Thinking and Language

Chapter 9

Unit 7 ~ Part 2

AP Psychology ~ Ms. Justice
BIG IDEAS

Thinking
- Concepts, Solving Problems, Making Decisions and Forming Judgments

Language
- Language Structure, Language Development, the Brain and Language

Thinking and Language
- Language Influences Thinking, Thinking in Images

Animal Thinking and Language
- What Do Animals Think? Do Animals Exhibit Language? The Case of the Apes
Thinking, or cognition, refers to a process that involves knowing, understanding, remembering, and communicating.
Cognitive Psychologists

Thinking involves a number of mental activities, which are listed below. Cognitive psychologists study these in great detail.

1. Concepts
2. Problem solving
3. Decision making
4. Judgment formation
1: What are the functions of concepts?
The mental grouping of similar objects, events, ideas, or people.

There are a variety of chairs but their common features define the concept of a chair.
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.
2: What strategies assist our problem solving, and what obstacles hinder it?
Problem Solving

Problem solving strategies include:

1. Trial and Error
2. Algorithms
3. Heuristics
4. Insight
Algorithms

Algorithms are methodical, logical rules or procedures for problem solving. They are very time consuming and exhaust all possibilities before arriving at a solution.

S P L O Y O C H Y G

If we were to unscramble these letters to form a word using an algorithmic approach, we would face 907,200 possibilities.
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.
Heuristics

Heuristics make it easier for us to use simple principles to arrive at solutions to problems.

SPLOYOCHYG

Put a Y at the end, and see if the word begins to make sense.
Insight

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

Grande using boxes to obtain food
Insight

Brain imaging and EEG studies suggest that when an insight strikes (the “A-ha” experience), it activates the right temporal cortex. The time between not knowing the solution and realizing it is about 0.3 seconds.
Obstacles in Solving Problems

Confirmation Bias: A tendency to search for information that confirms a personal bias.

2 – 4 – 6

Rule: Any ascending series of numbers. 1 – 2 – 3 would comply. Wason’s students had difficulty figuring out the rule due to a confirmation bias (Wason, 1960).
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: How would you arrange six matches to form four equilateral triangles?
The Matchstick Problem: Solution
Candle-Mounting Problem

Using these materials, how would you mount the candle on a bulletin board?
Candle-Mounting Problem: Solution
3: How do heuristics, overconfidence, and belief perseverance influence our decisions and judgments?
Using and Misusing Heuristics

Two kinds of heuristics, **representative heuristics** and **availability heuristics**, have been identified by cognitive psychologists.

Amos Tversky

Daniel Kahneman
Representative Heuristic

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

If you meet a slim, short, man who wears glasses and likes poetry, what do you think his profession would be?

An Ivy league professor or a truck driver?
Availability Heuristic

Estimating the likelihood of events based on their availability in memory; if instances come readily to mind, we presume such events are common.

If statistical reality is pitted against a single vivid case, the memorable case often wins.
Overconfidence

Intuitive heuristics, confirmation of beliefs, and the inclination to explain failures increase our overconfidence. Overconfidence is a tendency to overestimate the accuracy of our beliefs and judgments.

In the stock market, both the seller and the buyer may be confident about their decisions on a stock.
Exaggerated Fear

The opposite of having overconfidence is having an exaggerated fear about what may happen. Such fears may be unfounded.

The 9/11 attacks led to a decline in air travel due to fear.
4: How do smart thinkers use intuition?
Intuition - an effortless, immediate, automatic feeling or thought – can feed our gut fears and prejudices.

Intuitive reactions can also enable us to react quickly and often adaptively.
5: What is framing?
The Effects of Framing

The way an issue is posed can significantly affect decisions and judgments.

Example: What is the best way to market ground beef — as 25% fat or 75% lean?
The Belief Perseverance Phenomenon

Belief perseverance is the tendency to cling to our beliefs in the face of contrary evidence.
6: What are the structural components of a language?
Language

Language, our spoken, written, or gestured work, is the way we communicate meaning to ourselves and others.

Language transmits culture.
The Building Blocks of Language

• **Phonemes** – a basic set of sounds
• **Morpheme** – the smallest unit that carries meaning (most are combinations of two or more phonemes)
• **Grammar** – a system of rules that enable us to communicate with and understand others; includes semantics and syntax
7: What are the milestones in language development?
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.*
When do we learn language?

*Longer phrases:* After telegraphic speech, children begin uttering longer phrases (*Mommy get ball*) with syntactical sense, and by early elementary school they are employing humor:

You never starve in the desert because of all the sand-which-is there.
When do we learn language?

<table>
<thead>
<tr>
<th>Month (approximate)</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Babbles many speech sounds.</td>
</tr>
<tr>
<td>10</td>
<td>Babbling resembles household language.</td>
</tr>
<tr>
<td>12</td>
<td>One-word stage.</td>
</tr>
<tr>
<td>24</td>
<td>Two-word, telegraphic speech.</td>
</tr>
<tr>
<td>24+</td>
<td>Language develops rapidly into complete sentences.</td>
</tr>
</tbody>
</table>

Table 9.2, p. 386
8: How do we learn language?
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.

   *Babies learn to talk in much the same way that animals learn to peck keys and press bars.*
Explaining Language Development

2. **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.
Critical Period

Learning new languages gets harder with age.

The older the age at immigration, the poorer the mastery of a second language.
9: What brain areas are involved in language processing?
Genes, Brain, & Language

Figure 9.10, p. 389
10: What is the relationship between language and thinking?
Thinking & Language

Language and thinking intricately intertwine.
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.

We don’t think in words, when:

1. When we open the hot water tap.
2. When we are riding our bicycle.
11: What do we know about animal thinking? Do other animals share our capacity for language?
Animal Thinking & Language

Do animals have a language?

Honey bees communicate by dancing. The dance moves clearly indicate the direction of the nectar.
Do Animals Think?

Common cognitive skills in humans and apes include the following:

1. Concept Formation
2. Insight
3. Problem Solving
4. Culture

African grey parrot sorts red blocks from green balls.
Insight

Chimpanzees show insightful behavior when solving problems.

Sultan uses sticks to get food.
Problem Solving

Apes are, much like us, shaped by reinforcement when solving problems.

Chimpanzee fishing for ants.

Courtesy of Jennifer Byrne, c/o Richard Byrne, Department of Psychology, University of St. Andrews, Scotland
Animal Culture

Animals display customs and culture that are learned and transmitted over generations.

Dolphins using sponges as forging tools.

Chimpanzee mother using and teaching a young how to use a stone hammer.
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.

Rico (collie) has a 200-word vocabulary.
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).

Pages 398-400
Sign Language

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

When asked, this chimpanzee uses a sign to say it is a baby.
Syntax Comprehension

Others have shown that pygmy chimpanzees can develop even greater vocabularies and perhaps semantic nuances in learning a language (Savage-Rumbaugh, 1993). Kanzi (shown below) developed vocabulary for hundreds of words and phrases.
Conclusions

If we say that animals can use meaningful sequences of signs to communicate a capability for language, our understanding would be naive… Steven Pinker (1995) concludes, “chimps do not develop language.”