

Class 1: The Nature and History of AI

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Course Mechanics

- The “Welty Nomenclature”_h
- Everything is on the Web_w — and the site will grow
- From syllabus_h
 - texts
 - grading
 - * two exams (w/ review & pre-view)
 - * three programming projects
 - schedule
 - computing resources
 - * ACL ”Lite”
 - * LPA
 - * MCL

Intro to AI Show	Intro to AI
script	notes
show	course
host	Selmer
agent	Selim
producer	Chung Kim
sidekicks	JR9000, Ralph, Brutus
schedule	syllabus
The Network	RSVP/PDE
season	semester
viewer mail	evaluations
studio	classroom
home viewers	off-site viewers
studio audience	on-site students
survey	test
time slot	scheduled meeting time
competition	Oprah, Geraldo, ...
in makeup	playing golf or tennis

What is AI?

- The Turing Test
 - Turing's setup_p
 - the “circus” version_p
- TT in Blade Runner_v

- R&N's Matrix:

Thinking Humanly (Cog Sci)	Thinking Rationally (Idealized Logic)
Acting Humanly (Turing Test)	Acting Rationally (The Agent Approach)

- Is there really a difference between the right two boxes, given that it's possible to understand 'acting' so that 'thinking' is acting?

Classify in the matrix: AI is

1. “a collection of algorithms that are computationally tractable, adequate approximations of intractably specified problems” (Partridge, 1991)
2. “the enterprise of constructing a physical symbol system that can reliably pass the Turing Test” (Ginsberg, 1993)
3. “the field of computer science that studies how machines can be made to act intelligently” (Jackson, 1986)
4. “a field of study that encompasses computational techniques for performing tasks that apparently require intelligence when performed by humans” (Tanimoto, 1990)
5. “a very general investigation of the nature of intelligence and the princi-

ples and mechanisms required for understanding or replicating it” (Sharples *et al.*, 1989)

6. “the getting of computers to do things that seem to be intelligent” (Rowe, 1988)

More on What is AI?

- Are R&S correct that the distinction between tractable and intractable problems is more important than that between solvable and unsolvable?
- What about “Strong” versus “Weak” AI?
 - Bringsjord as rabid proponent of “Weak” AI, opponent of “Strong” AI

Attitudes

- Ripley's in *Aliens*_v
- Ours toward HAL9000_v
- Ours toward Deep Blue_w

History of AI...

- AI started at Dartmouth Conference?
Hardly: see cover of AIMA text!
- Two horses in a race?
- Should be a hybrid approach

AI Today

Can the following tasks currently be solved by computers?

1. Playing a decent game of Poker, Go, table tennis.
2. Driving in the center of Cairo.
3. Playing bridge at a competitive level.
4. Discovering and proving new mathematical theorems.
5. Writing an intentionally funny story.
6. Giving competent legal advice in a specialized area of law.
7. Translating spoken English into spoken Swedish in real time.

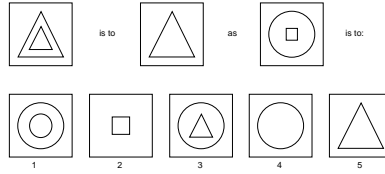


Figure 1: Example problem solved by ANALOGY.

- Suppose we extend Evans' ANALOGY program so that it can score 200 on a standard IQ test. Would we then have a program more intelligent than a human?
- Can machines today ace IQ tests? (Warwick)

The Future

1. *Robot: Mere Machine to Transcendent Mind*, by Hans Moravec
2. *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* by Ray Kurzweil
3. *When Things Start to Think* by Neil Gershenfield
4. *March of the Machines: Why the New Race of Robots Will Rule the World* by Kevin Warwick

Some Test-Cases

“Number Sense”

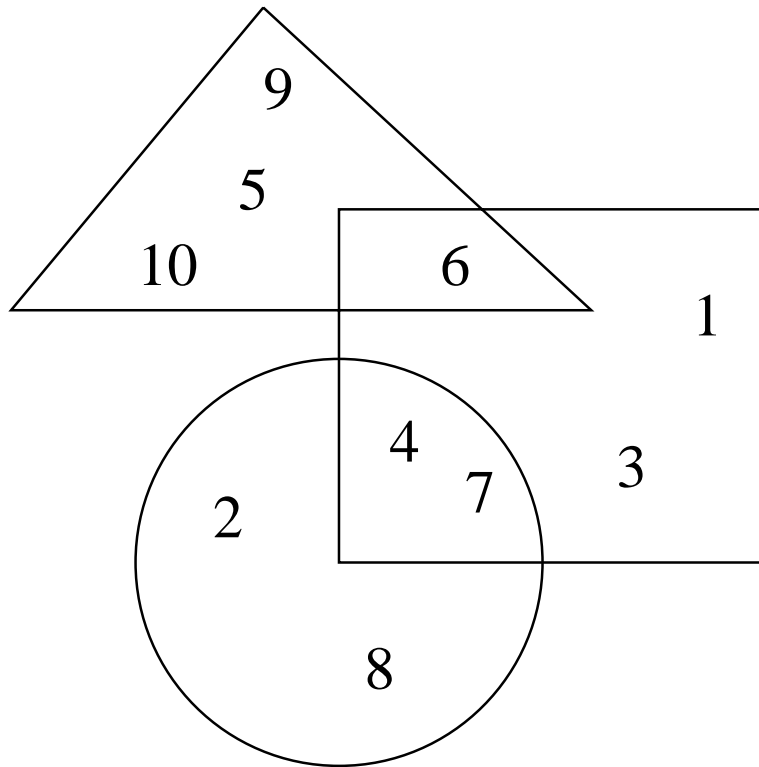


Figure 2: Secrets Problem – 3rd Grade NYS.

Q Vicky’s secret number is inside the \triangle . It is outside the \square . It is greater than 7 but less than 10. Vicky’s secret number is ...

Recall: “NYS 1”

Given the statements

$$\neg a \vee \neg b$$

$$b$$

$$c \rightarrow a$$

which one of the following statements must also be true? (Check the correct answer.)

c

$\neg b$

$\neg c$

h

a

none of the above

“NYS 2”

Which one of the following statements is logically equivalent to the following statement: “If you are not part of the solution, then you are part of the problem” (Check the correct answer.)

- If you are part of the solution, then you are not part of the problem.
- If you are not part of the problem, then you are part of the solution.
- If you are part of the problem, then you are not part of the solution.
- If you are not part of the problem, then you are not part of the solution.

“NYS 3”

Given the statements

$$\neg\neg c$$

$$c \rightarrow a$$

$$\neg a \vee b$$

$$b \rightarrow d$$

$$\neg(d \vee e)$$

which one of the following statements must also true? (Check the correct answer.)

$\neg c$

e

h

all of the above

none of the above

“WASON VAR 1”¹

Suppose that you are on an expedition with a naturalist who is studying the insects of a remote country. The naturalist tells you a rule about native insects and you need to find out if any violate the rule. The rule is:

R If an insect is a spade fly, then it is black.

¹I'm indebted to Kathryn Verzoni and Karen Swan for their stimulating paper “On the Nature and Development of Conditional Reasoning in Early Adolescence,” *Applied Cognitive Psychology* **9**: 213-234 (1995). This example comes directly from this paper.

- 1** You see an insect that is a spade fly.
Which of the following would be true
about the insect if it violates the rule?
- a** The insect is black.
 - b** The insect is green.
 - c** The color of the insect does not
matter. The insect can be any
color and still not violate the rule.

R If an insect is a spade fly, then it is
black.

2 You see an insect that is green. Which of the following would be true about the insect if it violates the rule?

a The insect is a spade fly.

b The insect is a bevel wasp.

c The color of the insect does not matter. The insect can be any type and still not violate the rule.

R If an insect is a spade fly, then it is black.

- 3** You see an insect that is a bevel wasp.
Which of the following would be true
about the insect if it violates the rule?
- a** The insect is black.
 - b** The insect is green.
 - c** The color of the insect does not
matter. The insect can be any
color and still not violate the rule.
- R** If an insect is a spade fly, then it is
black.

“The Dreadsbury Mansion Mystery”

Someone who lives in Dreadsbury Mansion killed Aunt Agatha. Agatha, the butler, and Charles live in Dreadsbury Mansion, and are the only people who live therein. A killer always hates his victim, and is never richer than his victim. Charles hates no one that Aunt Agatha hates. Agatha hates everyone except the butler. The butler hates everyone not richer than Aunt Agatha. The butler hates everyone Agatha hates. No one hates everyone. Agatha is not the butler.

Now, given the above clues, there is a bit of a disagreement between three (incompetent?) Norwegian detectives: Inspector Bjorn is sure that Charles didn't do it. Is he right? Inspector Reidar is sure that it was a suicide. Is he right? Inspector Olaf is sure that the butler, despite conventional wisdom, is innocent. Is he right?

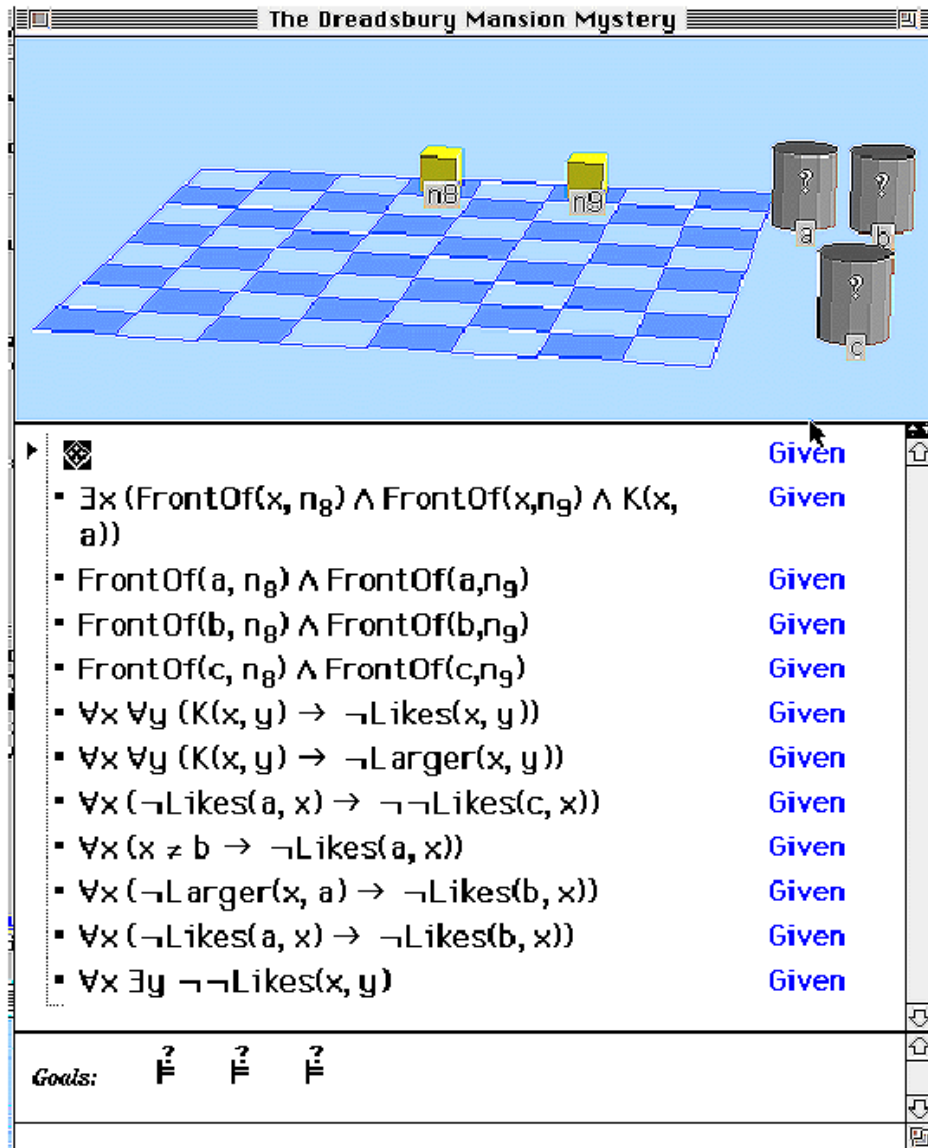


Figure 3: Start of Dreadsbury in Hyperproof.

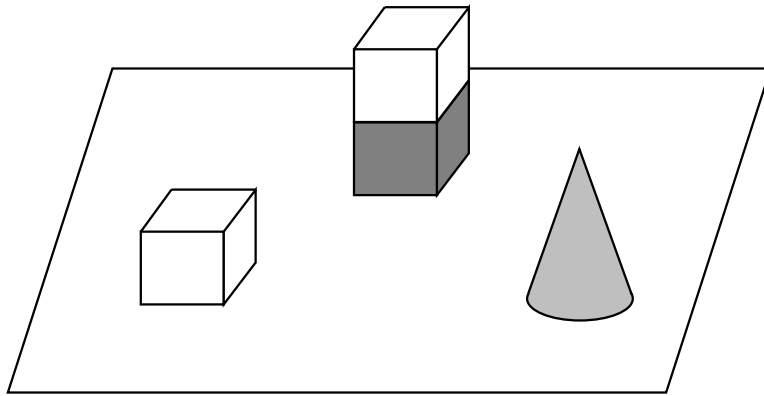


Figure 4: Situation in Blocks World (“Hyperproof”).