

Chapter 10:

Summary:

1. Thinking, the manipulation of information, occurs for a wide range of what appear to be very different tasks. Psychologists draw distinctions among types of problems (for example, between well-defined and ill-defined ones) and among types of thinking (for example, focused versus unfocused). It is not yet clear, however, whether the cognitive processes used for different tasks are themselves really different in kind. An alternative possibility is that what look like different kinds of thinking really stem from different combinations of the same cognitive processes.
2. Some psychologists studying problem solving have discovered general strategies (for example, generate-and-test, means-ends analysis, reasoning by analogy) that they believe people use in a wide variety of situations and have explored different blocks to problem solving (mental set, functional fixedness, incorrect or incomplete problem representations).
3. Other psychologists argue for the importance of domain-specific knowledge and strategies as a better predictor of whether a given person will have success solving a given problem. These investigators point out that problem-solving strategies often vary with the expertise, or background knowledge, of the problem solver.
4. Psychologists studying creativity differ over whether there is one general creativity, independent of domain, or whether creativity, like expertise, is specific to a domain. Some argue for special-purpose creative cognitive processes, such as incubation and unconscious processing; others believe that creativity makes use of everyday, ordinary cognitive processes such as directed remembering and contrary recognition.
5. There are a variety of types of reasoning. Deductive reasoning involves conclusions that are logically necessary, or valid. Examples include propositional or syllogistic reasoning. Inductive reasoning can lead only to conclusions that possess some degree of inductive strength. Examples here include analogies and hypothesis testing.
6. Formal reasoning includes tasks in which all the premises are supplied and the problems are self-contained; they usually have one correct, unambiguous answer and often contain content of limited interest. Everyday reasoning tasks often involve implicit premises, are typically not self-contained, and are often of personal relevance.
7. Theoretical approaches to the study of reasoning vary and depend heavily on whether reasoning is considered a separate process from other kinds of mental activity. Those who consider reasoning to be very distinct focus on self-contained problems, often emphasizing special-purpose rules of inference as the mechanism for drawing conclusions. Others see reasoning as an extension of other aspects of mental life, such as language comprehension or thinking. In this view, the way to understand reasoning is not to search for special purpose cognitive processes or rules but to examining general aspects of mental performance – why people fail to consider enough of the relevant evidence or to imagine enough of the possibilities.
8. The prefrontal cortex has been implicated as playing a very important role in a person's ability to integrate relations – that is, to build a mental representation that incorporates multiple propositions or relationships.

Key Terms:

Believability effects: People are likely to judge as valid any conclusion that reinforces their initial assumptions, regardless of whether the conclusion follows from the premises.

Content Effect: Two people reasoning with exactly the same kind of premises will perform differently, depending on what the premises are about.

Confirmation Bias: When you assume what you think is true and continue to see if it is true, rather than try and prove it wrong.

Contradiction: When a proposition is false regardless of the truth value of the premises.

Creativity: Appropriate novelty, originality that suits some purpose.

Deductive reasoning: Goes from the general to the specific/particular. No new information is added

Deductive validity: Is said to have deductive validity iff it is impossible for the premises to be true and the conclusion or conclusions to be false.

Fallacy: Rules that turn out to be not valid. Denying the antecedent ($p \rightarrow q$, if not p , then not q) OR Affirming the consequent (p implies q , if q , then p)

Functional fixedness: when a person has adopted a rigid mental set towards an object.

Generate-and-test-technique: consists of generating possible solutions and then testing them.

Ill-defined problem: don't have goals, starting information or steps clearly spelled out as well-defined problems.

Incubation: Putting away a problem and working on it unconsciously

Inductive reasoning: Goes from the specific to the general. Can follow arguments to provide conclusions with new information.

Inductive strength: When inductive logic has begun with true premises and followed acceptable principles.

Introspection: Is the detailed, concurrent and non-judgemental observation of the contents of your consciousness as you work on a problem.

Logical-connectedness: And, Or implies etc connectives used to connect propositions.

Means-ends analysis: Involves comparing the goal with the starting point and thinking possible ways of overcoming the difference and choosing the best one.

Mental models approach: The processes we use to draw conclusions are also the ones we use to comprehend language. Construct mental models to depict the premises. Effective reasoning occurs when the reasoner checks to be sure his or her first idea of what the conclusion might be is assessed by an attempt to construct alternative models consistent with the premises but inconsistent with the hypothesized conclusion.

Mental set: the tendency to adopt a certain framework, strategy or procedure – or more generally to see things in a certain way instead of in other equally plausible ways.

Perceptual set: The tendency to perceive an object or pattern in a certain way on the basis of your immediate perceptual experience.

Permission Schema: Rule 1: If the action is to be taken, then the precondition must be satisfied. Rule 2: If the action is not to be taken, then the precondition need not be satisfied. Rule 3: If the precondition is satisfied, then the action may be taken. Rule 4: If the precondition is not satisfied, then the action must not be taken.

Premise: A statement about something. (Kind of a hypothesis)

Problem solving: Solving a problem.

Propositional reasoning: involves drawing conclusions from the premises that are in the form of propositions. (A proposition is thought of as an assertion).

Reasoning by analogy: using knowledge from one relatively known domain and applying it to another domain.

Rules approach: An analogy between mental logic and grammars. Systems of rules to which we have only implicit access. So you can't be expected to state all the rules you follow to draw conclusions, you may not even know you follow rules.

Syllogistic reasoning: When a problem presents two or more premises and asks the reasoner to either draw a conclusion or to evaluate a conclusion that the problem supplies to see if the conclusion must be true whenever the premises are true.

Tautology: When a proposition is true regardless of the truthness of the premises.

Thinking: "going beyond the information given"

Truth table: A TABLE OF TRUTH (and some false)

Unconscious processing: When you put aside a problem and work on it unconsciously.

Well-defined problem: have a clear goal, present a small set of information to start from and often (but not always) present a set of rules or guidelines to abide by while you are working towards a solution.

Working backward: analyze the goal to determine the last step needed to achieve it, then the next-to-last step and so on.

Chapter 11:

Summary:

1. Decision making requires setting goals; gathering information; organizing combining and evaluating information; and making a final selection.
2. Because real-life decisions are often made under conditions of uncertainty, many decisions require some sort of probability estimates, even if only vague and intuitive ones. Research reviewed in the chapter suggests that people's understanding of concepts relating to probability

theory is often vague or weak, especially for probabilities that are not exactly equal to either .00 or 1.00.

3. Because the process can be so complex, it is perhaps not surprising that decision making can go wrong or be suboptimal in a number of ways. People's intuitions about uncertainty and probability their activities to acquire or remember relevant information and the process they use to integrate different pieces of relevant information and the processes they use to integrate different pieces of information can easily be shown to be error prone. You can think of at least some biases and errors in decision making as cognitive illusions: They arise for understandable reasons and may actually be quite useful in some circumstances. For example, using availability to estimate the relative frequency of something may work perfectly well as long as you can be sure that examples have been collected in an unbiased fashion.
4. The existence of framing effects suggests that the way people evaluate options often is inappropriately coloured by the way they describe (or "frame") those options. If the description frames the status quo in a positive light, then people see changes as more risky and shy away from those options; the converse is true if the status quo is defined in more negative terms.
5. One of the most general biases that people typically exhibit is overconfidence in their own judgement. Several demonstrations make the point that people often feel much more sure of their thinking and their predictions for the future than is justified (on the basis of their track records, for instance). Overconfidence can also play a role in more specific biases, such as hindsight bias and illusory correlation. In general, overconfidence can prevent people from critically examining their own thinking or from admitting of possibilities other than their favoured one.
6. Some normative models of decision making purport to show how people should make decisions under ideal circumstances (e.g. expected utility theory). Other descriptive models describe how people actually make decisions. One such model, image theory, places more emphasis on the initial phases of decision making, the screening of options rather than on the later stages of decision making, in which one option is selected. Recognition-primed decisions making, a model developed from studies of experts, suggests that much of the work of decision making is done when an expert "sizes up" a decision situation.
7. The field of neuroeconomics has recently emerged as a discipline that examines how emotions and cognition jointly contribute to real-life decisions.
8. Decision analysis is a collection of technique to help people consider all relevant options and trade offs, can improve the quality of decision making.

Key Terms:

Anchoring: Their initial starting point will have a huge effect on their final estimates.

Availability Heuristic: Assessing the ease with which the relevant mental operation of retrieval, construction or association can be carried out.

Bias: Ways of thinking that lead to systematic errors.

Calibration Curve: Confidence vs accuracy. The closer to 45 degrees the better the calibration between confidence and accuracy/

Cognitive Illusions: meant to invoke the analogy to perceptual illusions: errors of cognition that come about for understandable reasons and that provide information relevant to understanding normal functioning.

Cognitive Overload: When the information available overwhelms the cognitive processing available.

Confirmation Bias: To search only for information that will confirm one's initial hypothesis.

Decision Analysis: is an emerging technology that helps people gather and integrate information by using human judges' feelings, beliefs and judgements of relevance but helps ensure that integration of information is carried out in an unbiased way.

Decision Structuring:

Descriptive model of decision making: simply detail what people actually do when they make decisions. These are not necessarily endorsements of good ways of thinking, rather, they describe actual performance.

Expected utility theory: if you always choose so as to maximize expected utility, then over a sufficiently large number of decisions, your own satisfaction will be highest.

Framing effect: People evaluate outcomes as changes from a reference point, their current state. Depending on how their current state is described, they perceive certain outcomes as gains or losses.

Gambler's fallacy: Assuming something will happen because it has not happened before, ie rolling a dice 5 times coming out to 1, 2, 3, 4, 5 you might think that 6 is more likely since it has not occurred, this is wrong thinking.

Heuristic: Rules of thumbs that help making judgements easier.

Hindsight bias: the tendency to consistently exaggerate what could have been anticipated in foresight when looking back on an event.

Illusory correlation: When we see a non-existent relationship.

Image theory: The fundamental assumption of this theory is that in making real-life decisions, people rarely go through a formal structuring process in which they lay out all their options and criteria and then weigh and integrate various pieces of information as EU models predict. Instead, most of decision-making work is done during a phase typically winnow the number of options under active consideration to a small number, sometimes one or two. They use the value image (the decision maker's values), the trajectory image (goals and aspirations) and the strategic image (how the decisions maker plans to attain their goals).

Neuroeconomics: a field that examines how the brain interacts with the environment to enable us to make complex decisions.

Normative model of decision making: define ideal performance under ideal circumstances.

Overconfidence: Derivations from the calibration curve when confidence ratings are higher than expected.

Prescriptive model of decision making: tell us how we ought to make decisions. They take into account the fact that circumstances in which decisions are made are rarely ideal and they provide guidance about how to do the best we can.

Probability: can generally be thought of as a measurement of a degree of uncertainty.

Rationality: Rational decision making “has to do with selecting ways of thinking and acting to serve your ends or goals as moral imperatives, whatever they may be, as well as the environment permits.”

Recognition-primed decision making: decision making based on intuition, mental simulation, making metaphors and analogies and recalling or creating stories.

Representativeness Heuristic: When people expect the results to be representative of the process that generated them.

Subjective probability: probabilities influenced by characteristics of the probability estimator, and objective probabilities, which are not.

Sunk cost effect: The greater tendency to continue an endeavor once an investment in money, effort or time has been made.

Ultimatum game: One person is given \$10, you can make an offer to another person, that person either accepts or rejects the offer. If they accept you take the offer, if they reject then you both get nothing.

Utility: the ideas of happiness, pleasure and the satisfaction that comes from achieving one or more personal goals. Expected utility = summation over i of (probability of i th outcome \times value of the i th outcome)

Chapter 12:

1. Cognition may not always operate the same way for all people. Potential sources of variation in the way people approach the cognitive tasks in their lives include individual differences in cognitive abilities, expertise, bilingualism, as well as age and gender.
2. Individuals apparently differ in their cognitive abilities, especially in such things as mental speed, storage capacity, and attention span. Some psychologists equate these cognitive abilities with intelligence. Other cognitive psychologists do not make this equation but see cognitive abilities as a part of intelligence. Still other psychologists reject the idea that there is one single thing called intelligence.
3. People’s expertise can affect the ways in which they approach a cognitive task within their domain of expertise. Experts perceive more distinctions and categorize information differently from the way novices do. Experts can use their domain-related knowledge to chunk information so as to use their memories more effectively.
4. Bilingual children and lifelong bilingual adults who use both languages in their daily lives show an advantage on tasks involving attentional control.
5. Age-related deficits in cognition are found on tests of episodic memory and on short-term or working memory tasks in which information must be re-ordered or manipulated online. Despite declines in these sorts of memory functions, semantic memory, vocabulary levels, and general world knowledge remain intact, and continue to increase over the lifespan.

6. Neuroimaging studies show striking differences in how the brains of young and old achieve performance on cognitive tasks. Older adults show more bilateral brain activation in the frontal lobes, and less activation in occipital lobes; these differences are interpreted as reflecting a heavier reliance on top-down attentional control processes in older adults, to compensate for deficits in bottom-up processing.
7. The common finding is that women outperform men on tasks involving receptive and productive language, and on high-level verbal tasks such as analogies, comprehension of prose, and episodic memory tasks, whereas men outperform women on tasks assessing visuospatial ability. One variable that can modify the strength of the female advantage on verbal tests is the levels of ovarian hormones in circulation, which fluctuate with the menstrual cycle. Gender differences in visuospatial task performance have been shown to vary as a function of children's socioeconomic status.
8. Another reason for gender differences may have to do with the neurological differences in male and female brains. Females tend to have cerebral hemispheres that are less lateralized, or specialized in function, than are the cerebral hemispheres of males.

Key Terms:

Age differences: different memory for lists of words in which the context for the words were initially experienced.

Bilingual: Can speak multiple languages, they have a boost in functions that generalize across tasks.

Cognitive Neuroscience of aging: Understanding the relationship between the aging brain and behavioral measures of cognitive performance.

Effect size (d): d defined as the difference in mean scores between two groups, divided by the average standard deviation for the two groups.

Environmental Support: External aids, category headings to help structure the support through memory to get the correct response.

Gender Differences: See summary for gender differences effect on cognition

Individual Differences: Stable patterns of performance that differ qualitatively and or quantitatively across individuals.

Intelligence: Cognitive abilities.

Meta Analysis: Combining results from different studies.

Multiple Intelligences (MI) theory: Linguistic, logical mathematical, musical, bodily-kinesthetic, spatial, interpersonal, intrapersonal, naturalist, existential. The idea that we have lots of different kinds of intelligences.

Neurological differences: Gender differences may be because of neurological differences in male and female brains. Females tend to have cerebral hemispheres that are less lateralized, or specialized in function than the cerebral hemispheres of males.