Chapter 9
Category Hierarchies
We organize concepts into category hierarchies.

Development of Concepts
We form some concepts with definitions. For example, a triangle has three sides. Mostly, we form concepts with mental images or typical examples (prototypes). For example, a robin is a prototype of a bird, but a penguin is not.

Problem Solving
Problem solving strategies include:
- Algorithms
- Heuristics
- Insight

Problem solving strategies include:
Algorithms
Algorithms, which are very time consuming, exhaust all possibilities before arriving at a solution. Computers use algorithms.

Heuristics
Heuristics are simple, thinking strategies that allow us to make judgments and solve problems efficiently. Heuristics are less time consuming, but more error-prone than algorithms.

Obstacles in Solving Problems
Confirmation Bias: A tendency to search for information that confirms a personal bias.

Fixation
Fixation: An inability to see a problem from a fresh perspective. This impedes problem solving. An example of fixation is functional fixedness.

The Matchstick Problem: Solution
Making Decision & Forming Judgments
Each day we make hundreds of judgments and decisions based on our intuition, seldom using systematic reasoning.

The Effects of Framing
Decisions and judgments may be significantly affected depending upon how an issue is framed.

The Belief Perseverance Phenomenon
Belief perseverance is the tendency to cling to our beliefs in the face of contrary evidence.

Perils & Powers of Intuition
Intuition may be perilous if unchecked, but may also be extremely efficient and adaptive.

When do we learn language?
Babbling Stage: Beginning at 4 months, the infant spontaneously utters various sounds, like *ah-goo*. Babbling is not imitation of adult speech.

When do we learn language?
One-Word Stage: Beginning at or around his first birthday, a child starts to speak one word at a time and is able to make family members understand him. The word *doggy* may mean *look at the dog out there*.

When do we learn language?
Two-Word Stage: Before the 2nd year, a child starts to speak in two-word sentences. This form of speech is called telegraphic speech because the child speaks like a telegram: “Go car,” means *I would like to go for a ride in the car*.

Explaining Language Development
1. Operant Learning: Skinner (1957, 1985) believed that language development may be explained on the basis of learning principles such as association, imitation, and reinforcement.

Explaining Language Development
Inborn Universal Grammar: Chomsky (1959, 1987) opposed Skinner’s ideas and suggested that the rate of language acquisition is so fast that it cannot be explained through learning principles, and thus most of it is inborn.

Explaining Language Development
Childhood is a critical period for fully developing certain aspects of language. Children never exposed to any language (spoken or signed) by about age 7 gradually lose their ability to master any language.
Language Influences Thinking
Linguistic Determinism: Whorf (1956) suggested that language determines the way we think. For example, he noted that the Hopi people do not have the past tense for verbs. Therefore, the Hopi cannot think readily about the past.

Language Influences Thinking
When a language provides words for objects or events, we can think about these objects more clearly and remember them. It is easier to think about two colors with two different names (A) than colors with the same name (B) (Özgen, 2004).

Thinking in Images
To a large extent thinking is language-based. When alone, we may talk to ourselves. However, we also think in images.

Images and Brain
Imagining a physical activity activates the same brain regions as when actually performing the activity.

Language and Thinking
Traffic runs both ways between language and thinking.

Animal Thinking & Language
Do animals have a language?

Do Animals Think?
Insight
Problem Solving
Animal Culture

Do Animals Exhibit Language?
There is no doubt that animals communicate.

Vervet monkeys, whales and even honey bees communicate with members of their species and other species.

Sign Language
American Sign Language (ASL) is instrumental in teaching chimpanzees a form of communication.

The Case of Apes
Gardner and Gardner (1969) used American Sign Language (ASL) to train Washoe, a chimp, who learned 181 signs by the age of 32.

Gestured Communication
Animals, like humans, exhibit communication through gestures. It is possible that vocal speech developed from gestures during the course of evolution.
But Can Apes Really Talk?
1. Apes acquire their limited vocabularies with a great deal of difficulty, unlike children who develop vocabularies at amazing rates.
2. Chimpanzees can make signs to receive a reward, just as a pigeon who pecks at the key receives a reward. However, pigeons have not learned a language.
3. Chimpanzees use signs meaningfully but lack human syntax.
4. Presented with ambiguous information, people tend to see what they want to see (perceptual set).

Intelligence: Ability or Abilities? Have you ever thought that since people’s mental abilities are so diverse, it may not be justifiable to label those abilities with only one word, intelligence?

General Intelligence
The idea that general intelligence (g) exists comes from the work of Charles Spearman (1863-1945) who helped develop the factor analysis approach in statistics.

General Intelligence
Spearman proposed that general intelligence (g) is linked to many clusters that can be analyzed by factor analysis.

Contemporary Intelligence Theories
Howard Gardner (1983, 1999) supports the idea that intelligence comes in multiple forms. Gardner notes that brain damage may diminish one type of ability but not others.

Emotional Intelligence
Emotional intelligence is the ability to perceive, understand, and use emotions (Salovey and others, 2005). The test of emotional intelligence measures overall emotional intelligence and its four components.

Emotional Intelligence: Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
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<tbody>
<tr>
<td>Perceive emotion</td>
<td>Recognize emotions in faces, music and stories</td>
</tr>
<tr>
<td>Understand emotion</td>
<td>Predict emotions, how they change and blend</td>
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<tr>
<td>Manage emotion</td>
<td>Express emotions in different situations</td>
</tr>
<tr>
<td>Use emotion</td>
<td>Utilize emotions to adapt or be creative</td>
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</tbody>
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Alfred Binet
Alfred Binet and his colleague Théodore Simon practiced a more modern form of intelligence testing by developing questions that would predict children’s future progress in the Paris school system.

Lewis Terman
Formula of Intelligence Quotient (IQ), introduced by William Stern:

Principles of Test Construction
For a psychological test to be acceptable it must fulfill the following three criteria:
Standardization
Reliability
Validity

Standardization
Standardizing a test involves administering the test to a representative sample of future test takers in order to establish a basis for meaningful comparison

Normal Curve
Standardized tests establish a normal distribution of scores on a tested population in a bell-shaped pattern called the normal curve.

Reliability
A test is reliable when it yields consistent results. To establish reliability researchers establish different procedures:
1. Split-half Reliability: Dividing the test into two equal halves and assessing how consistent the scores are.
2. Test-Retest Reliability: Using the same test on two occasions to measure consistency.

Validity
Reliability of a test does not ensure validity. Validity of a test refers to what the test is supposed to measure.

Extremes of Intelligence
A valid intelligence test divides two groups of people into two extremes: the mentally retarded (IQ 70) and individuals with high intelligence (IQ 135). These two groups are significantly different.

High Intelligence
Contrary to popular belief, people with high intelligence test scores tend to be healthy, well adjusted, and unusually successful academically.

Mental Retardation
Mentally retarded individuals required constant supervision a few decades ago, but with a supportive family environment and special education they can now care for themselves.
Flynn Effect: A Mystery
In the past 60 years, intelligence scores have risen steadily by an average of 27 points. This phenomenon is known as the Flynn effect.

Genetic and Environmental Influences on Intelligence
No other topic in psychology is so passionately followed as the one that asks the question, “Is intelligence due to genetics or environment?”

Genetic Influences
Studies of twins, family members, and adopted children together support the idea that there is a significant genetic contribution to intelligence.

Adoption Studies
Adopted children show a marginal correlation in verbal ability to their adoptive parents. More correlation with birth parents as the children age.

Heritability
The variation in intelligence test scores attributable to genetics. We credit heredity with 50% of the variation in intelligence. It pertains only to why people differ from one another, not to the individual.

Early Intervention Effects
Early neglect from caregivers leads children to develop a lack of personal control over the environment, and it impoverishes their intelligence.

Environmental Influences on Intelligence:
Early neglect
Poor Nourishment in childhood
Impoverished (non-stimulating) environment
In utero terratagins
Drug/alcohol abuse or accident

This is a list of ?:
• German measles
• X-rays, other radiation, toxic chemicals
• Sexually transmitted diseases
• Metabolic effects of cigarette smoking
• Alcohol
• Drugs
• Malnutrition
--answer:
-- can negatively affect prenatal development

Schooling Effects
Schooling is an experience that pays dividends, which is reflected in intelligence scores. Increased schooling correlates with higher intelligence scores.
Environmental Effects
Differences in intelligence among these groups are largely environmental, as if one environment is more fertile in developing these abilities than the other.

1. Ethnic Similarities and Differences  Racial groups differ in their average intelligence scores.
2. High-scoring people (and groups) are more likely to attain high levels of education and income.

The Question of Bias
Aptitude tests are necessarily biased in the sense that they are sensitive to performance differences caused by cultural differences.

Gender Similarities and Differences
There are seven ways in which males and females differ in various abilities.

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<tbody>
<tr>
<td>1.</td>
<td>Girls are better spellers</td>
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<tr>
<td>2.</td>
<td>Girls are verbally fluent and have large vocabularies</td>
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<tr>
<td>3.</td>
<td>Girls are better at locating objects</td>
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<tr>
<td>4.</td>
<td>Girls are more sensitive to touch, taste, and color</td>
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<td>5.</td>
<td>Boys outnumber girls in counts of underachievement</td>
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<td>6.</td>
<td>Boys outperform girls at math problem solving, but under perform at math computation</td>
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<td>7.</td>
<td>Women detect emotions more easily than men do</td>
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