PSYC1010
TEST 2
STUDY PACKAGE

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Preface

This document was created by the York University chapter of Students Offering Support (York SOS) to accompany our PSYC1010 Exam-AID session. It is intended for students enrolled in Professor Jubis's sections of 2012/2013 INTRODUCTION TO PSYCHOLOGY – PSYC1010 course who are looking for an additional resource to assist their studies in preparation for the exam. Please do NOT share this with other students and instead tell them about the session or to contact York SOS to make a donation to get a copy of it. (info@yorksos.com)

References

Myers, David G. (2012). *Psychology 10th Edition in Modules.* New York, NY: Worth Publishers.

Tips for General Midterm Success

Use mnemonics to remember concepts better. An example of a mnemonic would be acronyms.

Do practice multiple choice questions. Doing these practice questions can assess your understanding of what you have learned and can help you identify areas of weakness. Practice multiple choice questions are found in textbooks, on textbook companion websites, and/or provided by your professor.

Read a multiple choice question and try to answer it BEFORE looking at the possible answers. Having an answer in mind before looking at possible answers can reduce the chances of being fooled by wrong answers.

Use logic and process of elimination on multiple choice questions. For example, if you know that answer A is wrong, then logically an answer "A and B are correct" in the same question must also be incorrect. When you don"t know the answer, eliminating wrong answers (as opposed to just random guessing) can increase your chances of getting the question right.

Practice writing answers to short answer questions. If you know ahead of time what the questions will be on the short answer section, make a list of essential points you want to include in each answer and practice writing the answer on paper. If you don't know what questions will be on the short answer section, you could try scanning the material to identify concepts that have enough content to be a possible short answer question. Again, you can make a list of essential points you want to include in each answer and practice writing the answer on paper. Even if the question you thought of doesn't show up on the short answer section, doing this can help solidify what you learned.

Don't spend too much time on a difficult question. It is better to move onto easier questions to ensure getting those marks than to get hung up on a difficult question, especially when time is limited.

Get adequate sleep the night before your test. Sleeping at night helps consolidate what you learned during the day into memory so that it is better remembered in future. Not only does staying up late the night before a test destroy your concentration during the test the next day, but your brain has not effectively learned the material.

York SOS: Students Offering Support

What is Students Offering Support?

Students Offering Support is a national network of student volunteers working together to **raise** funds to **raise** the quality of education and life for those in developing nations through **raising** marks of our fellow University students. This is accomplished through our Exam-AID initiative where student volunteers run group review sessions prior to a midterm or final exam for a $20 donation. All of the money raised through SOS Exam-AIDs is funneled directly into sustainable educational projects in developing nations. Not only does SOS fund these projects, but SOS volunteers help build the projects on annual volunteer trips coordinated by each University chapter.

LEARNING : MODULE 20

Basic Learning Concepts and Classical Conditioning

- **Learning:** process of acquiring new and relatively enduring information or behaviours
    - Helps us adapt to environments
    - Helps us prepare for significant events such as food or pain
- We typically learn to repeat acts that bring us rewards and avoid acts that bring unwanted results
- We learn things we have never experienced through observation of events and of other people, as well as language
- **Locke and Hume** → we learn by association
    - **Associative learning:** learning that certain events occur together. The events might be two stimuli or a response and its consequence.
    - Example: Smelling freshly baked bread and after eating some, finding it tasty. The next time you smell freshly baked bread, you will expect it to be tasty.
    - Associative learning can be subtle
        - Example: Give someone a red pen instead of a black one to edit an essay and they will spot more errors and give more critical grades.
    - Associations also feed our habits
        - Example: sleeping in a certain position every night because it was comfortable at several occasions
- **Stimulus:** any event or situation that evokes a response
- **Cognitive Learning:** acquiring mental information that guides our behaviour
    - Example: Monkeys sometimes learn behaviours just by watching others do them.

Classical Conditioning

- **Pavlov** → researched the idea of classical conditioning
    - **Classical Conditioning:** a type of learning in which one learns to link two or more stimuli and anticipate events
- **Watson** → based on Pavlov's work, he explored the idea of behaviourism
    - **Behaviourism:** the view that psychology (1) should be an objective science that (2) studies behaviour without reference to mental processes (inner thoughts/feelings/motives)
        - Most psychologists agree with (1) but not (2)

What did Watson do?

- Watson experimented on phobias: "Little Albert"
    - He presented baby Albert with a white mouse
    - Then he had someone make a loud sound every time the mouse was shown to Albert
    - Albert's startling response was paired with the mouse's appearance
    - Now whenever Albert saw the mouse, he cried and showed fear

- Thus, Watson used conditioning to create phobias
  - In this experiment:
    - US = loud noise
    - UR = fear response
    - NS = mouse before it was paired with the noise
    - CS = the mouse after being paired with the noise
    - CR = the mouse

Pavlov's Experiments

Before Conditioning:

- Dog is given food and he starts to salivate (a respondent behaviour). This is an **unconditioned stimulus (US)** creating an **unconditioned response (UR).**
  - Eventually the dog starts salivating not just when given food, but at the sight of food, or the food dish, or the person delivering the food.
- Then Pavlov sounded a tone which did not make the dog salivate like the food had. This is a **neutral stimulus (NS)** creating no response.

During Conditioning:

- The US (food) is repeatedly presented immediately after the NS (tone). The US (food) continues to create the UR (salivation).

After Conditioning:

- Playing the tone used to be neutral, but now when it is played the dog salivates. This means that the NS (tone) is creating a **conditioned response (CR)**; therefore it has now become a **conditioned stimulus (CS).**

* Conditioned = learned*

Recap of important terms:

Respondent behaviour: behaviour that happens as an automatic response to some stimulus
Unconditioned stimulus (US): something (in Pavlov's study, food) that naturally and automatically triggers an unconditioned response
Unconditioned response (UR): this is an unlearned and naturally occurring response to an unconditioned stimulus (salivation)
Neutral stimulus (NS): something that brings out no response before conditioning (the tone)
Conditioned response (CR): a learned response to a previously neutral (but now conditioned) stimulus (salivation after conditioning)
Conditioned stimulus (CS): an originally irrelevant stimulus (tone) that after being associated with an unconditioned stimulus (food) starts creating a conditioned response (salivation)

****USURNSCRCS****

5 Major Conditioning Processes (Pavlov)

Acquisition: the initial stage, when one links a NS and a US so that the NS starts triggering the CR.

- In other words, when the tone and food were repeatedly paired together and reached a point where the tone started creating salvation.

- Experiments have shown that stimuli can be conditioned to create sexual arousal
- *Conditioning helps an animal survive and reproduce – by responding to cues that help it gain food, avoid dangers, locate mates, and produce offspring*
- **Higher-order conditioning:** procedure in which the CS in one conditioning experience is paired with a new NS, creating another (most likely weaker) CS.
    - Example: The dog has learned that a tone predicts food. Now if the tone is paired with a light, eventually he will learn that the light predicts the tone and may start responding (salivating) to the light alone.
    - Also called **second-order conditioning**

Extinction: the diminishing CR, happens when a US does not follow a CS
- In other words, if the tone sounded again and again, but no food appeared, the dog would salivate less and less as a reaction.

Spontaneous recovery: the reappearance, after a pause, of an extinguished CR
- In other words, after extinction Pavlov sounded the tone again and the dog would begin salivating despite the delay.
- This process suggests that *extinction suppresses the CR rather than eliminating it*

Generalization: the tendency, once a response has been conditioned, for stimuli similar to the CS to trigger similar responses
- After being conditioned to the sound of the tone, Pavlov noticed that the dog also responded somewhat to the sound of a new, different tone
- He tested this behaviour by attaching small vibrators to various parts of the dog's body. After conditioning the dog to salivate to stimulation on the thigh, Pavlov stimulated other areas. The closer the simulated spot was to the thigh, the stronger the CR.

Discrimination: the learned ability to differentiate between a conditioned stimulus (CS) and irrelevant stimuli
- Pavlov's dog learned to respond to the particular tone that Pavlov used, and not just any other tone.
- *Example:* If you come face to face with a guard dog, your heart might race. This probably wouldn't be the case if you met a guide dog.

What can we use Classical Conditioning for? **Aversion Training**
- First give a person a pill that creates nausea
- Then pair that pill with a drink of alcohol
- The nausea caused by both pill and drug will be linked
- Thus, the sight, smell, or even taste of alcohol will trigger nausea

<u>Pavlov's view of contiguity</u>

- **Contiguity** in classical conditioning occurs when the conditioned stimulus (CS) and unconditioned stimulus (US) occur together in time and space and become associated
- 2 things to remember:
    1) In order for classical conditioning to be possible, CS and US must be contiguous, and;
    2) If any CS and US *are* contiguous, there will be classical conditioning.
- *Example:* Garcia et al., did a study on taste aversion in rats

- Took x-rays of rats which caused them to be nauseous

X- Rays = US

Nausea = UR

- Before the x-rays the rats had drank a sugar solution
- Now the smell or taste of the solution caused nausea making the sugar solution a CS and the nausea its CR
- But there was a 7 hour time lapse between the rats drinking the solution and being x-rayed so those two things cannot be contiguous

- *So then why were they connected?*
  - Predictions included that maybe we have the tendency to link nausea to the last thing we ate
  - This was interesting...so Garcia et al., did another experiment
  - This time they exposed the rats to water+light+noise and then the x-rays
    - Results: Water = nausea, but light and noise did not
    - **Why??**
    - Prediction: we link nausea with what we have consumed (*which goes back to the idea of learning from observations and experience*)

Learning: Module 21

Two forms of associative learning:

- *Classical conditioning* – associations between stimuli (a conditioned stimulus, or CS, and the unconditioned stimulus, or US, it signals). It also involves respondent behavior – actions that are automatic responses to a stimulus
- *Operant conditioning* – association of organisms own actions with consequences
    - If an action is reinforced, then it increases
    - If punished, action decreases
    - Operant behavior - behavior that operates on the environment to produce rewarding or punishing stimuli

Skinner's Experiments

- Law of effect – rewarded behavior is likely to recur
- Developed a behavioral technology that revealed principles of behavior control
- Operant chamber (i.e. Skinner Box) – which has a lever that an animal presses to release a reward of food or water; these responses are recorded by a device – animals act out the concept of **reinforcement – any event that increases the frequency of a proceeding response**
- **Shaping Behavior**
    - Shaping – gradually guiding the action of an organism (i.e. animal/person) toward the desired behavior – example: shape a hungry rat to press a bar; process:
        - Watch how the rat naturally behaves – to build on existing behavior
        - Give the rat a bit of food each time it approaches the bar
        - Once it is approaching regularly, give food only when it moves closer to the bar
        - Require it to touch the bar to get food
    - This procedure is called successive approximations – rewarding responses that are ever closer to the final desired behavior
    - **Discriminative stimulus –** a signal that a response will be reinforced

Types of Reinforcers

- Positive reinforcement – strengthens a response by presenting a reward (pleasurable stimulus)
    - Example – give treat to a dog every time it responds to your high-fives
- Negative reinforcement – strengthens a response by reducing or removing something negative
    - Example – we fasten our seatbelt in our car to end the system from beeping annoying sounds; annoying sound is the aversive event in this case
    - Note: negative reinforcement is not a punishment – it REMOVES a punishment ← remember!
- There are times when the two meet, consider:
    - A student did badly on their last psychology test because they did not study enough. He is very worried (aversive event). Then he attends a SOS Exam-Aid session (yay!) to help study for his next test and does better this time. The action of attending a SOS Exam-Aid

session is a negative reinforcer because it removed the feeling of being worried and positively reinforced by a better grade (we hope to see you next time!).

- **Primary and conditioned reinforcer**
  - Primary reinforce – getting food when you are hungry – innate satisfying
    - Unlearned
  - Conditioned reinforcer (secondary reinforcer) – get their power through learned association with primary reinforcer
    - E.g. – We need to eat to survive (primary), we need to get money (conditioned) to buy food so we are not hungry, so we work hard to get money
- **Immediate and Delayed Reinforcers**
  - Consider this scenario:
    - A rat is hungry. It's scratching, sniffling in his cage. These are unwanted behavior because it's supposed to get food after it turns on the light. "Turn on the light" is the actual wanted behavior you are trying to train. However, you give it food immediately after those 'unwanted' behavior, it will continue to repeat them because it has learned that these are what get it the food.
    - NOW – the rat accidentally turns on the light but you failed to provide it food (!), if this delay is longer than 30 seconds, the rat will not learn to turn on the light in order to get food (opps).
    - As a result – animals do not respond to delayed reinforcer – you'll need to wait for it to accidentally press the light again and reinforce it then.
  - Humans DO respond to delayed responses – such as a good grade at the end of term after a long term of hard work
    - However, sometimes small immediate responses still are more attractive than the big but delayed consequences – such as streaming Gossip Girls (or a football game) online into the late night hours, not sleeping, and not being fully awake for an exam the next day (we hope that never happens).
- **Reinforcement schedule**
  - Reinforcement schedule is a pattern that defines how often a desired response will be reinforced
  - Continuous reinforcement – reinforcing the desired response every time it occurs
    - Learning happens quickly – but same goes for extinction
      - if you no longer provide food to the poor hungry rat after it presses the bar, it will stop pressing the bar soon
  - Partial (intermittent) reinforcement – reinforcing a response only part of the time, results in slower acquisition of a response but much greater resistance to extinction than does continuous reinforcement
    - Gamblers continue to gamble because they get lucky some times.
    - If you want to teach a child to say "thank you" after someone opens the door for him in public, reward him unexpectedly – when a child doesn't know when

to expect a reward, he'll persist on saying "thank you" after someone opens the door for him because he thinks he'll get a reward some time

- **Fixed ratio schedules –** reinforce behavior after a set number of responses
  - Some bubble tea shops provide reward card – get 20 drinks (recorded with stamps on the card) – then you get the 21st free.
- **Variable ratio scheduling –** reinforces after a seemingly unpredictable number of responses
  - Gamblers and their slot machines provide best example
  - Reinforcers increase as the number of responses increase – high rates of responding
- **Fixed interval schedules –** reinforce the first response after a fixed time period
  - We check more of our mail boxes as delivery date approaches
  - Respond more frequently as the anticipated time for reward draws near
- **Variable interval schedules –** reinforce the first response after varying time intervals
  - Slow and steady responding – not knowing when the waiting (ie. For a facebook message) will end
- **Generally**
  - Response rates of a ratio schedule is higher than an interval schedule
  - Response is more consistent for a variable schedule than a fixed schedule

- **Punishment**
  - Punishment does the opposite of increase behavior – they decrease!
    - E.g. the poor rat is shocked after touching a certain object
  - **Parenting implications**
    - Punished behavior is suppressed, not forgotten
    - Punishment teaches discrimination among situations
      - Discrimination occurs when an organism learns that certain responses, but not others, will be reinforced
    - Punishment can teach fear
    - Physical punishment may increase aggression by modeling aggression as a way to cope with problems
  - **Positive punishment –** administer an aversive stimulus
    - Give a traffic ticket for speeding
  - **Negative punishment –** withdraw a rewarding stimulus
    - Take away a teen's driving privileges for allowing his friend drive the family car

Punishment tells you what not to do; reinforcements tell you what to do.

- **"**clean up your room or no dinner! (angry face)" vs. "join us at dinner after you clean up your room ☺"

Application of Operant Conditioning

- **At school**
  - Teacher A – gives whole class the same lesson not distinguishing between brighter and slower students receive concepts at different rates
  - Teacher B – paces the material according to each student's rate of learning and provides prompt feedback with positive reinforcement to both slow and fast learners
    - Interactive learning software – closer to Teacher B
- **In Sports**
  - Reinforce small successes then gradually increase challenge
- **At Work**
  - Have employees become owners of the company to share its rewards and risks
  - Reward specific, achievable behavior, not vaguely defined 'merit'
  - Should be immediate, but not necessarily material
- **At home**
  - Parenting should remember – notice people doing something right and affirm them for it
    - Give children attention and other reinforcers when they are behaving well
    - If they misbehave, don't yell at them but explain the misbehavior
  - For ourselves – to reinforce your own desired behavior
    - State your goal in measurable terms and announce it
    - Monitor how often you engage in your desired behavior
    - Reinforce the desired behavior
    - Reduce the reward gradually

Contrasting classical and operant conditioning

- Review page 296 for comparison chart

LEARNING: MODULE 22

Effects of Biology and Cognition, and Learning by Observation

Learning is a product of :

- *Biological influences:*
  - Genetics
  - Unconditioned responses
  - Adaptive responses
- *Psychological influences:*
  - Previous experience
  - Predictability of associations
  - Generalization
  - Discrimination
- *Socio-cultural influences:*
  - Culturally learned preferences
  - Motivation, affected by presence of others

Limits on Classical Conditioning

- Animal's capacity for conditioning is constrained by its biology
- **John Garcia** →taste aversion
  - If you become violently ill after eating shrimp, you will probably develop an aversion to the taste of shrimp but not the sight of it, the restaurant, the people you were with, etc.
  - Our body prepares us to learn taste aversion to toxic foods
  - Supports Darwin's idea of natural selection; that we have the tendency to make decisions that aid our survival
- Our tendency to learn behaviours that are favoured by natural selection might explain why we associate the colour red with sexuality

Limits on Operant Conditioning

- Nature sets limits on someone's capacity for operant conditioning
- We learn and retain behaviours that reflect our biological predispositions
  - Using food as a reinforcer is effective if the behaviour you're trying to condition is associated with hunger, but probably not if you're trying to teach something completely unrelated

Cognitive Processes and Classical Conditioning

- Pavlov and Watson underestimated the importance not only of biological constraints on learning, but also cognitive processes (thoughts, expectations, perceptions)

- **Cognitive learning:** the acquisition of mental information, whether by observing events, by watching others, or through language
    - **Example:** researchers classically conditioned attitudes of adults by making them watch a video with a stream of words and Pokémon characters.
        - Then they were told to respond to one Pokémon by pressing a button
        - The participants didn't know that each Pokémon was associated with either positive or negative words
        - Without having conscious memory of the pairings participants had a gut-reaction to choose those Pokémon that were linked to positive words

Cognitive Processes and Operant Conditioning

- Skinner admitted to the influence of biology and cognition on conditioning, but he was criticized for not giving them importance
- Studying rats in mazes
    - Rats exploring a maze, given no obvious rewards, developed a cognitive map
    - **Cognitive map:** mental representation of the layout of one's environment
    - When the researcher places food in the maze's goal box, the rats run through the maze as quickly and efficiently as those rats who had been given rewards to achieve the same result
    - Shows that the rats experienced latent learning during their earlier runs
    - **Latent learning:** learning that occurs but isn't apparent until there is an incentive to demonstrate it
    - *There is more to learning than simply associating a response with a consequence; there is also cognition*
- Cognition also shows that there are limits to rewards
    - Promising people rewards for a task can backfire
    - Excessive rewards can destroy intrinsic motivation
    - **Intrinsic motivation:** desire to perform a behaviour effectively for its own sake
    - **Extrinsic motivation:** desire to perform a behaviour to receive promising rewards or avoid threatened punishment
        - *Example:* Think of yourself taking PSYC 1010. Are you feeling pressure to get a certain grade or worried about deadlines and other course work? If Yes, then you're experiencing extrinsic motivation. Are you also finding the material interesting and is learning making you feel more confident? If Yes then you're also experiencing intrinsic motivation

Learning by Observation

- **Observational learning:** learning by observing others
- **Modeling:** process of observing and imitating a specific behaviour
- **Albert Bandura** → did the Bobo doll experiment on observational learning
    - A child works on a drawing and an adult in another part of the room is playing with a toy. Then the adult gets up and goes to a Bobo doll in the room.

  - The adult pounds, kicks, and yells at the doll for 10 minutes with the child watching.
  - Then the child is taken to another room with appealing toys. The researcher tells the child that he has to save these toys for the other children
  - Then the child is taken to a third room with a few toys and a Bobo doll
  - Compared to the children who were not exposed to the adult's behaviour, those who were exposed were more likely to lash out at the doll
  - By watching a model, we experience vicarious reinforcement or vicarious punishment and we learn to anticipate the consequences of a behaviour in situations similar to what we have observed

Mirrors and Imitation in the Brain

- **Mirror neurons:** frontal lobe neurons that some scientists believe fire when performing certain actions or when observing another person doing so
  - The brain's mirroring of another person's action may enable imitation and empathy
  - *Example:* Monkey A watched Monkey B touch 4 images on a screen in a certain order to get a banana. Monkey A learned to imitate that order even when the same pictures were shown in a different sequence
  - This mirroring effect makes emotions contagious
  - Brain activity underlies our intensely social nature as humans

Applications of Observational Learning

- Prosocial models can have positive and constructive effects as opposed to antisocial models which can have negative effects
- These could be found in things like media in addition to interactions with others

SOCIAL PSYCHOLOGY: MODULE 43

Social Thinking

Fundamental Attribution Error

- **Fritz Heider** → proposed attribution theory
- **Attribution theory**: we can explain someone's behaviour by crediting either the situation or the person's disposition (stable character traits)
- Example: Jenny is really quiet at parties and Lydia is really loud in class discussions. So we assume that Jenny is shy and Lydia is outgoing, but we might be wrong. We're focusing on their personalities and ignoring the situations.
- **Fundamental Attribution Error (FAE):** when (during observation) we underestimate the impact of the situation and overestimate the impact of a person's personality
- **Napolitan and Goethals** → did experiment with college students
    - They had students talk one at a time with a young woman who either acted cold/critical or warm/friendly
    - Before the talks, the researchers told half the students that the woman's behaviour would be spontaneous and told the other half the truth (that she was acting)
    - Results showed that even knowing the truth did not change the students' impression of the woman. If she was critical they decided she was cold and if she was friendly they decided she was warm
    - They assumed her behaviour was "dispositional" even when told it was "situational"
- FAE in some cultures more than others
    - Individualists in the west give more credit to people's dispositions
    - East Asians are more likely to give credit to the situation
    - Example: an experiment was done when people were shown a scene of a big fish swimming. Americans focused on the fish itself and Japanese people focused on the whole scene
- The way we explain other people's actions, whether we pin it on personality or situation, can have real-life effects
    - Example: People must decide if a person's friendliness is romance or not
        - Jury must decide whether a shooting was intended or in self-defence
        - Voter must decide if candidate's promises will be kept or forgotten
- Social & economic effects of FAE
    - In Britain, India, Australia, and America conservatives put blame on the personal dispositions of the poor/unemployed
        - "People get what they deserve", "If you don't work you're a freeloader"
    - Liberals more likely to blame past and present situations
        - "If you lived in the same poor condition with lack of education and discrimination, would you be better off?"
        - To understand terrorism, consider the situations that breed terrorists

- *Our attributions, whether it's to disposition or situation, have real consequences*

Attitudes and Actions

- **Attitudes:** feelings, often influenced by our beliefs, that predispose us to have a certain response to people, things, and events
- *Attitudes Affect Actions*
    - Example: The public's attitudes towards issues, such as global warming, affect public policies. Therefore, people on both sides want to persuade the public towards their side.
- Two forms of persuasion:
    - **Peripheral route persuasion**: when people are influenced by incidental cues like the speaker's attractiveness
        - Doesn't allow for systemic thinking.
        - Examples: celebrity endorsements, perfume adds with images of beautiful people
    - **Central route persuasion**: when interested people focus on the arguments and respond with favourable thoughts
        - Offers evidence and arguments that trigger constructive thinking. Happens when people are naturally analytical or involved in the issue
        - Examples: Environmental advocates show evidence of rising temperatures/melting glaciers and because it's thoughtful and not superficial, it's more likely to influence our behaviour
- Those that try to persuade are trying to influence our behaviour by changing our attitudes but other factors, like situation, also influence behaviour
    - Example: Strong social pressures can weaken attitude-behaviour connection
- *Actions affect Attitudes*
    - Example: not only will people stand up for what they believe in, but they will also believe more strongly in what they stood up for
- **Foot-in-door technique:** tendency for people who have first agreed to a small request, to comply to a bigger request later
    - In other words, to get people to agree with a big demand, start small and build up
- *Moral actions strengthens moral convictions*

Role Playing Affects Attitudes

- When you take on a new role (student, spouse, accountant, etc.) you strive to follow social prescriptions
    - At first, your actions may feel fake because you're acting the role (Newlyweds feeling like they're "playing house")
    - But eventually, that life becomes you
- **Philip Zimbardo** → did experiment to test this in which male college students spent time in a simulated prison

    - Randomly assigned some students to be guards. He gave them uniforms, clubs, whistles, and told them to enforce certain rules
    - The others were prisoners, locked in cells and forced to wear humiliating outfits
    - For the first couple of days, the students "played" their roles. Then the simulation became too real.
    - Most of the guards developed critical attitudes, some devised cruel and degrading routines
    - One by one, the prisoners broke down, rebelled, or became submissive
    - After only six days, Zimbardo had to call off the study.
- Role playing can train torturers
- *What we do, we eventually become.*

<u>Cognitive Dissonance: Relief from Tension</u>

- Why do actions affect attitudes?
- **Cognitive Dissonance Theory**: We act to reduce the discomfort (dissonance) we feel when two of our thoughts are inconsistent with each other
    - Example: when we realize that our actions and attitudes clash, we reduce the discomfort we feel by changing our attitudes to match our actions.
    - Example: American attitudes towards the invasion of Iraq
        - When the war started, the reason was to uncover weapons of mass destruction. Would the war be justified if Iraq had no such weapons? 38% of Americans said it would be, and almost 80% believed that Iraq did have the weapons.
        - When no weapons of mass destruction were found, many Americans felt dissonance which increased even more when they realized the war cost them financial and human losses, and a bad reputation.
        - To decrease this dissonance, some people altered their memories of the reason for the invasion. It became a movement to liberate the Iraqi people and promote democracy.
        - Eventually, more Americans said they supported the war regardless of not finding any weapons of mass destruction.
- We cannot directly control all our feelings, but we can influence them by changing our behaviour.
- If you feel sad, you can talk in a more positive, self-accepting way to feel better
- *Cruel actions and acts of good will <u>both</u> shape you. Changing our behaviour can change how we think about others and how we feel about ourselves.*

SOCIAL PSYCHOLOGY : MODULE 44

Social Influence

Automatic Mimicry

- Human behaviour is contagious
    - Example: If one person yawns, soon enough so does another. We also take on emotional tones (or the mood) of those around us
- Chartrand and Bargh → researched the ***chameleon effect***
    - Had students work in a room with another person who was actually a confederate working with the researchers
    - At times the confederate would rub their face or shake their foot. Eventually the student began to imitate this behaviour
- Another study has found that people alter their grammar to match what they're reading or hearing
- On a bigger scheme, things like obesity, drug use, loneliness, and happiness spreads through social networks
- Automatic mimicry helps us empathize (feel what others are feeling)
    - This is why we feel happier around happy people or sadder around sad people
    - Studies have shown "mood linkage" (sharing up and down moods) in groups of nurses and accountants
    - Empathetic people tend to get fondness and liking from other people
- Mimicry can sometimes lead to tragedy
    - Example: Following the Columbine High School shooting, almost every US state experienced threats of copycat violence
    - Phillips et al → found that sometimes number of suicides increase after a highly-publicized suicide occurs

Conformity and Social Norms

- **Conformity:** aligning our behaviour or thinking with a group standard
- **Asch** → devised a test to study conformity
    - Participant believes that the test is on visual perception and sits at a table with five other people. The experimenter asks each person, one by one, to say which of three comparison lines is identical to a standard line.
    - Participant clearly sees that the answer is 2 and waits their turn to say so. Boredom sets in as the next set of lines is just as easy.
    - At the third set, the answer seems just as easy, but the first person gives the wrong answer. When the rest of the people give the same wrong answer, the participant sits up straighter and squints and heart rate increases.

  - When it is the participant's turn, they are tense and unsure due to the unanimous wrong answer by the others and the evidence in front of their eyes. They hesitate before answering
  - Results show that college students answering alone make fewer errors and although most told the truth instead of conforming, one-third went along with the group.
- Studies like Asch's have shown that we are more likely to conform when we:
  - Feel incompetent or insecure
  - Are in a group of at least 3 people
  - Are in a group where everyone agrees
  - Admire the group's status
  - Have not already given any response
  - Know that others in the group will watch our behaviour
  - Are from a culture that emphasizes respect for social standards
- Generally, people conform to avoid rejection and gain social approval
  - **Normative social influence:** influence resulting from a person's desire to get approval or avoid disapproval
  - We are sensitive to *social norms* (understood rules for accepted/expected behaviour) because being different is risky. We need to belong.
- We also conform because we want to be accurate
  - When we accept another person's opinion about reality, we are responding to informational social influence
  - **Informational social influence:** influence resulting from one's willingness to accept other people's opinions about reality
  - Sometimes it's good to assume others are right and follow their lead.
    - Example: Rebecca Denton, set a record for the furthest distance driven on the wrong side of the British highway until she ran out of roadway and police punctured her tires. She explained that she thought all the other drivers were coming at her on the wrong side of the road.
- Whether conformity is good or bad partly depends on our cultural influences
  - Western Europeans and in most English-speaking countries, individualism is prized
  - Group standards are honored more in Asian, African, and Latin American countries
  - A study across 17 countries shows that conformity rates are lower in individualist cultures

<u>Obedience: Following Orders</u>

- **Stanley Milgram** → did experiments to study obedience
  - You participate in a study on the effect of punishment on learning. You and another person are asked to pick from a hat to decide who will be the "teacher" and who will be the "learner". You draw "teacher" and are asked to sit in front of a machine that has a set of labeled switches.

  - The other person, who seems mild-mannered, is led to a connected room and strapped to a chair. From the chair, wires run through the wall to your machine.
  - Your task is to teach then test the learner on a list of word pairs. If the learner gives the wrong answer, you have to flip a switch to deliver a brief electrical shock. For the first wrong answer, you will use the "slight shock" switch. With each error you move along the switches increasing in voltage.
  - You do the experiment and at the third, fourth, and fifth switches you hear the learner grunt. After you do the eighth switch (moderate shock), the learner cries out that the shocks are painful. After the tenth (strong shock), he begins shouting to get him out of there and that he refuses to continue.
  - You stop, but the moderator insists that the experiment must continue. You resist but they say "It is absolutely essential that you continue" or "You have no choice, you must go on."
  - If you obey, the learner shrieks in agony and after the 330-volt level, he falls silent. Still, the moderator encourages you to continue and give shocks when no answer is given.
  - In a survey before the experiment, Milgram asked at what level a person would refuse to obey. Most people were sure they would stop when the learner first indicates pain. However, more than 60% of people went all the way up to the last switch.
- **Burger** → replicated Milgram's studies in 2009.
  - 70% of participants obeyed up to 150 volts, a slight decrease from Milgram's result
- Milgram's results are gender neutral; both women and men show similar responses
- Also, the "teachers" did not figure out that they were being tested on their level of obedience to cause punishment or that the learner was pretending to be in pain. The teachers felt genuine distress.
- Milgram's use of deception and stress started a debate over his ethics, but he argued that after finding out the actual research purpose, almost no participant regretted taking part.
- He later found some things that influence people's behaviour and obedience is highest when:
  - The person giving the orders was close at hand and perceived to be a legitimate authority figure
  - The authority figure was supported by a prestigious institution (people more likely to obey if the experiment was associated with Yale University than not)
  - The victim was depersonalized or at a distance, even in another room (soldiers more likely to fire when they can't see the enemy than those who can)
  - There were no role models for defiance (teachers did not see any other participant disobey the moderator)
- An example of the power of close-at-hand, legitimate authority figures is during the Holocaust when commanders ordered their soldiers to shoot innocent villagers and the orders were followed due to obedience

<u>So what do Asch's and Milgram's studies teach us?</u>

- Strong social influences can make people conform to falsehoods or capitulate cruelty

- By focusing on an act of violence or deceit, we ignore how they eventually got there
- Milgram did not ask his participants to zap the learners with high voltage immediately. Instead, he used the foot-in-door technique (beginning small and gradually escalating his demands). That way, the small action of flipping a switch became justified and that made flipping the next switch more tolerable.
- *Greater evils grow out of people's compliance to lesser evils*

Group Behaviour

- **Normal Triplett** → studied how others' presence affects our behaviour
    - Example: kids more likely to wind a fishing reel faster in the presence of someone doing the same thing
    - **Social facilitation**: stronger responses on simple or well-learned tasks in the presence of others
- However, when doing tougher tasks (like solving complex math problems) people perform worse when they're around others doing the same thing.
- Presence of others sometimes helps and sometimes hinders performance
    - When others watch us, we become aroused, and this arousal amplifies our other reactions
    - It strengthens our most likely response (the correct one on an easy task and the incorrect one on a difficult task)
        - Example: Expert pool players who made 71% of their shots when alone made 80% when people came to watch them. Poor pool players who made 36% of their shots when alone only made 25% when they were being watched.
        - Example: Hometown advantage in sports. Enthusiastic crowds have energizing effects
- *What you do well, you are more likely to do better in front of an audience, especially a friendly one. What you find difficult may seem almost impossible when you're being watched.*

- **Social loafing**: the tendency for people in a group to exert less effort when pooling their efforts towards a common goal than when working at it individually
    - Example: when blindfolded people were seated in a group they clapped and shouted as loud as they could when they heard other people clapping and shouting through headphones. When they thought they were alone, they were less likely to be as loud
- **Latané et al** → did experiments on social loafing in the U.S and Asian countries
    - More common in men of individualistic cultures
- Three things cause social loafing:
    - People acting as part of a group feel less accountable so they worry less about what others think
    - Group members may view their individual contributions as dispensable
    - When group members share equally in the benefits, regardless of how much they contribute, some may slack off

- Sometimes the presence of other does both social facilitation and social loafing

  - **Deindividuation:** the loss of self-awareness and self-restraint occurring in group situations that foster arousal and anonymity
  - Example: London riots in 2011. Rioters had social arousal and anonymity by the darkness and hoods
  - Example: Internet trolling. People who would never say "You're a fraud" to someone's face will do it online and hide behind anonymity.

- The beliefs and attitudes we bring to a group grow stronger as we discuss them with like-minded people
- **Group Polarization**: The enhancement of a group's main ideals through discussion within the group
- Can have benefits or consequences
- Example: When high-prejudice students discussed racial issues they became even more prejudiced and when low-prejudiced students did, they became even more accepting
- Example: Suicide terrorism, begins slowly among people who share grievance and eventually categorize the world as "us" against "them"
  - Example: The Internet. It's bad in the way it isolates certain groups with specific perspectives yet good because it connects different people through social networking
- *By linking and magnifying the inclinations of like-minded people, the Internet can be very bad, but also very good.*

- **Irving Janis** → studied decision-making process procedures leading to the ill-fated invasion of America into Cuba during the "Bay of Pigs fiasco" (US invaded Cuba with trained Cuban exiles who were then of course easily captured)
  - Found that the high morale of recently elected President John F. Kennedy created undue confidence. To preserve this good feeling, group members suppressed their opinions and did not speak against the decision which made everyone believe that support was unanimous.
  - Groupthink: the mode of thinking that occurs when the desire for harmony in a decision-making group overrides a realistic appraisal of alternatives
  - Groupthink can be bad (contributing to other major fiascos in history like escalation of Vietnam war) or good (in business world)

- There is power in groups, but also power in individuals
- Social control (power of the situation) and personal control (power of individual) interact and when being pressured we may react by asserting our sense of freedom
- People who are committed can sway the majority and make social history (ex: Rosa Parks)
- Minority influence: the power of one or two individuals to sway majorities

SOCIAL PSYCHOLOGY : MODULE 45

Antisocial Relations

Prejudice: an unjustifiable and usually negative attitude towards a group and its members
- Generally involves stereotyped beliefs, negative emotions, and a predisposition to discriminate

Stereotype: generalized (sometimes accurate, but over generalized) belief about a group of people

Discrimination: unjustifiable negative behaviour towards a group of people and its member

- To measure prejudice we can observe what people say or do
- Support for things like interracial dating and women receiving the same pay as men for the same job has increased over the years
- Overt prejudice (the obvious kind) has decreased but subtle prejudice remains
    - *Example:* People tend to perceive their dads as more intelligent than their moms
        - People feel more positively about women than men

Why does prejudice arise?

- When some people are well off and others are not, the people who are well off tend to develop attitudes that justify why things are this way
- Just-world phenomenon: the tendency for people to believe the world is just and that people therefore get what they deserve and deserve what they get
    - So people assume that those who succeed must be good, and those who suffer must be bad
- Victims of discrimination may react in self-blame or anger, which would add to prejudice through "blame-the-victim"
    - Higher crime rate could be used to justify discrimination against those in poverty

- We have the need to belong and there is safety in numbers
- Prejudice also occurs by dividing the world into "us" and "them"
    - We cheer, defend, and die for our groups
    - **Ingroup:** "Us" – people with whom we share common identity
    - **Outgroup:** "Them" – those whom we think are different from our ingroup
    - **Ingroup bias:** the tendency to favour our own group
        - *Example:* sports teams – Miami Heat (Miami ingroup) vs. Chicago Bulls (Chicago outgroup)
    - Distinguishing between friends and foes in this way predisposes us to be prejudice to strangers

- Prejudice also comes from emotions

- **Scapegoat theory**: theory that prejudice offers an outlet for anger by providing someone for blame
    - *Example:* After 9/11, outraged people lashed out at innocent Arab-Americans

Cognitive Roots of Prejudice

- Prejudice comes from social divisions, emotions, but also from one's mind
- One way we simplify our world is to categorize
    - Therapists categorize psychological disorders, people categorize others by race (despite being mixed, Obama is perceived by most Americans as black)
    - By putting people into groups, we emphasize how different we are
    - **Other-race effect:** tendency to recall faces of one's own race more accurately than faces of other races. Also called the cross-race effect or the own-race bias

Aggression

    - Any physical or verbal behaviour intended to hurt or destroy
- Stems from interaction between biology and experience

Biology of Aggression

- Three levels of influence: genetic, neural, biochemical
- Genetics influence aggression
    - Study done on twins showed that if one identical twin admits to having a violent temper, the other twin will often independently admit the same
    - Fraternal twins are less likely to respond similarly
- No specific spot in brain that controls aggression but when provoked neural systems will either inhibit or facilitate aggression
    - Frontal lobe plays important role in controlling impulses. When damaged, aggression may be more likely
- The hormone testosterone circulates in the bloodstream and influences neural systems that dominate aggression
    - As men age, testosterone levels decrease and in turn, so does aggression

Psychological and Socio-Cultural Factors of Aggression

- **Frustration-aggression principle:** idea that frustration (the lack of an attempt to achieve a goal) create anger which can cause aggression
- Aversive stimuli such as hot temperatures, pain, insults, bad smells, and crowds can cause hostility

Reinforcement and Modelling

- Aggression might be natural response to difficult events but learning can alter natural reactions
- By reinforcing good behaviours, you can create positive change especially in children

- Media is also a strong model for aggression (positive and negative)
    - **Social script:** culturally modeled guide for how o act in various situations

    - When we find ourselves in uncertain situations, we rely on social scripts (things learned from movies or tv) to dictate our behaviour
    - Experiments show that positive video games have positive effects while violent video games increased aggression
    - *We are what we repeatedly do*
    - Violence has many determinants and different biological, psychological, and social factors influence aggressive behaviour

SOCIAL PSYCHOLOGY : MODULE 46

Prosocial Relations

Attraction

- 3 things affect our attraction to others: proximity, attractiveness, and similarity

Proximity

- being geographically close to someone and is a powerful indicator of friendship
- It breeds liking partly because of the mere exposure effect
- Mere exposure effect: idea that repeated exposure to a novel stimuli increases liking of them
    - Applies to music selection, human faces, even the letters in our own name
    - *Familiarity breeds fondness; what is familiar is generally safe and what is unfamiliar could be dangerous*

Physical Attractiveness

- Initially, appearance greatly influences how attracted we are to someone
    - Example: Blind-dates
- Physically attractive people give the impression of being healthier, happier, or more successful
- Beauty is in the eye of the culture
- We also find people with appealing traits (such as honesty, politeness, and humour) as being more physically attractive than people who are rude and unfair

Similarity

- Proximity brings you in contact with someone, appearance makes a first impression, but similarity influences whether you will becomes friends
- In real life, opposites don't attract as much as similar people
- The more similar people are, the more their liking for each other will endure
- In addition to those three factors, we also like people who like us and will continue relationships that offer us more rewards than costs

Romantic Love

- **Passionate love:** an aroused state of intense positive absorption in another, usually present at the beginning of a love relationship
    - Emotions have two ingredients → physical arousal and cognitive appraisal
- **Companionate love:** the deep affectionate attachment we feel for those with whom our lives are intertwined
    - Something that leads to a gratifying and enduring relationship is equity
        - **Equity:** a condition in which people get from a relationship what they give into it
    - Another vital factor is self-disclosure

        - **Self-disclosure:** revealing intimate aspects of oneself to others
    - Positive support is also very important in influencing companionate love

Altruism

- The unselfish concern for the welfare of others
- Became something of interest for researchers after the case of Kitty Genovese
    - She was raped and stabbed outside her home in Queens, New York around 3:30am
    - She screamed and pleaded for help and even though windows opened and lights went on no one came to her aid
    - The attacker returned to rape and stab her again and it wasn't until he left for good that someone did as much as call 911
- Research into "bystander intervention" shows that we will help only if the situation enables us to first notice the incident, to interpret it as an emergency, and finally if we assume responsibility for helping
    - At each of these steps, the presence of others might make us turn away
        - **Bystander effect:** tendency for a bystander to be less likely to help if other bystanders are nearby
    - Also happy people are more likely to help others
    - *Happiness breeds helpfulness and so helpfulness also creates happiness (like doing charity)*

Norms of Helping

- Why do we help?
- **Social exchange theory:** theory that our social behaviour is an exchange process, the aim of which is to maximize benefits and minimize costs
    - When donating blood you think about the costs (time, discomfort, anxiety) against the benefits (social approval, good feelings, charity)
- **Reciprocity norm:** expectation that people will help, not hurt, those who have helped them
- **Social responsibility norm:** expectation that people will help those dependent upon them

Module 7 – Brain States and Consciousness

Defining Consciousness

- Psychology initially was "the description and explanation of states of consciousness" → then became "science of behaviour" → then the concept of consciousness reemerged and the importance of cognition/mental process regained importance
- **Consciousness –** our awareness of ourselves and our environment; allows us to
    - Organize information from different sources when reflecting on our past or forward looking into the future
    - Focus when we learn complex concept or behavior (i.e. when learning to drive, we focus on the car and the road)
    - Has evolution implications – scientists pursuing further research

The Biology of Consciousness

Cognitive Neuroscience

- **Cognitive neuroscience –** interdisciplinary study of the brain activity linked with our mental process
- when body is motionless, mind is still active
    - 23 year old woman was unconscious after a car accident but her brain still showed activity when researcher asked her to imagine playing tennis

Dual Processing: The Two Track Mind

- **Dual processing –** The principle that information is often simultaneously processed on separate conscious and unconscious tracks of our mind. E.G. when we see a bird flying, we may reason the bird is a hummingbird but we are not aware of how we reached that conclusion – i.e we don't realize the way our mind has processed the color, form, movement and distance of the bird
- **Blindsight –** condition in which a person can respond to a visual stimulus without consciously experiencing it – e.g. woman overcome by carbon monoxide; she could slip a postcard into a vertical or horizontal mail slot but cannot tell how the width of a block in front of her
    - Eye sends information simultaneously to different brain areas – the woman's brain area responsible for grasping, reaching, and navigating objects are normal but area responsible for recognizing objects is damaged
- The two tracks are
    - Visual perception track – enables us to recognize things and plan future actions
    - Visual action track – guides our moment-to-moment movements
- The two may conflict – hollow face illusion
    - Person perceives the inside of a mask as a protruding face but hand still reaches into the mask to flick off a switch
- Our conscious typically moves faster than our action. We move our wrist after coming to a conscious decision to do so but our brain waves jump 0.35 seconds before we make that conscious decision to move.

- But then there are types that it comes late – especially when we are routinely used to something such as a tennis player reacting automatically to a serve with consciously recognizing the ball's path afterward
- Unconscious parallel processing is faster than sequential conscious processing. Sequential processing is skilled at solving new problems, which require focused attention

Selective Attention

- **Selective Attention –** the focusing of conscious awareness on a particular stimulus
    - Example – cocktail party effect – ability to attend to only one voice among many, but if someone speaks your name, your consciousness instantly brings that conversation into your attention radar

Selective Attention and Accidents

- When we are driving and talking on the phone or listening to music, our attention shifts back and forth between the road and the electronics
- We are at higher risk when driving and talking on the phone/texting. The risk is greater than speaking with a passenger in the car because the passenger can recognize the driving demands and pause conversation
    - Cell phone users (hands free sets included) were four times more at risk for accidents VS. conversation with passenger were only 1.6 times more at risk

Selective Inattention

- **Inattentional blindness** → result of focusing attention on some part of our environment (while ignoring the rest) → selective attention is very powerful
- **Change blindness –** failing to notice change in environment
- **Choice blindness –** we are biased by our preference – e.g. people tasted two jams, indicated a preference, retasted, had the "same" preference, but didn't realize that the jams have been changed jars and the retasted preference was their nonpreferred jam

Module 8 – Sleeps and Dreams

- EEG recordings confirm that the brain's auditory cortex responds to sound stimuli even during sleep
- When you are asleep, as when you are awake, you process most info outside your conscious awareness
- By recording brain waves and muscle movements, and by observing and occasionally waking sleepers, researchers are glimpsing things that a thousand years of common sense never told us

8-1: Circadian Rhythm

Circadian rhythm: An internal clock that roughly synchronizes our bodies with the 24-hour cycle of day and night

- As morning approaches, body temperature rises, then peaks during the day, dips for a time in early afternoon, and begin to drop again in the evening
- Thinking is sharpest and memory most accurate when we are at our daily peak in circadian arousal
- Age and experience can alter our circadian rhythm
    - E.g. most 20 year olds are evening-energized "owls"
    - E.g. most older adults are morning-loving "larks" with performance declining as the day wears on
    - At about age 20 (or a little earlier for women), we shift from being owls to larks

8-2: Sleep Stages

- Rather than emitting a constant dial tone, the sleeping brain has its own biological rhythm
- About every 90 minutes, we cycle through 4 distinct sleep stages
- Researchers used electrodes near patient's eyes to record the rolling eye movements believed to occur during sleep
    - Discovered **REM sleep** (rapid eye movement)
- When you are in bed with your eyes closed, the researcher in the next room sees on the EEG relatively slow **alpha waves** of your awake but relaxed state
    - You eventually grow in an unremembered moment as you slip into sleep
    - Transition is marked by slowed breathing and the irregular brain waves of non-REM stage 1 sleep (NREM-1)
- During the brief NREM-1 sleep, you may experience fantastic images resembling **hallucinations** – sensory experiences that occur without a sensory stimulus
    - May have sensation of falling or floating
    - These **hypnagogic** sensations may later be incorporated into your memories
- You then relax more deeply and begin about 20 minutes of NREM-2 sleep, with periodic **sleep spindles** – bursts of rapid, rhythmic brain-wave activity
    - You can be awakened easily but still considered asleep
- Then you transition to the deep sleep of NREM-3

  - During this slow-wave sleep, which lasts for about 30 minutes, your brain emits large slow **delta waves**
  - You are harder to awaken
  - These slow delta waves are at the end of the deep sleep

REM sleep

- About an hour after you fall asleep, rather than continuing in a deep slumber you ascend from your initial sleep dive
- Returning through NREM-2 (where you spend most of your night) you enter to REM sleep
- For about 10 minutes, your brain waves become rapid and saw-toothed, more like those of the nearly awake NREM-1 sleep
- Unlike NREM-1, during REM sleep your heart rate rises, your breathing becomes rapid and irregular, and every half minute or so your eyes dart around in momentary bursts of activity behind closed lids
  - These eye movements announce the beginning of a dream
- Except during very scary dreams, your genitals become aroused during REM sleep
  - Genitals are aroused regardless of whether the dream's content is sexual
  - Explains men's "morning wood" – stemming from last night's REM period
  - In young men, sleep related erections outlast REM periods (30-40 min avg)
    - Time decreases with age
- Your brain's motor cortex is active during REM sleep but your brainstem blocks its messages
  - This leaves muscles relaxed – you are essentially paralyzed
- You cannot be easily awakened
- This immobility may occasionally linger as you awaken from REM sleep, producing experience of **sleep paralysis**
- REM sleep sometimes called **paradoxical sleep** – body is internally aroused, with waking-like brain activity, yet asleep and externally calm
- The sleep cycle repeats itself about every 90 minutes for younger adults
- As night wears on, deep NREM-3 sleep grows shorter and disappears
  - REM and NREM-2 sleep periods get longer
  - By morning, we have spent roughly 20-25% of an average night's sleep in REM sleep

8-3: What Affects Our Sleep Patterns?

- Idea that everyone needs 9 hours of sleep is untrue
- Newborns sleep nearly 2/3 of their day while most adults have no more than 1/3
- Sleep patterns are also genetically influenced
  - In studies of fraternal and identical twins, only identical twins had strikingly similar sleep patterns
- Sleep patterns are also culturally influenced
  - Adults in US and Canada on average sleep 7-8 hours per night
- Bright morning light tweaks the circadian clock by activating light-sensitive retinal proteins
  - These proteins control the circadian clock by triggering signals to the brain's **suprachiasmatic** nucleus (SCN)

- SCN causes the brain's pineal gland to decrease its production of the sleep-inducing hormone **melatonin** in the morning and to increase it in the evening

8-4: Sleep Theories

Psychologists believe sleep may have evolved for 5 reasons:

1. **Sleep protects**
   - A species' sleep pattern tends to suit its ecological niche
   - Animals with the greatest need to graze and the least ability to hide tend to sleep less
2. **Sleep helps us recuperate**
   - It helps restore and repair brain tissue
   - Animals with high waking metabolism burn a lot of calories, producing a lot of *free radicals* –molecules that are toxic to neurons
   - Sleeping a lot gives resting neurons time to repair themselves
3. **Sleep helps restore and rebuild our fading memories of the day's experiences**
   - Sleep consolidates our memories
   - It strengthens and stabilizes neural memory traces
4. **Sleep feeds creative thinking**
   - On occasion, dreams have inspired noteworthy literary, artistic, and scientific achievements
   - A complete night's sleep boosts our thining and learning
   - People are better at spotting connections among novel pieces of info after sleep
5. **Sleep supports growth**
   - During deep sleep, pituitary gland releases a growth hormone
   - This hormone is necessary for muscle development
   - Can dramatically improve athletic ability

8-5: Sleep Deprivation and Sleep Disorders

Effects of Sleep Loss

- Most adults will sleep at least 9 hours a night
  - with that much sleep, we awake refreshed, sustain better moods, and perform more efficient and accurate work
- E.g. the US navy and National Institutes of Health have demonstrated the benefits of unrestricted sleep in experiments where volunteers spent 14 hours daily in bed for at least a week
  - 63% of adults who reported getting the sleep they needed also reported being "very satisfied" with their personal life
- College and university students are especially sleep deprived
- Sleep loss is a predictor of depression
  - Researchers who studied 15,500 young people 12-18 years old found that those who slept 5 or fewer hours a night had a 71% higher risk of depression than their peers who slept 8 hours or more
  - REM sleep's processing of emotional experiences helps protect against depression

- Sleep deprivation can also make you gain weight
    - Sleep deprivation increases **ghrelin** – a hunger-arousing hormone and decreases its hunger-suppressing partner **leptin**
    - Also increases **cortisol** – a stress hormone that stimulates the body to make fat
- Sleep deprivation can suppress immune cells that fight off viral infections and cancer
    - E.g. experiment proved that those who had been averaging less than 7 hours of sleep were 3 times more likely to develop a cold than those who slept 8 or more hours
    - When infection sets in, we typically sleep more, boosting our immune cells
- Sleep deprivation slows reactions and increases errors on visual attention tasks similar to those involved in screening airport baggage, performing surgery, etc
- Stanley Coren found that in both Canada and US accidents increase immediately after the time change from "spring forward" to "daylight savings" shortens sleep

Major Sleep Disorders

- **Insomnia** – persistent problems in falling or staying asleep
- Ironically, insomnia is worsened by fretting about one's insomnia
    - In lab studies, insomnia complainers sleep less than others but they typically overestimate how long it takes them to fall asleep
- The most common quick fixes for true insomnia is sleeping pills and alcohol
    - However, can aggravate the problem, reducing REM sleep
    - Such aids can lead to a tolerance for those drugs
- An ideal sleep aid would mimic the natural chemicals that are abundant during sleep, without side effects
- **Narcolepsy** is having sudden attacks of overwhelming sleepiness, usually lasting less than 5 minutes
    - Narcolepsy attacks can occur at the most inopportune times
    - In severe cases, person collapses directly into a brief period of REM sleep, with loss of muscular tension
    - It is a brain disease
    - Most cases have absence of a hypothalamic neural center that produces **orexin**
- **Sleep apnea** means "with no breath" and people with this condition intermittently stop breathing during sleep
    - Decreased blood oxygen arouses them and they wake up enough to snort in air for a few seconds
    - Process repeats hundreds of times each day, depriving them of slow-wave sleep
    - Apnea sufferers don't recall these episodes the next day
    - Associated with obesity
    - Signs include: snoring loudly, daytime sleepiness and irritability, high blood pressure
    - Treatment is a masklike device with an air pump that keeps the sleeper's airway open
- **Night terrors** target mostly children, who may sit up or walk around, talk incoherently, experience doubled heart and breathing rates, and appear terrified
    - They seldom wake up fully during an episode
    - Recall little or nothing the next morning

  - They are NOT nightmares
  - Night terror usually occur during the first few hours of NREM-3
- **Sleepwalking** and **sleep talking** are another NREM-3 disorder
  - Usually childhood disorders and run in families
  - Can occur during any sleep stage
  - Young children who have the deepest and lengthiest NREM-3 sleep are most likely to experience both night terrors and sleepwalking

8-6: What We Dream

- Daydreams tend to involve the familiar details of our life
- **REM dreams** are vivid, emotional, and bizarre
  - Sometimes may confuse them with reality
- Common themes are repeatedly failing in an attempt to do something, of being attacked, pursued, or rejected
- More commonly, the story line of our dreams incorporates traces of previous day's nonsexual experiences and preoccupations
    - Sexual imagery occur less than you think
- Our two-track mind is also monitoring our environment while we sleep
  - Sensory stimuli may be instantly and ingeniously woven into the dream
    - E.g. phone ringing

8-7: Why We Dream

Dream theorists have proposed several explanations of why we dream:

1. **To satisfy our wishes**
   - Sigmund Freud proposed that dreams provide a psychic safety valve that discharges otherwise unacceptable feelings
   - Viewed dream's **manifest content** (the apparent and remembered story line) as a censored symbolic version of its **latent content** (the unconscious drives and wishes that would be threatening if expressed directly)
   - Freud considered dreams the key to understanding our inner conflicts
   - However, many critics say "there is no reason to believe any of Freud's specific claims about dreams and their purposes"

2. **To file away memories**
   - The information-processing perspective proposes that dreams may help sift, sort, and fix the day's experiences in our memory
   - Brain scans confirm the link between REM sleep and memory
3. **To develop and preserve neural pathways**
   - Perhaps dreams serve a physiological function, providing the sleeping brain with periodic stimulation
   - Stimulating experiences preserve and expand the brain's neural pathways
4. **To make sense of neural static**

- Other theories propose that dreams erupt from neural activation spreading upward from the brainstem
- One version says that dreams are the brain's attempt to make sense of random neural activity
- Much as neurosurgeon can produce hallucinations by stimulating different parts of a patient's cortex, so can stimulation originating within the brain
- These internal stimuli activate brain areas that process visual images, which receives raw input from the eyes
- Frontal lobe regions responsible for inhibition and logical thinking seem idle
- Adding to all the above, the limbic system's emotional tone to the brain's visual parts, we form a dream

5. **To reflect cognitive development**
    - Some dream researchers dispute both the Freudian and neural activation theories
        - Prefer to see dreams as part of brain maturation and cognitive development
    - E.g. prior to age 9, children's dreams seem more like a slide show and less like an active story in which the dreamer is an actor
    - Dreams overlap with waking cognition and feature coherent speech
    - They stimulate reality by drawing on our concepts and knowledge
    - Cognitive perspective emphasize our mind's top-down control of our dream content

Module 9: Hypnosis

9.1 What is hypnosis and what powers does hypnosis have over a hypnotized subject

- you are given a hypnotic induction and then may experience hypnosis
- **hypnosis**: a social interaction in which one person suggest to another that certain perceptions, feeling, thoughts or behaviours will occur at one
- **posthypnotic suggestion: a** suggestion, made during a session, to be carried out after the subject is no longer hypnotized
- the power of hypnotises reside in the subjects openness to suggestion and their ability to focus on certain images or behaviours
- *Can anyone experience hypnosis*: postural sway is one of the items assessed with hypnosis; people become absorbed in imaginative activities
- *Can hypnosis enhance recall of forgotten events:* People believe that experiences are recorded in three and we can access them in our brain only if we break through a defence → This is wrong. We only remember certain events and hypnosis helps refresh these memories.
- *Can hypnosis force people to act against their will:* From an experiment discovered that all un-hypnotized participants performed the same acts as those who were hypnotized
- *Can hypnosis help people heal or relieve their pain:* posthypnotic suggestions has helped people alleviate headaches, asthma, and stress related skin disorders. It also inhibits pain-related activity

9.2 - Explaining the Hypnotized State

As a Social Phenomenon

- Believe that hypnotic phenomena reflect workings of normal consciousness and well as the power of social influence
- This does not mean that fake it, they just get caught up and begin to feel like a good hypnotic subject
- More they trust them, they more they all the person to direct them

Hypnosis as Divided Consciousness

- Believe that it is more than inducing someone to play the role of a good subject
- Imaginations had become a compelling hallucination
- Hypnotized people were less slowed by the word colour conflict of the word RED in green letters
- Ernest Hilgard believed that hypnosis involves social influence but also special dual processing state dissociation – a split between different levels of consciousness
    - Attention is diverted from painful ice bath
        - **Divided consciousness theory**: hypnosis has caused a split awareness
        - **Social Influence Theory**: the subject is so caught up in the hypnotized role that she ignores the role
    - Another form of dual processing is selective attention
        - Reduces stimuli in the regions that processes painful stimuli

Summary

Hypnosis

Biological influences: distinctive brain activity, unconscious information processing

Psychological influences: focused attention, expectations, dissociation between normal sensations and conscious awareness

Social-cultural influences: presence of an authoritative person in legitimate context

Module 10: Drugs and Consciousness

Psychoactive drugs: chemicals that change perceptions and moods

- Effect of a drug depends on biological effects but also on the psychology

10.1 Tolerance, Dependence and Addiction

- continued use of a drug effect, people build a tolerance and therefore needs a larger and larger dose, which will lead to addiction
- stopping the drug will leads to effect of withdrawal. The body may feel physical pain and intense cravings indicating physical dependence.
-psychological dependence: for stress relieving drugs such as alcohol Types of Psychoactive Drugs

10.2 Depressants

- are drugs such as alcohol, barbiturates and opiates that calm neural activity and slow body functions

Alcohol

- Slowed neural processing: low dose of alcohol relax the drinker by slowing sympathetic nervous system activity
- Memory Disruption: disrupts memory formation. Drinking can also have long term effects on the brain and cognition. Those people will alcohol dependence, prolonged and excessive drinking can shrink the brain
- Reduced Self-Awareness and Self Control: in a experiment those who consumed alcohol were doubly likely to be caught mind wandering during a reach takes yet were less likely to notice that they zoned out
- Expectancy Effects: when people believe that alcohol affects social behavior in certain ways, and believe rightly or wrongly that they have drinking alcohol that will behave accordingly

Barbiturates: drugs that depress nervous system activity

- Examples are nembutal, seconal and amytal are prescribed to induce sleep or reduce anxiety

Opiates: similar to morphine and heroin, depress neural functioning

- Get short term please at long term price as people crave for another fix
- Flooded with an artificial opiate the brain eventually stops producing endorphins
- If the artificial withdrawn, the brain lacks the normal level of these painkilling neurotransmitters
- Methadone: a synthetic opiate prescribed as a substitute for heroin or for relief of common pain can also produce tolerance and dependence

10.3 Stimulants

- excites neural activity and speeds up body functions

Pupils dilate, heart and breaking rates increase, and blood sugar level rises, casing a drop in appetite. This causes energy and self-confidence also rise

- Stimulants include caffeine, nicotine, the amphetamines, cocaine, methamphetamine and ecstasy
- Use them to feel alert and lose weight

Nicotine

- Found in cigarettes and other tobacco products
- Difficult to quit because tobacco products are powerfully and quickly addictive as heroin and cocaine
- Smokers become dependent and they develop tolerance
- Withdrawal: craving, insomnia, anxiety, irritability and distractibility

Cocaine

- Enters the bloodstream quickly, producing a rush of euphoria that depletes the brains supply of the neurotransmitters dopamine, serotonin and norepinephrine

- Within an hour, a crash of depression follows as the drugs effect wears off

Methamphetamine

- Chemically related to its parent drug amphetamine
- - triggers the release of neurotransmitters dopamine which stimulates brain cells that enhance energy and mood
- Have eight hours of energy and euphoria

Ecstasy

- A street name MDMA (methylenedioxymethamphetaimine) is both a stimulant and mild hallucinogen
- Triggers a dopamine release
- Feel after an hour of taking it
- Experience high energy

10.4 Hallucinogens

- distort perceptions and evoke sensory images in the absence of sensory input

LSD (lysergic acid diethylamide)

- Emotions vary from euphoria to panic
- Powerful hallucinogenic drug also known as acid

Marijuana

- THC (the major active ingredient in marijuana that triggers a variety of effect including mild hallucinations
- THC stays in the body for a week or more
- Feeling anxious or depressed will cause these feeling to intensify
- Disrupts memory formation and interferes will recall of information learned only a few minutes before

Psychological and Social Cultural Influences

Biological Influences

- Genetic predispositions
- Variations in neurotransmitter systems

Psychological Influence

- Lacking sense of purpose
- Significant stress
- Psychological disorders such a depressions

Social Cultural Influences

- Urban environment
- Cultural attitude toward drugs use
- Peer influences

Module 4 – Neural and Hormonal Systems

Biology, behavior and mind

- **Biological perspective –** concerned with the links between biology and behavior; includes psychologists working in neuroscience, behavior genetics, and evolutionary psychology.
- Our behavior is based on how biological, psychological, and social systems work and interact.

Neural Communication

Neurons

- Building blocks of the nervous system; a nerve cell
- Each has a cell body and branching fibers
- **Dendrite –** receiving end of a neuron
- **Axon –** once receives information from dendrite, axon passes the message (in the form of neural impulse) to other neurons
- **Myelin sheath –** fatty tissue that insulate axons and help with speed neural impulses
    - if it degenerates – communication with muscle slows (eventually lost) - multiple sclerosis
- Neuron transmit messages when stimulated by signal from our senses/triggered by chemical signal from neighboring neurons → fires an impulse (an action potential) → the impulse travels down the axon →
- **Action potential –** brief electrical charge
- Neurons generate electricity from chemical events – exchange of ions
    - Fluid outside an axon's membrane has mostly positively charged ions
    - Resting axon's fluid interior has mostly negatively charged ions
    - Above two together is called resting potential
- Axon's surface is selective – selectively permeable
- When neuron fires:
    - A section of axon's membrane opens up
    - Positive ions outside of axon's membrane flood into the axon
    - This depolarizes that axon section (it's depolarize because now both inside and outside of the membrane are positively charged, instead of positive outside and negative inside)
    - This depolarization causes the next section to open up, and the process repeats
- There are refractory periods – resting pauses during which neuron pumps these positive ions (that had flood in) out, to restore its resting potential state → this way it can fire again
- **Review diagram on pg 49 for the neuron process**
- There are excitatory (pushing a neuron's accelerator) and inhibitory (pushing its break) signals
- IF (excitatory – inhibitory) > intensity threshold = action potential → this is an all-or-none response; how much greater over the threshold does not influence the intensity; as long as it is threshold, it's on → therefore a strong stimulus is characterized by more neurons being fired, not higher intensity of each neuron.

How Neurons Communicate

- **Synapse –** meeting point between neurons
- Axon terminal of one neuron is separated from the receiving neuron by a synaptic gap/cleft
- How it transfers information across the synaptic gap:
    - action potential reaches the terminal
    - neurotransmitters (chemical messages) are released into the synaptic gap
    - these neurotransmitters bind to receptor sites on receiving neuron in lock and key fashion
    - then they unlock channels at the receiving site
    - electronically charged atoms flow in – exciting or inhibiting the receiving neuron's readiness to fire
    - excess neurotransmitters then are reabsorbed by the sending neuron → **reuptake**

How Neurotransmitters influence us

- They affect our motions and emotions
- Acetylcholine (ACh) – best understood, plays role in learning and memory, found in all junction between motor neurons and skeletal muscles; when it is released – muscles contract; if blocked, muscles cannot contract and we are paralyzed
- Morphine (opiate drug that elevates mood and eases pain) bound to receptors in areas linked with mood and pain sensations → they are received by our brain because our body produces chemicals of same nature (endorphins) → think of "runner's high"
- **How drugs and other chemicals alter neurotransmission**
    - When we intake too much drugs such as heroin/morphine, our brain stops producing its own natural opiates → we become dependent on the drug for pain killing → when drug is withdrawn we feel deprived
    - Agonist molecules – similar to neurotransmitter and bind to its receptors and mimic its effect
    - Antagonists –similar to neurotransmitter's shape but once bound to receptors they block neurotransmitter's functioning (not similar in function)
    - **Review pg. 52 for neurotransmitters and their functions**

The Nervous system

- **Nervous system –** the body's speedy, electrochemical communication network; consist of nerve cells of the peripheral and central nervous systems
- Breaks down to **Central nervous system (brain and spinal cord) and the Peripheral nervous system (sensory and motor neurons that connect the CNS to the rest of the body)**
- **Nerves –** bundled axons that form neural cables connecting the CNS with muscles, glands, and sense organs
    - **Sensory neurons** – carry messages from body's tissues and sensory receptors inward to brain and spinal cord for processing
    - **Motor neurons** – carry instructions from CNS out to body's muscles
    - **Interneurons** – within the brain and spinal cord; intervene between sensory inputs and motor outputs

Peripheral Nervous System

- Two components
    - **Somatic nervous system –** enables voluntary control of our skeletal muscles
    - **Autonomic nervous system (ANS) –** controls our glands and the muscles of internal organs (i.e. regulates heart beat); breaks down into
        - **Sympathetic nervous system –** arouses and expends energy
        - **Parasympathetic nervous system –** produces opposite effects, conserving energy, calms you down
        - They work together to keep you in a steady internal state

Central nervous system

- Brain's neuron's cluster into neural networks
- Spinal cord – two-way information highway connecting between the peripheral nervous system and the brain
- Sensory information are sent up through ascending neural fibers, whereas motor control information is sent down in descending fibers.
- Neural pathways govern reflexes
- If spinal cord is damaged – brain becomes out of touch with the rest of the body

Endocrine system

- **Endocrine system –** the body's slow chemical communication system; set of glands that secrete hormones into the bloodstream
- **Hormones –** travels through the bloodstream and affect other tissues
- In moment of danger, adrenal gland are ordered by the ANS to release epinephrine and norepinphrine (adrenaline and noradrenaline) → increase heart rate, blood pressure, blood sugar → surge of energy
- **Pituitary gland – the master gland** located in the core of the brain; controlled by the hypothalamus
    - Releases certain hormones such as growth hormone that stimulates development; oxytocin that enables contraction associated with birthing, milk flow during nursing, and orgasm, and promotes pair bonding and social trust
    - Feedback system: brain → pituitary → other glands → hormones →body and brain

Review diagram on page 54

Module 5-Tools of Discovery and Older Brain Structures

- The brain enables the mind; seeing, hearing, smelling, feeling, thinking, speaking, dreaming etc.
- The brain self –reflectively analyzes the brain; when we're thinking about our brain, we're thinking with our brain
- Brain+body=mind
- Neuroscientists say, the mind is what the brain does
- Brain, behaviour and cognition are an integrated whole
- Today scientists can selectively lesion (destroy) tiny clusters of brain cells, leaving the surrounding tissue unharmed
- In the lab such studies have revealed for example that damage to one area of the hypothalamus in a rat's brain reduces eating, to the point of starvation, whereas damage to another area produces overeating
- Today's neuroscientists can also electrically, chemically or magnetically stimulate various parts of the brain and note the effect
- Depending on the stimulated brain part people may for example giggle, hear voices, turn their head or have an out of the body experience
- Our mental activity emits electrical, metabolic and magnetic signals that would enable neuroscientists to observe our brain at work
- Electrical activity in the brain's billions of neurons sweeps in regular waves across its surface
- An electroencephalogram (EEG) is an amplified readout of such waves
- With no direct access to the brain EEG allow researchers to present a stimulus repeatedly and have a computer filter out brain activity unrelated to the stimulus. What remains is the electrical wave evoked by the stimulus
- Positron emission tomography scan (PET) depicts brain activity by showing each brain area's consumption of its chemical fuel, the sugar glucose
- PET scan can track the gama rays release by this glucose as the person performs a given task
- Magnetic resonance imaging (MRI) scans the brain
- A persons head is put in a strong magnetic field, which aligns the spinning atoms of brain molecules. A radio wave pulses momentarily disorients the atoms. When atoms return to their normal spin they emit singles that provide a detailed picture of soft tissues, including the brain
- Function MRI (fMRI) is a special application of MRI that can reveal the brain's functioning and structure. Where the brain is especially active, blood goes
- By comparing MRI scans taken less than a second apart, researchers can watch the brain "light up" with increased oxygen laden blood-flow as a person performs different mental functions.

Older Brain Structure

The brainstem

- The oldest and innermost region
- It beings where the spinal cord swells slightly after entering the skull
- The slight swelling is the medulla (Fig.5.4 pg 63) which controls our heartbeat and breathing
- It is a crossover point, where most nerves to & from each side of the brain connect with body's opposite side
- Includes pons and medulla-an extension of the spinal cord.
- The thalamus is attached to the top of the brainstem. The reticular formation passes through both structures.

The Thalamus

- Sits atop the brainstem, it is a pair of egg-shaped structures that act as the brain's sensory switchboard
- Receives information from all the senses except smell and routes it to the higher brain regions that deal with seeing, hearing, tasting and touching
- It also receives some of the higher brain's replies, which it then directs to the medulla and to the cerebellum

The reticular Formation

- Located inside the brainstem between the ears
- It is a finger-shaped network of neurons that extends from the spinal cord right up through the thalamus
- As the spinal cords sensory input flows up the thalamus some of it travels through the reticular formation which filters income stimuli and replays important information to other brain areas

The cerebellum-'little brain'

- Extends from the rear of the brainstem
- Is baseball size and two wrinkled halves resemble
- It enables nonverbal learning and memory
- Helps judge time, modulate our emotions and discriminate sounds and textures
- It coordinates voluntary movement

The Limbic System

- Between the oldest and newest brain areas lies the limbic system (limbus means "border")
- This system contains the amygdale, the hypothalamus and the hippocampus
- The hippocampus processes conscious memories

The amygdale

- Two lima-bean-size neural clusters linked to aggression (rage) and fear as well as the perception of these emotions and the procession of emotional memories
- The brain is not neatly organized intro structures that correspond to our behaviour categories
- When we feel or act in aggressive or fearful ways, there is neural activity in many levels of our brain
- Even with the limbic system, stimulating structures other than the amygdale can evoke aggression or fear

The hypothalamus

- Below the thalamus is the hypothalamus (see fig. 5.8 pg 66)
- An important link in the command chain governing bodily maintenance
- Some neural clusters in the hypothalamus influence hunger, others regulate thirst, body temperature and sexual behaviour
- Together, they help maintain a steady internal state
- As the hypothalamus monitors the state of your body it tunes into your blood chemistry and any incoming orders from other brain parts

- Interplay between the nervous and endocrine system: the brain influences the endocrine system which in turn influence the brain
- In 1954 two McGill University neuropsychologists made an unexpected discovery about the hypothalamus through an experiment on rats
- Other limbic system reward centres like the nucleus accumbens in front of the hypothalamus were later discerned in many other species including dolphins and monkeys
- Animal research has revealed both a specific centers associated with the pleasures of eating, drinking and sex-they appear to come equipped with built-in systems that reward activities essential to survival
- Contemporary researchers are experimenting with new ways of using limbic stimulation to control animals' actions in future applications
- Humans also have limbic centers for pleasure
- Some researchers believe that addictive disorders may stem from malfunctions in natural brain systems for pleasure and well-being
- People genetically predisposed to this reward deficiency syndrome may crave whatever provides that missing pleasure of relives negative feelings

****See fig. 5.11 which locates the brain areas that are discussed in module 5**

Key Terms for Module 5

Lesion- tissue destruction. A brain lesion is a naturally or experimental caused destruction of the train tissue

EEG-an amplified recording of the waves of electrical activity that sweep across the brain's surface, these waves are measured by electrodes place on the scalp

PET-a visual display of brain activity that detects where a radioactive form of glucose goes while the brain performs a given task

MRI-a technique that uses magnetic fields and radio waves to produce computer generated images of soft tissue. MRI scans show brain anatomy.

fMRI-a technique for revealing blood-flow and, therefore brain activity by comparing successive blood-flow and therefore brain activity by comparing successive MRI scans. fMRI scans show brain function

Brainstem-oldest part and central core of the brain, beginning where the spinal cord swells as it enters the skull; the brainstem is responsible for automatic survival functions

Medulla-base of the brainstem; controls heartbeat and breathing

Thalamus-brains sensory switchboard, located on top of the brainstem; it directs messages to the sensory receiving areas in the cortex and transmits replies to the cerebellum and medulla

Reticular formation-a nerve network that travels through the brainstem and plays an important role in controlling arousal

Cerebellum-the "little brain" at the rear of the brainstem; functions include processing sensory input and coordinating movement output and balance

Limbic system-neural system (including the hippocampus, amygdale and hypothalamus) located below the cerebral hemispheres; associated with emotions and drives. The limbic system's hypothalamus controls the nearby pituitary gland (see Fig 5.7 pg 65)

Amygdala-two lima-bean sized neural clusters in the limbic system; linked to emotion

Hypothalamus-a neural structure lying below (hypo) the thalamus; it directs several maintenance activities (eating, drinking, body temperature) helps govern the endocrine system via the pituitary gland and is linked to emotion and reward

Module 6-The Cerebral Cortex and Our Divided Brain

The Cerebral Cortex

- Older brain networks sustain basic life functions and enable memory, emotions, and basic drives
- Newer neural networks within the cerebrum-the hemispheres that contribute 85% of the brain's weight-for specialized work teams that enable our perceiving, thinking and speaking
- Like other structures about the brainstem, the cerebral hemispheres come as a pair
- Covering those hemispheres is the cerebral cortex-a thin surface layer of interconnected neural cells
- It's the brains thinking crown, the body's ultimate control and information-processing center

Structure of the cortex

- The brain's ballooning left and right hemispheres are filled mainly with axons connecting the cortex to the brain's other regions
- The cerebral cortex-thin surface layer contain about 20-23 billion nerve cells and 300 trillion synaptic connections
- Supporting these billions of nerve cells are 9 times as many spider glial cells
- Neurons cannot feed themselves, glial cells provide nutrients and insulating myelin, guide neural connections and neurotransmitters
- Glia may also play a role in learning and thinking, while working with neurones they may participate in information transmission and memory
- Each hemisphere's cortex is subdivided into 4 lobes. Separated by prominent fissures or fold
- Starting at the front of your brain and moving over the top, there are frontal lobes (behind your forehead), the parietal loves (at the top and to the rear), and the occipital lobes (at the back of your head)
- Reversing directions and moving forward, just above the ears are the temporal lobes
- Each of the 4 lobes carries out many functions, and many functions require the interplay of several lobes

Functions of the Cortex-Motor Functions

- In 1870 German physicians Gustav Fritsch and Eduard Hitzig made an important discovery: mild electrical stimulation to parts of the animal's cortex made part of its body move
- Stimulation caused movement only when applied to an arch shaped region at the back of the frontal lobe, running roughly ear to ear across the top of the brain
- Stimulating parts of this region in the left or right hemisphere caused movements of specific body parts on the opposite side of the body
- Fritsch and Hitzig had discovered what is now called the motor cortex
- Otfrid Foerster and Wilder Penfield were able to map the motor cortex in hundreds of wide-awake patients by stimulating different cortical areas and observing the body's response
- They discovered that body areas requiring precise control like the fingers and mouth, occupy the greatest amount of cortical space
- Spanish neuroscientist Jose Delgado demonstrated motor behavior mechanics
- More recently, scientists were able to predict a monkey's arm motion a tenth of a second before it moved by repeatedly measuring motor cortex activity preceding specific arm movements
- Such findings have opened the door to research on brain-controlled computers
- Brain Computer interfaces-research have used moneys to match the their thinking with computer activity

- Clinical trials of such cognitive neural prosthetics are now under way with people who have suffered paralysis or amputation

Sensory functions

- Research has identified the cortical area that specializes in receiving information from the skin senses and from the movement of body parts
- This area at the front of the parietal loves, parallel to and just behind the motor cortex, is called the sensory cortex
- Stimulate a point of top of this band of tissue and a person may report being touched on the shoulder; stimulate some point on the side and the person may feel something on the face
- From your occipital lobes, visual information goes to other areas that specialize in tasks like identifying words, detecting emotions, and recognizing faces
- In the association areas neurons are busy with higher mental function-many of the tasks that make us human
- Association areas are found in all four lobes
- In the frontal lobes, they enable judgment, planning and processing of new memories
- Frontal lobe damage can alter personality and remove a person's inhibitions
- With frontal lobes ruptured, people's moral compass seems to disconnect from their behaviour
- Association areas also perform other metal functions like enabling us to recognize faces
- Complex mental functions don't reside in a single place; memory, language and attention result from the synchronized activity among distinct brain areas-our mental experiences arise from coordinated brain activity

The Brain's Plasticity

- Our brains are sculpted not only by our genes but also by our experiences
- The brain's plasticity: its ability to modify itself after damage
- Some of the effects of brain damage described earlier can be traced to two hard facts
    - Severed neurones usually do not regenerate
    - Some brain functions seem preassigned to specific areas
- Some neural tissue can reorganize in response to damage
- Under the surface of our awareness, the brain is constantly changing, building new pathways as it adjusts to little mishaps and new experiences
- Plasticity mat occur after serious damage, especially in young children
- Constraint-induced therapy aims to rewire brains and improve the dexterity of a brain-damaged child or even an adult stroke victim
- By restraining a fully functioning limb, therapists force patients to use the "bad" hand or leg, gradually reprogramming the brain
- Plasticity also helps explain why some studies find that deaf people have enhanced peripheral visions. In those people whose native language is sign, the temporal lobe area normally dedicated to hearing waits in vain for stimulation
- Finally, it looks other signals to process like those from the visual system
- Similar reassignment may occur when disease or damage frees up other brain areas normally dedicated to specific functions
- Although the brain often attempts self-repair by reorganizing existing tissue it sometimes attempts to mend itself by producing new brain cells. This process is known as neurogenesis, has been found in adult mice, birds, monkeys and humans
- These baby neurons originate deep in the brain and may then migrate elsewhere and form connections with neighboring neurons

- Master stem cells that can develop into any type of brain cell have also been discovered in human embryo

Our Divided Brain

- In Philip Vogel and Joseph Bogen wondered if they could severed the corpus callosum (wide band of axon fibers connects the two hemispheres and carries messages between them) to treat seizures
- The surgeons operated and found that the patients with the split brains were surprisingly normal, their seizures all but disappeared-patients greatly expanded the understanding of interaction between intact brain's two hemispheres
- Data received by either hemisphere are quickly transmitted to the other across the corpus callosum
- With a split brain, both hemispheres can comprehend and follow an instruction to copy, simultaneously, different figures with the left and right hands
- When the "two minds" are at odds, the left hemisphere try to rationalize reactions it does not understand

Right-Left differences in the intact Brain

- Several studies indicate each hemisphere perform distinct functions in an undivided brains
- When a person performs a perceptually task for example brain waves, blood-flow and glucose consumption reveal increased activity in the right hemisphere
- When the person speaks or calculates activity increase in left hemisphere
- To the brain, language is language whether spoke or singed
- The left hemisphere is adept at making quick, literal interpretation of language, the right hemisphere: excels in making inferences, helps us modulate our speech to make meaning clear, helps orchestrate our sense of self
- Today's neuroscience has come a long way: we can describe the brain, we can learn the functions of its operates, we can study how the parts communicate
- Roger Sperry believed the complex human brain gives rise to consciousness
- He argued the mind emerges from the brain's dance of ions yet is not reducible to it
- The mind seeking to understand the brain- that is indeed among the ultimate scientific challenges

Key Terms

Cerebral cortex-intricate fabric of interconnected neural cells covering the cerebral hemispheres; the body's ultimate control and information-processing centre

Glial cells (glia)-cells in the nervous system that support, nourish, and protect neurons; they may also play a role in learning and thinking

Frontal lovers-portions of the cerebral cortex lying just behind the forehead; involved in speaking and muscle movements and in making plans and judgements

Parietal lobes-portion of the cerebral cortex lying at the top of the head and toward the rear; receives sensory input for touch and body position

Occipital lobes-portion of the cerebral cortex lying at the back of the head; includes areas that receive information from the visual fields

Temporal lobes-portion of the cerebral cortex lying roughly about the ears; includes the auditory areas, each receiving information primarily from the opposite ear
Motor cortex-an area at the rear of the frontal lobes that controls voluntary movements
Sensory cortex- area at the front of parietal lobes that registers and processes body touch and movement sensations
Association areas-areas of the cerebral cortex that are not involved in primary motor or sensory functions; rather, they are involved in higher mental functions such as learning, remembering, thinking and speaking
Plasticity-the brain's ability to change, especially during childhood, by reorganizing after damage or by building new pathways based on experience
Neurogenesis-formation of new neurons
Corpus Callosum- the large bank of neural fibers connecting the two brain hemispheres and carrying messages between them
Split brain- a condition resulting from surgery that isolates the brain's two hemispheres by cutting the fibers (mainly those of the corpus callosum) collecting them

GOOD LUCK!