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# Agents and Definitions of Artificial Intelligence

Intelligence is the art of good guesswork.  
(H. B. Barlow)

# What is Artificial Intelligence?

Definitions of AI

▷ What is AI?

The Turing Test

Goals of AI

Agents

- Artificial Intelligence is *the synthesis and analysis of computational agents that act intelligently*.
- An *agent* is something that *acts* in an environment.
- An agent acts *intelligently* to the extent that it uses its perceptions, knowledge and experience to maximize its expected performance.
  - Its actions are appropriate.
  - It is flexible to change.
  - It learns from experience.
  - It works within its limitations.

# The Turing Test

Definitions of AI

What is AI?

▷ The Turing Test

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- This idea of defining intelligence by external behavior was the motivation for the *Turing test*.
- The Turing test consists of an imitation game where an interrogator can ask a witness, via a text interface, any question.
- If the interrogator cannot distinguish the witness from a human, the witness must be intelligent.
- An agent could not fake intelligence for arbitrary topics.

# Goals of Artificial Intelligence

Definitions of AI

What is AI?

The Turing Test

▷ Goals of AI

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- **Scientific goal:** to understand the principles that make intelligent behavior possible in natural or artificial systems.
  - analyze natural and artificial agents
  - formulate and test hypotheses about what it takes to construct intelligent agents
  - design, build, and experiment with computational systems that perform tasks that require intelligence
- **Engineering goal:** design useful, intelligent artifacts.

# Illustration

Definitions of AI

Agents

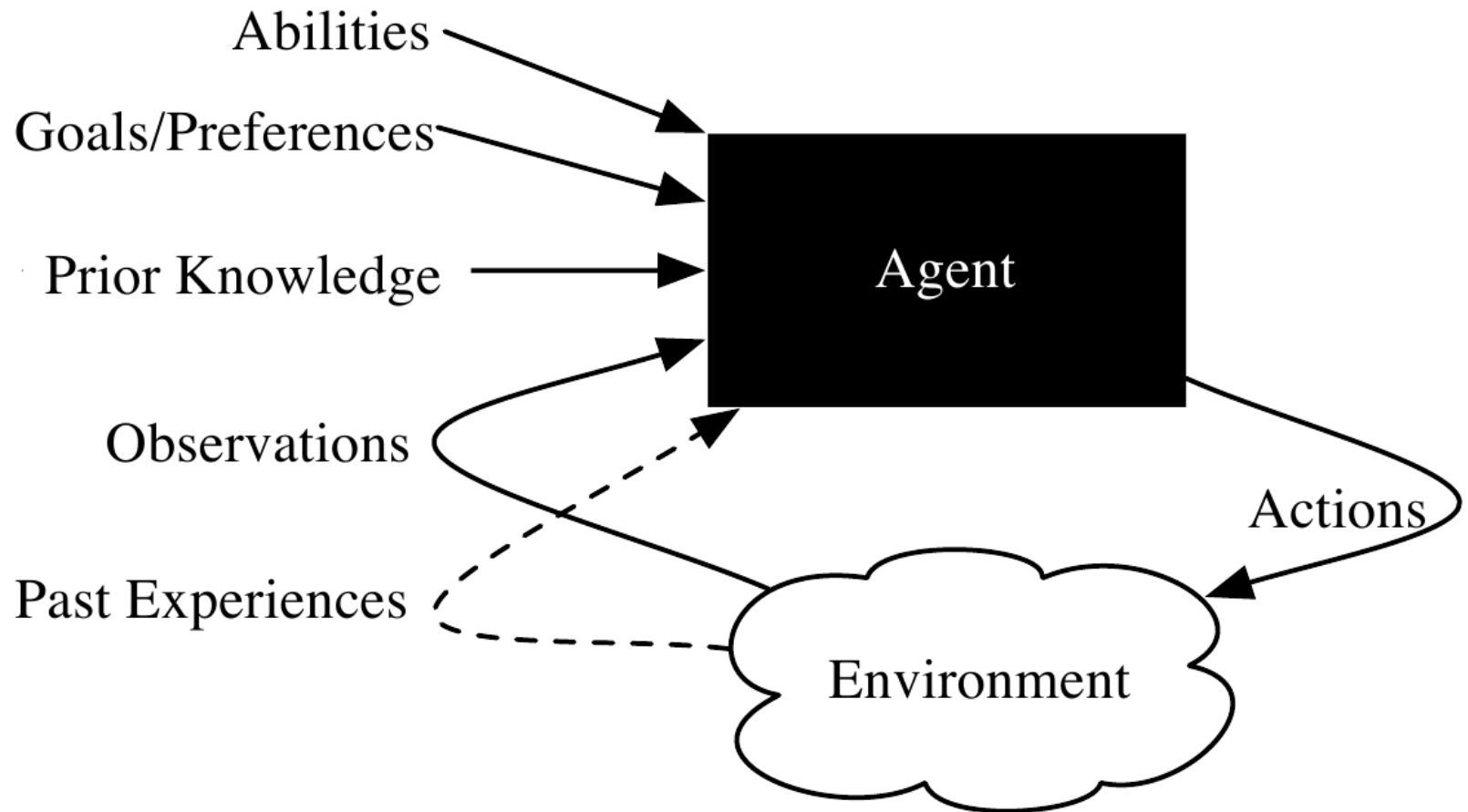
▷ Illustration

Example 1

Example 2

Representation

Probability



# Example 1

Definitions of AI

Agents

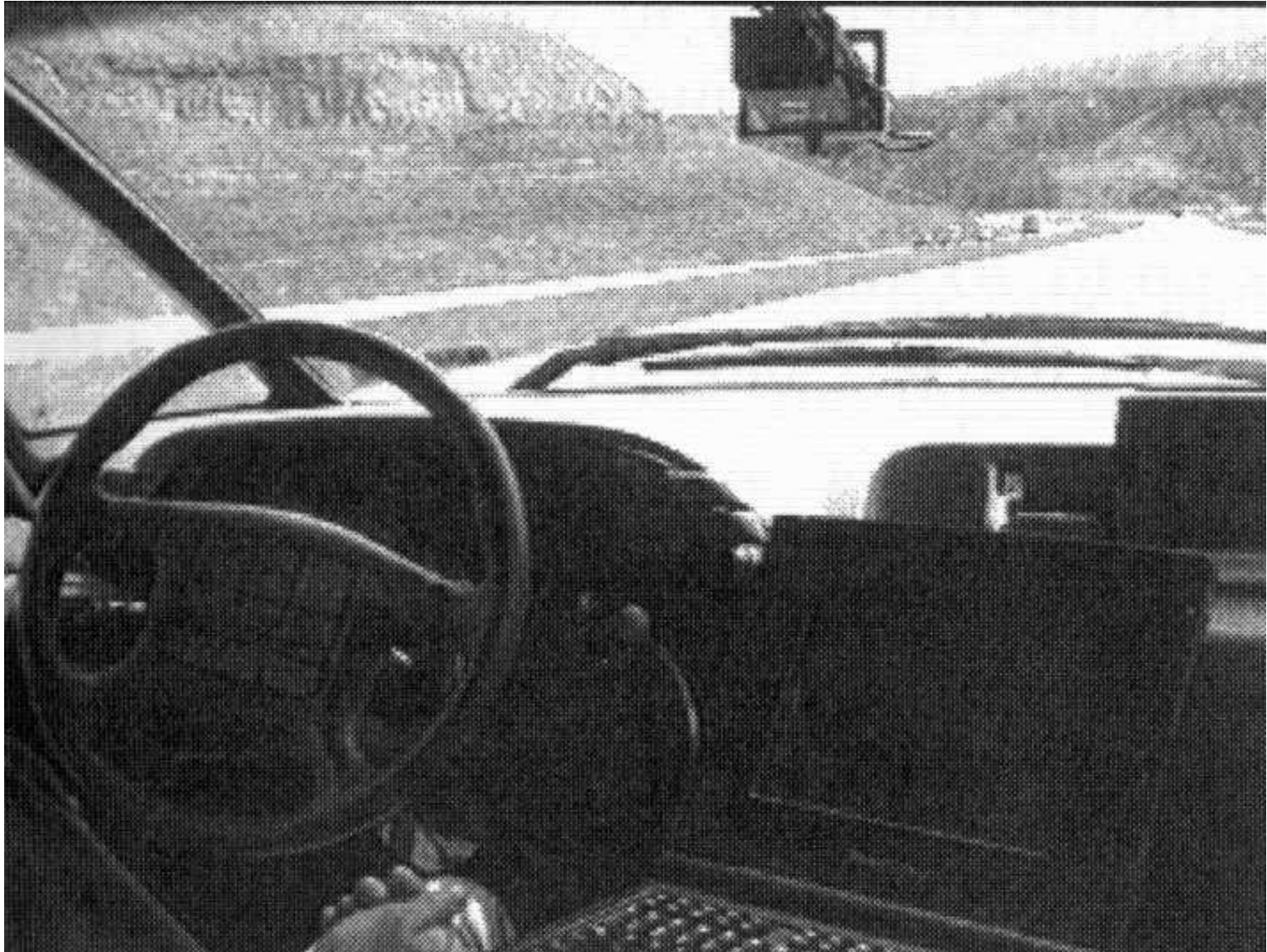
Illustration

▷ Example 1

Example 2

Representation

Probability



# Example 2

Definitions of AI

Agents

Illustration

Example 1

▷ Example 2

Representation

Probability



# Knowledge Representation

Definitions of AI

Agents

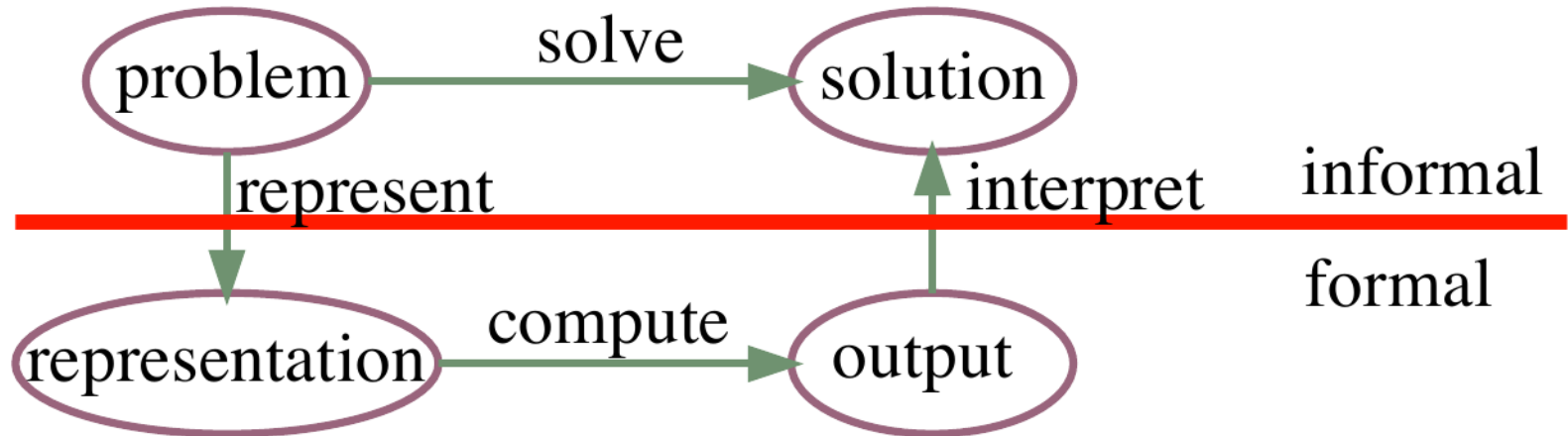
Illustration

Example 1

Example 2

▷ Representation

Probability



To solve a problem, the designer of a system must

- understand the problem and its solution
- represent the problem in a computer language
- use the computer to compute an output
- interpret the output as a solution

AI focuses on KRs that generalize for many problems.



# Probability

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Illustration

Example 1

Example 2

Representation

▷ Probability

- Agents need to act even if they are uncertain.
- Predictions are needed to decide what to do.
- Acting is gambling: agents who don't use probabilities will do worse than those who do.
- Probabilities can be obtained from prior knowledge or learned from data.