

Introduction to Artificial Intelligence

Objectives



- Discuss what is meant by Artificial Intelligence (AI)
- How do we test for Intelligence ?

Aim of this lecture

- Allow the students to answer general AI questions
- Allow the students to further investigate machine intelligence
- Introduce some important AI tests and terms

Introduction to Artificial Intelligence

Sections



- What is Artificial Intelligence ?
- Intelligence and Understanding
- Tests and Experiments
- Conclusions

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Question 1

Can a Machine Ever Be Intelligent ?

(survey)

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Question 2

What is Artificial Intelligence ?

(ideas)

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What is Artificial Intelligence ?

Artificial Intelligence (AI):

is the study of how to make computers **do** things which, at the moment, people do better

Elaine Rich, 1991

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What is Artificial Intelligence ?

Artificial Intelligence (AI):

is a branch of computer science and engineering that deals with intelligent behavior, **learning**, and adaptation in machines.

Wikipedia

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What is Artificial Intelligence ?

Artificial Intelligence (AI):

Originated in 1956, John McCarthy coined the term

Very successful at early stage

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'I think that...'

'You know about....'

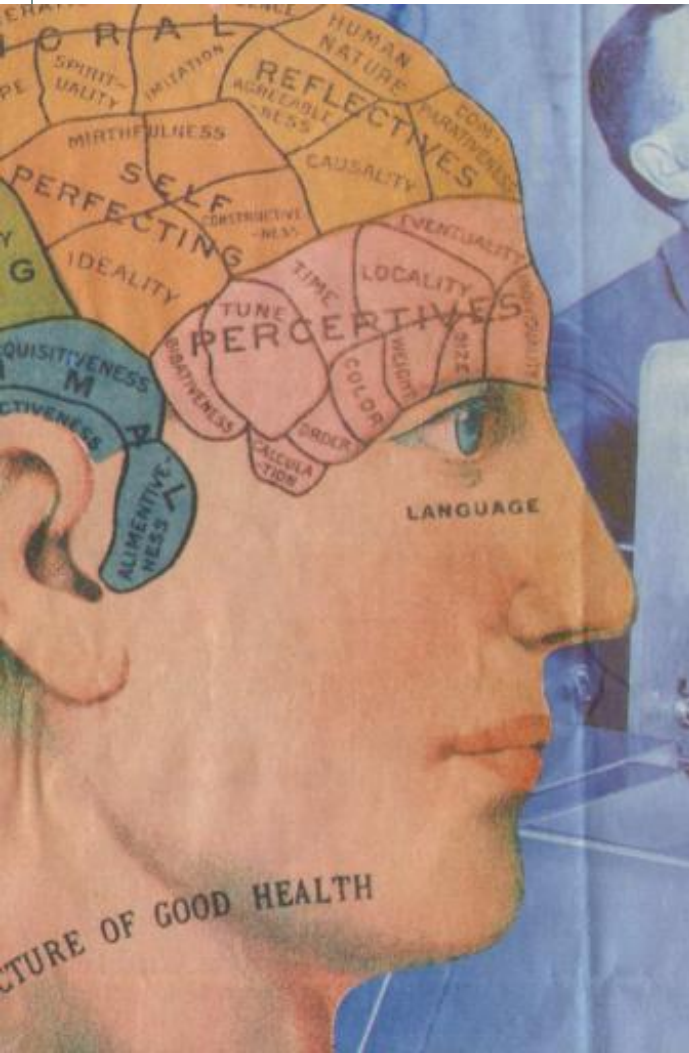
'She is intelligent...'

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'The machine thinks that...'
'The computer knows about....'
'It is intelligent...'

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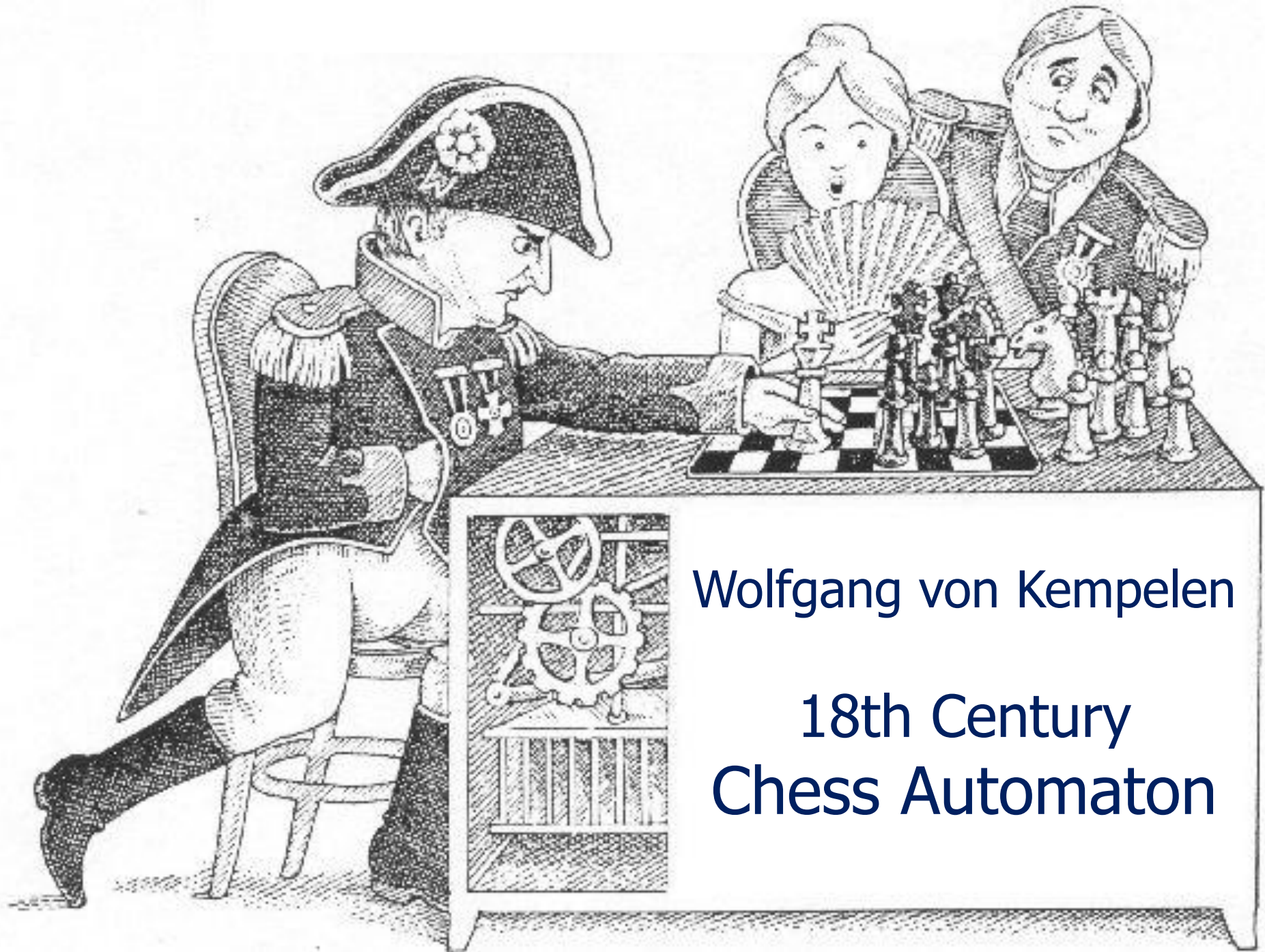


Silicon Souls

A.I. Artificial Intelligence (2001)

Director: Steven Spielberg





Wolfgang von Kempelen

18th Century
Chess Automaton

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Think about Question 1

Can a Machine Ever Be Intelligent ?

(survey)

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Maybe we are asking the wrong question

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Question 3

What is Intelligence ?

(ideas)

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What is Intelligence ?

Intelligence :

The faculty of understanding.

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Question 4

What is Understanding ?

(ideas)

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What is Understanding ?

Understanding :

To comprehend something, or to recognise its significance.

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What is Understanding ?

Understanding :

Usually Requires Knowledge

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Human Knowledge

- There is a lot of it.
- It is hard to characterise accurately.
- It is constantly changing.
- It differs from data by being organised.

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N'Kisi

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Parrot's oratory stuns scientists

By Alex Kirby
BBC News Online environment correspondent

The finding of a parrot with an almost unparalleled power to communicate with people has brought scientists up short.



Feathered prodigy: N'kisi leads the field

The bird, a captive African grey called N'kisi, has a vocabulary of 950 words, and shows signs of a sense of humour.

He invents his own words and phrases if he is confronted with novel ideas with which his existing repertoire cannot cope - just as a human child would do.

N'kisi's remarkable abilities, which are said to include telepathy, feature in the latest BBC Wildlife Magazine.

N'kisi is believed to be one of the most advanced users of human language in the animal world.

About 100 words are needed for half of all reading in English, so if N'kisi could read he would be able to cope with a wide range of material.

Polished wordsmith

He uses words in context, with past, present and future tenses, and is often inventive.

One N'kisi-ism was "fled" for "flew", and another "pretty smell medicine" to describe the aromatherapy oils used by his owner, an artist based in New York.

When he first met Dr Jane Goodall, the renowned chimpanzee expert, after seeing her in a picture with apes, N'kisi said: "Got a chimp?"

SEE ALSO:

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28 Aug 03 | Europe
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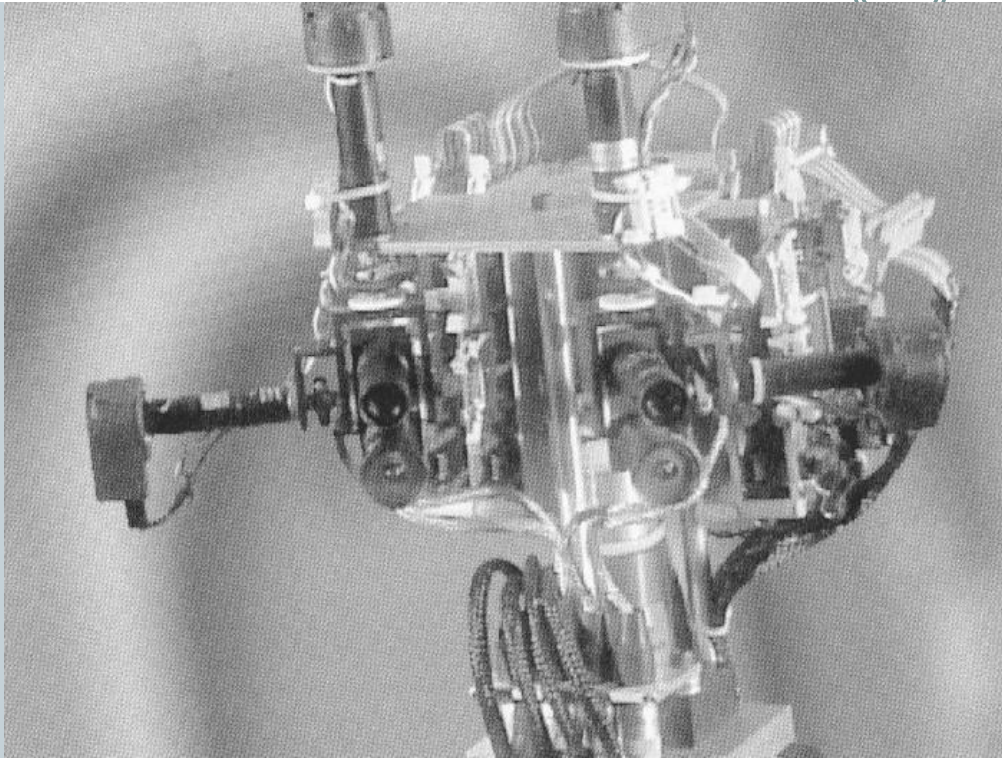
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COG

MIT's AI Lab

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“No computer can play even an amateur-level game of chess.”

Hubert Dreyfus, 1960's

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“Within 10 years a computer will be a chess champion”

Herbert Simon, 1957

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IBM Deep Blue

- Chess champion Garry Kasparov
- 11 May 1997



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We commonly think a good chess player is highly intelligent. Surely we cannot deny that such machines are intelligent.

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Why use AI to play games?

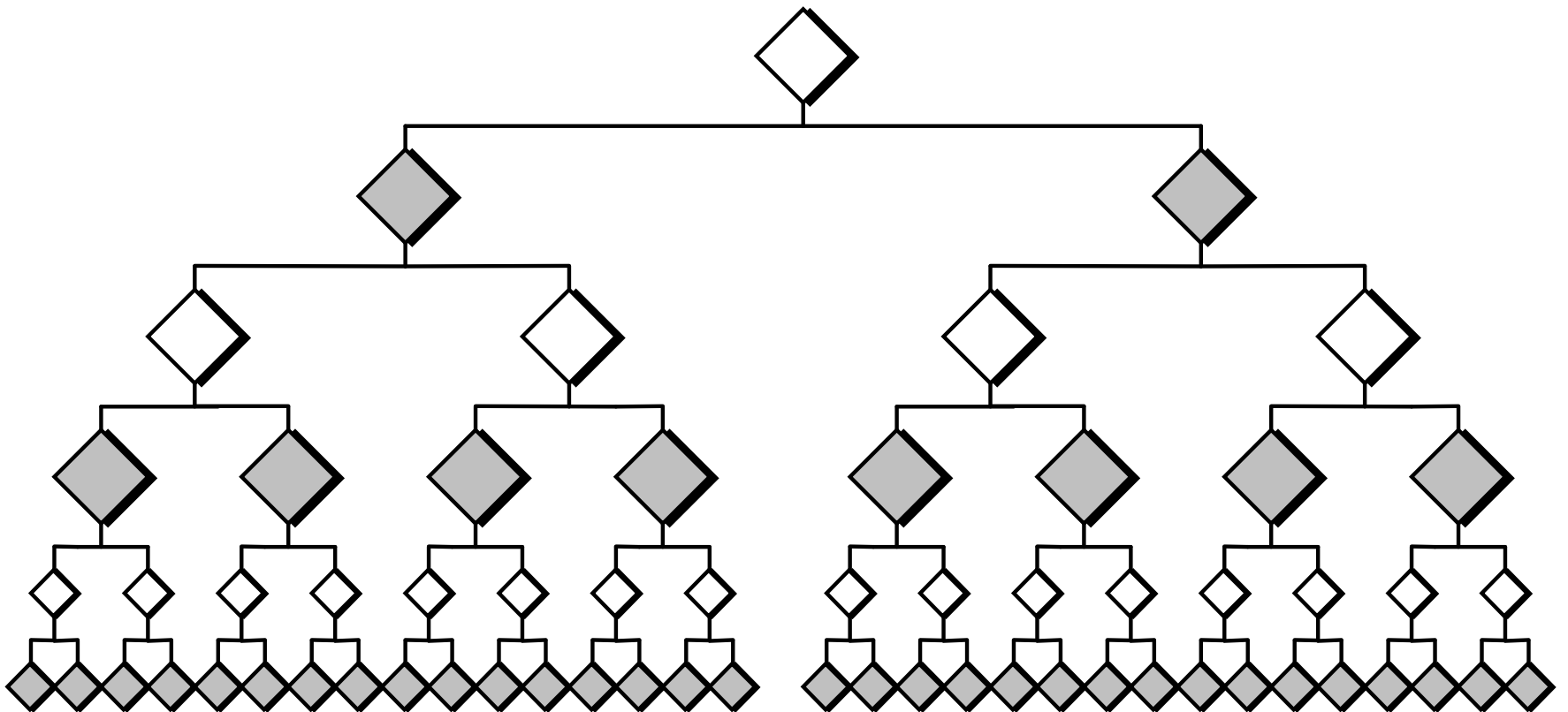
Games are an intelligent activities.

They provide a structured task in which it is very easy to measure success or failure.

They do not require large amounts of knowledge. They were thought to be solvable by straightforward search from the starting state to a winning position.

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Combinatorial Explosion ?



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Combinatorial Explosion

The Travelling Salesman Problem

A salesperson has to visit a number of cities

(S)He can start at any city and must finish at that same city

The salesperson must visit each city only once

The number of possible routes is $(n!)/2$

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Combinatorial Explosion

The Travelling Salesman Problem

The cost of a solution is the total distance traveled

Solving the TSP means finding the minimum cost solution

Given a set of cities and distances between them

Find the optimal tour, i.e. the shortest possible such tour

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Combinatorial Explosion

The Travelling Salesman Problem

A 50 City TSP has $1.52 * 10^{64}$ possible solutions

A 10GHz computer might do 10^9 tours per second

Running since start of universe, it would still only have done 10^{26} tours

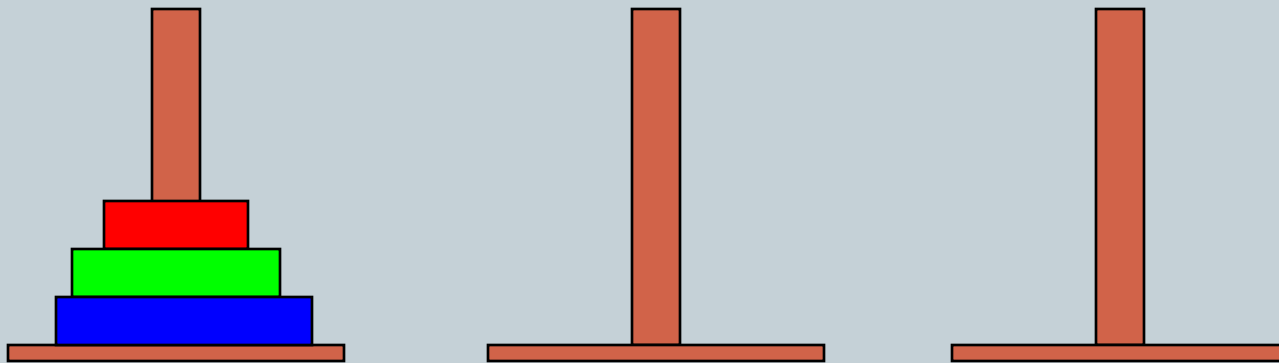
Not even close to evaluating all tours!

One of the major unsolved theoretical problems in Computer Science

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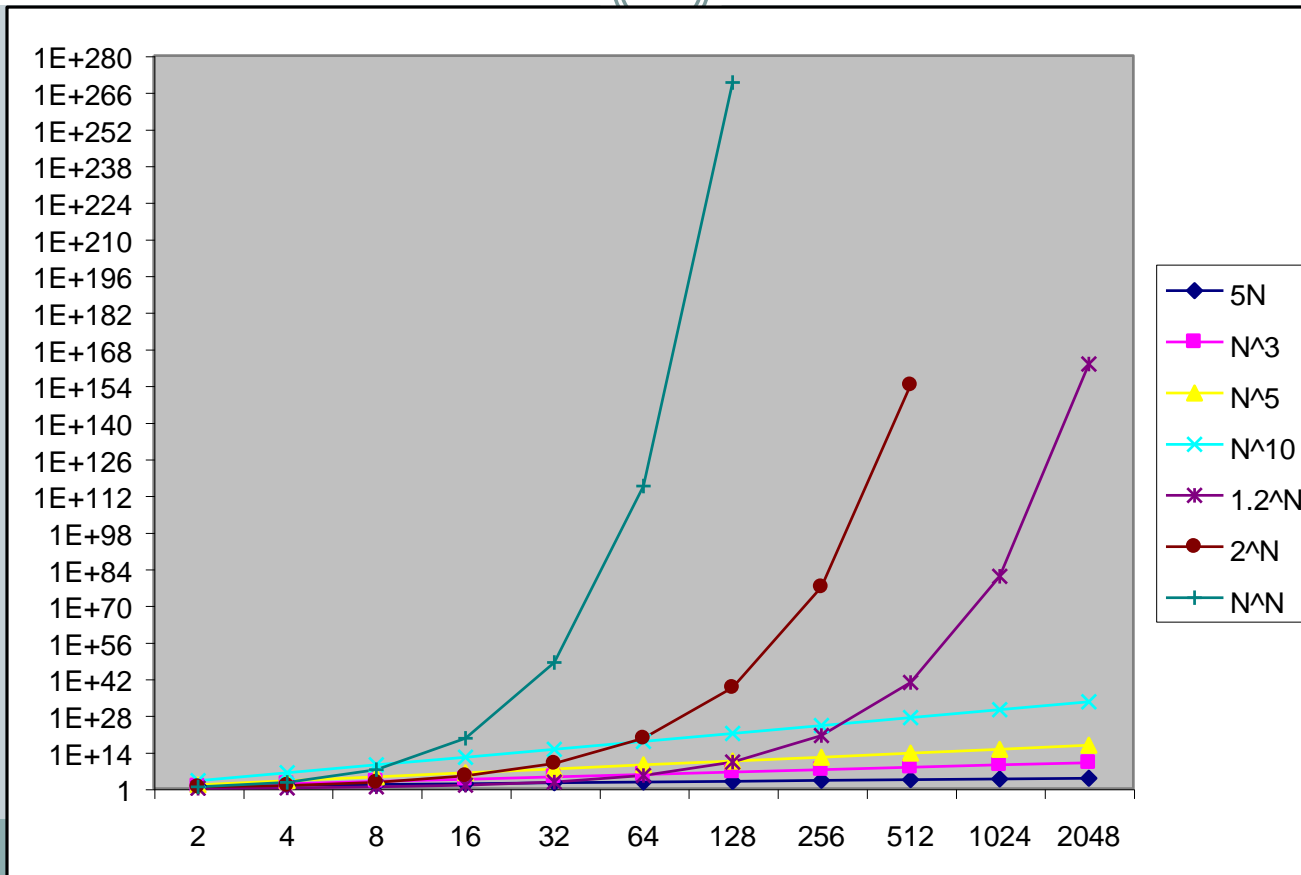
Combinatorial Explosion

Towers of Hanoi



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Combinatorial Explosion



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Turing Test

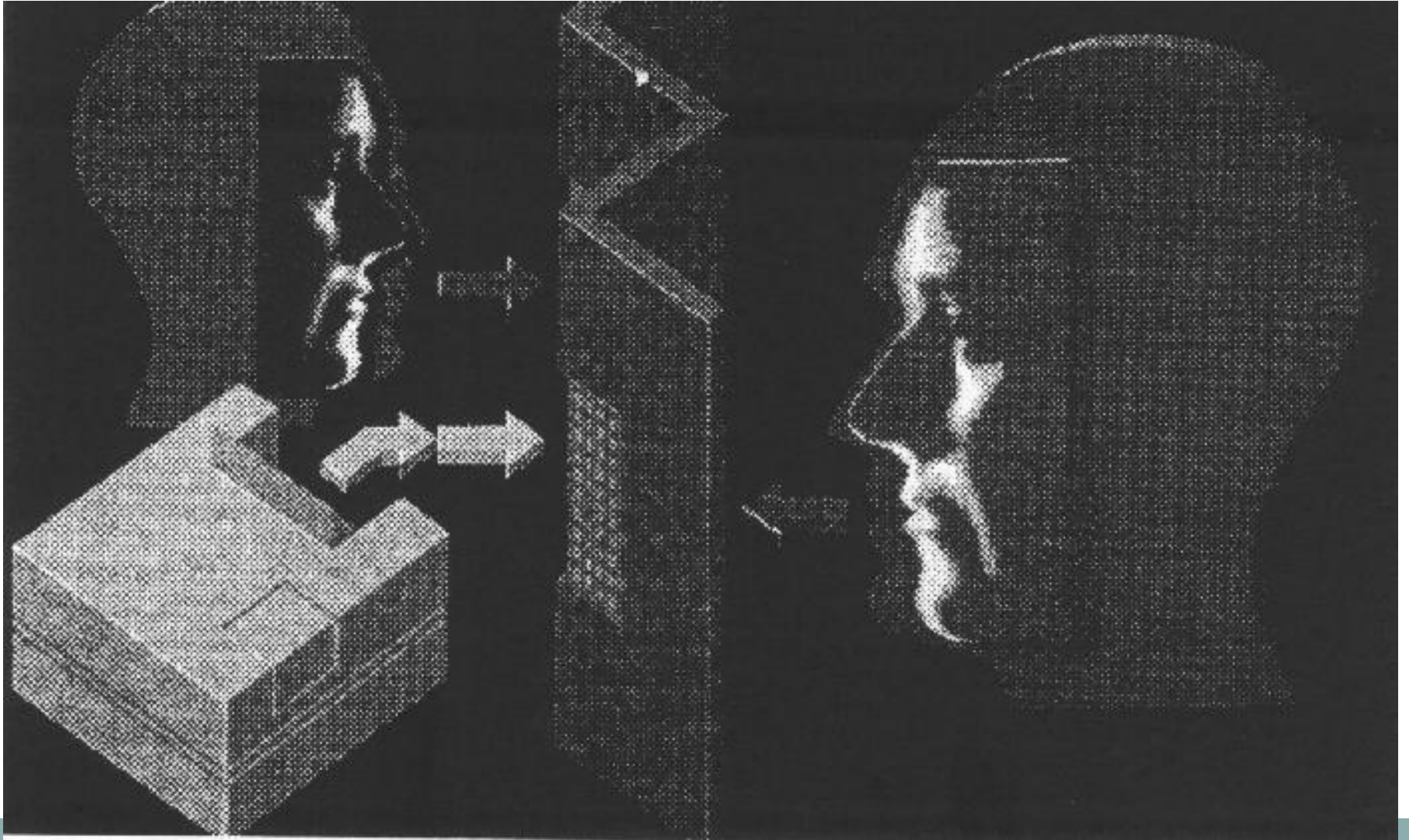
A human is connected to a person and a machine via a terminal of some kind and cannot see either the person or machine. The interrogator's task is to find out which of the two candidates is the machine, and which is human only by asking them questions.

If the human cannot make a decision within a certain time, the machine is considered intelligent.

Alan Turing (1912-1954)



Turing Test



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Turing Test

Question : "What is 35,076 divided by 4,567?"

Answer : ????

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Turing Test

Question : "What is 35,076 divided by 4,567?"

Answer : 7.6803153

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Turing Test
Homepage

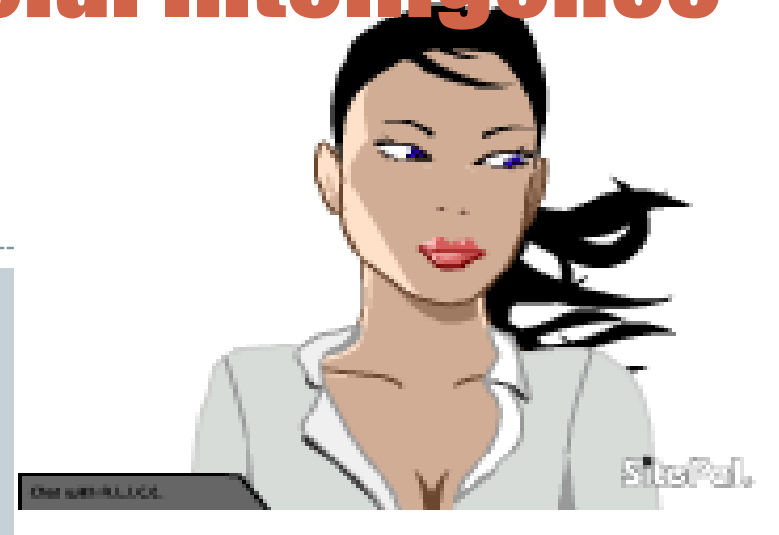


<http://cogsci.ucsd.edu/~asaygin/tt/ttest.html>

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Alice

<http://www.alicebot.org/>



My Little Tony

<http://www.mylittletony.com/>

welcome to mylittletony.com



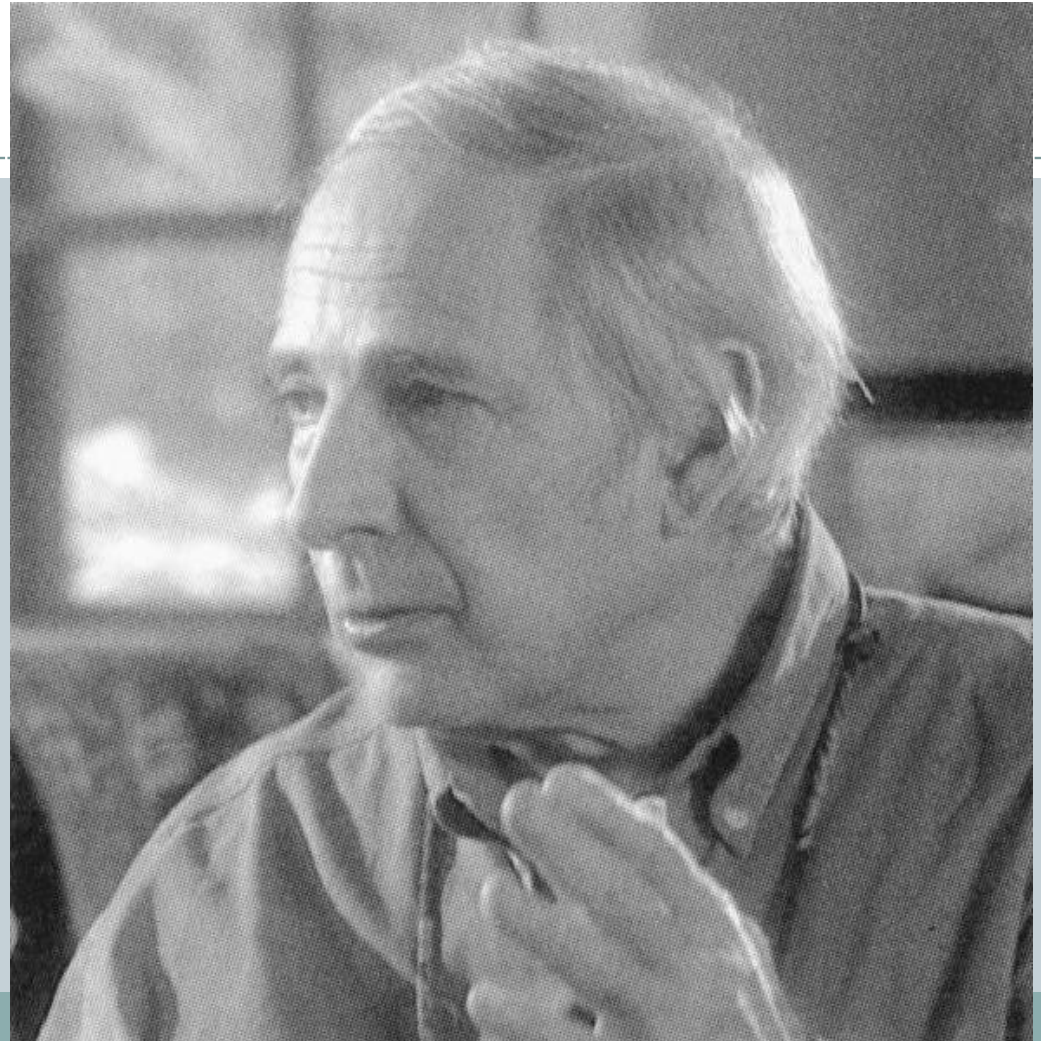
You must have the Macromedia Flash 5 plug-in to view the mylittletony site
[Get the Flash plug-in here](#)

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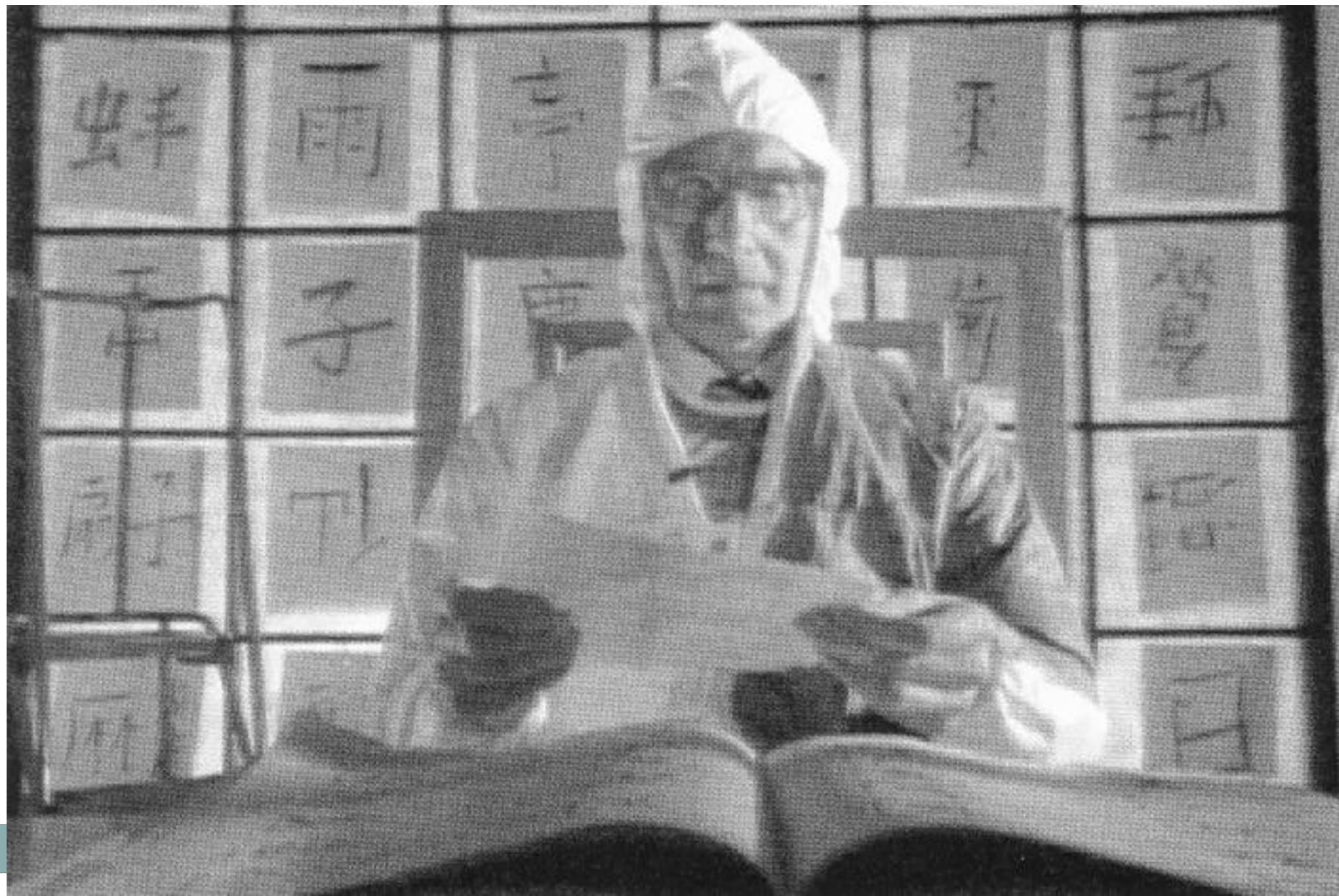
JOHN
SEARLE

Intentionality

Knowing
what you are
talking about



Chinese Room



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- **Conclusions**

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What is Artificial Intelligence ?

System

- think/act like human
- think/act rationally (or to do the right thing)

Read Chapter 1, Artificial Intelligence: The Modern Approach

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Question 5 (1 again)

Can a Machine Ever Be Intelligent ?

(survey)