

## Chapter 1

### Summary:

1. Cognition plays a large role in our everyday existence. We take much of our cognitive experience for granted because the ways in which we function cognitively are so routine we simply don't pay attention to them. Nonetheless, on closer inspection we see that many cognitive activities are astonishingly complex.
2. We've examined different traditions in the study of cognition, tracing the history of study back at least as far as Wundt's Leipzig laboratory. We've seen how different major schools of thought – structuralism, functionalism, behaviourism and Gestalt approaches – have framed cognitive questions.
3. Structuralism, a school of psychology associated with Wilhelm Wundt, sought to discover the laws and principles that explain our immediate conscious experience. In particular, structuralists wanted to identify the simplest essential units of the mind and to determine how these units combine to produce complex mental phenomena.
4. Functionalism, a school of psychology associated with William James, took as the basic aim of psychology understanding the function of the mind – the ways in which mental functions let individuals adapt to their environment.
5. Behaviourism, regarded by some as a branch of functionalism, took as the central aim of psychology the scientific study of behaviour, an observable consequence of psychological experience. Radical behaviourists insisted that references to unobservable, subjective, mental states (such as consciousness) as well as to unobservable, subjective processes (such as expecting, believing, understanding, remembering, hoping for, deciding, perceiving) should be banished from psychology proper.
6. The school of Gestalt Psychology held as its central assumption that psychological phenomena cannot be reduced to simple elements but must be analyzed and studied in their entirety. Gestalt psychologists believed observers do not construct a coherent perception from simple, elementary sensory aspects of an experience but instead apprehend the total structure of an experience as a whole.
7. Work by Francis Galton emphasized the idea that individuals differ, even as adults, in their cognitive capacities abilities and preferences.
8. We've also seen how the present study of cognitive psychology grows out of, and contributes to, innovations in other fields such as computer science, communications, engineering, linguistics, evolution, and anthropology.
9. Cognitive psychology draws upon many different research methods, including experiments, quasi-experiments, controlled observation, and naturalistic observation.
10. Finally, we've reviewed four major approaches to the modern study of cognitive phenomena: the information-processing, connectionist, evolutionary, and ecological paradigms. We've seen that the information-processing approach emphasizes state-like processing of the information and specific storage of that information during processing. The connectionist approach instead depicts cognitive processing as a pattern of excitation and inhibition in a network of connections among simple (and usually numerous) processing units that operate in parallel. The evolutionary paradigm examines how a cognitive process has been shaped by environmental pressure over

long periods of time. The ecological paradigm stresses the ways in which the environment and the context shape the way cognitive processing occurs.

Key Terms:

Artificial Intelligence: programming computers to do the same tasks as humans

Association: Connection between two things

Attention: Mentally focussing on a stimulus

Behaviourism: Study the behaviours of people. One of the general doctrines of behaviourism is that references to unobservable, subjective mental states as well as unobservable, subjective processes were to be banished from psychology proper, which behaviourists took to be the scientific study of behaviour.

Between-Subjects design: different experimental participants are assigned to different experimental conditions and the researcher looks for differences in performance between the two groups,

Brain imaging: construction of pictures of the anatomy and functioning of intact brains.

Clinical Interview: the investigator tries to channel the process even more. The investigator begins by asking each participant a series of open-ended questions. Continues a line of questioning depending on the response.

Cognitive Neuropsychology: study cognitive deficits in certain brain-damaged individuals.

Cognitive revolution: a rejection of the behaviourist assumption that mental events and states were beyond the realm of scientific study or that mental representations did not exist.

Cognitive Science: the study of how the human mind stores, processes, organizes, manipulates and uses information.

Computer Metaphor: The comparison of people's cognitive activities to an operating computer.

Connectionism: (Parallel-distributed processing) derived from models depicting cognition as a network of connections among simple processing units (neurons).

Controlled Observation: When observers change the parameters of a situation so that it is the same for each test subject

Decision making: Determining how to deal with a situation

Ecological approach: cognition does not occur in isolation from larger cultural contexts; all cognitive activities are shaped by the context in which they occur.

Ecological validity: things studied really do occur in the real world and not just in a lab.

Empiricism: rests on the tenant that knowledge comes from an individual's own experience.

Experiment: an experimenter manipulates one or more independent variables and observes how the recorded measures change as a result.

Experimental control: Ability for experimenters to adjust parameters of the experiment

Functionalism: the purposes of the mind's various operations

Gestalt psychology: (Gestalt = shape or configuration) the central assumption was that psychological phenomena could not be reduced to simple elements but rather had to be analyzed and studied in their entirety.

Human factors engineering: Build/engineer devices to suit the capacities of the people operating it.

Individual differences: how people differed intellectually, studies into how intelligence could be passed down from parents to children and if people had intelligence as a natural trait.

Information-processing approach: draws an analogy between human cognition and computerized processing of information.

Introspection: consists of presenting highly trained observers with various stimuli and asking them to describe their conscious experiences. (Wundt)

Knowledge representation: Mental organization of knowledge you have learned over your lifetime

Language: A way of communication

Limited-capacity processor: human's were communication channels, they could receive, send and process information and the circumstance under which they distort the information they receive. Humans were related to inanimate communication channels were described as this.

Linguistics: the study of language

Localization of function: a function is localized in a particular region is to claim that the neural structures supporting that function reside in a specific brain area.

Memory: Storage facility and retrieval processes of cognition

Mental representation: internal depictions of information (internal copies of external stimuli)

Nativism: emphasizes the role of constitutional factors – of native ability- over the role of learning in the acquisition of abilities and tendencies.

Naturalistic observation: consists of an observer watching people in familiar, everyday contexts going about their cognitive business.

Neural network: A connection of neurons which transmit signals and process information in the body.

Paradigm: a body of knowledge structured according to what its proponents consider important and what they do not.

Pattern recognition: classifying stimulus into categories

Perception: interpreting sensory information

Person-machine system: the idea that machinery operated by a person must be designed to interact with the operator's physical, cognitive and motivational capacities and limitations.

Problem solving: Process of figuring out an issue

Quasi-experiment: empirical study used to estimate the causal impact of an intervention on its target population with random assignment. The group may not be comparable at baseline due to the randomness.

Reasoning: Process of figuring something out

Recall: Determine what something is from memory

Recognition: See an object that is familiar and understand what it is

Structuralism: focus on what the element components of the mind are rather than the question of why the mind works as it does. (Wundt)

Within-subject design: exposes participants to more than one condition in an experiment (alternate to between-subjects design)

## Chapter 2

### Summary:

1. The hindbrain, containing some of the most evolutionarily primitive structures, is responsible for transmitting information from the spinal cord to the brain, regulating life support functions, and helping to maintain balance.
2. The midbrain contains many “relay” centres to transform information between different brain regions.
3. The forebrain contains the thalamus, hypothalamus, hippocampus, amygdala, and the cerebral cortex, structures that are most directly implicated in cognitive processes such as memory, language, planning and reasoning.
4. The cerebral cortex has four lobes, frontal (involved with movement and planning), parietal (involving reception and integration of sensory information), occipital (processing visual information) and temporal (processing auditory information as well as information about taste and smell).
5. Although some specific brain areas have specific functions localized to them (for example, the motor cortex or the primary somatosensory cortex), most higher order cognitive processes do not map to one specific neural area.
6. Aphasia, a disorder of language, has been traced to two different areas of the brain, Broca’s area and Wernicke’s area, although other brain areas are likely involved as well.
7. Cerebral hemispheres have been shown to be lateralized in many individuals, with the left hemispheres usually processing analytical information and the right hemisphere synthesizing information. In normal operations, however, the two hemispheres communicate extensively.
8. A variety of modern techniques have been developed to measure the functioning of the brain during cognitive processing. Among the major techniques are CAT scans, MRI, PET scans, fMRI, EEG recording and ERP recordings.
9. The subtraction technique provides a means of isolating brain regions whose activity varies in a task state compared to a control state.

### Key Terms:

Ablation: removal of parts of the brain.

Amygdala: modules the strength of emotional memories, and used for emotional learning.

Aphasia: a disruption of expressive languages. Broca's which the person is unable to produce many words or speak fluently. Wernicke's – cannot understand language but can still produce.

Brain imaging techniques: methods of examining the functions of the brain.

CAT (computerized axial tomography): a technique in which a highly focused beam of X-rays is passed through the body in many different angles. Differing densities of body organs(including the brain) deflect the X-rays differently, allowing visualization of the organ.

Cerebellum: contains neurons that coordinate muscular activity. Governs balance and is involved in general motor behaviour and coordination.

Cerebral Cortex: carries information between the cortex and the thalamus or different parts of the cortex.

Corpus Callosum: sends information from one hemisphere to the other very quickly.

EEG (Electroencephalography): can be used to detect different states of consciousness. Metal electrodes on the scalp used.

ERP (event-related potential): measures the area of the brain's response to a specific event. Electrodes attached to scalp.

Executive Functioning: planning, making decisions, implementing strategies, inhibiting inappropriate behaviours, and using working memory to process information.

Faculty Psychology: the theory that different mental abilities, such as reading or computation were independent and autonomous functions, carried out in different parts of the brain.

fMRI (functional MRI): relies on the fact that blood has magnetic properties, shows blood flow in the brain.

Forebrain: Remainder of the brain (biggest part). Thalamus, hypothalamus, amygdala, hippocampus, cerebral cortex, frontal, occipital, parietal and temporal lobe, motor cortex, prefrontal cortex.

Frontal lobe: three separate regions, motor cortex, premotor cortex, prefrontal cortex,

Hindbrain: bulge in the neural tube. Medulla oblongata, pons, cerebellum.

Hippocampus: formation of long term memories.

Hypothalamus: Controls the pituitary gland by releasing hormones, that help regulate other glands in the body. Also controls eating, drinking temperature control, sleeping, sexual behaviors and emotion reactions.

Lateralization: The two hemispheres play different roles when it comes to some cognitive functions, esp language.

Localization of function: a means of mapping the brain.

Medulla Oblongata: transmits information from the spinal cord to the brain and regulates life support functions such as respiration, blood pressure, coughing, sneezing, vomiting, and heart rate.

Midbrain: Located in the middle of the brain, structures here relay information between other brain regions. Inferior and superior colliculi).

Motor cortex: directs fine motor movement.

MRI (Magnetic resonance imaging): provides information about neuroanatomy like CAT, however MRI requires exposure to radiation and gives clearer pictures.

Occipital Lobe: process visual information

Parietal lobe: contains many other things – mostly for processing sensory information from the body

PET (positron emission tomography): involves injecting a radioactively labelled compound (radioisotopes of carbon, nitrogen, oxygen or fluorine subatomic particles that rapidly emit gamma radiation, which can be detected by devices outside the head). Measures blood flow in different regions of the brain.

Phrenology: discredited idea that psychological strengths and weaknesses could be precisely correlated to the relative sizes of different brain areas.

Plasticity: some brain regions can adapt or take over functions of damaged regions, depending on the injury and the function involved.

Pons: also acts as a neural relay center, facilitating the “crossover” of information between the left side of the body and the right side of the brain and vice versa. Balance. Visual and auditory information.

Prefrontal cortex: involved in executive functioning – planning making decisions, implementing strategies, inhibiting inappropriate behaviors and using working memory to process information.

Primary somatosensory cortex: is organized in such that each part of it receives information from a specific part of the body.

Subtraction technique: the relative amount of activation in a particular brain region needed for a given cognitive task can be measured by subtracting a control state (responding to a light) from a task state (discriminating colour).

Temporal lobe: auditory information and the ability to recognize things such as faces.

Thalamus: structure for relaying information esp to the cerebral cortex.

### Chapter 3:

#### Summary:

1. Perception is more than the sum of static., individual sensory inputs. Perception clearly involves some integration and, perhaps, some interpretation of the sensations we receive. Perception is *not* a matter of simply taking in information from the world and creating from it a duplicate internal representation.
2. Perception sometimes involves “seeing” things that are not there (as in the case of subjective conours or synaesthesia) or distorting things that are (as in the case of other context effects).

Perception involves both bottom-up processes, which combine small bits of information obtained from the environment into larger pieces, and top-down processes, which are guided by the perceiver's expectations and theories about what the stimulus is.

3. One important perceptual task is the segregation of the figure from the background. Gestalt psychologists offered many principles of how we accomplish this task, including the principles of proximity, similarity, good continuation, closure and common fate. All of them follow the law of Pragnanz, which states that of all the possible interpretations of perceiver could make of a stimulus, he or she will select the one that yields the simplest, most stable form.
4. Various bottom-up models of perception include template matching, which holds that patterns are recognized when perceivers match them to stored mental representations; prototype matching, which posits that the stored mental representations are not exact copies of stimuli but rather idealizations; and featural analysis, which holds that we first recognize features or components of patterns and objects and then put information about these components together to form an integrated interpretation.
5. Top-down models of perception incorporate perceivers' expectations into the model of how we interpret sensory information. Recent work on change blindness suggests that people processes everyday visual information only to the level of gist, glossing over many details. Research on the word superiority effect demonstrates that context changes our perception of stimuli.
6. The connectionist model of letter perception illustrates just how complex the task of recognizing single letters (all typewritten in a single, simple font) can be.
7. Perception involves a great deal of activity on the part of the perceiver. We do more than simply record the visual world around us; we are not cameras. In both the constructivist and the direct-perception approaches to perception, perception is assumed to be the result of activity, either mental or physical. We navigate the world, gathering information as we go, seeking more information about objects of interest as a matter of course. Any theory of perception must ultimately take into account our own activity in our everyday perception.
8. Disruptions of perception (as in visual agnosia, including prosopagnosia) involve not understanding or recognizing what is seen. Apperceptive agnosia's involve intact recognition of contours but an inability to recognize what the object is. Associative agnosics can (sometimes slowly) recognize the identity of objects but focus intently on small details. Prosopagnosia is an inability to recognize faces, either of relatives, famous people, or even one's own reflection or photograph.

#### Key Terms:

Affordance: the acts or behaviours permitted by objects, places, and events.

Bottom-up Process: means that the perceiver starts with small bits of information from the environment that she then combines in various ways to form a percept.

Change blindness: inability to detect changes to an object or scene especially when given different views of that object or scene.

Constructivist approach to perception: describes people as adding to and distorting the information in the proximal stimulus to obtain a percept, a meaningful interpretation of incoming information. Active selectors.

Context effects: changes of the viewer's perception depending on the context that the object is in.

Direct perception: the light hitting the retina contains highly organized information that requires little or no interpretation.

Distal stimulus: all things to be observed.

Feature: parts of an object that we search for and recognize.

Form perception: The segregation of a display into objects and the background.

Gestalt principles of perceptual organization: proximity (perceive things close together as one group), similarity (similar things as one group), good continuation (straight lines or a pattern as one group), closure (things that are enclosed or combined as one group), common fate (elements that move together will stay together) and many more that are not mentioned in the book.

Pandemonium model: it consists of a number of different kinds of "demons" which function basically as feature detectors. Demons at the first level of processing scan the input and the demons at higher levels scan the output from the lower level demons. In response to what they find the demons scream. The more screaming demons from a certain section we know that is what we recognize the object as.

Pattern recognition: recognition of a particular object, event and so on as belonging to a class of objects, events and so on.

Percept: something that is perceived

Perception: taking sensory input and interpreting the meaning.

Phoneme: set of basic sounds that are the building blocks to all spoken language.

Prosopagnosia: very specific kind of visual agnosia for faces.

Prototype: an idealized representation of some class of objects or events.

Proximal stimulus: Reception of information and its registration by sense organ.

Retina: Surface at the back of the eye that reflects light for you to process.

Retinal image: image of an object that you see from the light reflections of the retina.

Schema: a cognitive system which helps us organize and make sense of information.

Size constancy: Moving your hand away and towards your face, the size doesn't feel like it is changing, but it is taking up more of your vision.

Subjective contours: When gaps are made in objects to make it seem like shapes are there, but they are not.

Template: previously stored patterns relating to an object

Top-down process: the perceiver's expectations, theories, or concepts guide the selection and combination of the information in the pattern recognition process.

Visual agnosia: impairments in the ability to interpret visual information.



Visual search task: Active scan of the visual environment for a particular object or feature among other objects or features.

Word superiority effect: We can recognize characters more easily in the context of words – top down processing.

## Chapter 4

### Summary:

1. Attention has been shown to be a flexible aspect of cognition. We see that attention, rather than being rigidly and mechanically limited, as first described, is instead a more flexible system, affected by things such as practice, the kinds of tasks being performed and the persons' intention.
2. The idea that there are limits on the number of things we can pay attention to at once is known as selective attention. Anecdotal, laboratory, and even neuroscientific evidence seems to suggest that we process information to which we are actively paying attention differently from the way we process information to which we are not attending.
3. Whereas once attention was compared to a bottleneck, today people tend to liken attention more to a pool of resources that can be allocated in a fairly flexible manner.
4. The most common metaphor to describe spatial attention seems to be a spotlight (although some disagree over how far that metaphor extends). The idea here is that attention can vary in effectiveness, just as a spotlight aimed at one spot, more or less lights surrounding areas, depending on its size and intensity.
5. Cognitive neuropsychologists have identified three different neural (brain) networks of attention, which they have localized in specific regions of the brain. They have also demonstrated a different pattern of event-related potentials for attended and unattended information
6. Practice with a physical or cognitive task seems to change the amount of attention we need to perform that task. Tasks that require little mental capacity to perform are said to be automatic.
7. Some criteria offered to call a task or process automatic include the following:
  - a. It occurs without intention
  - b. It occurs without conscious awareness
  - c. It does not interfere with other mental activity
8. It appears that tasks can be performed simultaneously so long as operations such as memory retrieval or response selection are performed serially
9. A real-world example of the relevance of laboratory research on attention comes from work on conversing via cell phone while driving a car.

### Key Terms:

Attention hypothesis of automatization: The proposal that attention is needed during a learning phase of a new task

Attenuation Theory: Model of selective attention proposed by Anne Treisman. Is a means to explain how unattended stimuli sometimes came to be processed in a more rigorous manner than Donald Broadbent's Filter Model. We sometimes observe things and process information that we did not intend to.

Automatic Processing: Sort of like muscle memory, when you start to do something that you have done many times and you can complete it successfully without giving it any thought. It can sometimes be disruptive when you think about the process (overthinking).

Controlled Processing: Opposite of automatic processing, we have to think to do these tasks.

Dichotic Listening Task: A person is given headphones, each ear is playing different things. The person must answer questions about one of the ears. The other is for distraction and other things

Divided Attention: When mental focus is on multiple tasks or ideas at once, also called multitasking.

Dual Task Performance: Performing two tasks simultaneously.

Event-related potential (ERP) : is the measured brain response that is the direct result of a specific sensory, cognitive or motor event.

Feature Integration Theory: Explains how an individual combines pieces of observable information about an object in order to form a complete perception of the object. First Stage: focus on one attribute of an object that stands out. Second stage: occurs when the attribute does not stand out. Ie finding a penny in quarters vs a nickel in quarters

Filter Theory: View of Attention, such that humans process information with limited capacity and selected information to be processed early. Due to the limited capacity a filter is needed for information processing.

Inattentional Blindness: A person doesn't see new and unexpected things that suddenly appear within their visual field.

Late Selection Theory: Information is selected after processing for meaning

Priming: Things are done to prepare memories, ie talking about cats then asking a person what their favourite animal is.

Psychological Refractory Period: Response to a stimulus is significantly slowed because a first stimulus is still being processed.

Selective Attention: Purposefully focussing your attention on one stimulus.

Spatial Cue: ?

Stroop Effect: Test that demonstrates interference in task reaction time. This particular test uses words that name colors but then print the names in a different color.

Visual Search: an active scan of the visual environment for a particular object

## Chapter 5:

### Summary:

1. Memory is a very basic cognitive process used in almost every cognitive activity. It involves encoding information, storing it, and later retrieving it from that storage. Cognitive psychologists

consider memory an active, constructive process. This means that the information does not sit still in a storehouse, waiting to be retrieved, but instead is elaborated and sometimes distorted or constructed.

2. One approach to the study of memory, called the modal approach, divides memory into different types: sensory memory, which holds information in specific modalities for fractions of a second up to several seconds (depending on the modality); STM, which holds a limited amount of information for brief periods of seconds or minutes; and LTM which holds on to memories for longer, sometimes infinite periods of time.
3. The number of unrelated pieces of information that can be held in the short term (without rehearsal or recording) seems to be seven, plus or minus two. This limit can be overcome through techniques such as chunking, which requires some knowledge about the pieces of information and how they relate.
4. There is controversy in the explanations proposed for why we forget information. The question is whether information in a memory store ever decays or “disintegrates” or whether all supposedly “forgotten” information is actually buried information displaced by interference from other information. Although these two possibilities are quite distinct, as a practical matter it is very difficult to design critical experiments that would rule out one of them. Perhaps both kinds of processes play some role in forgetting.
5. Saul Sternberg’s work suggests that retrieval from STM is serial and exhaustive. Later work suggests that this may depend on the nature of the stimuli presented.
6. A newer conception of STM, proposed by Alan Baddeley, is called working memory (WM). Working memory is thought to consist of a central executive concerned with coordinating and controlling incoming information; a phonological loop, acting as an inner ear; and as a visuospatial sketch pad, used as an inner eye. Recent work suggests that WM capacity is a powerful variable relating to the ability to resist distraction and distortion, to reason with abstract or concrete premises and to maintain control of attention more generally.
7. Retrieval of information is made easier when the information to be retrieved is categorized, when the retrieval cues match the cues that were available at the time of encoding (the encoding specificity principle) and when the retrieval cues are very distinctive.
8. Consistent with the encoding specificity principle, investigators have found that recall (but not recognition) is made easier when the recall context is the same as the learning context (the context effect) or when the pharmacological state of the person at recall matches his or her pharmacological state during encoding (the state dependent learning effect).
9. Neuropsychological studies of memory provide a glimpse at some very exciting “cutting-edge” research. Investigators are examining the role of particular brain structures, such as the hippocampus and medial temporal cortex, in memory formation as well as attempting to localize the brain regions involved in encoding and retrieval.

#### Definitions:

Anterograde Amnesia: Refers to an individual's inability to form new memories following a traumatic event.

Capacity: Amount of items that can be stored in memory

Categorization: Compare and differentiate objects into categories

Central Executive (Working memory): Information that is currently coming into your brain. Temporary items you can use immediately. ( a cache)

Chunking: Taking data and grouping it so that it is easier to remember ie CIA rather than C-I-A

Coding: The way things are stored in your brain.

Context Effect: the environmental factors that surround an event effects how an event is perceived and remembered.

Decay: Memories slowly fade, STM things last only 20-30 seconds

Echo: Sensory memory for auditory material.

Encoding: The process of storing information in memory

Encoding Specificity: the idea that memory is improved when information available at encoding is also available at retrieval.

Episodic Memory: Long term declarative memory in which we store memories of personal experiences that are tied to particular times and places.

Exhaustive Search: Even if a result is found you continue looking at every other item in the set .

Fan Effect: Recognition times or error rate for a particular concept increases as more information about the concept is acquired (more branches like a fan in a tree)

Forgetting: losing information/information getting overwritten

Icon: Visual memory

Interference: When memories overlap and interfere with each other

Long Term Memory: Memories that can be stored for some amount of time, thought to be infinite size storage

Long-Term Potentiation: ability of brain cells to retain how frequently they send signals to other brain cells.

Memory Systems: Episodic vs Semantic

Memory Trace: Also known as an engram, is a theoretical means by which memories are physically stored in the brain.

Modal Model of Memory: Assumes that information is received, processed and stored differently for each kind of memory. Unattended information is stored briefly in sensory memory, attended info is in short term memory for 20-30 seconds and longer periods of exposure are sent to long-term memory.

Paired Associates learning: Participants hear lists of pairs of words such as flag-spoon and drawer-switch. After one or more presentation of a list the experimenter then presents participants with the first word in each pair and participants are asked to recall the paired word.

Parallel Search: Searching for one item against multiple other items at the same time

Phonological loop: part of our working memory system that handles auditory and verbal information, including language and music. It consists of two components: storage and rehearsal.

Primacy Effect: The tendency for the first items presented in a series to be remembered more easily.

Proactive Interference: Difficulty learning new information because of already existing information

Recency Effect: The tendency for the last things in a list to be remembered more easily.

Rehearsal: repeating things so they stay in memory

Retention duration: varied from a few days to a lifetime for LTM, 20 seconds for STM

Retrieval Cue: Prompt that helps us remember. When we make a new memory, we include certain information about the situation that helps trigger the memory

Retroactive interference: New information interferes with old information

Retrograde Amnesia: The loss of memory surrounding a traumatic event, also usually includes events shortly before the event.

Self Terminating Search: terminate the search when we find the solution

Semantic memory: one of the three types of LTM, we store general world knowledge like facts, ideas words, problem solving etc.

Sensory Memory: The part of the memory system which is the initial contact for stimuli. Very short retention period.

Serial Position Effect: Tendency to recall information that is first and last

Serial Search: go through each item in a list and compare (not parallel)

Short term Memory: holds memories for ~20-30 seconds

State-dependent learning: Recall from long term memory that is dependent on certain cues from our physical states

State dependent memory: See above

Storage: where we hold information

Visuospatial sketch pad of working memory: Responsible for handling visual and spatial information. Temporarily stores information on how things look and allows us to manipulate images in our mind.

Working memory: Small amount of memory 7 items plus/minus 2. Basically a cache

## Chapter 6:

### Summary:

1. We've seen in this chapter, as well in Chapter 5, that cognitive psychologists approach the study of memory in a variety of ways and that this diversity dates back at least to founding cognitive

psychologists such as Ebbinghaus and Bartlett. Some of the diversity arises in theoretical orientations: Some psychologists seek evidence for the proposition that there are different memory stores, whereas others focus on the kind of processing done with the to-be-remembered information

2. Work on the levels of processing theory has demonstrated that the more active and meaningful the original processing of the information, the more memorable the information will be. This idea has obvious and practical relevance for students. If you want to improve your recall of material for later testing (in midterms and finals), organize it and think about its meaning (deep processing) rather than merely reading, underlining or highlighting the words (shallow processing)
3. The work reported here on people's recall of their own life events dovetails in several ways with the laboratory-based investigations of memory described in this chapter and the last. Some of the findings that have emerged—for example, the constructive nature of recall—fit well with laboratory findings. However, different results are found in laboratory- and everyday-based studies. Autobiographical recall seems better than recall of laboratory stimuli, but whether different cognitive mechanisms are at work remains an open question.
4. Work on flashbulb and eyewitness memories suggests that people's recollections of moments of their past can be wrong, even when those people seem absolutely convinced of the accuracy of the memory. This suggests that our own confidence in our memories may sometimes be too high; at the very least, there are probably occasions when we are both very sure of our memories and also very wrong. Work on eyewitness testimony suggests that memory traces of a witnessed event are very malleable and subject to disruption by post-event leading questions.
5. Debates over whether memory traces can be repressed for long periods of time, then recalled, have erupted in recent years. Some studies purport to show that under repeated urgings, people can be induced to "recall" emotional events that never happened.
6. Neuropsychologists who study memory deficits recognize two different kinds of amnesia. Both seem to involve damage to either the hippocampal system or the midline diencephalic region. This damage can arise in several different ways: through closed head injury, a stroke, oxygen deprivation to the brain, bilateral electroconvulsive shock treatments, a virus such as encephalitis or other diseases such as Alzheimers or Korsakoff's
7. Anterograde amnesia, which extends forward in time from the onset of amnesia, selectively affects long term (but not working) memory, regardless of modality or type of memory test, and spares memory for general knowledge and skilled performance (although the learning of the latter will not be explicitly remembered) but can result in memories for skills that are hyper specific to the original learning context and cannot be transferred to other similar contexts.
8. Retrograde amnesia, the loss of memory acquired and stored before the point of the onset, is almost always a component of amnesia. The temporal extent of the amnesia varies in different patients; it is worst for memories of information acquired closest to the point of onset. Some recovery of some of the lost retrograde memories is often possible. Retrograde amnesia also spares material that has been "over-learned" before the onset. Including such things as language, general knowledge and perceptual and social skills. As with anterograde amnesia, retrograde amnesia seems to spare skill learning.
9. Some theorists have proposed a distinction between explicit and implicit memory: the former refers to conscious recollection, the latter to facilitation in performance as a function of past

learning without awareness of that past learning. In this proposal, implicit memory phenomena have been seen as ways of determining how general knowledge is organized.

10. Some have argued against associating different memory tasks with different memory systems. Jacoby(1991) believed the best way of understanding memory process is to distinguish between automatic and intentional memory processes.

#### Definitions:

Amnesia: Inability to recall past events

Amygdala: 2 areas of the brain containing lots of neurons that influence anger, aggression, fear and rage.

Anterograde Amnesia: inability to form new memories following a traumatic event

Autobiographical Memory: memory system of a person's life built from a combination of experiences and general knowledge collected over a lifetime.

Cognitive Economy: Properties and facts are stored at the highest level possible. To recover information you use inference. Try to prevent storing redundant information

Elaboration: development of an existing idea by incorporating new information to augment the idea. It can be used as a method of memory retention by making a memory or idea with greater detail in order to remember it accurately.

Explicit Memory: Type of long term memory in which we store memories of fact.

EyeWitness memory: Study of eyewitnesses in court and how they remember events.

False Memory: Times where you sure you are 100% correct about something, but turn out to be false.

Flashbulb memory: The sudden clear memory of an emotionally significant moment or event. When you are trying to remember something and then it all of a sudden comes to you.

Hippocampus: Part of the limbic system that is vital for the formation of memories.

Implicit Memory: Involves recollection of skills, things you know how to do, preferences etc. You do not need to recall consciously.

Incidental Learning: Learning that happens inadvertently.

Levels of processing theory of memory: Memory varies according to and is a by-product of the process of processing information during encoding.

Lexical Decision Tasks: Type of experiment where participants see a series of letter strings and are asked to decide as quickly as possible if the letter strings form real words.

Memory Consolidation: Storage of information initially requires the hippocampus to link different aspects (sights, smells, sounds) of an event and to retrieve these at a later time;

Process dissociation framework: people perform differently on implicit memory tasks from the way they do another memory tasks????????? BLAH



Recovered Memory: When a repressed memory is remembered we say it has been recovered

Repetition priming: Cognitive processing of information immediately after encountering that information.

Repressed Memory: A memory that is too difficult or unacceptable to deal with, we unconsciously exclude them from our consciousness.

Retrograde amnesia: Loss of memory surrounding a traumatic event, often lose memory just before the event as well.

Schemata: A conceptual framework. It is used to refer to a mental set or representation.

Semantic Network: Collection of nodes associated with all of the words and concepts one knows

Semantic Priming: Exposure to one word which facilitates the recognition of other cognitive processing of a semantically related word.

Spreading activation: the idea that excitation spreads along the connections of nodes in a semantic network.

## Chapter 7

### Summary:

1. Categories are classes of similar objects, events, or patterns. Concepts are mental representations of those categories. Concepts are thought to help us order our knowledge and to relate new objects or patterns to previously encountered ones.
2. There are five distinct approaches to the study of concepts. These have been themselves categorized into two major types: similarity-based and explanation-based
3. The similarity-based category, comprising the classical, prototype and exemplar views (and some parts of the schemata view), includes the approaches in which categorization is assumed to be based on the similarity of an instance to some abstract specification of the category (for example, a definition or a prototype) or to one or more stored exemplars.
4. The explanation-based category, comprising aspects of the schemata/scripts view and aspects of the knowledge-based view, instead sees people as classifying instances based on meaningful relationships among instances and categories.
5. The classical approach to concepts posits that each concept is defined by a set of necessary and sufficient features.
6. The prototype approach to concepts holds that we categorize objects by comparing them to mental abstractions, called prototypes, which are idealized representations of some class of objects or events.
7. Some researchers have found that the acquisition of concepts results in a shift from right-to-left hemisphere processing in the brain.
8. The exemplar approach to concepts assumes we store specific individual instances and use these stored representations to categorize.
9. The schemata/scripts view regards concepts as schemata, packets of information with specific parts that fill in default values for aspects of the situation.
10. Proponents of the knowledge-based view of concepts hold that people use their own theories to guide their classification of objects.
11. When people are explicitly asked to form concepts and to search for underlying rules or features, they seem to acquire and use different kinds of information from what they use when left to their own exploration. This raises the question of applicability of very traditional laboratory-based investigations of concept formation to the processes people use outside the laboratory. What gets learned depends, apparently, on the original learning materials, the task instructions, and the learner's anticipation of how the learned information will be used in the future. As in other areas of cognition, then the way people process information is flexible and varies with the situation and the purpose of the task.

### Key Terms:

Artifact Concept: Things constructed to serve some function or accomplish some task.

Basic Level of Categorization: Most basic level of categorizing objects ie piano and guitar.

Category: Well defined class of similar things

Classical View of concepts: features represented are individually necessary and collectively sufficient.

Concept: a mental representation of some object or event.

Exemplar view of concepts: Assets that concepts include representations of at least some actual individual instances. The exemplar approach assumes that people categorize new instances by comparing them to representations of previously stored instances called exemplars.

Family Resemblance structure of concepts: a structure within each member has a number of features, sharing different features with different members. Few features are shared by each member – the more similar features it has the more typical it is.

Features: Under the classical view, the most fundamental characteristics

Implicit Learning: Requires that people pay attention to individual exemplars, storing information about and representations of them in memory. Later classification is done by comparing new instances to the representations of them in memory.

Knowledge-based view of concepts: a person classifying objects and events doesn't just compare features or physical aspects of the objects and events to features or aspects of stored representations.

Natural-kind concept: "Gold" or "Tiger" things that naturally occur in one's environment.

Nominal-kind concept: Concepts that have clear definitions

Nonanalytic concept formation: It is better to learn examples and learn implicitly than it is to learn the structures of how things are formed. I.e. the English language we learn by example rather than by learning every grammatically correct way to speak.

Prototype: idealized representations of some class of objects or events.

Prototype view of concepts: Denies the existence of necessary and sufficient feature lists. Regards concepts as a different sort of abstractions called prototypes.

Psychological essentialism: people generally act as if objects, people or events have certain essences or underlying natures that make them what they are. People have a reliance on underlying nature as a basis for many concepts.

Schemata/Scripts view of concepts: Concepts are a schema – frameworks of knowledge that have roles, slots, variables and so on. Schemata can embed themselves in one another hierarchically.

Subordinate level of categories: categories under the basic categories i.e. upright piano and grand piano rather than piano and guitar

Superordinate level of categories: categories over the basic categories i.e. if the basics are piano and guitar, the superordinate may be musical instruments

Chapter 8:

Summary:

1. Visual images are mental representations of perceptual experiences. There are also auditory, olfactory, cutaneous and other images each thought to be a mental representation of a perceptual experience.
2. Visual images are often used in mnemonics, techniques that improve the chances of recalling information. Some examples include the method of loci and the method of interacting images.
3. The dual-coding hypothesis of memory states that when information can be coded both by a verbal label and by a visual image, the memorability of that information is enhanced relative to information that can be coded only by a verbal label.
4. Not all psychologists believe in the existence of these two distinct codes. However, despite the theoretical possibility that only one propositional code is used to perform the visual imagery tasks described, many cognitive psychologists are persuaded by the evidence of the existence of some sort of a distinct visual spatial code.
5. Research on visual imagery has suggested that images function in some ways like internal pictures, undergoing certain kinds of mental operations and transformations. These mental operations and transformations appear to function in ways similar to corresponding physical operations and transformations.
6. However, other researchers and theoreticians have pointed out limitations in the image-as-picture metaphor. There are a number of ways in which images work differently from pictures. Some investigators, such as Fara(1988), have therefore concluded that “imagery is not visual in the sense of necessarily representing of information acquired through visual sensory channels. Rather, it is visual in the sense of using some of the same neural representational machinery as vision (P315).
7. Finke (1989) has proposed five principles of visual imagery.
  - a. Implicit encoding
  - b. Perceptual equivalence
  - c. Spatial equivalence
  - d. Transformational equivalence
  - e. Structural equivalence
8. Neuropsychological findings, taken in conjunction with the older studies, can help distinguish among different proposals. The studies that show activation of the visual cortex when forming imagery provide convincing evidence that the processing of visual images and the processing of visual perceptual information share a neural substrate.
9. Images are necessarily a private mental experience. It is all the more exciting then, when results from cognitive psychology and neuropsychology converge. Many consider the empirical investigations of imagery a major victory in the larger task of understanding how cognition, a collection of private mental experiences, functions.
10. Visual imagery can be seen as part of a broader topic of spatial cognition. Spatial information about spatial properties to navigate.

#### Key Terms:

Demand Characteristic: A task demands that a participant behave in some way.

Dual-Coding Hypothesis: long term memory contains two distinct coding systems for representing information to be stored. One is verbal, containing information about an item’s abstract, linguistic

meaning. The other involves imagery, mental pictures of some sort that represent what the item looks like.

Experimenter expectancy effect: When an experimenter gives unconscious subtle cues to participants.

Heuristic: A rule of thumb when determining something

Imaginal Scanning: View an image and scan it, moving from one position on the image to another, ie looking at the letter F and starting in the top left corner and looking at the other corners from the top left to the bottom right.

Implicit Encoding: information was stored unintentionally along with other information that allows you to construct a visual image of your kitchen, so you can count the number of drawers by remembering how your kitchen looked.

Mental Rotation: Being able to figure out what an image is even if it is rotated.

Method of Loci: Imagine a series of places or locations that have some sort of order to them. You then divide the material you wanted to remember around at the landmarks in order to remember them easier.

Mnemonics: Techniques that increase your chance of remembering.

Relational-Organizational Hypothesis:

Space around the body: Area immediately around you

Space of navigation: Larger spaces, ones we walk through, explore travel to and through.

Space of the body: Knowledge of where different parts of one's body are located at any moment.

Spatial Cognition: how people represent and navigate in and through space. That is, how do we acquire, store and use mental representations of spatial entities, and use them to get from point A to point B.

Tacit Knowledge: is knowledge that is difficult to write down or share verbally. It can be learned by doing or observing. It is a skill that we know how to do rather than facts. Ie how to speak or dance, we just feel how to do it, we do not know all of the rules.

Visual Image: mental pictures

Chapter 9:

Summary:

1. To be a language, a system must exhibit regularity (that is, be governed by a system of rules, called grammar) and productivity (be able to express an infinite number of ideas).
2. When researchers say that people "follow" the rules of a language, they distinguish between conscious awareness of a rule (which neither psychologists nor linguists believe is the way people apply most linguistic rules) and implicit access to a rule (such that a person follows a rule, though perhaps unaware of its existence and unable to articulate just what the rule is).

3. Language is structured on several levels: the phonological (sound), syntactic (ordering and structuring of words and phrases in sentences), semantic (meaning) and pragmatic (the ways in which language is actually used), to name a few. Each of these levels has a different set of rules associated with it.
4. People use different linguistic rules both when they produce and when they comprehend language. The ways in which a number of our perceptual systems are set up help people master the very complicated task of processing language relatively easily. Despite ambiguity in many of the utterances we encounter, we can use the context of the utterance as well as other strategies to settle on the most likely intended meaning.
5. Perceptual context effects exist at many levels. Context can affect even the perception of individual sounds. The phoneme restoration effect demonstrates that people effortlessly “fill in” experimentally created gaps in a stream of speech. Context affects the ways in which individual words are interpreted, although Swinney’s (1979) study suggests that context effects operate not instantaneously but after a brief (Fraction of a second) period.
6. People seem to parse sentences into syntactic constituents as they construct the sentence’s meaning. They appear to discard the exact wording of a sentence and to retain only a gist when they finish the processing. Many sentences involve some sort of ambiguity, which people seem to resolve very quickly.
7. In processing text passages, listeners and readers seem to be affected by the difficulty of the individual words and the syntactic complexity as well as by the propositional complexity, the relationships among sentences and the context in which the passage is presented.
8. Conversations, spoken versions of text, also seem governed by a system of implicit rules known as the Gricean Maxims of cooperative conversation. Speakers who consistently violate the maxims are doing so for humorous or ironic effect, trying to end or avoid conversation, being inattentive or inappropriate, or showing a gross disregard for the expectations of their conversational partners.
9. Two distinct proposals regarding the relation of language to other cognitive processes are the modularity hypothesis and the Whorfian hypothesis of linguistic relativity. The modularity hypothesis proposes that some aspects of language, especially syntactic processes, function autonomously, independent of any other cognitive process. This proposal, being relatively recent, awaits rigorous empirical testing, although some evidence is consistent with it. The rigorous empirical testing, although some evidence is consistent with it. The strong version of the Whorfian hypothesis of linguistic relativity, despite its intriguing nature, has so far failed to receive strong or lasting empirical support.
10. The development of various neuroimaging techniques has allowed researchers to construct detailed “brain maps” that localize different functions. There is some ongoing disagreement over just how localized any one language process is.

Key Terms:

Aphasia: Language disorders

Broca’s Aphasia: Difficulty speaking/writing fluent languages, still able to receive and process language.

Expressive Aphasia: (Same as Broca’s aphasia)

Grammar: A language is regular and has a system of rules, the rules are the grammar

Gricean maxims of cooperative conversation: Grice believed that for people to converse, they must do more than produce utterances that are phonologically, syntactically and semantically appropriate. It must also have continuity, don't usually follow up "What is your name?" with "I like pineapple pizza".

Informationally encapsulated process: It operates independently of the beliefs and the other information available to the processor.

Laterlization: The different hemispheres in your brain have different functions.

Lexical ambiguity: Occurs when words have two meanings, such as bank.

Linguistic competence: Underlying linguistic knowledge that allows people to produce and comprehend language.

Linguistic performance: Ability to produce the language correctly.

Modularity hypothesis: Certain perceptual and language processes are modules. These processes are thought to be set apart from other cognitive processes such as memory, attention, thinking and problem solving that are thought to be nonmodular.

Morpheme: Smallest meaningful unit of language.

Phoneme: The most basic sounds

Phonetics: the study of speech sounds and how they are produced.

Phonology: the study of systematic ways in which speech sounds are combined and altered in language.

Pragmatics: The flow/give and take. Listeners must pay attention and make assumptions and speakers must craft their contributions in ways that make the listeners job feasible.

Propositional Complexity: two sentences of equal length can differ in the difficulty to process. This is the propositional complexity of a sentence – the number of basic ideas conveyed.

Receptive Aphasia: (Wernicke's Aphasia) Difficulty receiving and processing language, but you can still speak/write it fluently.

Semantics: The branch of linguistics devoted to the study of meaning.

Syntax: The structure of each sentence.

Wernicke's area: Part of the cerebral cortex linked to speech comprehension and understanding. (written and spoken language).

Whorfian Hypothesis of linguistic relativity: We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds – and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significance

## 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.