Introduction to CS7637

Lesson Preview

- Class goals, outcomes, and strategies
- Class projects and assessments
- Computational psychometrics
- Raven's Progressive Matrices
- Principles of CS7637

You will learn...

- Core methods of knowledge-based AI

- Tasks addressed by knowledge-based AI

- How knowledge-based AI agents use these methods to address these tasks

- The relationship between AI and human cognition

You will be able to...

- Design and implement a knowledge-based AI agent

- Use these strategies and agents to address complex, practical problems

- Use the design and results of these agents to reflect on human cognition

You will learn by...

- Learning by Example

- Learning by Doing

- Project-Based Learning

- Personalization

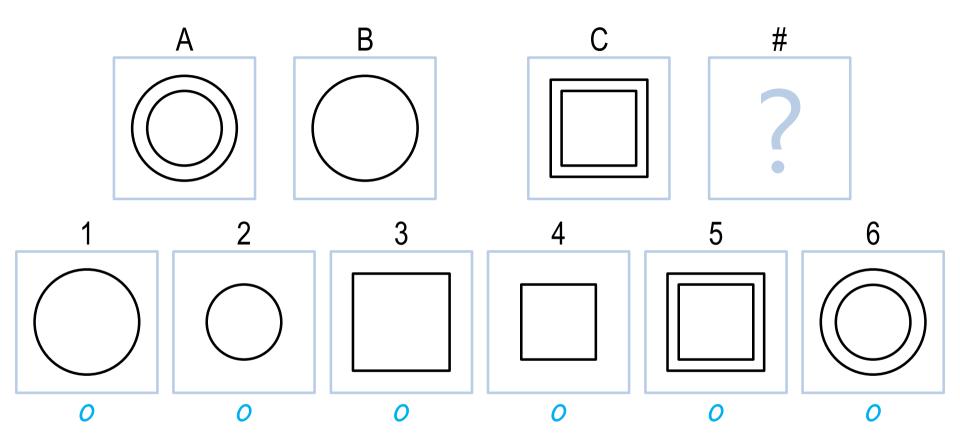- Learning by Reflection

You will complete...

- Projects

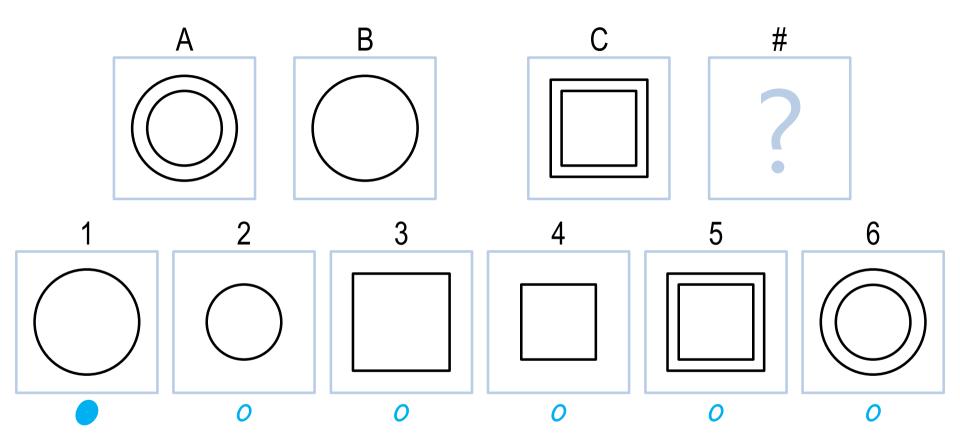- Short assignments

- Tests

- Exercises

- Discussions
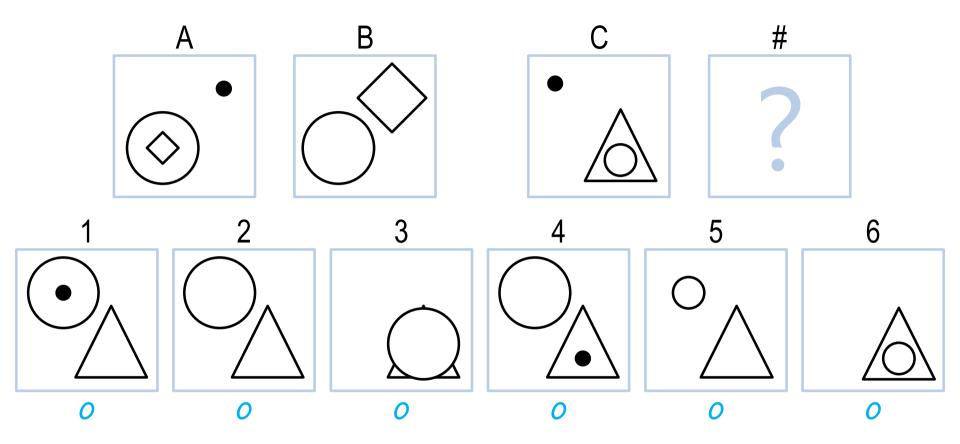
Raven's Progressive Matrices

- Test written in the 1930s to examine general intelligence.

- Consists of 60 multiple-choice visual analogy problems.

- Unique in that problems are strictly visual.
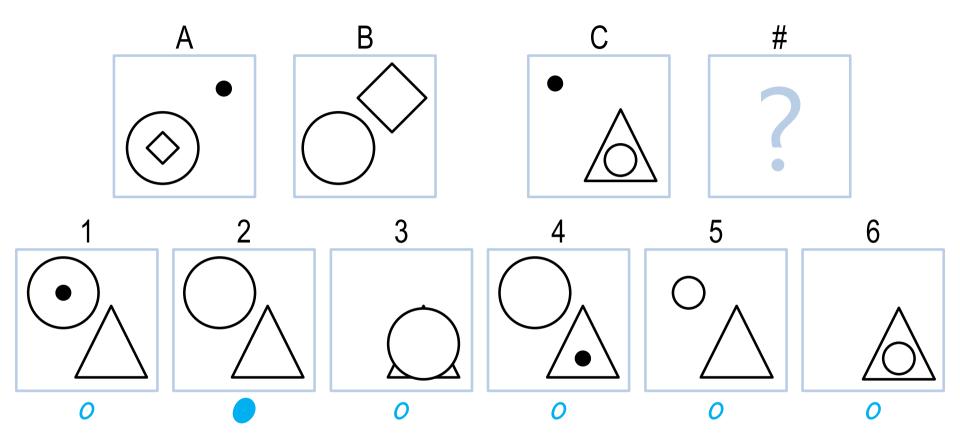
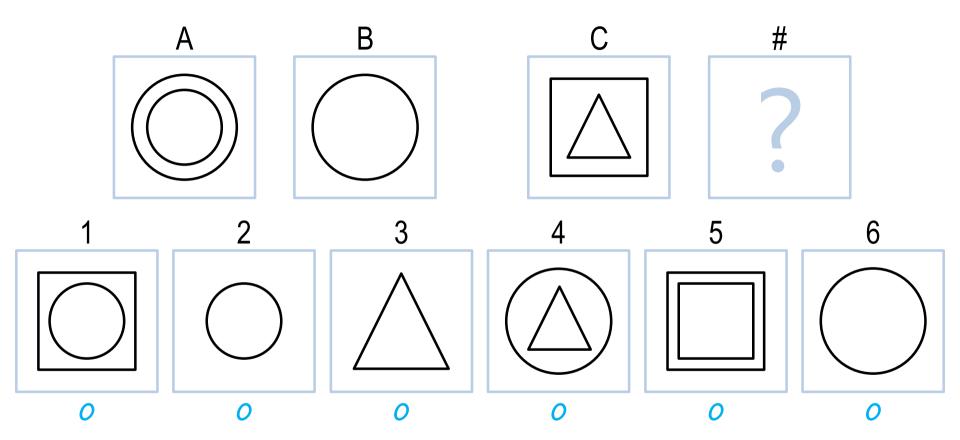- Widespread usage as a valid test for intelligence.

Problems

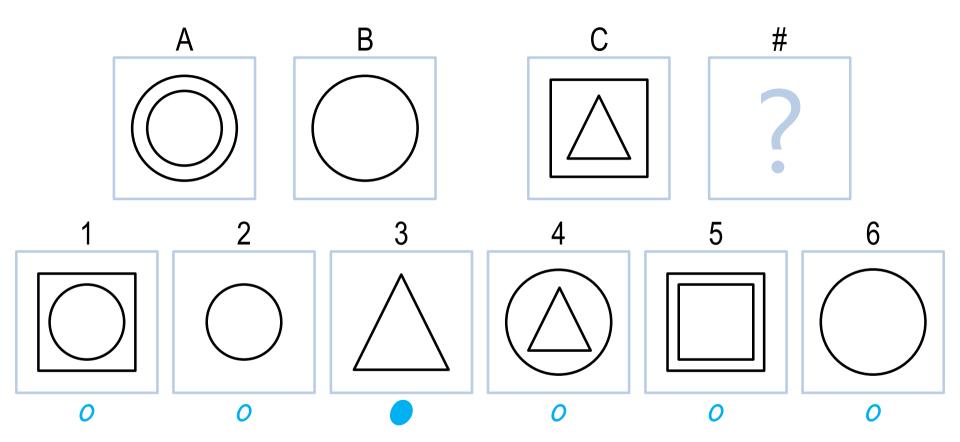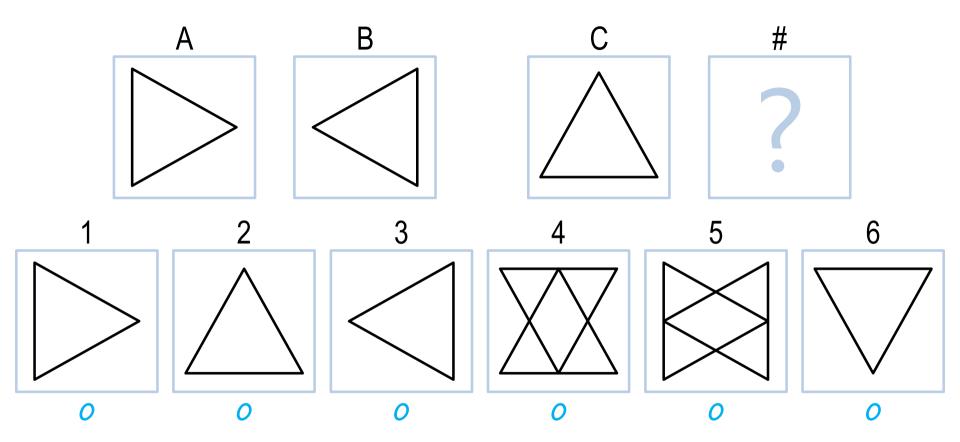- 2x2 matrix problems

- 3x3 matrix problems

- 2x1 matrix problems

A

B

C

#

?

1

2

3

4

5

6

o   *o*   *o*   *o*   *o*   *o*

A	B	C	#

?

1	2	3	4	5	6

A   B   C   #

?

1   2   3   4   5   6

A   B   C   #

?

1   2   3   4   5   6

O   O   O   O   O   O

A   B   C   #

?

1   2   3   4   5   6

A   B   C   #

?

1   2   3   4   5   6

O   O   O   O   O   O

A B C #

?

1 2 3 4 5 6

○ ○ ○ ○ ○ ●

A

B

C

1 O

2 O

3 O

4 O

5 O

6 O

A ■

B □

C ●

?

1 ○ □

2 ○ ■

3 ● ○

4 ○ ◆

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A

B

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1 O

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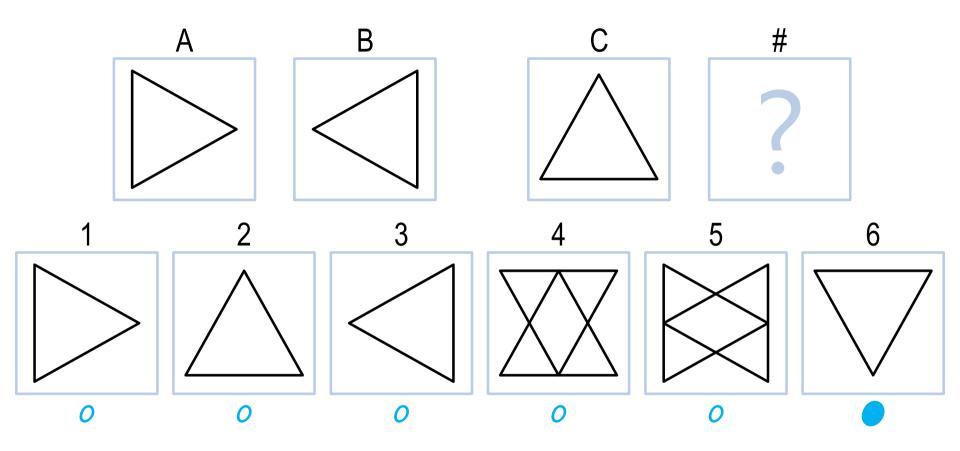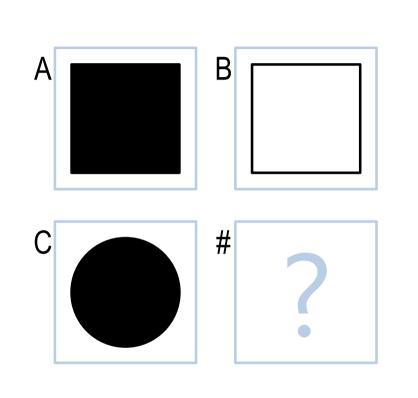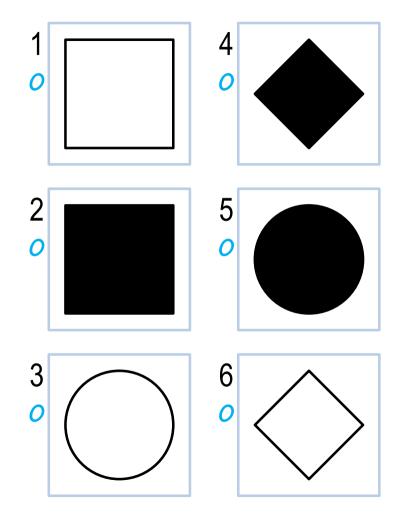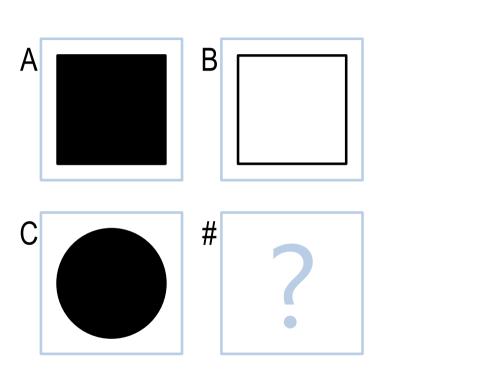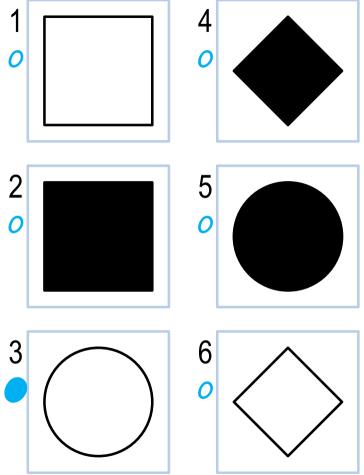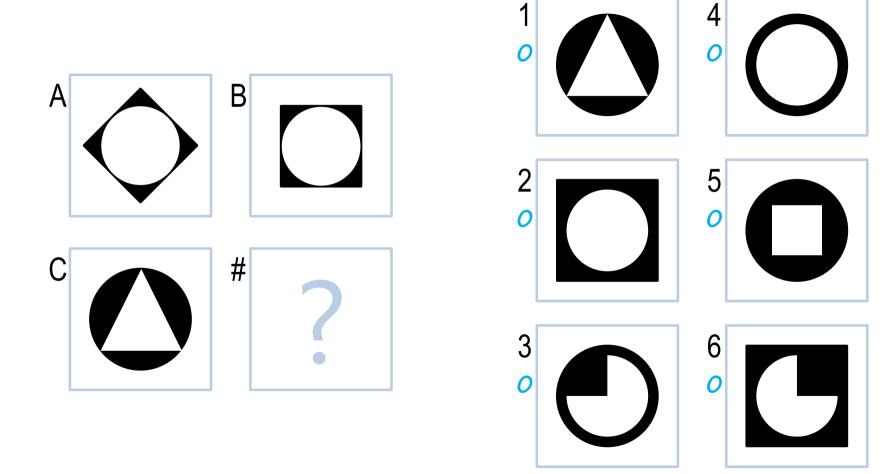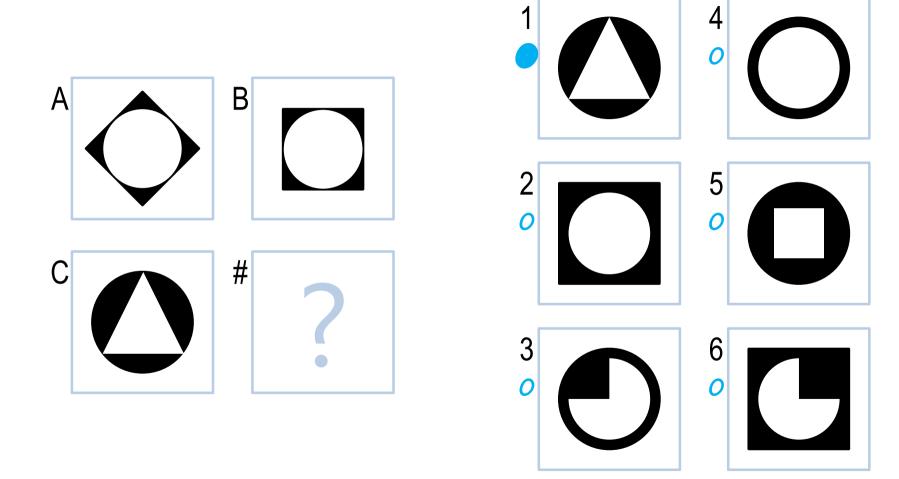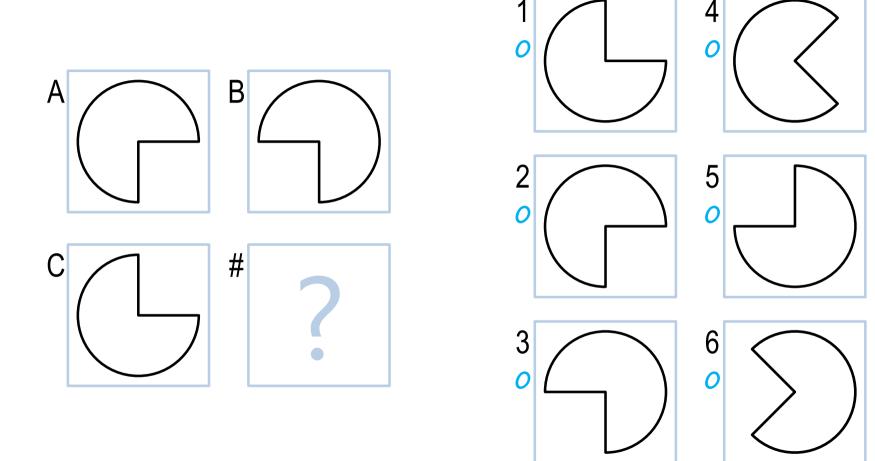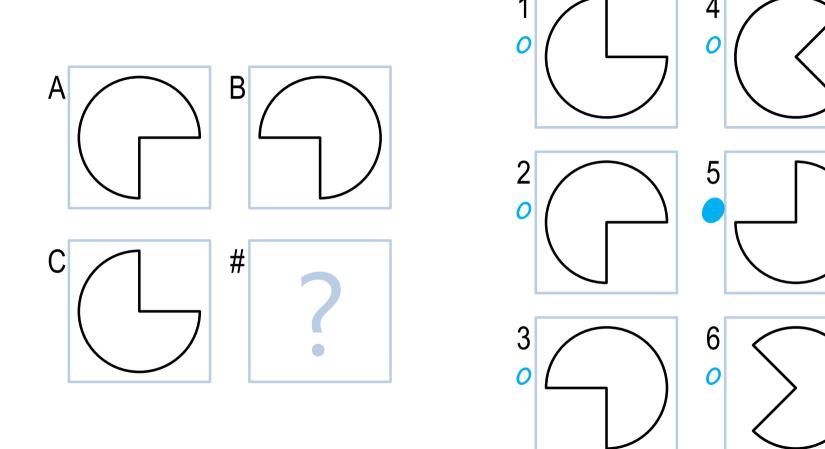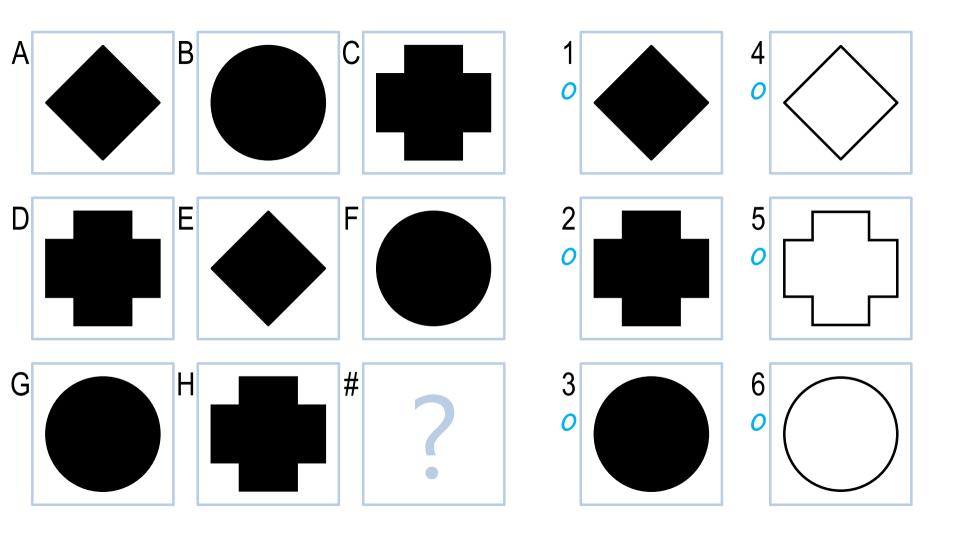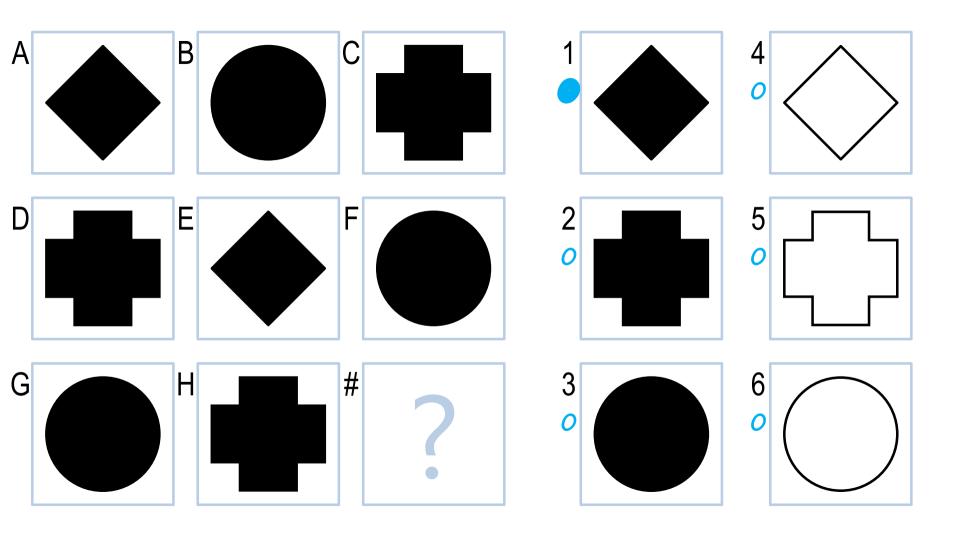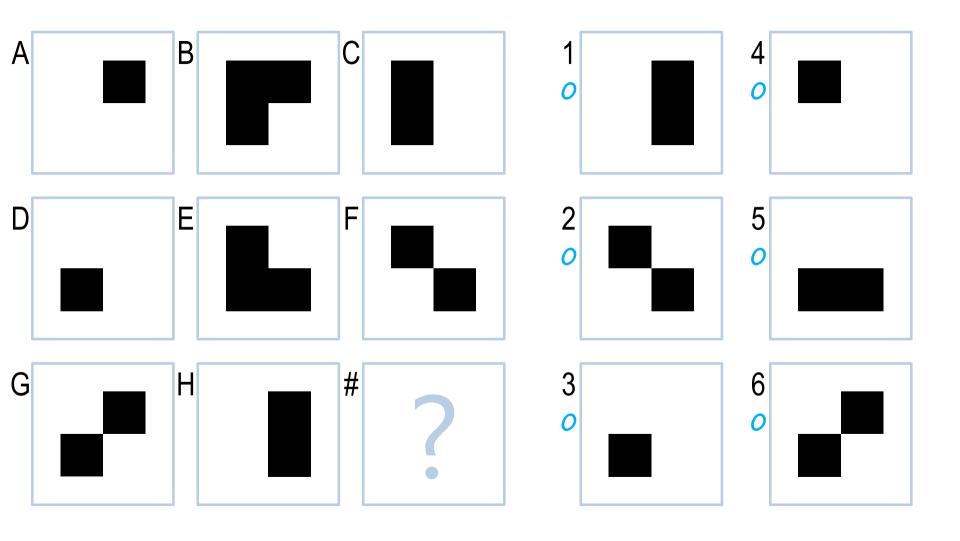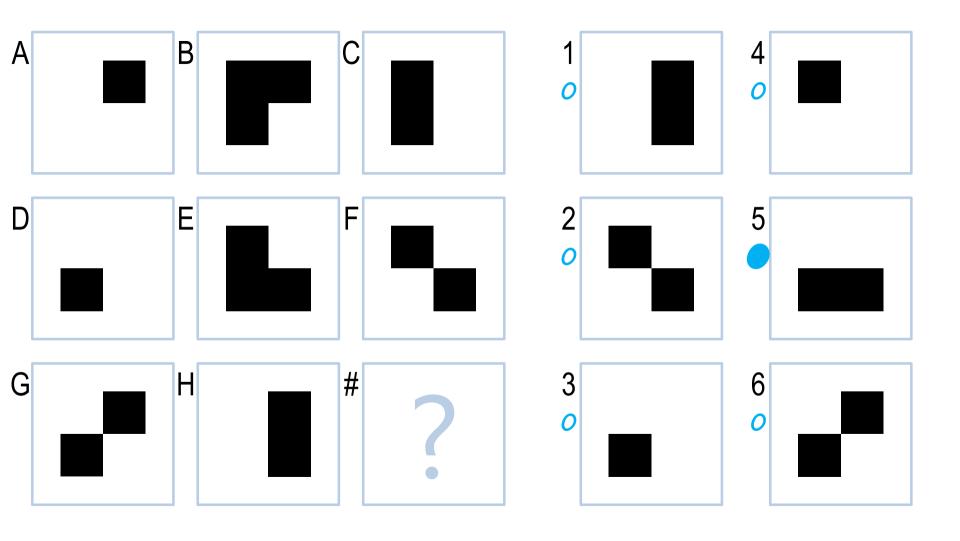
Principles of CS7637

1. KBAI agents represent and organize knowledge into knowledge structures to guide and support reasoning.

2. Learning in KBAI agents is often incremental.

3. Reasoning in KBAI agents is top-down as well as bottom-up.

4. KBAI agents match methods to tasks.

5. KBAI agents use heuristics to find solutions that are good enough, though not necessarily optimal.

6. KBAI agents make use of recurring patterns in the problems they solve.

7. The architecture of KBAI agents enables reasoning, learning, and memory to support and constrain each other.

Frequently-used readings

- Artificial Intelligence by Patrick Winston

- Knowledge Systems by Mark Stefik

- Artificial Intelligence by Elaine Rich and Kevin Knight

- Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig

To recap…

- Class goals, outcomes, and strategies

- The Project: Raven's Progressive Matrices

- Principles of CS7637