

Chapter 3

-Consciousness and the Two-Track Mind-

1. What is Consciousness?

- Consciousness
 - Our awareness of ourselves & environment
- Cognitive Neuroscientists
 - Study links between <brain activity & mental processes>
- Conscious Information Processing
 - Enables us to exercise control & to communicate our mental states to others

- Beneath the surface, unconscious processing occurs simultaneously on many parallel tracks

- Our awareness focuses on a limited aspect of all that we experience

2. Brain States & Consciousness

- Describe place of consciousness in psy's HIS
- Explain what is meant by "dual processing" as revealed by today's cognitive neuroscience
- Discuss how selective attention directs our perceptions

3. Sleep & Dreams

- DEFINE SLEEP
- DESCRIBE
 - How our biological rhythms influence our daily functioning
 - The biological rhythm of our sleeping & dreaming stages
 - How biology & environment interact in our sleep patterns
 - Effects of sleep loss & identify major sleep disorders
 - Our dreams
 - Functions of dreams proposed by theorists

4. Drugs & Consciousness

- Explain what substance use disorders are
- Describe the roles played by tolerance, withdrawal, and addiction in these disorders
- Discuss how the concept of addiction has changed
- Identify depressants & describe their effects
- Identify stimulants & describe their effects
- Identify hallucinogens & describe their effects
- Explain why some people become regular users of consciousness-altering drugs

5. The Place of Consciousness in Psy's HIS

- 1880s
 - Psychology defined as description and explanation of states of consciousness
- First half of 20th century
 - Direct observation of behaviour
- 1960s
 - Consciousness nearly lost; science of behaviour
- After 1960s
 - Study of consciousness altered by hypnosis, drugs, and meditation; importance of cognition
- Today
 - Under the influence of cognitive psychology, neuroscience, and cognitive neuroscience, our consciousness has reclaimed its place as an important area of research

1. Brain States & Consciousness

□ CONSCIOUSNESS

- **Awareness** of **self** and **environment**
- In addition to normal, waking awareness, consciousness comes to us in altered states, including meditating, daydreaming, sleeping, and drug-induced hallucinating.
- Psychology: “the description & explanation of states of consciousness”

□ ALTERED STATES of CONSCIOUSNESS

Some states occur spontaneously	Daydreaming	Drowsiness	Dreaming
Some are physiologically induced	Hallucinations	Orgasm	Food or oxygen starvation
Some are psychologically induced	Sensory deprivation	Hypnosis	Meditation

□ THE BIOLOGY OF CONSCIOUSNESS

□ COGNITIVE NEUROSCIENCE

- **Interdisciplinary** study of **brain activity** linked w/ **cognition** (**perception, thinking, memory, language**)
- Helps us to understand how **specific brain states** relate to **conscious experiences**
- Many cognitive neuroscientists are exploring and mapping the **conscious functions of the cortex**

□ DUAL PROCESSING: TWO-TRACK MIND

- Cognitive neuroscientists & others studying the **brain activity underlying consciousness** have discovered a **two-track human mind**, each w/ its own neural processing
- Perception, memory, thinking, language, attitudes all operate on two levels (**conscious, deliberate “High Road”** &

Unconscious, automatic “Low Road”)

⇒ Dual Processing

□ DUAL PROCESSING

- Principle that **information** is often **simultaneously processed** on separate **conscious** (explicit) and **unconscious** (implicit) tracks

□ BLINDSIGHT AWARENESS

- Condition in which a person can respond to a **visual stimulus** without **consciously** experiencing it

- In everyday life, we mostly function like an automatic camera, but with a manual (conscious) override.

□ CONSCIOUSNESS & SELECTIVE ATTENTION

□ SELECTIVE ATTENTION

- Focusing of **conscious awareness** on a **particular stimulus**
- We selectively attend to, and process, a very limited portion of incoming information, blocking out much and often shifting the spotlight of our attention from one thing to another

□ PARALLEL PROCESSING

- Processing many aspects of a problem **simultaneously**; the **brain’s natural mode** of information processing for many functions
- **Faster** than sequential conscious processing
- Takes care of the routine business, while sequential processing is best for solving new problems that require our attention

□ SEQUENTIAL PROCESSING

- Best for **solving new problems**, which requires **focused attention**.

□ SELECTIVE INATTENTION

□ INATTENTIONAL BLINDNESS

- **Failing to see** visible objects when **attention** is directed **elsewhere**

- Focused intently on one task, we often display inattentional blindness to other events and change blindness to changes around us.
- CHANGE BLINDNESS
 - Failing to notice changes in the environment.
- SELECTIVE ATTENTION & ACCIDENTS
 - RAPID TOGGLING BTW ACTIVITIES IS COMMON TODAY
 - **Multitasking** distracts brain resources allocated to driving; **brain activity** decreases an average of 37 percent when conversation occurs
 - **Cell-phone use** increases accident risk fourfold
 - **Crashes** or **near-crashes** increase sevenfold when dialling or reaching for the phone

2. Sleep & Dreams

- SLEEP
 - **Periodic, natural loss of consciousness**
 - as distinct from unconsciousness resulting from a coma, general anesthesia, or hibernation
 - Even while **asleep**, we are **processing information**, although outside our conscious awareness
- BIOLOGICAL RHYTHM
 - **24-hour biological clock**
 - **90-minute sleep cycle** for younger adults
- CIRCADIAN RHYTHM
 - Internal **biological clock**; **regular bodily rhythms** that occur on a **24-hour cycle**
 - Body temperature
 - As morning approaches, rises
 - peaks during the day,
 - dips in the early afternoon,
 - begin to drop in the evening
 - Altered by **age** and **experience**
- MEASURING SLEEP ACTIVITY

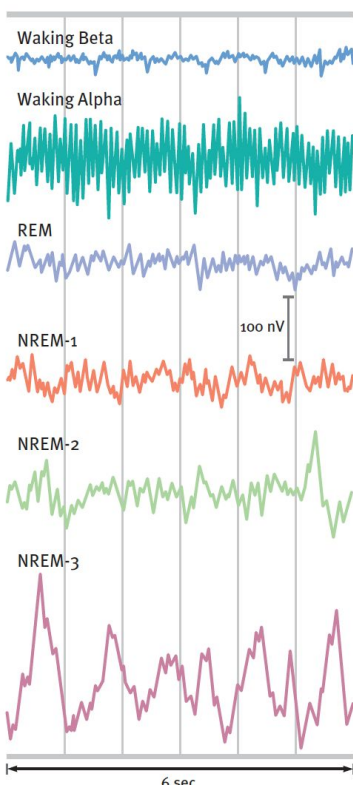
- Sleep researchers measure **brain-wave activity**, **eye movements**, and **muscle tension** by electrodes that pick up weak electrical signals from the brain, eyes, and facial muscles.
- BIOLOGICAL RHYTHM OF OUR SLEEPING & DREAMING STAGES
 - We pass thru a **cycle of 4 sleep stages** (Total about **90 minutes**)-every 90 min.
 - As we lie awake and relaxed, **before** we **sleep**, our EEG show relatively **slow Alpha waves**
 - STAGE1 SLEEP (NREM-1)
 - **Unremembered moment & Slow breathing & Irregular brain waves**
 - May experience fantastic images resembling **hallucinations**(sensory experiences that occur w/out sensory stimulus) = (**hypnagogic sensations**⇒ incorporated into **memories**.)
 - STAGE2 SLEEP (NREM-2)
 - **Relax** more **deeply**
 - Follows for the next **20 minutes**
 - with its periodic sleep spindles (bursts of **rapid, rhythmic brain-wave activity**)
 - STAGE3 SLOW-WAVE SLEEP(NREM-3)
 - **Deep** sleep
 - **Slow-wave** sleep
 - Lasts for about **30 minutes**
 - The brain emits **large, slow delta waves**.
 - we are **hard to awaken**.
 - Children may wet the bed
 - Reversing course, we retrace our path thru these stages w/ 1 difference
 - REM (Rapid Eye Movement) SLEEP
 - For about **10 minutes**
 - **Brain waves** become **rapid & saw-toothed**, more like of the nearly wake NREM-1 sleep
 - **Dream** occurs

- Internally aroused but outwardly paralyzed (sleep paralysis), **heart rate** rises, **breathing** becomes rapid and irregular, **genitals** become aroused, **eyes** often dart around

- The **sleep cycle repeats** itself about **every 90 minutes** for younger adults (somewhat more frequently for older adults)

- As the night wears on, deep **NREM-3** sleep grows **shorter & disappears**.

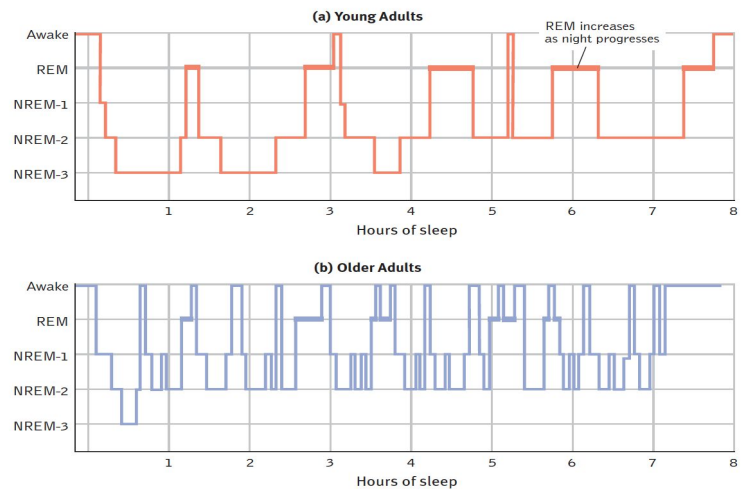
- **REM** and **NREM-2** sleep periods get **longer**.



□ REM SLEEP

- REM (Rapid Eye Movement)
 - Sleep stage during which **vivid dreams** commonly occur
 - Also known as **paradoxical sleep**, because the muscles are relaxed (except for minor twitches) but other body systems are active
- REM REBOUND

- Tendency for REM sleep to increase following REM sleep deprivation



□ ALPHA WAVES

- Relatively **slow brain waves** of a **relaxed, awake state**

□ HALLUCINATIONS

- **False sensory experiences**, such as seeing something in the absence of an external visual stimulus

□ DELTA WAVES

- **Large, slow brain waves** associated with **deep sleep**

□ DREAMS

- **Genitals** aroused during REM sleep, even when dream content is not sexual.
- **Brainstem** blocks **message** from the **motor cortex**
 - Sleep paralysis
 - Paradoxical sleep

○ WHAT AFFECTS OUR SLEEP PATTERNS?

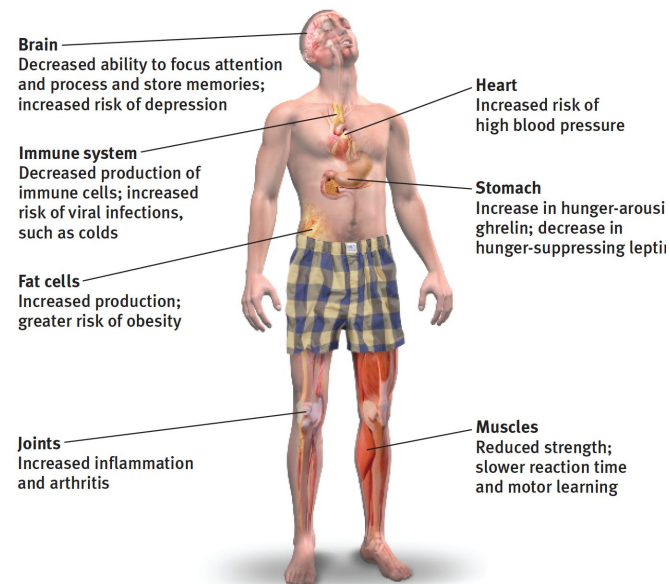
- Ppl differ in their individual sleep requirements
 - **Age**-related changes are rivalled by differences in the normal amount of sleep among individuals of any age
 - Sleep patterns are **genetically** influenced. (ex. Twin studies)
 - **Cultural** influence
 - North Americans get less sleep because of modern lighting, shift work, and social media diversions.
 - **Light**
 - Activates light-sensitive retinal proteins, signalling the suprachiasmatic nucleus in the hypothalamus to cause the brain's pineal gland to decrease its productivity of sleep-inducing melatonin in the morning and to increase it in the evening
 - The cycle last about 24 hours, but it can be disrupted by bright light, time changes, and alterations in our sleep schedule (such as staying up late and sleeping in on weekends)
- SUPRACHIASMATIC NUCLEUS (SCN)

- A pair of cell clusters in the hypothalamus that controls circadian rhythm.
- In response to light, the SCN causes the pineal gland to adjust melatonin production ⇒ modifying our feelings of sleepiness.

○ WHY DO WE SLEEP?

- PROTECTIVE ROLE
 - In human evolution by keeping ppl safe during potentially dangerous periods
- RECUPERATE
 - Helps restore the immune system & repair brain tissue.
- RESTORE & REPAIR
 - Helps restore & repair damaged neurons
 - Helps restore & rebuild our fading memories of the day's experience.
- CREATIVE THINKING
 - Dreams can inspire noteworthy artistic & scientific achievements
- GROWTH HORMONE
 - Pituitary gland secretes a growth hormone necessary for muscle development

○ HOW SLEEP DEPRIVATION AFFECT US?



- MAJOR SLEEP DISORDERS
 - INSOMNIA
 - **Persistent problems in falling or staying asleep**
 - NARCOLEPSY
 - Sudden **uncontrollable sleep attacks**, sometimes lapsing directly into REM sleep, often at inopportune times.
 - Suffer periodic, **overwhelming sleepiness**
 - In severe cases, collapses **directly into a brief period of REM sleep** with loss of muscular tension
 - SLEEP APNEA
 - **Stopping of breathing** while asleep; associated with obesity, especially in men
 - After an airless minute or so, decreased blood oxygen arouses the sleeper to snort in air for a few seconds
 - NIGHT TERRORS
 - **High arousal and appearance of being terrified**
 - **Sit up or walk around, talk incoherently**, experience a doubling of heart & breathing rates, appear terrified
 - Unlike nightmares, it occurs during **NREM-3** sleep
 - Within 2 or 3 hours of falling asleep, **seldom remembered.**
 - SLEEPWALKING & SLEEPTALKING
 - Children are most prone to sleepwalking and sleeptalking both of which run in families

Some Natural Sleep Aids

Exercise regularly but not in the late evening. (Late afternoon is best.)

Avoid caffeine after early afternoon, and avoid food and drink near bedtime. The exception would be a glass of milk, which provides raw materials for the manufacture of serotonin, a neurotransmitter that facilitates sleep.

Relax before bedtime, using dimmer light.

Sleep on a regular schedule (rise at the same time even after a restless night) and avoid long naps.

Hide the time so you aren't tempted to check repeatedly.

Reassure yourself that temporary sleep loss causes no great harm.

Focus your mind on nonarousing, engaging thoughts, such as song lyrics, TV programs, or vacation travel (Gellis et al., 2013).

If all else fails, settle for less sleep, either going to bed later or getting up earlier.

- WHAT DO WE DREAM?
 - Usually dream of ordinary events and everyday experiences, most involving some anxiety or misfortune
 - DAYDREAMS
 - **Familiar details of our life**
 - (ex. Picturing ourselves explaining to an instructor why a paper will be late, replaying in our minds personal encounters we relish or regret.)
 - REM DREAMS
 - **Vivid, emotional**, often **bizarre**
 - More frequently involve **anxiety** or **misfortune** than triumphant achievement
 - DREAMS w/ NEGATIVE EVENT or EMOTION
 - **8 in 10** dreams
 - DREAMS w/ SEXUAL IMAGERY
 - **1 in 10** among young **men**
 - **1 in 30** among young **women**
 - Because our two-track mind continues to monitor our environment while we sleep, sensory stimuli may also intrude on our dreams
 - DREAMS INCORPORATING PREVIOUS DAY'S EXPERIENCE

- Most common

□ MAJOR VIEWS of the FUNCTION of DREAMS

1. To satisfy our own wishes

- Dream's manifest content (the apparent & remembered storyline) as a censored, symbolic version of its latent content, the unconscious drives & wishes that would be threatening if expressed directly.)

□ MANIFEST CONTENT

- According to Freud, the **remembered storyline** of a dream (as distinct from its latent, or hidden, content)

□ LATENT CONTENT

- According to Freud, the **underlying meaning** of a dream (as distinct from its manifest content.)

2. To file away memories

3. To develop & preserve neural pathways

4. To make sense of neural static

5. To reflect cognitive development

□ Freud's Wish-Fulfillment

- Dreams provide a psychic "safety valve" with manifest content (story line) acting as a censored version of latent content (underlying meaning that gratifies our unconscious wishes)

□ INFORMATION-PROCESSING

- Dreams help us sort out the day's events and consolidate them in memory

□ PHYSIOLOGICAL FUNCTION

- Regular brain stimulation may help develop and preserve neural pathways in the brain

□ NEURAL ACTIVATION

- Brain attempts to make sense of neural static by weaving it into a storyline

□ COGNITIVE DEVELOPMENT

- Dreams reflect the dreamer's level of development

Theory	Explanation	Critical Considerations
Freud's wish-fulfillment	Dreams preserve sleep and provide a "psychic safety valve"—expressing otherwise unacceptable feelings; contain manifest (remembered) content and a deeper layer of latent content (a hidden meaning).	Lacks any scientific support; dreams may be interpreted in many different ways.
Information – processing	Dreams help us sort out the day's events and consolidate our memories.	But why do we sometimes dream about things we have not experienced and about past events?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This does not explain why we experience meaningful dreams.
Neural activation	REM sleep triggers neural activity that evokes random visual memories, which our sleeping brain weaves into stories.	The individual's brain is weaving the stories, which still tells us something about the dreamer.
Cognitive development	Dream content reflects dreamers' level of cognitive development—their knowledge and understanding. Dreams simulate our lives, including worst-case scenarios.	Does not propose an adaptive function of dreams.

8. Drugs & Consciousness

□ TOLERANCE & ADDICTION

□ SUBSTANCE USE DISORDER

- Continued **substance craving** & use despite significant life disruption and/or physical risk.

□ PSYCHOACTIVE DRUG

- A **chemical substance** that alters **perceptions & moods**

□ TOLERANCE

- **Diminishing effect** w/ regular use of the same dose of a drug, **requiring** the user to take larger and **larger doses** before experiencing the drug's effect.

□ ADDICTION

- **Compulsive craving** of drugs or certain behaviours (such as gambling) despite known **harmful consequences**

□ WITHDRAWAL

- **Discomfort** and **distress** that follow **discontinuing** an addictive drug or behaviour

□ What ROLES do TOLERANCE, WITHDRAWAL, ADDICTION play in SUBSTANCE USE DISORDERS?

- Those with a substance use disorder may exhibit impaired control, social disruption, risky behaviour, and the physical effects of tolerance and withdrawal
- Psychoactive drugs alter perceptions and moods
 - They may produce tolerance - requiring larger doses to achieve the desired effect-and withdrawal-significant discomfort accompanying attempts to quit
 - Continued use may lead to addiction, which is the compulsive craving of drugs or certain behaviours (such as gambling) despite known adverse consequences

□ WHEN is DRUG USE a DISORDER?

- A person may be diagnosed with substance use disorder when drug use continues despite significant life disruption
- Resulting changes in brain circuits may persist after quitting use of the substance (⇒ leading to strong cravings when exposed to people and situations that trigger memories of drug use)
- The severity of substance use disorder varies from mild (2-3 symptoms) to moderate (4-5 symptoms) to severe (6-more symptoms)

Diminished Control

1. Uses more substance, or for longer, than intended
2. Tries unsuccessfully to regulate use of substance
3. Spends much time acquiring, using, or recovering from effects of substance
4. Craves the substance

Diminished Social Functioning

5. Use disrupts commitments at work, school, or home
6. Continues use despite social problems
7. Causes reduced social, recreational, and work activities

Hazardous Use

8. Continues use despite hazards
9. Continues use despite worsening physical or psychological problems

Drug Action

10. Experiences tolerance (needing more substance for the desired effect)
11. Experiences withdrawal when attempting to end use

□ How has the CONCEPT of ADDICTION CHANGED?

□ CONCEPT of ADDICTION

- Extended to cover many behaviours
- Degree and scope debated

□ ADDICTION as a DISEASE

NEEDING TREATMENT

- Offered for many driven, excessive behaviours that become compulsive and dysfunctional

□ TYPES of PSYCHOACTIVE DRUGS

□ DEPRESSANTS

- Alcohol, Barbiturates(tranquillizers), Opiates
⇒ calm neural activity & slow body functions

□ ALCOHOL acts as disinhibitor

- **Slowed neural processing** & potent sedative when paired with sleep deprivation
- **Memory disruption** & long-term effect on brain and cognition; impairs growth of synaptic connections
- **Reduces self-awareness & self-control**; produces myopia by focusing on arousing situation at expense of normal inhibitions and future consequence
- **Expectancy effect**
 - When ppl believe that alcohol affect social behaviour in certain ways, and believe they have been drinking alcohol, they will behave accordingly.
- Disordered drinking shrinks the brain

□ ALCOHOL EXPECTANCY EFFECT

□ EXPECTATION INFLUENCE BEHAVIOUR

- Attribution social behaviours or sexual responses to alcohol releases inhibitions
- 14 intervention studies w/ college students lowered positive expectations of alcohol and reduced drinking in the ensuing month

□ ALCOHOL USE DISORDER (Alcoholism)

- **Alcohol** use marked by **tolerance, withdrawal**, and a drive to continue **problematic use**

□ BARBITURATES

- Depress activity of **central nervous system**, reducing **anxiety**
- Can **impair memory & judgment**; potentially **lethal** when combined w/ alcohol
- **Nembutal, Seconal, Amytal**

□ OPIATES

- **Opium & its derivatives (Codeine, Morphine, Heroin)**
- **Constricts pupils, slows breathing**, causes **lethargy**
- Depress **neural activity**, temporarily lessening **pain** and **anxiety**
- Causes **withdrawal** when ingestion is stopped

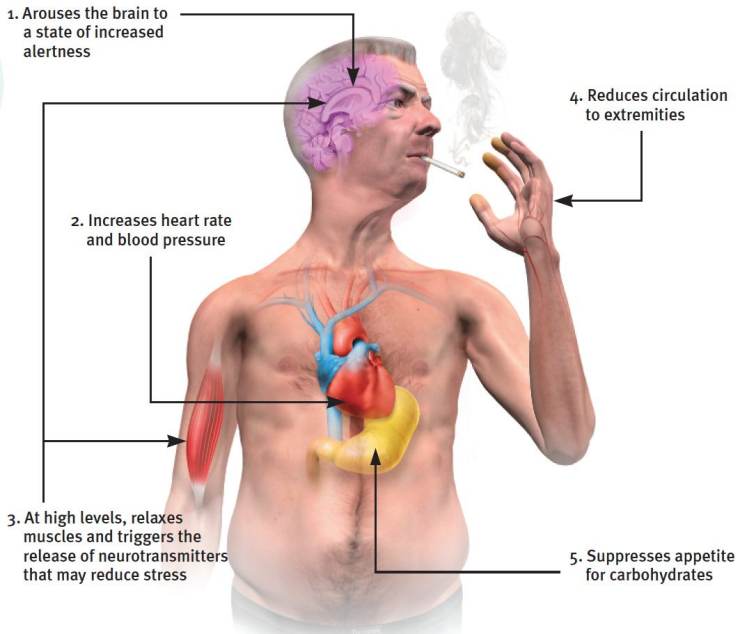
□ STIMULANTS

□ STIMULANT DRUGS

- **Caffeine, Nicotine**, more powerful **Amphetamines, Cocaine, Ecstasy(MDMA), Methamphetamine** that excite neural activity and speed up body functions
- Involve **dilation of pupils**, increase **heart&breathing rates**, rise in **blood sugar**, drop in **appetite**
- Often involves increase in **energy & self-confidence**

□ NICOTINE

- Stimulating & **highly addictive** psychoactive drug in tobacco
- Signals central nervous system to release a flood of neurotransmitters
- Diminishes **appetite**, boosts **alertness** and **mental efficiency**, calms **anxiety**, reduces **sensitivity to pain**
- Involves challenging **acute craving** and **withdrawal** symptoms which contribute to relapse



- Nicotine reaches brain within 7 seconds, twice as fast as intravenous heroin
- Within minutes, the amount in the blood soars

□ COCAINE

- **Powerful & addictive** stimulant derived from the coca plant.
- Produces temporarily increased **alertness & euphoria**
- Involves crash of agitated depression **within 15-30 minutes** after neurotransmitters drop
- Produces psychological effects depending on dosage & form consumed & user's expectations & personality

□ METHAMPHETAMINE

- **Powerfully addictive** drug
- Stimulates the **central nervous system**
- speeded-up **body functions** & associated **energy & mood changes**
- Over time, appears to reduce **baseline dopamine levels**

□ ECSTASY (MDMA)

- Synthetic stimulant & mild **hallucinogen**
- Produces **euphoria & social intimacy**

- Short-term health risks & longer-term harm to **serotonin-producing neurons & to mood & cognition**

□ HALLUCINOGENS

□ HALLUCINOGENS

- **Psychedelic** ("mind-manifesting") drugs
- LSD
 - **Distorts perceptions** and calls up sensory images without any input from the senses)

□ MARIJUANA

- Has leaves containing **THC** (delta-9-tetrahydrocannabinol) which are smoked or eaten to produce increase **sensitivity to colours, sound, tastes, and smells**; lingers in body longer
- Can also **relax, disinhibit, impair motor & perceptual skills & reaction time**
- THC
 - The major active ingredient in marijuana
 - Triggers a variety of effects, including **mild hallucinations**.

□ MARIJUANA & SYNTHETIC MARIJUANA (K2 & Spice)

- Contains **THC** & produces mix of effects
- **Relaxed, disinhibits**, may produce **euphoria**
- Mild **hallucinogen** (amplifies sensory sensitivity, impairs motor coordination & perceptual skills & reaction time)
- Disrupts **memory formation** and **immediate recall**
- Impairs brain development w/ prenatal exposure
- Can linger in the body for weeks

□ Why Do Some People Become Regular Users of Consciousness-Altering Drug?

- **Biological Influences**
 - Some people may be biologically vulnerable to particular drugs
- **Psychological Factors**
 - Stress, depression, hopelessness
- **Social Factors**
 - Peer pressure
- **Cultural & Ethnic groups**
 - Differing rates of drug use

Drug	Type	Pleasurable Effects	Negative Aftereffects
Alcohol	Depressant	Initial high followed by relaxation and disinhibition	Depression, memory loss, organ damage, impaired reactions
Heroin	Depressant	Rush of euphoria, relief from pain	Depressed physiology, agonizing withdrawal
Caffeine	Stimulant	Increased alertness and wakefulness	Anxiety, restlessness, and insomnia in high doses; uncomfortable withdrawal
Nicotine	Stimulant	Arousal and relaxation, sense of well - being	Heart disease, cancer
Cocaine	Stimulant	Rush of euphoria, confidence, energy	Cardiovascular stress, suspiciousness, depressive crash
Methamphetamine	Stimulant	Euphoria, alertness, energy	Irritability, insomnia, hypertension, seizures
Ecstasy (MDMA)	Stimulant; mild hallucinogen	Emotional elevation, disinhibition	Dehydration, overheating, depressed mood, impaired cognitive and immune functioning
LSD	Hallucinogen	Visual "trip"	Risk of panic
Marijuana (THC)	Mild hallucinogen	Enhanced sensation, relief of pain, distortion of time, relaxation	Impaired learning and memory, increased risk of psychological disorders, lung damage from smoke