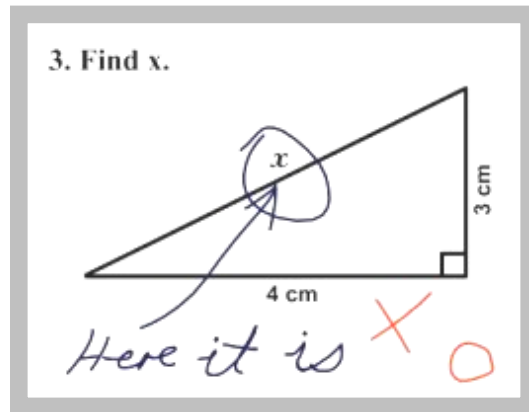
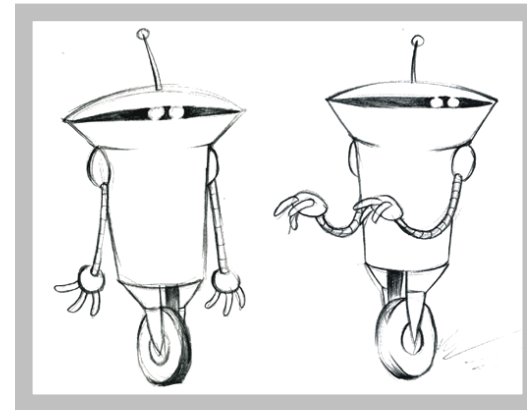


Alan Turing's
Computing Machinery
and



Intelligence



- Published in 1950
- Considered a seminal paper on artificial intelligence
- “Imitation game” now known as the Turing test was first introduced.
- It was also the origin of the thesis that cognition is a form of computation (computationalism).

Note: Up to Turing's time the word 'computer' referred to person skilled at calculation, not to a machine. Hence the use of “computing machinery”.

The Imitation Game

Question- "Can machines think?"

- Played with three people, a man (A), a woman (B), and an interrogator (C).
- Interrogator stays in a room apart from the other two.
- Interrogator's objective: to determine which of the other two is the man and which is the woman by putting questions to A and B.
- A and B's objective: try and cause C to make the wrong identification.

Now "What will happen when a machine takes the part of A in this game?"

Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman?

The **Turing test** is a proposal for a test of a machine's capability to demonstrate intelligence

Replacing the emotionally charged and (for him) meaningless question "Can machines think?" with a more well-defined one.

The advantage –

"drew a fairly sharp line between the physical and intellectual capacities of a man."

Can computers think =

Can a computer, communicating over a teleprinter, fool a person into believing it is human.

Understand that the person judging is mentally sound

Has good cognitive skills.

Humans sometimes give stupid answers to questions.

Interpretation of intelligence.

When will it be considered that he decisively believes.

Would asking 'n' more questions change the mind of the interrogator

Even then it only proves that it is a linguistic computer that can converse fluidly...?

Computing machinery could be engineered to operate on language..?

- It is true that we feel more at ease ascribing intelligence (and sometimes even the ability to think) to those entities with which we can have an interesting conversation than to radically different entities.

- Mathematical ability may raise some questions.

-There has been some important work done on vision and human reasoning.

Digital Computers

- These machines are intended to carry out any operations which could be done by a human computer.
- The human computer is supposed to be following fixed rules; he has no authority to deviate from them in any detail.
- Imagine these rules are supplied in a book, which is altered whenever he is put on to a new job. He has also an unlimited supply of paper on which he does his calculations.

- If one wants to make a machine mimic the behavior of the human computer in some complex operation one has to ask him how it is done, and then translate the answer into the form of an instruction table. Constructing instruction tables is usually described as "programming."

Contrary Views on the Main Question

- Theological objection: Thinking is part of humans' souls, and so animals/machines can't think.
- Head-in-the-sand objection:
Consequences of thinking machines are dreadful, so let's hope it's not possible.
Futuristic movies and books build upon this fear.
- Machines will never be able to do X.
X = {be kind, friendly, have sense of humor, fall in love, etc.}

Mathematical objections

-Gödel's Incompleteness Theorem: in any consistent logical system that includes number theory, there are statements that can't be proved or disproved

-The halting problem: no machine can determine whether another machine will halt on a given input
These show limitations to discrete-state machines

- But humans are not infallible
Judge of the imitation game
We will not know if incorrect response is because of limitation or human error.

Consciousness

“Not until a machine can write a sonnet...because of thoughts and emotions felt...could we agree that machine equals brain...” – Professor Jefferson

Really just attack on Turing Test, but Turing Test does not test whether computer thinks or feels.

But the capability to demonstrate intelligence

Solipsism: the only way to *really* know if a machine is thinking is to *be* the machine.

Lady Lovelace's Objection

- Wrote about Babbage's Analytical Engine.
- Machine can not *originate* anything, and only does what it is programmed to do.
- But what about learning machines? Maybe machines can't surprise? But then again, humans often are surprised by machines.

In addition, what is surprise?
Theorems may not be surprising after they are proven, but is there no virtue in proving them?

Continuity of the Nervous System

Nervous system is not a discrete-state machine, so can't mimic by computer.

Again, interrogator can't tell difference

Extra-Sensory Perception

Seems to acknowledge overwhelming statistical evidence for telepathy.

Imitation game fails with ESP, since human can communicate with interrogator via ESP.

Telepathic human is better at guessing games (i.e. which hand is coin in?)

To solve this, Turing suggests putting subjects in 'telepathy-proof room'.

Psychologism and Behaviorism

Intelligence can't be based *only* on behavior

Turing test does not demonstrate general capacity of machine for producing reasonable responses

Even a *mindless* machine can pass Turing Test:

- Have all possible conversations of given length in memory

- Machine just looks up correct response

- Clearly not intelligent

For intelligence, need capacity and *compactness*:

- No exponential blow-up in storage

Learning Machines

To imitate an adult human mind

(a) The initial state of the mind, say at birth, - blank sheets

(b) The education to which it has been subjected,

(c) Other experience, not to be described as education, to which it has been subjected.

Replicate child brain, and then feed it information.

Gives estimate of amount of storage in human brain: 10⁹ decimal digits.

Much less than currently believed.

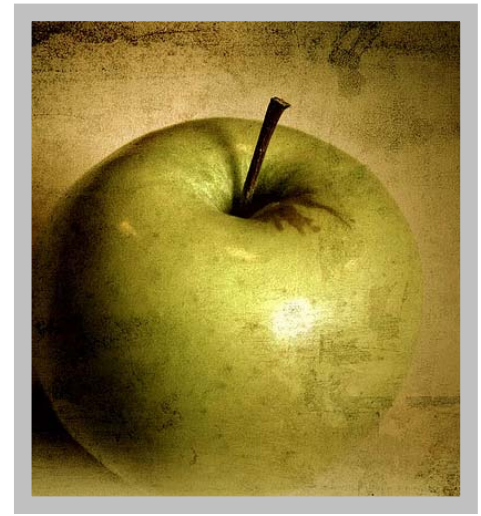
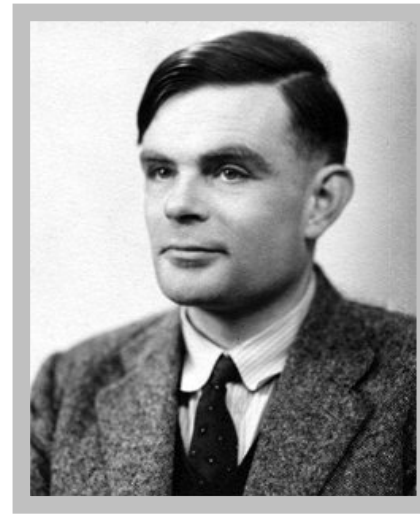
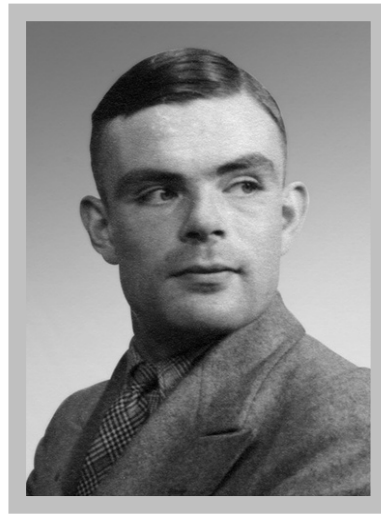
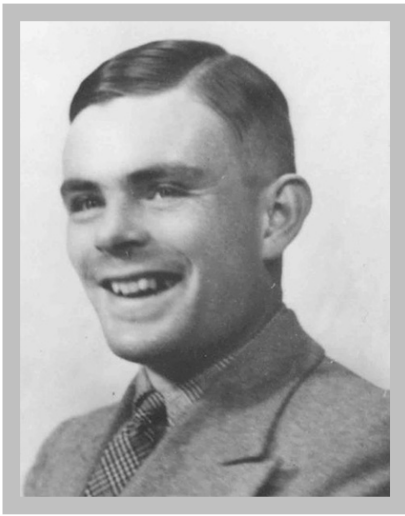
Believes that once memory is available, constructing a computer with a human-like mind is "mainly one of programming".

Even discusses ways of "teaching" computer.

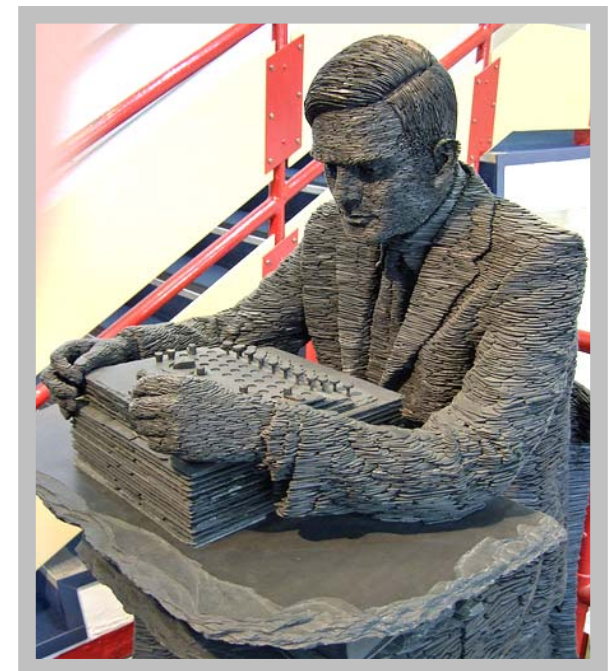
Later debate on the Turing Test

Stuart Shieber's analogy:

- Deniers: intelligence is like bad cold.
 - There is a germ, a hidden cause.
 - Can't "fake it".
- Approvers: intelligence is like fluency in Italian.
 - Talk to someone in Italian for an hour.
 - Can't say, "he doesn't really know Italian, he's just faking it."
- Now say someone gets good grades, does well on Psychometry
 - Can you say, "He's not really intelligent, he's just faking it to get into a good University"?



Turing's promising career as a code-breaker for England came to a grinding halt when he was arrested under the English law in 1952 for alleged homosexuality. The penalty for this crime was submission to psychoanalysis and to injections of estrogen designed to "cure the disease." Unfortunately, the cure worsened him, and in a fit of depression, Turing committed suicide in 1954 by eating a cyanide-poisoned apple.





Completely Automated Public Turing test to tell Computers and Humans Apart

A CAPTCHA involves one computer (a server) which asks a user to complete a test. While the computer is able to generate and grade the test, it is not able to solve the test on its own. Because computers are unable to solve the CAPTCHA, any user entering a correct solution is presumed to be human.

Показывать информацию обо мне

Всем
 Только зарегистрированным пользователям
 Никому

Защита от автоматической регистрации

$\lim_{x \rightarrow 0} \ln \left(2 + \sqrt{\arctg x \cdot \sin \frac{1}{x}} \right)$

Введите ответ

No computer has passed TT to date.
IRC chatbots: people have conversations online with machines, can't distinguish

Loebner Prize: annual TT competition, prizes for passing TT and for "most human conversation".

No prize awarded for former yet.

Building WPF applications with the J...

http://learnwpl.com/Posts/Post.asp

Properties

General

Captcha ashw?nt=6SF86

Protocol: HyperText Transfer Protocol

Type: JPEG Image

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Size: 2912 bytes

Dimensions: 160 x 60 pixels

Created: 07.03.2006

Modified: 07.03.2006

OK Cancel Apply

Enter Captcha Validation:

(If you cannot read the Captcha image, press "Reset Image" to generate a new one)

6SF86

Remember Me

Add Comment Reset Image

So do computers think?

Interview with Gary Kasparov's advisor after loss to Deep Blue

Q: "Did Gary Kasparov think the computer was thinking?"

A: "Not thinking but that it was showing intelligent behavior...it understands strategy..."

- <http://gooie-duck.livejournal.com/tag/cartoon>
- <http://en.wikipedia.org/>
- <http://www.cogs.susx.ac.uk/users/blayw/tt.html>
- <http://www.bletchleypark.org.uk/>