# 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.