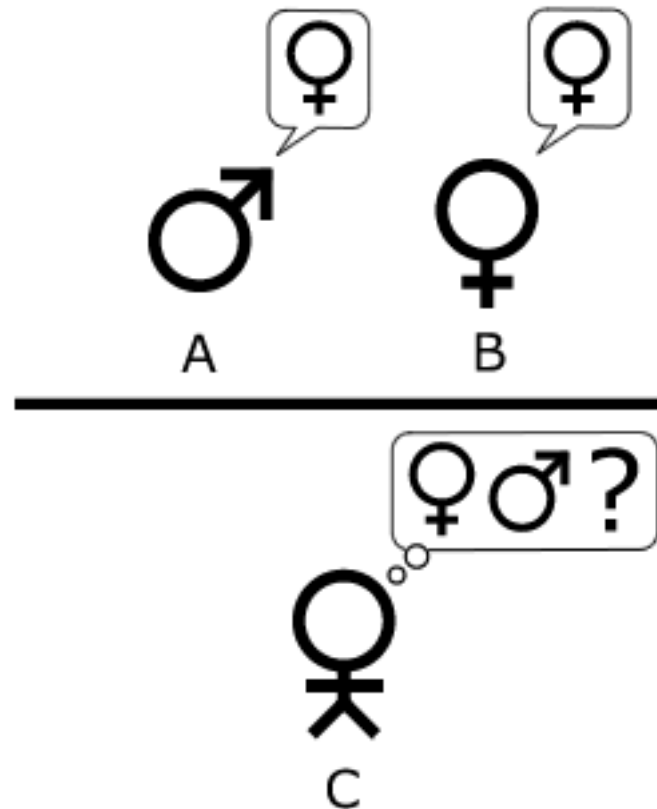
- ▶ Turing considers the question :

## Can machines think?

- ▶ The question is not easy to answer directly.
- ▶ Instead, he suggested the experiments with machines and humans.
- ▶ Can human distinguish which is which?

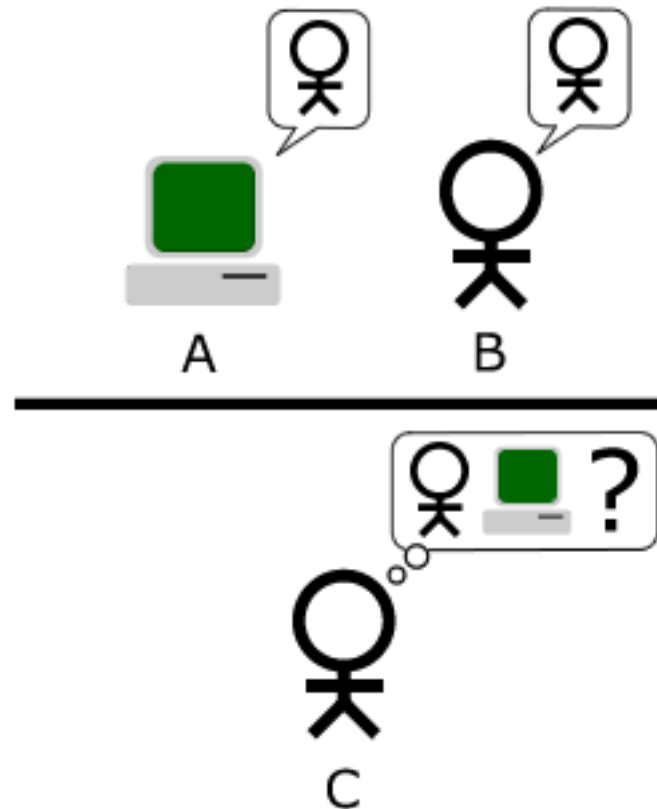
# Introduction of Imitation game(continued)

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# Introduction of Imitation game(continued)

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## Introduction of Imitation game(continued)

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Q : Please write me a sonnet on the subject of the Porth Bridge.

A : Count me out on this one. I never could write poetry.

Q : Add 34957 to 70764 .

A : (Pause about 30 seconds and then give as answer)  
105621.

Q : Do you play chess ?

A : Yes.

Q : I have K at my K1, and no other pieces. You have only K at K6 and R at R1. It is your move. What do you play ?

A : (After a pause of 15 seconds) R-R8 mate.

## Introduction of Imitation game(continued)

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- ▶ This game replace the question

**Can machines think?**

with

**Can machines do what we can do?**



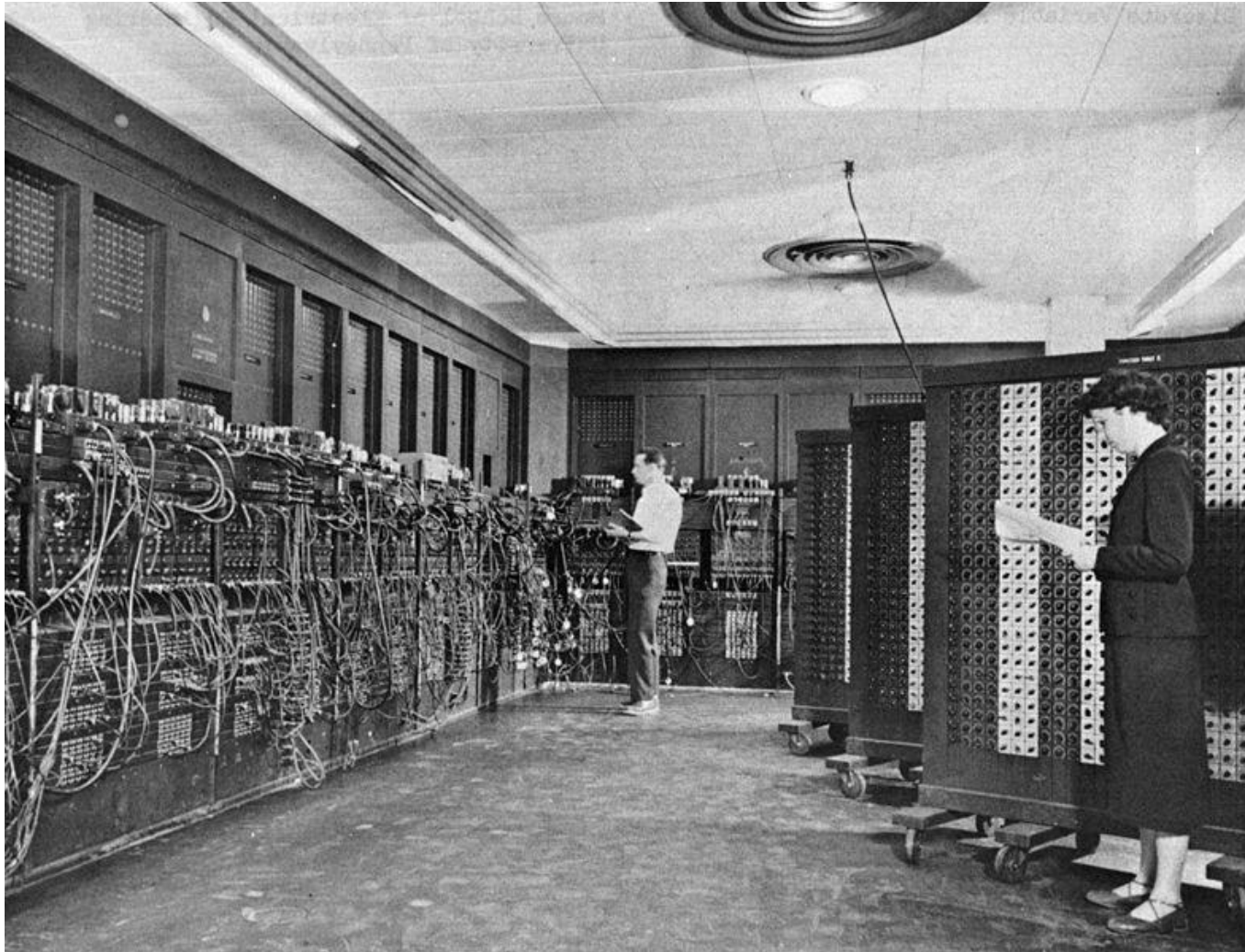
# Discussions about digital machine

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- ▶ To make argument clear, Turing restricted the term 'machine' to digital computers.
- ▶ It is imaginary discrete state machine that can deal with huge amount of states.
- ▶ The number of states should be sufficient to contain possible answers.
  
- ▶ Mind that first general computer was invented 1946, which is only four years past from this paper!

# Discussions about digital machine(continued)

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# Objections to his opinion

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- ▶ It was very sensational opinion and many objections were suggested.
- ▶ Turing introduced nine of them in his paper.

# Objections to his opinion(continued)

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## ▶ I.Theological objection

- ❖ Thinking is a function of soul which God gives to us
- ❖ Machines do not have soul
- ❖ Therefore, machines cannot think

→ Example of elephant

## Objections to his opinion(continued)

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- ▶ 2. 'Heads in the Sands' objection
- ❖ “The consequences of machines thinking would be too dreadful. Let us hope and believe that they cannot do so.”

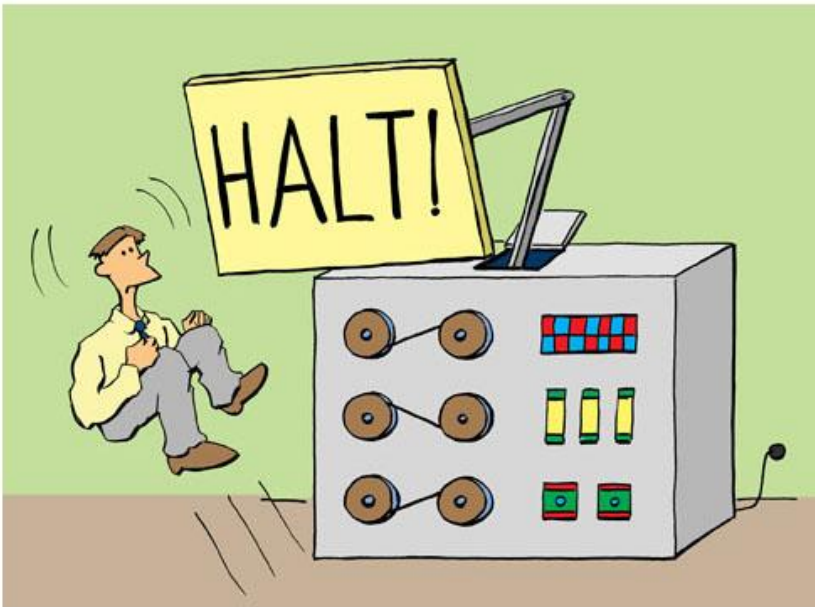
# Objections to his opinion(continued)

## ▶ 3. Mathematical objection

❖ By Gödel's incompleteness theorem, Answers from computer are limited.

❖ e.g) Halting Problem(Is program A eventually stop or not?)

→ Humans are too rigorous to faults of machines, while are generous to theirs.



*Alan designed the perfect computer*

# Objections to his opinion(continued)

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- ▶ 4. Argument from consciousness
- ❖ Suggested by Professor Geoffrey Jefferson
- ❖ "not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain?"
- Example of mind of 'others'
- Chinese room debate

# Objections to his opinion(continued)

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▶ 5. Argument from various disabilities

❖ Machines cannot do X

→ Mistake of machines

→ Self awareness of machines

→ Diversity in machine behavior



# Objections to his opinion(continued)

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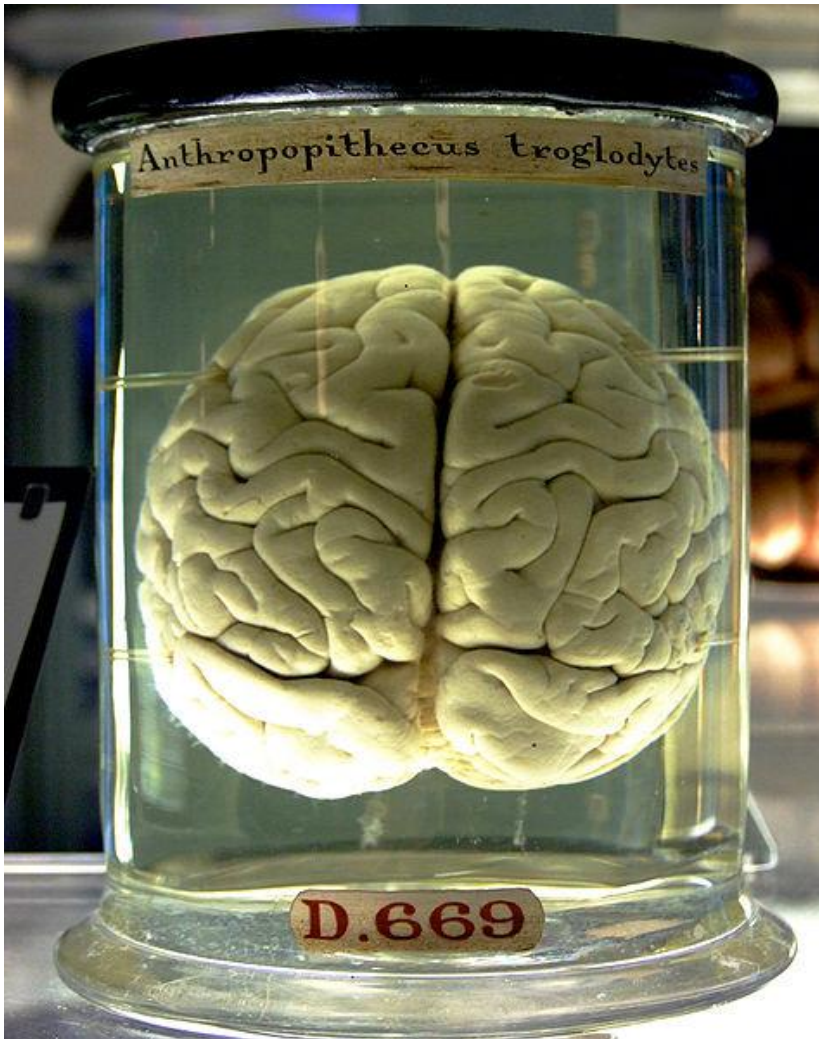
## ▶ 6. Lady Lovelace's objection

❖ Machine can only do what we order it to do

→ Example of context

→ Example of brain

## Objections to his opinion(continued)



- ▶ 7. Argument from continuity in the nerve system
- ❖ Brain is neither digital nor discrete state machine
- Substitution with digital computer.

# Objections to his opinion(continued)

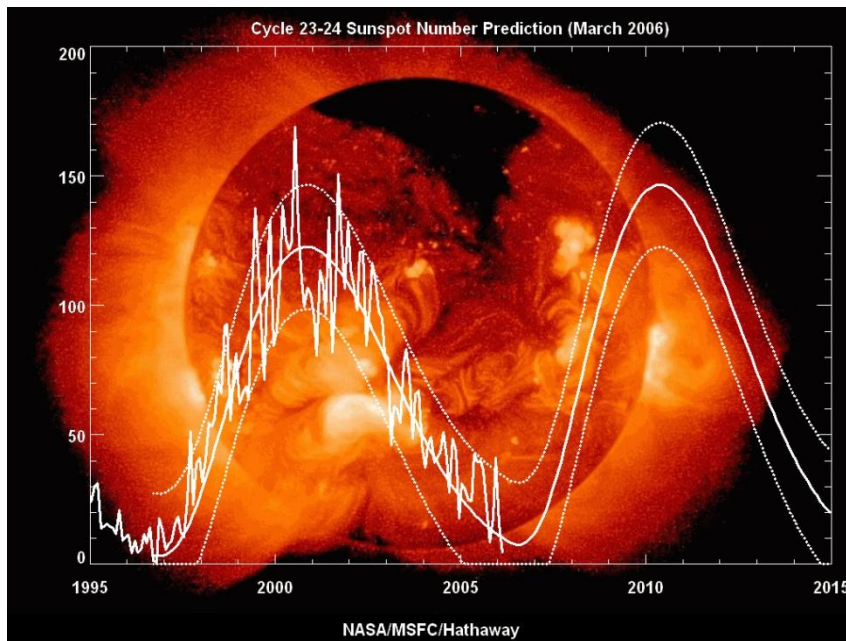
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▶ 8. Argument from the informality of behavior

❖ Behavior of machines are predictable while that of humans are not

→ Difficulty in prediction

→ Suspicion of law of behavior



## Objections to his opinion(continued)

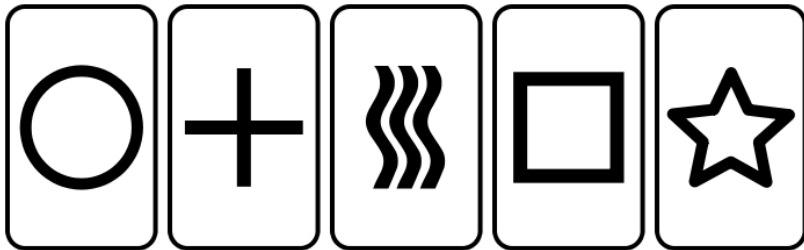
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▶ 9. Argument from extra sensory perception

❖ Machines cannot perceive something requires extra sensory

- Telepathy

- Precognition ....



# Summary

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- ▶ Turing introduced the imitation game
- ▶ In this game, machine imitates human
- ▶ He imagined digital computer that can pass the test
- ▶ Many objections were made and nine objections were presented

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>>Thanks you.