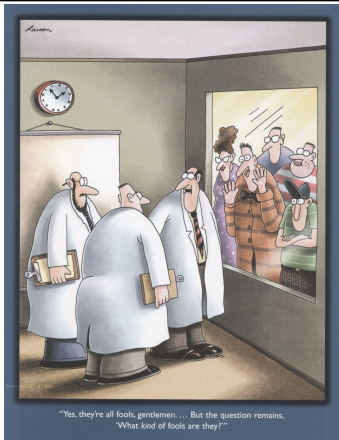


Chapter 9:
Language,
Thought,
& Intelligence

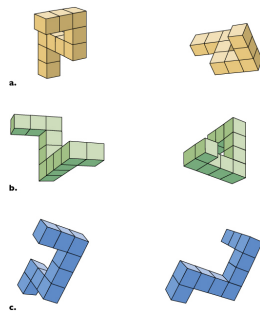


Operational Definitions

- Cognitive Psychology
 - Branch of psychology that focuses on the study of higher mental processes, including thinking, language, memory, problem solving, knowing, reasoning, judging, and decision making
- Thinking
 - Manipulation of mental representations of information

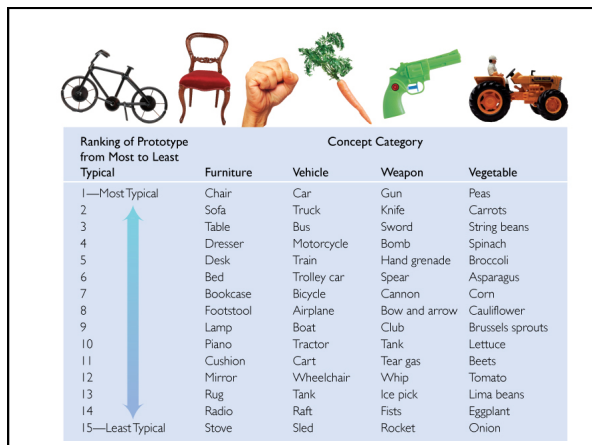
Mental Images

- Representations in the mind of an object or event
- Not just visual, but every sensory modality



Concepts: Categorizing the World

- Concepts
 - Categorizations of objects, events, or people that share common properties
- Prototypes
 - Highly representative examples of a concept
 - For example, name a vehicle



Reasoning: Making Up Your Mind

- Syllogistic Reasoning: Formal Rules of Logic
 - Kind of formal reasoning in which a person draws a conclusion from a set of assumptions
 - Example
 - Premise 1: All professors are mortal.
 - Premise 2: Professor Rivera is a professor.
 - Conclusion: Therefore, Dr. Rivera is mortal.

Reasoning: Making Up Your Mind

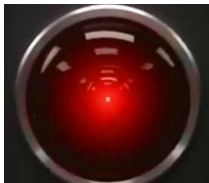
- Algorithm
 - Rule that, if applied appropriately, guarantees a solution to a problem
 - $a^2 + b^2 = c^2$

Reasoning: Making Up Your Mind

- Heuristic
 - Cognitive shortcut that may lead to a solution
 - Representativeness heuristic
 - Rule one applies when he judges people by the degree to which they represent a certain category or group of people
 - Availability heuristic
 - Judging the probability of an event on the basis of how easily the event can be recalled from memory

Computers and Problem Solving

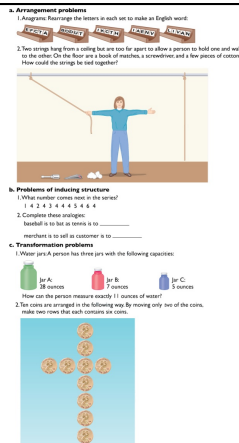
- Artificial intelligence
 - Field that examines how to use technology to imitate the outcome of human thinking, problem-solving, and creative activities



Understanding & Diagnosing Problems

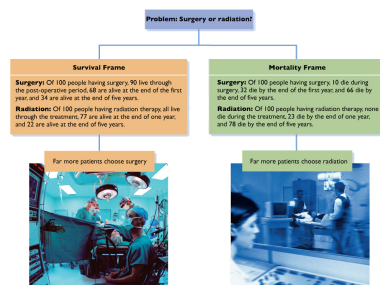
- Well-defined Problem
 - Both the nature of the problem itself and the information needed to solve it are available and clear
- Ill-defined Problem
 - Not only the specific nature of the problem is unclear, but the information required to solve the problem is less obvious

- Kinds of Problems
 - Arrangement problems
 - Problems of inducing structure
 - Transformation problems



Representing & organizing the problem

- Decisions often depends on the way a problem is phrased, or framed



Production

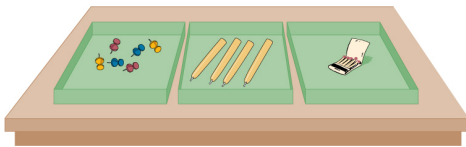
- Means-end Analysis
 - Involves repeated tests for differences between the desired outcome and what currently exists
 - Most frequently applied heuristic in problem solving
 - Can lead you astray in certain situations, though
- Water lillies grow rapidly, so that the amount of surface covered by them doubles every 24 hours. On the first day of summer, there was one water lily. On the 90th day of the summer, the lake was entirely covered. On what day was half the lake covered?

Production

- Forming subgoals
 - Dividing problems into their parts and then moving forward to solve them
- Insight
 - A sudden awareness of relationships between elements that seemed to be independent

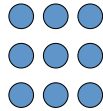
Why Is Problem Solving Such a Problem?

- Functional Fixedness
 - Tendency to think of an object only in terms of its typical use



Why Is Problem Solving Such a Problem?

- Mental Set
 - Tendency for old patterns of problem solving to persist



Connect all dots with no more than four straight lines without lifting your hand

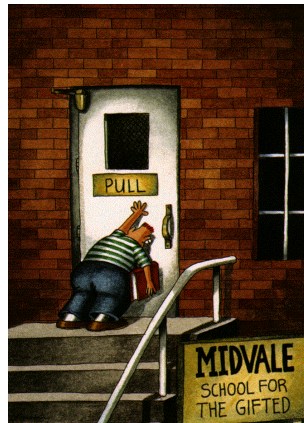
Why Is Problem Solving Such a Problem?

- Inaccurate evaluation of solutions
 - Confirmation bias
 - Problem solvers favor initial hypotheses and ignore contradictory information that supports alternative hypotheses or solutions
- Risk aversion
 - Would you rather have a....
 - 10% chance of winning?
 - 90% chance of losing?
 - People try to avoid/minimize risks and losses, to the exclusion of rational thinking

Creativity and Problem Solving

- Creativity
 - Ability to generate original ideas or solve problems in novel ways
 - Divergent thinking
 - Ability to generate unusual, yet appropriate, responses to problems or questions
 - Convergent thinking
 - Produces responses that are based primarily on knowledge and logic

Intelligence



Theories of Intelligence

- Many different theories are what intelligence actually is...and is not
- G-factor
 - General factor for mental ability
 - Was thought to underlie performance in every aspect of intelligence
 - Recent theories view intelligence as a multidimensional concept

Theories of Intelligence

- Fluid Intelligence
 - Reflects information-processing capabilities, reasoning, and memory
- Crystallized Intelligence
 - Accumulation of information, skills, and strategies that people learn through experience

Practical and Emotional Intelligence

- Practical Intelligence
 - Related to overall success in living
- Emotional Intelligence
 - Set of skills that underlie the accurate assessment, evaluation, expression, and regulation of emotions

Assessing Intelligence

- Intelligence Tests
 - Quantify and measure intelligence in an objective manner

Assessing Intelligence

- Binet and The Development of IQ tests
 - Mental age (MA)
 - Chronological age (CA)
 - Intelligence quotient (IQ)
 - Deviation IQ scores
 - Bell-shaped distribution
 - IQ score = $\frac{MA}{CA} \times 100$

Assessing Intelligence

- Contemporary IQ Tests: Gauging Intelligence
 - Achievement test
 - Designed to determine a person's level of knowledge in a specific subject area
 - Aptitude test
 - Designed to predict a person's ability in a particular area or line of work

Assessing Intelligence

- Taking the Measure of Tests
 - Reliability
 - Tests measure consistently what they are trying to measure
 - Validity
 - Tests actually measure what they are supposed to measure
 - Norms
 - Standards of test performance that permit the comparison of one person's score on a test to scores of others

Using Computers to Assess Performance

- Adaptive Testing
 - Adaptive in the sense that the computer individualizes the test to the test-taker
