CHAPTER 3

Consciousness and the 2 track mind

- What is consciousness
    - Being aware of ourselves, thoughts, feelings, behaviours, and environment
    - Human brain processes things at 2 levels (dual processing)
        - @ conscious level: 1 step at a time, serial processing
        - @ unconscious level: multiple steps at a time, parallel processing
- Blindsight
    - Result of damage to visual cortex
    - Ppl who are consciously blind
        - BUT unconsciously, they have some vision
- Selective attention
    - Ability to focus attention on specific stimulus and disregard others
- Inattentional blindness
    - Missing info in environment because you're not paying attention
- Change blindness
    - Miss a significant change in environment because you're not paying attention
- Choice blindness
    - Blind to our choices and preferences
        - Researcher shows 2 stimuli (A and B)
            - Participant prefers A
                - Researcher switches A and B to become each other
                    - Participant explains why he likes B better

Sleep

- Circadian Rhythm
    - *Circa*= about, *diem*= day
    - Biological body clock
    - Circadian Rhythm changes with age
        - As you get older, you wear down earlier in the day

Sleep Stages

- Every 90 minutes, we cycle through 4 distinct sleep stages
- REM sleep
    - Rapid eye movement sleep
- EEG checks sleep
    - Alpha waves= awake but relaxed state (eyes closed)
- 1st transition from awake to non-REM stage 1 (NREM-1)
    - Slowed breathing, irregular brain waves
    - May experience hallucinations
        - May feel like falling

- 2nd transition in NREM-2 for 20 mins
    - Periodic sleep spindles
    - Could be awakened easily, but still asleep
- 3rd transition to NREM-3 for 30 minutes
    - Brain emits slow delta waves
        - Hard to awaken
- REM Sleep
    - An hour after you fall asleep, you come up from your sleep a bit
    - Returning to NREM-2
        - Spend half your night here
            - Transition to REM sleep
                - Most intriguing sleep phase
    - For 10 minutes your brain waves become rapid
        - Heart rate rises, breathing becomes rapid and irregular, every 30s your eyes dart around
            - Eye movements show beginning of a dream
        - Genitals become aroused during REM sleep
    - REM known as paradoxical sleep
        - Inside body is aroused, but you can't move
    - This cycle (NREM-1, NREM-2, NREM-3, NREM-2, REM) repeats itself every 90 mins
        - NREM-3 becomes shorter as the night goes on
        - REM and NREM-2 get longer
    - 20-25% (100 minutes) spent in REM sleep

Sleep Patterns

- Bright morning light affects our Circadian Clock
    - Light sensitive retinal proteins send signals to Suprachiasmatic Nucleus (SCN)
        - Pair of rice grain sized, 10,000-cell clusters in hypothalamus
            - SCN tells pineal gland to decrease melatonin (sleep hormone) in morning, and increase it in the evening
- Too much/too little light disturbs circadian clock
    - We have to force ourselves to sleep and wake up thanks to artificial light

Why do we sleep?

- 5 reasons
    - 1. Sleep protects
    - 2. Sleep helps us recuperate
        - Cleans your brain of toxins
    - 3. Sleep helps rebuild and restore our fading memories of the day's experiences
    - 4. Sleep feeds creative thinking

    - Sleep supports growth
        - Pituitary gland releases growth hormone
        - Athletic ability is improved

Sleep Deprivation

- Increases ghrelin
    - Hunger arousing hormone
- Decreases leptin
    - Hunger suppressing hormone
- Decreases metabolic rate
- Increases cortisol
    - Stress hormone that stimulates the body to make fat

Major Sleep Disorders

- Insomnia
    - Problems falling/staying asleep
- Narcolepsy
    - *Narco* = numb
    - *Lepsy* = seizure
    - Sudden attacks of overwhelming sleepiness, lasting less than 5 minutes
        - Ppl with narcolepsy don't have enough orexin
- Sleep Apnea
    - Apnea= with no breath
    - Stop breathing, then forced to snort in air quickly
        - This deprives people of slow wave sleep
    - Associated with obesity
        - High blood pressure
        - Risk of stroke or heart attack
- Night terrors
    - Target most children
    - Sit up, walk around, talk incoherently, doubled heart and breathing rates, appear terrified
    - Night terrors are not nightmares
        - Occur during NREM-3
- Sleepwalking
    - Also occurs during NREM-3
        - (Sleeptalking occurs during any stage)

Dreams

- REM dreams are vivid, emotional, bizarre
- 2 track mind continues to work while we sleep
    - Smells, sounds around us while we sleep may be incorporated into our dreams

Why do we dream

- To satisfy our own wishes (Science does not support this, Freud sucks)
    - Freud looked at manifest content
        - Part of dream we remember
    - And Latent content
        - Underlying message of dream
- To file away memories
    - Dreams help sift, sort, and fix the day's experiences
- To develop and preserve neural pathways
    - Brain stimulation preserves and expands brain's neural pathways
- To make sense of neural static
- To reflect cognitive development

REM Rebound

- The tendency for REM sleep to increase following REM sleep deprivation (created by repeated awakenings during REM sleep)

Drugs and Consciousness

- Psychoactive Drugs
    - Drugs that influence and affect functioning of brain
    - Can be prescribed
        - Anti depressant
        - Anti anxiety
    - Street drugs
        - Heroin
        - Cocaine
    - Affect brain activity at level of synapse
    - Most street drugs agonize dopamine
        - Influence and affect pleasure pathways in brain
- Addiction
    - Continued use and abuse of drugs= addiction
    - Addiction is a serious brain disease
        - Brain changes, person becomes driven to seek drug regardless of consequences
    - Continued use of drug can result in development of tolerance of drug
        - More and more of drug required to achieve desired effects of drug
- Neuroadaptation:
    - Example of neuroplasticity
        - Brain can change functionally
            - Shutdown of certain neurotransmitter production
        - Brain can change structurally

            - Shutdown certain receptors
        - Other organs could also adapt to drug use
            - Liver becomes more efficient in breaking down alcohol
- Withdrawal
    - Can occur when we stop taking a drug
        - Seriously unpleasant/dangerous psychological effects
    - Develops b/c of dependence on drugs
        - Dependence can be physical
            - Drugs needed for brain to function "normally"
        - Dependence can be psychological
            - Become emotionally attached to drug
- Effects of drugs
    - Do NOT only depend on biochem
        - Expectations, emotions, assumptions, and beliefs also affect
- Bottom line:
    - 2 sides to every drug
        - Euphoria
        - Come down

(3) Types of drugs:

- Depressants: Drugs that reduce/decrease activity of nervous system
    - Alcohol: most commonly used
        - Depressant at both low/high dosages
        - Affects frontal lobes of brain
            - Controls impulses
                - Lack of control results in impulsive actions
        - Effects of low doses
            - Relaxing
            - Decreased tension
            - Decreased inhibitions
            - Impairs concentration
            - Slows reflexes
            - Impairs reaction time
            - Reduces coordination
            - IMPAIRS JUDGEMENT
        - Effects of medium doses
            - Further impairment of judgement
            - Slurred speech
            - Drowsiness
        - Effects of high doses

                - Vomiting
                - Breathing difficulties
                - Unconsciousness
                - Coma
                - Death
                - 1800+ young adults die from alcohol poisoning
            - Other effects
                - Affects memory
                - Reduces self-awareness
- Fetal Alcohol Syndrome (FAS)
    - Pregnant woman who drinks alcohol has risk of giving birth to child with FAS
        - Cognitive impairment
        - Facial deformities
        - Non-curable
- Sexuality
    - Drinking= whiskey dick…
- Organ damage
    - Liver
    - Heart
    - Stomach
- Drinking alcohol affects the brain
    - Cortex
    - Cerebellum
    - Brain stem
- Alcohol affects multiple neurotransmitters
    - Agonizes GABA
    - Antagonizes Glutamate
    - Agonizes dopamine and endorphins
- Continued use and abuse of alcohol shrinks brain
    - Frontal lobes and hippocampus affected
- Brain does not stop developing until 25-30
    - 25= frontal lobe
    - 30= myelin sheath
        - Alcohol more effectively and negatively affects the brain before 25
- Binge drinking
    - Perhaps irreversible damage on brain
- Barbiturates and Tranquilizers
    - Valium
    - Xanax

    - Low dosage = relaxing feeling
    - High dosage= severe consequences
    - GABA agonists
    - Mixing depressants together= lethal effects
- Opiates/Narcotics
    - Can be man made/ found in nature
    - Morphine, oxycontin, opium, heroin
    - Agonize endorphins
    - Antagonize GABA
    - Abuse of opiates= brain shuts down endorphin production
    - Opiates have lethal additive effect
    - After period of cessation from opioid use, previous tolerance level may be lethal
- Stimulants
    - Caffeine
    - Nicotine (=carcinogen)
        - Carcinogen = damages DNA
            - Interferes w/ body's ability to destroy cancer cells
        - 1 cigarette= -12 minutes of lifespan
            - Stoppage of smoking= increase life expectancy more than any other preventative measure
        - Pediatric Disease
            - Why don't people stop?
                - Nicotine= highly addictive
                - Smoking agonizes
                    - Acetylcholine
                    - Dopamine
                    - Norepinephrine
        - Nicotine has dual effect on brain
            - When stressed= relaxant
            - When sluggish=stimulant
    - Amphetamines
        - Drugs that stimulate neural activity
    - Cocaine
        - Highly addictive
        - Agonizes:
            - Norepinephrine
            - Serotonin
            - Dopamine
        - Blocks reuptake

                - 15-30 min euphoria, followed by come down
                - Coke abuse= chronic state of depression
            - Formication= feeling of bugs crawling under skin
            - Can lead to paranoia, violence, and aggression, psychotic episodes
            - Cocaine affects heart function
        - Methamphetamine (speed)
        - Ecstasy
- Hallucinogens
    - AKA psychedelics
        - Mind manifesting, mind expanding
        - Produce the most profound effect on consciousness
            - Altering behaviours, emotions, perceptions
    - LSD (synthetic)
        - 1 aspirin tablet will affect 3000 people
        - Effects
            - Unpredictable
            - Vary from 1 person to the next
                - Good/bad trip
            - Physical
                - Chills, tremors, increase in body temp.
            - Emotions
                - Multiple emotions at once, or switch between emotions rapidly
            - Distorted perceptions
                - Hear colours, taste sounds
            - Distorted thinking
                - Can't think straight, impaired judgement
            - Believed that LSD agonizes serotonin
            - Under LSD parts of brain that don't communicate w/ e/o talk
                - Those that usually do, don't
    - Marijuana
        - Contains THC (delta-9-tetrahydrocannabinol)

Influences on drug use

- Genetic component to addiction
    - Gene called CREB produces protein called CREB
        - When mice have no/less CREB, they consume 50% more alcohol
    - Low CREB= high anxiety
- Type of drug used
    - Some are more addictive

- Method of administration
    - Smoking, inhaling, injecting, increase addiction
- Age
    - Younger = higher risk of addiction
- Gender???
    - Twice as many men have drug problems
- Psychological factors (leading to potential addiction)
    - Major transitions in life
    - Culture
    - Family
        - Monkeys separated from mother
    - Community
    - Mental illness
    - Loneliness
    - Peers

Prevention? (addiction)

- Maximize protective factors/minimize risk factors
    - Raise self esteem
    - Sense of purpose
    - Healthy pleasurable activities
    - Managing emotions
    - Peers
    - Family bonds
    - Education