Thinking or *cognition* refers to a process that involves knowing, understanding, remembering and communicating.
Insight

Insight involves sudden novel realization of a solution to a problem. Humans and animals use insight.

- Coin problem
- Remote Associations

Problem Solving

Algorithms:

Heuristics:
Representativeness Heuristic

Judging the likelihood of things or objects in terms of how well they seem to represent, or match a particular prototype.

Availability Heuristic

*We make a judgment based on what we can remember, rather than complete data. In particular, we use this for judging frequency or likelihood of events.*

Letter “k” question
Fixation

**Fixation**: Inability to see a problem from a fresh perspective. Impediment to problem solving. Two examples are *mental set* and *functional fixedness*.

The Matchstick Problem: How would you arrange six matches to form four equilateral triangles?

---

Mental Set

A tendency to approach a problem in a particular way especially a way that has been successful in the past.

- A number puzzle
- Dot Problem
- Orc’s and Hobbits
Functional Fixedness
A tendency to think only of the familiar functions for objects.

Intelligence
Modules 31-33
What is Intelligence?

Intelligence

- capacity for goal-directed and adaptive behavior
- involves certain abilities
  - ✗
  - ✗
  - ✗
  - ✗

What is Intelligence?

- IQ is
  - ✗

- Is intelligence singular or multiple abilities?
Theories of Intelligence

- Spearman vs. Thurstone
  - "g" or multiple components??

- Sternberg’s Triarchic Theory
  -
  -
  -

Are There Multiple Intelligences?

- Factor Analysis
  - statistical procedure
  - used to identify

- General Intelligence (g)
  -
  -
Theories of Intelligence

- Gardner’s Multiple Intelligences
  - Talent v. Intelligence??

Origins of Intelligence

- Intelligence Test
  - a method of assessing an individual’s mental aptitudes and comparing them to those of others, using numerical scores
Origins of Intelligence Testing

- Mental Age

Origins of IQ

- Intelligence Quotient (IQ)
  - defined originally as
    - IQ = ma/ca x 100
    - on contemporary tests
Assessing Intelligence

- Standardization

- Normal Curve

The Normal Curve

<table>
<thead>
<tr>
<th>Number of scores</th>
<th>Wechsler intelligence score</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>2%</td>
</tr>
<tr>
<td>70</td>
<td>14%</td>
</tr>
<tr>
<td>85</td>
<td>34%</td>
</tr>
<tr>
<td>100</td>
<td>34%</td>
</tr>
<tr>
<td>115</td>
<td>14%</td>
</tr>
<tr>
<td>130</td>
<td>2%</td>
</tr>
<tr>
<td>145</td>
<td>0.1%</td>
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</table>

Ninety-five percent of all people fall within 30 points of 100

Sixty-eight percent of people score within 15 points above or below 100
Assessing Intelligence

- Stanford-Binet
  - revised by Lois Terman at Stanford University

Assessing Intelligence

- Wechsler Adult Intelligence Scale (WAIS)
  - most widely used intelligence test
  - subtests
    - verbal
    - performance (nonverbal)
Assessing Intelligence - Sample Items from the WAIS

**VERBAL**
- General Information
- Similarities
- Arithmetic Reasoning
- Vocabulary
- Comprehension
- Digit Span

**PERFORMANCE**
- Picture Completion
- Picture Arrangement
- Block Design
- Object Assembly
- Digit-Symbol Substitution

From Thorndike and Hagen, 1977

Getting Smarter? The Flynn Effect

![IQ scores graph](image)

- Intelligence test performance has been rising
Assessing Intelligence

- **Reliability**
  - assessed by consistency of scores on:
    - “split-half”:
    - “alternate forms”:
    - “test-retest”:

- **Validity**
  - Content Validity
  - Concurrent Validity
Assessing Intelligence

- Predictive Validity

The Dynamics of Intelligence

- Mental Retardation
Genetic Influences

Similarity of intelligence scores (correlation)

- Identical twins reared together
- Identical twins reared apart
- Fraternal twins reared together
- Siblings reared together
- Unrelated individuals reared together

Heritability
Genetic Influences

<table>
<thead>
<tr>
<th>Child-parent correlation in verbal ability scores</th>
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</thead>
<tbody>
<tr>
<td>3 years</td>
</tr>
<tr>
<td>16 years</td>
</tr>
<tr>
<td>0.35</td>
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<tr>
<td>0.30</td>
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<td>0.15</td>
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<tr>
<td>0.10</td>
</tr>
<tr>
<td>0.05</td>
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<tr>
<td>0.00</td>
</tr>
</tbody>
</table>

- Children and their birth parents
- Adopted children and their birth parents
- Adopted children and their adoptive parents

**Group differences and environmental impact**

- Variation within group
- Difference within group
- Variation within group

- Poor soil
- Seeds
- Fertile soil