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, sough 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 actives 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 tow 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 may 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 obejects 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 expectation's 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.