Cognition and Intelligence

Chapter 8

Problem Solving

- Problems of inducing structure
- Problems of arrangement
- Problems of transformation

Problems of inducing structure

- Series completion and analogy
- O, T, T, F ???

Analogies

- BIRD : NEST ::
  A) dog : doghouse
  B) squirrel : tree
  C) beaver : dam
  D) cat : litter box
  E) book : library
- DALMATIAN : DOG ::
  A) oriole : bird
  B) horse : pony
  C) shark : great white
  D) ant : insect
  E) stock : savings
- DOCTOR : HOSPITAL ::
  A) sports fan : stadium
  B) cow : farm
  C) professor : college
  D) criminal : jail
  E) food : grocery store
- TENET : THEOLOGIAN
  A) predecessor : heir
  B) hypothesis : biologist
  C) recluse : rivalry
  D) arrogance : persecution
  E) guitarist : rock band

Problems of arrangement

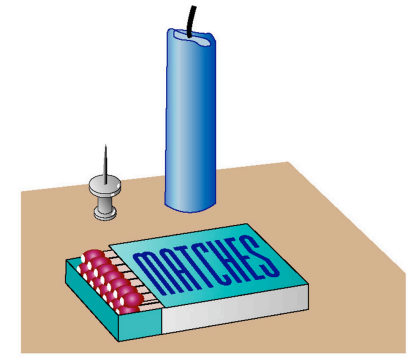
- Anagrams
- Candles and tacks
- Two string problem
- Insight

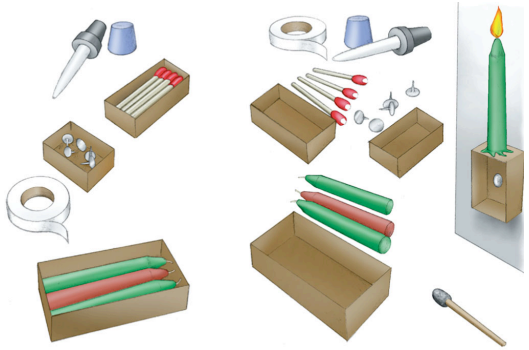
- G S R I N T
- E O S U H
- W P L O I L
- H U R T T

- Clint Eastwood: Old West Action
- slot machines: cash lost in 'em
- dormitory: dirty room
- President Clinton of the USA: To copulate he finds interns

Problems of arrangement

- Anagrams
- Candles and tacks
- Two string problem
- Insight





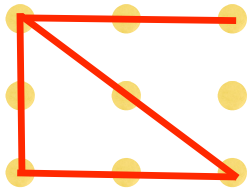
Problems of transformation

- Tower of Hanoi
- Missionaries and cannibals
- Subgoals

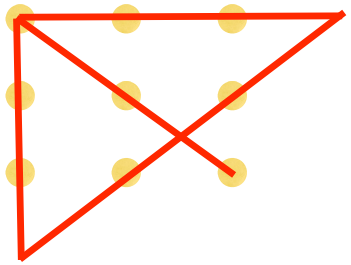
Barriers to problem solving

- Functional fixedness
- Irrelevant information
- Unnecessary constraints
- Mental Set

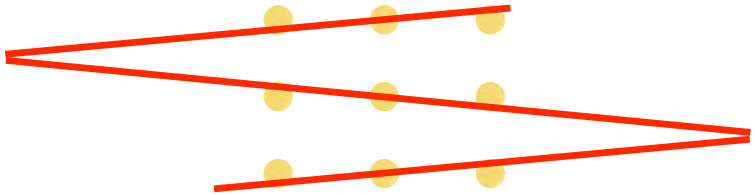
Nine dot problem



Nine dot problem



Nine dot problem



The "Three Water Jars" Problems

1. Jar A: 21 cups; Jar B: 127 cups; Jar C: 3 cups => 100 cups
2. Jar A: 10; Jar B: 79; Jar C: 4 => 61
3. Jar A: 23; Jar B: 49; Jar C: 3 => 20
4. Jar A: 18; Jar B: 48; Jar C: 4 => 22
5. Jar A: 28; Jar B: 76; Jar C: 3 => 25

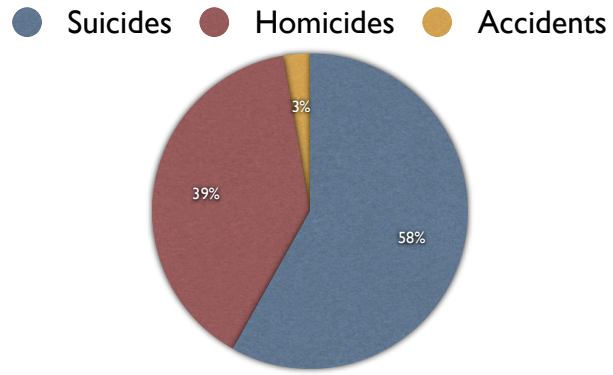
Risky Decision Making

- Expected Values
- Gamble
  - Costs $1 to play. Heads: you get $1.50, tails: nothing.
  - Expected value of $1 bet = 1/2 X $1.50 = 75¢
- Another
  - Costs $1 to play. 1 or 2, you get $3; 3, 4, 5, or 6, you get 30¢
  - EV of $1 bet = (1/3 X $3) + (2/3 X 30¢) = $1.20
- Subjective Utility

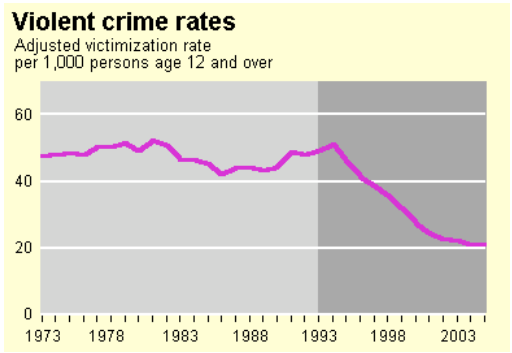
The Availability Heuristic

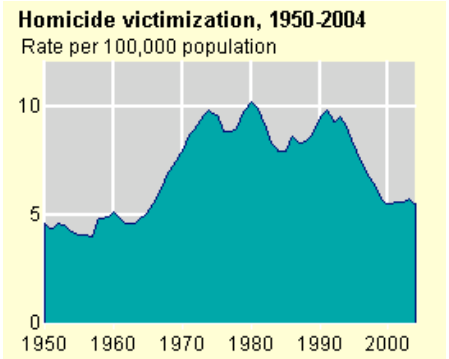
Swimming pools or guns?

Gun Deaths by Type



Crime is down!





The Representativeness Heuristic

Ignoring Base Rates

- Professor X enjoys poetry, is rather shy, and is small in stature. Which of the following is this Professor's field?

  A) Chinese studies

  B) Business

The Conjunction Fallacy

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student she was deeply concerned with issues such as discrimination and social justice, and also participated in anti-nuclear demonstrations.

Which is more likely?

1. Linda is a bank teller.
2. Linda is a bank teller and a feminist.

- How likely is the following to happen within the next 5 years: Iran attacks Israel and the US goes to war with Iran.
- How likely is the following to happen within the next 5 years: The US goes to war with Iran.

The Gambler's Fallacy

Which is more likely?

- H H H H H H
- T H H T H T

Intelligence

- Alfred Binet
- Stanford-Binet Intelligence Scale
- Intelligence Quotient
  - (Mental Age/Chronological Age) X 100

Table 8.3 Calculating the Intelligence Quotient

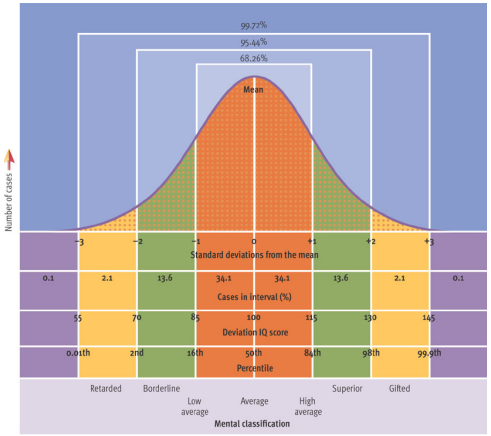
Measure	Child 1	Child 2	Child 3	Child 4
Mental age (MA)	6 years	6 years	9 years	12 years
Chronological age (CA)	6 years	9 years	12 years	9 years
$IQ = \frac{MA}{CA} \times 100$	$\frac{6}{6} \times 100 = 100$	$\frac{6}{9} \times 100 = 67$	$\frac{9}{12} \times 100 = 75$	$\frac{12}{9} \times 100 = 133$

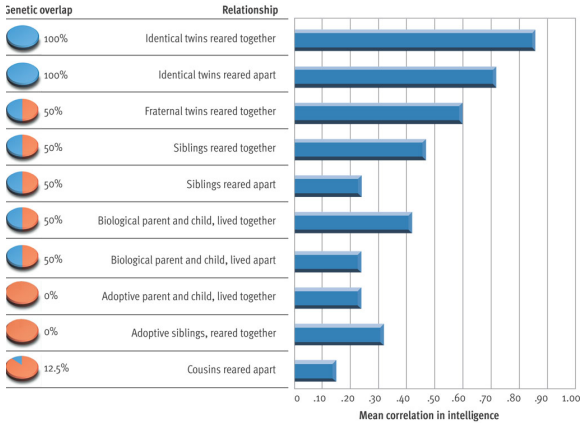
Intelligence

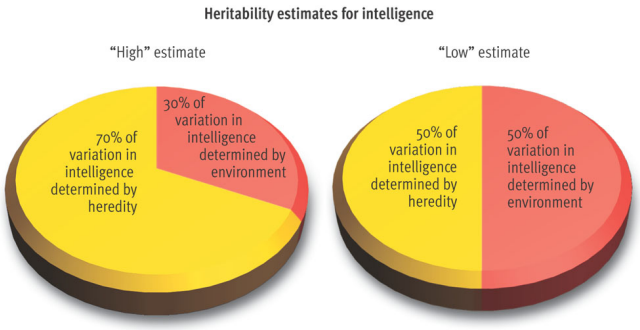
- Alfred Binet
- Stanford-Binet Intelligence Scale
- Intelligence Quotient
  - (Mental Age/Chronological Age) X 100
- David Wechsler
  - Wechsler Adult Intelligence Scale (WAIS)
  - Normal Distribution

Standard Deviation

Percentile







The Flynn Effect

- Nutrition?
- Technology?
- Education?
- Parenting?

Reaction Range