Chapter 7 – **Thinking, Language, and Intelligence**

Thinking is the mental representation and manipulation of information.

Cognitive psychology- focus is on mental processes as thinking, and problem solving.
Mental Images

- Mental Image is a mental picture or representation of an object or event. It is not an actual or photographic representation of an object, it is a ______________ of the object or event from memory.

- CONCEPTS: Are mental categories for ______________ events, objects, and ideas on the basis of their common features or properties. Having concepts, helps us develop a sense of order in the world and allows us to distinguish threatening from harmless stimuli.
Types of Concepts

- Concepts have been classified in two general categories, logical and natural.
- Logical concepts are those that have clearly defined rules for determining membership.
- Natural concepts are those with poorly defined or fuzzy rules for membership, e.g., furniture, fruit, abstractions etc.
Hierarchies of Concepts

- Researchers say that people order their concepts within hierarchies of broad to narrow categories. One commonly used hierarchy has three levels of concepts: **superordinate, basic-level, and subordinate concepts**. Superordinate concepts are broad categories, e.g., vehicle, animal, and furniture. Within these categories are **basic-level concepts**, such as car, dog, an chair and within these categories are **subordinate concepts** which are even more specific, such as SUV, greyhound, sofa. People are more likely to use basic-level concepts when identifying objects; calling an object a car rather than a vehicle.
Refining Concepts

- Positive instance – Is when an object fits a particular concept, e.g., a Pit Bull is a positive instance of dog.
- Negative instance – Is when an object that does not fit a particular concept, e.g., a Blue Jay is a negative instance of dog but a positive instance of bird.
Problem Solving Strategies

- Problem solving is a cognitive process in which we employ mental strategies to solve problems.
- Algorithms is a step-by-step set of rules that will always lead to a correct solution to a problem. What’s the algorithm for getting an “A” in this class?
- Heuristics is a rule of thumb for solving problems or making judgments or decisions. Heuristics do not guarantee a solution, but they may help you arrive at one more quickly. *Backward-working heuristic*, we start with a possible solution and then work backward to see if the data support the solution.
- **Means-end heuristic** is when you evaluate the current situation and compare it to the end result you want to achieve. You then develop a step-by-step procedure to reduce the distance between the two.

- Subgoals heuristic involves breaking the problem down into smaller, more manageable problems.

- Analogies in solving a problem is using a strategy based on using similarities between the properties of two things or applying solutions to past problems to the problem at hand.
Incubation Periods is a respite from active problem-solving efforts, which may facilitate a solution. It is assumed that the passage of time helps the person develop a fresh perspective on the problem, which may lead to a sudden realization of the solution.
Mental Roadblocks/Impediments to Problem Solving - What are they?

- Mental set – Is the tendency to rely on strategies that worked in similar situations in the past but that may not be appropriate to the present situation, e.g., The Nine-Dot Problem.

- Functional fixedness – Is the inability to see how familiar objects can be used in new ways.

Have the class give an example of this.
Impediments in Decision Making

- Decision Making is a form of problem solving in which you must select a course of action from among the available ______________.
- Researchers say that underlying biases in thinking often hamper our ability to make rational choices. An example is the confirmation bias which is the tendency to stick to an initial hypothesis even in the face of strong evidence that is inconsistent with it. The confirmation bias leads us to place greater weight on information confirming our prior beliefs and expectations than on contradictory evidence.
Representativeness heuristic is when you assume that a given sample is representative of a larger population.

Availability heuristic is the tendency to base decisions on information that readily comes to mind. Example: You avoid roller coaster, because a very close friend dies while riding on one.

Framing is the tendency for decisions to be influenced by how potential outcomes are phrased/ framed.
Creativity

- Creativity is thinking in ways that lead to original, practical, and meaningful solutions to problems or that generate new ideas.
- Divergent thinking is the ability to conceive of new ways of viewing situations and new uses for familiar objects.
- Convergent thinking is the attempt to narrow down a range of alternatives to converge on the one correct answer to a problem.
- Metaphor is a figure of speech for likening one object or concept to another.
Conceptual combinations refer to combinations of two or more concepts into one concept, resulting in the creation of a novel idea or application.

Conceptual expansion is the expansion of familiar concepts into new uses.
Language

- Language is a system of communication composed of symbols (words, hand signs, etc.) that are arranged according to a set of rules (grammar) to form meaningful expressions.
- Phonemes are the basic units of sound in a language.
- Morphemes are the smallest units of meaning in a language.
- Syntax refers to the rules of grammar that determine how words are ordered within sentences or phrases to form meaningful expressions.
- Semantics refers to the set of rules governing the meaning of words.
- Language acquisition device is Noam Chomsky’s concept of an innate, prewired mechanism in the brain that allows children to acquire language naturally. We acquire the ability to speak, much as we do the ability to walk and jump, because we have an *inborn propensity to develop it*. 
Culture and Language

- *Linguistic relativity hypothesis* is the proposition that the language we use determines how we think and how we perceive the world (Whorfian hypothesis). Now researchers are saying that the culture in which we are raised, and the language we use, are important influences on how we think and how we perceive the world.
Is Language Unique to Humans?

- The question of whether apes can use language depends on how broadly we define language. If our definition hinges on the ability to communicate through the use of symbols, then we can say that apes can indeed use language. However, if our definition hinges on the use of complex syntax and grammatical structures, then the ability to use language may be unique to humans. According to Noam Chomsky, trying to teach animals to use language is as irrational as trying to teach people to flap their arms and fly.
Intelligence is the ability to adapt to the environment. It is the global capacity of the individual to act purposefully, to think rationally, and to deal effectively with the environment.

Sir Francis Galton is well known as an early proponent of the genetic basis of intelligence.

Eugenics is an attempt to improve the human genetic stock by encouraging breeding among intellectually superior people.

Mental age is a representation of a person’s intelligence based on the age of people who are capable of performing at the same level of ability.
Intelligence Quotient

- Intelligence quotient is a measure of intelligence based on performance on tests of mental abilities, expressed as a ratio between one’s mental age and chronological age or derived from the deviation of one’s scores from the norms for those of one’s age group. IQ = MA
  CA
Norms are the standards used to compare an individual’s performance on a test with the performance of others.

Standardization is the process of establishing norms for a test by administering the test to large numbers of people who constitute a standardization sample.

Reliability is the stability of test scores over time.

Validity refers to the degree to which a test measures what it purports to measure.
Predictive validity refers to the degree to which test scores accurately predict future behavior or performance.

Culture-fair tests are tests designed to eliminate cultural biases. * It may be impossible to develop a purely culture-free IQ test because the skills that define intelligence depend on the values of the culture in which the test is developed.
- Mental retardation is a generalized deficit or impairment in intellectual and social skills. Three conditions must exist before a person is diagnosed with mental retardation: 1) The IQ is 70 or below, 2) they have very poor adaptive/social skills and 3) the onset of these problems occurred before they were 18 y.o.
- Mainstreaming is the practice of placing children with special needs in a regular classroom environment.
Theories of Intelligence

- Charles Spearman’s “g” – Spearman believed that intelligence involved general cognitive abilities he called “g”. However, he believed that mental tests also measured specific abilities, therefore, a person’s performance is a function of both “g” and a specific factor, or “s”.

- Louis Thurstone’s Primary Mental Abilities argued that there are seven basic mental abilities that constitute intelligence: verbal comprehension, numerical ability, memory, inductive reasoning, perceptual speed, verbal fluency, and spatial relations.
Gardner’s Model of Multiple Intelligences

- Howard Gardner’s Model of Multiple Intelligences rejects the view that there is a single entity called “intelligence.” Rather, he believes there exist different types of intelligence, called multiple intelligences, that vary from person to person. He identifies eight different intelligences: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist.
Sternberg’s Triarchic Theory of Intelligence

- Robert Sternberg’s theory of intelligence posits that there are three aspects of intelligence: analytic, creative, and practical.
- Analytic intelligence refers to intelligence measured by traditional intelligence tests. You have the skills to evaluate familiar problems, break them down into their component parts, and develop strategies to solve it.
- Creative Intelligence allows you to invent new ways of solving unfamiliar problems.
- Practical Intelligence is the ability to apply what is known to everyday problems. Sternberg believed that we need all three types of intelligence to succeed in life.
Overview of Theories of Intelligence

1) It is clear that human intelligence consists of multiple abilities, and maybe multiple intelligences. 2) The cultural context in which intelligent behavior occurs needs to be considered, and 3) the abilities a society values determine how it defines and measures intelligence. Our society places a high value on verbal, mathematical, and spatial skills.
Heritability of a trait is the degree to which genetic factors (heredity) account for variations on a given trait within a population.