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Chapter 3: Consciousness and the Two-Track Mind

Brain States and Consciousness

Consciousness: awareness of ourselves and our environment
Cognitive Neuroscience: study of brain activity linked with cognition (perception, thinking, memory, language)
Dual Processing: info is simultaneously processes on seperate conscious and unconscious tracks
Blindsight: a person can respond to a visual stimulus without consciously experiencing it (woman can not explain width of an object but can pick it up with her thumb and finger at the right spacing)
Parallel processing: processing of many aspects of a problem simultaneously
Selective attention: focusing of conscious awareness on a particular stimulus.
Inattentional blindness/selective inattention: failing to see visible objects when our attention is directed elsewhere (focusing on guys in black passing a ball; failing to see a lady with an umbrella walk through the circle).

Change blindness: failing to see change in scenery when focused on something else (construction worker changing scenario).

Choice Blindness: not noticing choices (focused on explaining why you chose this picture, failing to see the picture was changed/not the one chosen).

Sleep and Dreams

Sleep: periodic loss of consciousness
Circadian rhythm: biological clock' regular body rhythms (wakefulness, body temp)
REM sleep: rapid eye movement sleep associated with vivid dreams. Aka paradoxical sleep bc muscles are not moving but twitching.
Alpha waves: slow brain waves; awake but relaxed with eyes closed.
Hallucinations: false sensory experiences; no sensory stimulus
Delta waves: large, slow brain waves associated with deep sleep; can not be woken for these 30 mins.
Suprachiasmatic nucleus (SCN): part of hypothalamus that controls release of melatonin (sleep inducing hormone) released by pineal gland. SCN stimulated by light-sensitive retinal proteins that are activated to light in the morning.
Insomnia: recurring problems with falling asleep. Sol: sleeping pills
Narcolepsy: attacks of overwhelming sleepiness (5 mins) randomly in the day. Genetic influence: immune system attacks brain cells that enable alertness. Sol: drug that mimics orexin (alertness-related neurotransmitter that is absent).
Sleep apnea: no breathing during sleep. Waking up repeatedly but not remembering this.
Night terrors: high arousal and appearance of being terrified. Not remembered. Usually childhood disorder
Sleepwalking and sleeptalking: run in the families, usually childhood disorders.
Dream: sequences of images, emotions, and thoughts passing thru the mind when asleep.

Manifest content: according to Freud, the remembered storyline of a dream (distinct from latent content)
Latent content: according to Freud, unconscious drives and wishes that would be threatening if expressed directly; underlying meaning of a dream.
REM rebound: tendency for REM sleep in increase after REM sleep deprivation (created by repeated awakenings during REM sleep).

- Sleep patterns are genetically influenced (genes decide how much sleep you need)
- Sleep patterns are culturally influenced
- Dreams can be interpreted in different ways, involve events that have not been past experiences, can be meaningful, tell something about the dreamer, adaptive.

Why sleep?

1. Protects
2. Recuperate brain tissue/neurons
3. restore/rebuild fading memories
4. Creative thinking
5. Supports growth

Dream Theories
Freud's wish-fulfillment: dreams allow us to express unacceptable feelings, containing remembered content with underlying meaning.
Information-Processing: dreams help us to sort out the day's events and consolidate memories.
Physiological function: brain stimulation from REM sleep may help develop/preserve neural pathways
Neural activation: REM sleep invokes random visual memories that weaves into stories in sleeping brain.
Cognitive development: dreams reflect dreamer's level of cognitive development - knowledge and understanding. Dreams simulate our lives and worst-case scenarios.

<u>Drugs and Consciousness</u>
Psychoactive Drug: drugs that alter perceptions and moods.
Tolerance: when brain chemistry adapts to offset of the drug effect. To experience the same effect, the user needs larger and larger doses.
Addiction: compulsive cravings of drugs or certain behaviours (ex: gambling) despite known consequences.
Withdrawal: discomfort/distress that follow discontinuing drug or behaviour.
Depressants: drugs (alcohol, barbiturates, opiates) that reduce neural activity and slow body functions**.**

> **Alcohol use disorder:** alcohol use marked by tolerance, withdrawal, and a drive to continue problematic use.
>
> **Barbiturates:** drugs that depress NS activity, reducing anxiety, impairing memory and judgement.
>
> **Opiates:** including morphine and heroin; depress neural activity, temporarily lesson pain and anxiety

Stimulants: including caffeine, nicotine, more powerful amphetamines, cocaine, ecstasy, meth; excite neural activity, speed up body functions.

> **Amphetamines:** stimulate neural activity , speeds up body functions, associated with energy and mood changed
>
> **Nicotine:** stimulating and highly addictive psychoactive drug in tobacco.
>
> **Cocaine:** derived from coca plant; temporarily increases alertness and euphoria.
>
> **Methamphetamine:** stimulates CNS, speeds up body functions associated with energy and mood changes, reduces baseline dopamine levels over time.
>
> **Ecstasy (MDMA):** synthetic stimulant and mild hallucinogen; euphoria and social intimacy; long term effects hard to serotonin-producing hormones, mood and cognition. Serotonin affects mood + social behaviour.

Hallucinogens: aka psychedelic drugs (LSD and marijuana), distort perceptions and evoke sensory images in absence of sensory input.

> **Near-death experience:** altered state of consciousness reported after a near death experience; similar to drug induced hallucinogens.
>
> **LSD:** hallucinogenic drug; aka acid
>
> **THC:** ingredient in marijuana; triggers a number of effects including hallucinations

- 3 types of psychoactive drugs: depressants, stimulants, and hallucinogens. All have an effect on brain synapses and neurotransmitters.

Depressants

Alcohol

- Slow brain activity that controls judgement and inhibitions
- Increases helpful tendencies (giving larger tips)
- Increases harmful tendencies (sexual aggression)
- Slows sympathetic NS: slow speech, slur
- Long term effects on memory bc alcohol contributes to nerve cell death and reduces birth of new cells and synaptic connections.
- Reduced self awareness/self control (mind wandering, not noticing that they zoned out, suppress awareness of failures)
- A disinhibitor - makes us more likely to do what we would have done sober (being helpful or aggressive)

Barbiturates “tranquilizers”

- Depress NS activity
- Sometimes prescribed to induce sleep or reduce anxiety
- Large doses: impair memory and judgement
- Lethal effects if combined with alcohol.

Opiates (including opium and its derivatives, heroin and morphine)

- Depress neural functioning
- Pupils constrict, breathing slows, lethargy sets in, pleasure replaces pain and anxiety
- Brain eventually stops producing endorphins (natural opiates), so if artificial opiates are withdrawn, the brain lacks normal level of these painkilling neurotransmitters.

- Opiates include narcotics: codeine, morphine, and synthetic methadone (heroin substitute), which physicians prescribe for pain relief. Can also lead to addiction.

Stimulants
- Excitatory to NS: pupils dilate, breathing rate increases, blood-sugar levels rise, drop in appetite, energy and self confidence also rise.
- Used to lose weight, feel alert, or boost mood or athletic performance.

Nicotine
- found in cigarettes and tobacco
- a) arouses brain to increased alertness b) increases heart rate/blood pressure c) at high levels, relaxes muscles and triggers stress-reducing neurotransmitters d) reduces circulation to extremities e) suppresses appetite for carbohydrates.
- epinephrine/norepinephrine reduce appetite and increase alertness/mental efficiency

Cocaine
- Blocks reuptake of neurotransmitters dopamine, norepinephrine, serotonin. Accumulation in synapses leads to euphoria.
- Fast track from euphoria to crash- rush of euphoria depletes brains supply of neurotransmitters listed above.

Methamphetamine
- Parent drug: amphetamine
- Triggers release of dopamine, stimulating brain to enhance mood and energy
- 8 hours of euphoria
- After Effects: irritability, insomnia, hypertension, seizures, social isolation, depression, violent outbursts, scratching at skin thinking there's something there (scabs/cuts).
- Reduces baseline dopamine levels, leaving user with continued depressed function.

Ecstasy (MDMA/Molly)
- Is both a stimulant and mild hallucinogen

Hallucinogens - most profound effect on consciousness
- Synthetic: LSD, MDMA
- Natural: marijuana (mild hallucinogen)
- Phase 1: Seeing simple geometric forms- lattice, cobweb, or spiral
- Phase 2: meaningful images: tunnel or funnel, replays of past emotional experiences
- Phase 3: sensation of separation from body and in dreamlike scenes that appear very real
- Sensations similar to near-death experience: oxygen deprivation in brain is known to induce hallucinations.
- Epilepsy patients experience hallucinations

LSD
- Mood, expectations affect emotional experience, which vary from euphoria to detachment to panic.

Marijuana

- Flowers contain THC
- Mild hallucinogen: amplifies sensitivity to colours, sounds, tastes and smells.
- Like alcohol, impairs motor coordination, perceptual skills, reaction time
- THC lingers in body for more than 1 week, therefore less abrupt withdrawal
- May achieve high with smaller than usual amounts
- Intensifies feelings of anger or depression
- Short term memory loss

Biological Influences

- Family history of addiction
- Having an identical sibling increases risk for addiction
- Boys who at age 6 are excitable, impulsive, fearless (genetically influenced traits)
- Reduced levels of the brain chemical NPY
- Genes that make people predisposed to alcohol use disorder. These genes produce deficiencies in dopamine balance.

Psychological and Social-cultural influences

- Youth and adults feeling that life is meaningless and directionless.
- People who feel significant stress or failure and are depressed
- Influence by celebrities/other people around them
- Drug use varies across cultural and ethnic groups