Chapter 1

Artificial Intelligence

- AI is one of the newest fields in science and engineering.
- Work started in it after World War II, and the name itself was coined in 1956.

Definitions of AI

- " ... the science of making machines do things that would require intelligence if **done by humans**" - Marvin Minsky

- AI is the part of computer science concerned with **designing** intelligent computer systems -E. Feigenbaum

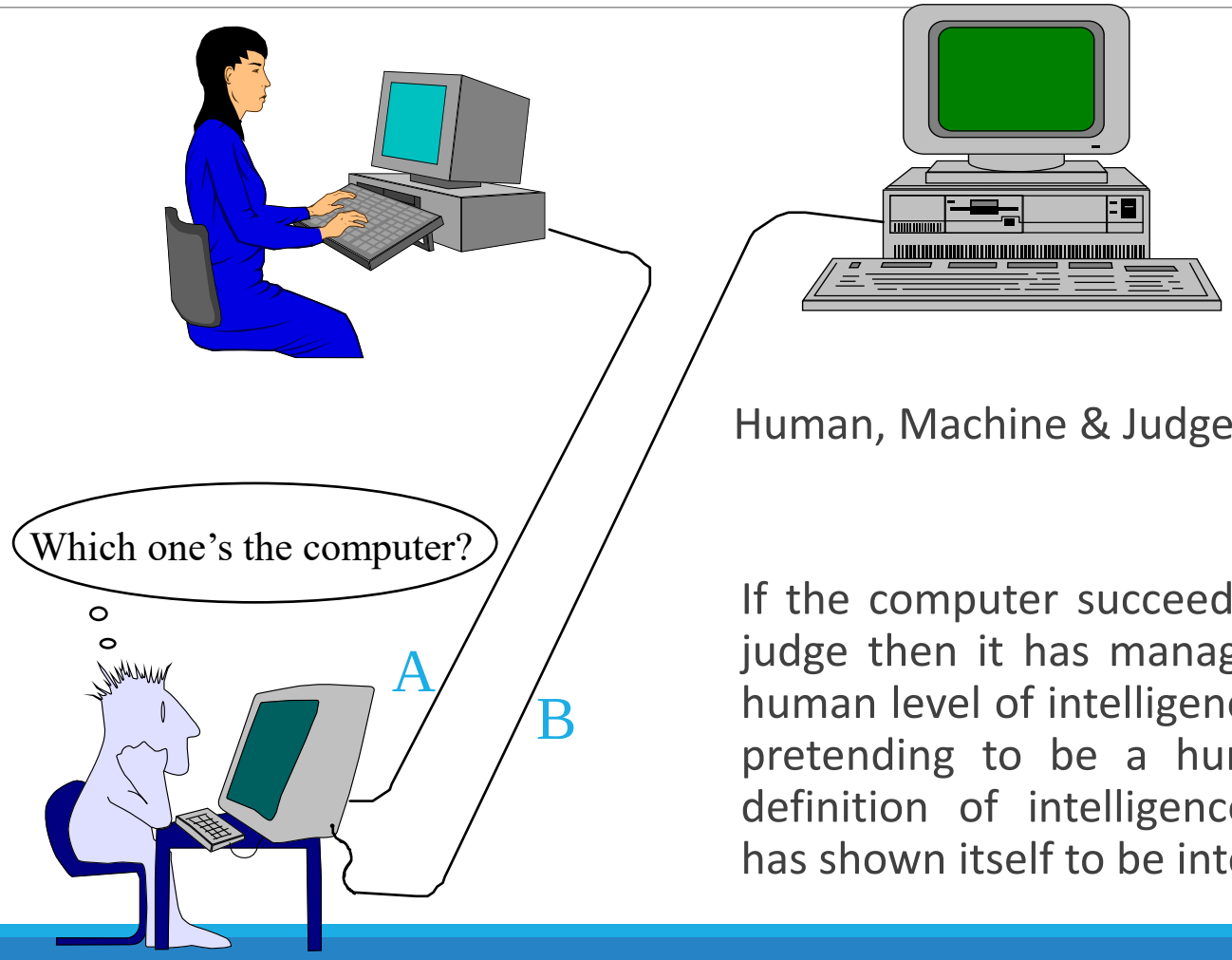
- *Science behind making* Systems that can demonstrate **human-like reasoning capability** to enhance the quality of life and improve business competitiveness - Japan-S'pore AI Centre

- John McCarthy (science and engineering)--common sense
  Science behind Making machines do things that **humans currently do better** (senses) AGI – artificial general intelligence Ray Solomonof

Turing’s Test

- In 1950 Alan Turing published his now famous paper "**Computing Machinery and Intelligence**." In that paper he describes **a method for humans to test AI programs**.

Turing's Test



Human, Machine & Judge.

If the computer succeeds in fooling the judge then it has managed to exhibit a human level of intelligence in the task of pretending to be a human , by the definition of intelligence the machine has shown itself to be intelligent.

What is AI?(Definitions –IA-based)

The science of making machines that:

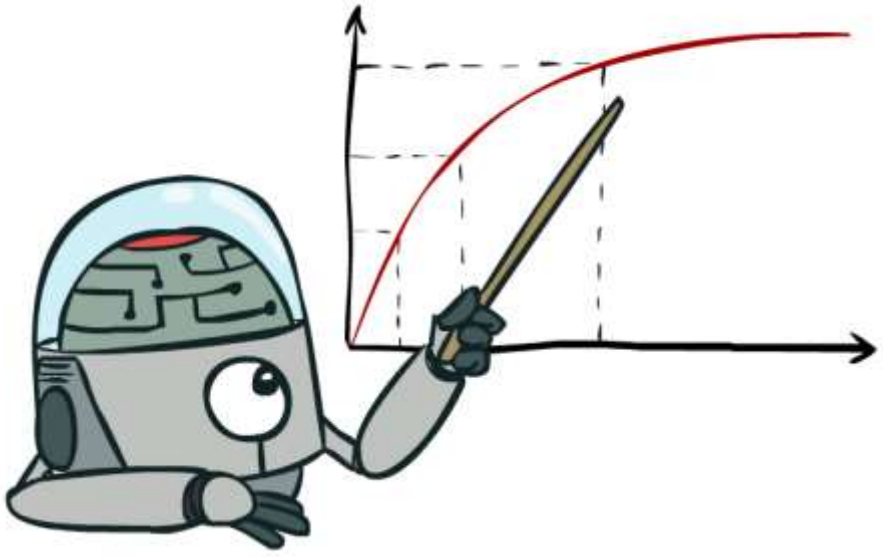
Rational Decisions

We'll use the term **rational** in a very specific, technical way:

- Rational: maximally achieving pre-defined goals
- Rationality only concerns what decisions are made

  (not the thought process behind them)
- Goals are expressed in terms of the **utility** of outcomes
- Being rational means **maximizing your expected utility**

Maximize Your Expected Utility



The foundations of AI

- **Philosophy** (reasoning, planning, learning, science, automation)
- **Mathematics** (logic, probability, optimization)
- **Neuroscience** (neurons, adaptation)
- **Economics** (rationality, game theory)
- **Control theory** (feedback)
- **Psychology** (learning, cognitive models)
- **Linguistics** (grammars, formal representation of meaning)

A (Short) History of AI

1940-1950: Early days
- 1943: McCulloch & Pitts: Boolean circuit model of brain
- 1950: Turing's “Computing Machinery and Intelligence”

1950—70:
- 1950s: Early AI programs: chess, checkers (RL), theorem proving
- 1956: Dartmouth meeting: “Artificial Intelligence” adopted
- 1965: Robinson's complete algorithm for logical reasoning

1970—90: Knowledge-based approaches
- 1969—79: Early development of knowledge-based systems
- 1980—88: Expert systems industry booms
- 1988—93: Expert systems industry busts: “AI Winter”

1990— 2012: Statistical approaches + subfield expertise
- Resurgence of probability, focus on uncertainty
- General increase in technical depth
- Agents and learning systems… “AI Spring”?

2012— ___: Big data, big compute, deep learning
- AI used in many industries

AI Applications

- Robotics
- Games
- Spam filtering
- Autonomous Driving
- Machine Translation
- Chatbots
- Recommender Systems