Problem Solving and Language

Notes 7.2, 7.3, 7.9, 7.10
Problem Solving

• Problem solving: occurs when a goal must be reached by thinking and behaving in certain ways

• Decision making: identifying, evaluating, and choosing between alternatives
Problem Solving

• Trial and error (mechanical solution): problem-solving method in which one possible solution after another is tried until a successful one is found

• Algorithms: very specific, step-by-step procedures for solving certain types of problems
  – will always result in a correct solution if one exists to be found
    • e.g., mathematical formulas
Problem Solving

• Heuristic: educated guess based on prior experiences that helps narrow down the possible solutions for a problem; also known as a “rule of thumb”
  – representative heuristic: assumption that any object (or person) sharing characteristics with the members of a particular category is also a member of that category
Problem Solving

• Heuristics (cont’d)
  – availability heuristic: estimating the frequency or likelihood of an event based on how easy it is to recall relevant information from memory or how easy it is to think of related examples
  – working backward from the goal is a useful heuristic
  – break a goal down into subgoals, so that as each subgoal is achieved, the final solution is that much closer
Problem Solving

• Insight: sudden perception of a solution to a problem
  – Köhler’s work with Sultan
  – “aha!” moment
  – problem may be recognized as similar to another previously solved, for example
Problem-Solving Barriers

- Functional fixedness: a block to problem solving that comes from thinking about objects only in terms of their typical functions
- Mental set: the tendency for people to persist in using problem-solving patterns that have worked for them in the past
Problem-Solving Barriers

• Confirmation bias: the tendency to search for evidence that fits one’s beliefs while ignoring any evidence that does not fit those beliefs
Creativity

• Creativity: the process of solving problems by combining ideas or behavior in new ways
  – convergent thinking: a problem is seen as having only one answer, and all lines of thinking will eventually lead to (converge on) that single answer, using previous knowledge and logic
  – divergent thinking: a person starts from one point and comes up with many different ideas or possibilities based on that point (a kind of creativity)
Language

- Language: a system for combining symbols (such as words) so that an unlimited number of meaningful statements can be made for the purpose of communicating with others
Elements and Structure of Language

• Grammar: the system of rules governing the structure and use of a language
  – Noam Chomsky
• Phonemes: the basic units of sound in a language
• Morphemes: the smallest units of meaning within a language
Elements and Structure of Language

• Syntax: the system of rules for combining words and phrases to form grammatically correct sentences

• Semantics: rules for determining the meaning of words and sentences

• Pragmatics: aspects of language involving the practical ways of communicating with others, or the social niceties of language
Language and Cognition

- Piaget: concepts precede language
- Vygotsky: language helps develop concepts
- Linguistic relativity hypothesis: the theory that thought processes and concepts are controlled by language
  - Sapir & Whorf
- Cognitive universalism: theory that concepts are universal and influence the development of language
Animal Studies in Language

• Studies have been somewhat successful in demonstrating that animals can develop a basic kind of language, including some abstract ideas.

• Controversy exists over the lack of evidence that animals can learn syntax, which some feel means that animals are not truly learning and using language.