Levels of Consciousness

Although your current level of consciousness is basically limited to what is relevant to you and what you notice, other events can either become conscious or influence your conscious experience. Your preconscious is the level of consciousness that is outside of awareness but contains feelings and memories that you can easily bring into conscious awareness. For example, if asked what you ate for dinner last night, you could easily remember and tell. Your nonconscious is the level of consciousness devoted to processes completely inaccessible to conscious awareness, such as blood flow, filtering of blood by kidneys, secretion of hormones, and lower level processing of sensations, such as detecting edges, estimating size and distance of objects, recognizing patterns, etc. For psychoanalysts, also known as psychodynamic psychologists, the unconscious, sometimes called the subconscious, is the level of consciousness that includes often unacceptable feelings, wishes, and thoughts not directly available to conscious awareness. According to cognitive psychologists, the unconscious is the level of consciousness that processes information of which you are unaware. The unconscious operates whenever you feel or act without being aware of what's influencing you, whether it's a stimulus from the current situation or from your past. Don't confuse the unconscious and unconsciousness.

Unconsciousness is characterized by loss of responsiveness to the environment resulting from disease, trauma, or anesthesia. Consciousness enables you to analyze, compare, and interpret experiences, and allows you to integrate what you already know, what you perceive in the present, and what you anticipate. Consciousness can be altered by sleep, hypnosis, meditation, and drugs.

Sleep and Dreams

Your finely tuned "biological clock," controlled by the hypothalamus, systematically regulates changes in your body temperature, blood pressure, pulse, blood sugar levels, hormonal levels, and activity levels over the course of about a day. In an environment devoid of environmental cues to the length of a day, your free-running biological clock cycles approximately every 25 hours, but in a typical environment with light during the day and dark at night, cycles of changes, circadian rhythms, recur approximately every 24 hours. The forebrain, reticular formation, and thalamus are involved in the changes in wakefulness, arousal, and attention. Your physiological fluctuations are reflected in changes in your energy level, mood, performance, wakefulness, and sleep. Jet lag and nightshift work involve disruptions of circadian rhythms.

Why do you sleep? Evolutionary psychologists say that humans evolved a unique waking–sleeping cycle as a result of natural selection that maximized our chances of survival. Sleep serves at least two restorative functions—one involved in protein synthesis throughout the body, the other involved in maintaining plasticity of neural connections essential for storing and retrieving memories, which enables you to put together new material from the day before with old material. This is sometimes called consolidation. Sleep deprivation makes you drowsy, unable to concentrate, and impairs your memory and immune system. Sleep time seems to decrease from about 16 to 18 hours for a newborn, to about 7 to 8 hours for an adult.

Sleep is a complex combination of states of consciousness, each with its own level of consciousness, awareness, responsiveness, and physiological arousal. The amount we sleep
changes as we age. **Electroencephalograms (EEGs)** can be recorded with electrodes on the surface of the skull. EEGs have revealed that brain waves change in form systematically throughout the sleep cycle (see Figure 9.1). When you are awake, your EEG shows beta waves when you are alert and alpha waves when you are relaxed. As you fall asleep, you pass into a semiwakeful state of dreamlike awareness, known as the **hypnagogic** state; you feel relaxed, fail to respond to outside stimuli, and begin stage 1 sleep. EEGs of stage 1 sleep show theta waves, which are higher in amplitude and lower in frequency than alpha waves. As you pass into stage 2, your EEG shows high-frequency bursts of brain activity (called sleep spindles) and K complexes. As you fall more deeply asleep, your stage 3 sleep EEG shows some very high amplitude and very low-frequency delta waves. In stage 4, your deepest sleep stage, EEGs show mostly delta waves. During stage 4, your heart rate, respiration, temperature, and blood flow to your brain are reduced. You secrete growth hormone involved in maintaining your physiological functions. Stages 1 through 4, during which rapid eye movements do not occur, are called **NREM** or **Non-REM** sleep. After passing through stages 1 through 4, you pass back through stages 3, 2, and 1; then, rather than awaking, you begin **REM** sleep (Rapid Eye Movement sleep) about 90 minutes after falling asleep. Your eyes jerk rapidly in various directions; your breathing becomes more rapid, irregular, and shallow; your heart rate increases; your blood pressure rises; and your limb muscles become temporarily paralyzed. Because your EEG shows beta activity typical of wakefulness and theta activity typical of stage 1 sleep, but you are truly asleep, REM sleep is often also called paradoxical sleep. Throughout the night, you cycle through the sleep stages with REM sleep periods increasing in length and deep sleep decreasing. About 50% of our sleep is in stage 2. More of a newborn's sleep is spent in REM sleep than an adult's. **Nightmares** are frightening dreams that occur during REM sleep. Most of your dreaming takes place during REM sleep. Dreams remembered from other stages are less elaborate and emotional. Training in **lucid dreaming**, the ability to be aware of and direct one's dreams, has been used to help people make recurrent nightmares less frightening.
Interpretation of Dreams

But what do dreams mean? Psychoanalyst Sigmund Freud thought dreams were "the royal road to the unconscious," a safety valve for unconscious desires, that reveal secrets of the unconscious.
part of the mind unknown to the conscious mind. Freud tried to analyze dreams to uncover the unconscious desires (many of them sexual) and fears disguised in dreams. He considered the remembered story line of a dream its **manifest content**, and the underlying meaning its **latent content**. Psychiatrists Robert McCarley and J. Alan Hobson proposed another theory of dreams called the **activation-synthesis theory**. During a dream, the **pons** generates bursts of action potentials to the forebrain, which is activation. The dreamer then tries to make sense of the stimulation by creating a story line, which is synthesis. The origin of dreams is psychological according to psychoanalysts, and physiological according to McCarley and Hobson. A cognitive view holds that when we sleep, information from the external world is largely cut off. So the only world our constantly active brain can model is the one already inside it from stored memories, recent concerns, current emotions, and expectations, which can be activated by electrical impulses discharged from within the brain. In other words, dreams are the interplay of the physiological triggering of brain waves and the psychological functioning of the imaginative, interpretive parts of the mind. Recent studies indicate correspondences between what you do in the dream state and what happens to your physical body and brain; thus if you dream you're doing something, it's as if you're actually doing it to your brain.

**Sleep Disorders**

Chances are you've been sleep deprived at one time or another. When you get little or no sleep one night, you spend more of your sleep time the next night in REM sleep (called REM rebound), with few consequences. But millions of people suffer from chronic, long-term sleep disorders. The most common adult sleep disorders include insomnia, sleep apnea, and narcolepsy, while children are more likely to experience night terrors and sleepwalking. **Insomnia** is the inability to fall asleep and/or stay asleep. Insomnia complainers typically overestimate how long it takes them to fall asleep and underestimate how long they stay asleep. Sleep researchers recommend that you go to bed at a set time each night and get up at the same time each morning; exercise for about a half hour daily 5 or 6 hours before going to bed; avoid alcohol, sleeping pills, and stimulants; avoid stress; and relax before bed to avoid insomnia. **Narcolepsy** is a condition in which an awake person suddenly and uncontrollably falls asleep, often directly into REM sleep. Victims often benefit from naps or drug therapy with stimulants or antidepressants. **Sleep apnea** is a sleep disorder characterized by temporary cessations of breathing that awaken the sufferer repeatedly during the night. Sleep apnea most often results from obstruction or collapse of air passages, which occurs more frequently in obese people. Weight loss and sleeping on the side can help alleviate the problem. An effective treatment is a positive pressure pump that provides a steady flow of air through a face mask worn by the sufferer. **Night terrors** are most frequently childhood sleep disruptions from stage 4 sleep characterized by a bloodcurdling scream and intense fear. **Sleepwalking**, also called **somnambulism**, is also most frequently a childhood sleep disruption that occurs during stage 4 sleep characterized by trips out of bed or carrying on of complex activities. Typically, sufferers do not recall anything in the morning.

**Hypnosis**

**Hypnosis** is an altered state of consciousness characterized by deep relaxation and heightened suggestibility. Under hypnosis, subjects can change aspects of reality and let those changes
influence their behavior. Hypnotized individuals may feel as if their bodies are floating or sinking; see, feel, hear, smell, or taste things that are not there; lose sense of touch or pain; be made to feel like they are passing back in time; act as if they are out of their own control; and respond to suggestions by others. For some people, this make-believe may be so vivid and intense that they have trouble differentiating it from reality. Subjects can actually think immersing a hand in ice water is comfortable! Many psychologists think hypnosis involves highly focused awareness and intensified imagination. Other psychologists propose social cognitive theories that hypnosis is a social phenomenon in which highly motivated subjects enter a hypnotized "role." Still others believe that hypnosis involves a division or dissociation of consciousness. According to the dissociation theory, hypnotized individuals experience two or more streams of consciousness cut off from each other. According to Ernest Hilgard, part of the consciousness responds to suggestions, while the other, the "hidden observer," remains in the background monitoring behavior. Evidence for this dissociation of consciousness is provided by hypnotized subjects who indicate, for example, that a part of them is experiencing more pain with hands submerged in ice water than the hypnotized subjects acknowledge. After hypnosis, the individual may follow a posthypnotic suggestion and may have a thought or feeling without conscious knowledge of its hypnotically suggested source, or may experience posthypnotic amnesia, forgetting selected events by suggestion. One of the most important practical applications of hypnosis is in analgesia (pain control), which is used in surgery, childbirth, and dentistry.

Meditation

Do you know someone who practices yoga or meditates? Meditation is a set of techniques used to focus concentration away from thoughts and feelings in order to create calmness, tranquility, and inner peace. Meditation is popular in Asia, where Zen Buddhists meditate. EEGs of meditators show alpha waves characteristic of relaxed wakefulness. Physiological changes, such as lowered blood pressure, slowed heart rate and breathing rate, and warming of hands, common during meditation, indicate activation of the parasympathetic nervous system, which is normally not under conscious control. Meditators often report an increased feeling of well being. Psychologists disagree as to whether or not meditation is an altered state of consciousness.

Drugs

Do you drink coffee, tea, cocoa, or cola in the morning to get you going? Lots of people do. These beverages contain a psychoactive drug called caffeine. Psychoactive drugs are chemicals that can pass through the blood-brain barrier into the brain to alter perception, thinking, behavior, and mood, producing a wide range of effects from mild relaxation or increased alertness to vivid hallucinations. The effect a person expects from a drug partly determines the effect of the drug on that person. That person may experience different effects, depending on his/her mood and social situation. Psychoactive drugs stimulate or inhibit different regions of the brain by interacting with neurotransmitter systems. Psychological dependence develops when the person has an intense desire to achieve the drugged state in spite of adverse effects. If a person uses a drug repeatedly, the intensity of effects produced by the same dose may decrease, causing the person to take larger doses. This decreasing responsivity to a drug is called tolerance. Tolerance for drugs partly depends on environmental stimuli associated with taking of
the drug. **Physiological dependence** or **addiction** develops when changes in brain chemistry from taking the drug necessitate taking the drug again to prevent withdrawal symptoms. Typically, **withdrawal symptoms** include intense craving for the drug and effects opposite to those the drug usually induces. Although hundreds of psychoactive drugs differ in their chemical composition, drugs can be classified into broad categories. One classification system categorizes drugs by their main effects: **depressants, narcotics, stimulants, and hallucinogens**.

- **Depressants** are psychoactive drugs that reduce the activity of the central nervous system and induce relaxation. Depressants include sedatives, such as barbiturates, tranquilizers, and alcohol. Among the barbiturates are secobarbital (Seconal) and Phenobarbital (Luminal). Sedatives are taken to induce sleep and prevent seizures. Tranquilizers include the benzodiazepines Valium, Xanax, and Rohypnol ("roofies"), as well as quaaludes. Rohypnol has been dubbed "The date rape drug." Tranquilizers relieve anxiety, induce sleep, and prevent seizures. Because more people use alcohol than any other depressant, alcohol has been the most studied psychoactive chemical. It acts at many sites, including the reticular formation, spinal cord, cerebellum, and cerebral cortex, and on many neurotransmitter systems. Alcohol increases transmission of the neuroinhibitor GABA, decreases transmission of the excitatory neurotransmitter acetylcholine, and increases production of beta-endorphins. In low doses, alcohol produces a relaxing effect, reduces tension, lowers inhibitions, impairs concentration, slows reflexes, impairs reaction time, and reduces coordination. It lowers inhibitions by depressing activity in the frontal lobes, which usually control expression of emotions. In medium doses, alcohol produces slurred speech, drowsiness, and altered emotions. In high doses, alcohol produces vomiting, depressed breathing, unconsciousness, coma, and even death. Chronic drinking can lead to addiction. Withdrawal symptoms include shaking (tremors), sleep problems, nausea, hallucinations, and even seizures.

- **Narcotics** are analgesics (pain reducers) which work by depressing the central nervous system. They can also depress the respiratory system. Narcotics include the opiaes and synthetic opiates: codeine, heroin, morphine, opium, Percodan, Darvon, Talwin, Dilaudid, methadone, and Demerol. People take narcotics to induce feelings of euphoria, relieve pain, and induce sleep. Their chemical properties are very similar to the endorphins that our brains produce. Opiates are very physically and psychologically addictive.

- **Stimulants** are psychoactive drugs that activate motivational centers and reduce activity in inhibitory centers of the central nervous system by increasing activity of serotonin, dopamine, and norepinephrine neurotransmitter systems. Stimulants include caffeine, nicotine, amphetamines, and cocaine. Stimulants are used to treat hyperactivity and narcolepsy. Among the amphetamines are methamphetamine, benzedrine, Ritalin, ephedrine (Ephedra), and ecstasy (MDMA), made popular at "all-night raves." Amphetamines stimulate the sympathetic nervous system and speed up the metabolism, reducing appetite and making a person feel alert, energetic, and elated. Recent research indicates that MDMA damages brain cells. Cocaine and "crack cocaine" that is sniffed, smoked, swallowed, and injected are powerfully addicting drugs that produce feelings of euphoria, excitement, and strength and reduce hunger. Various doses of cocaine can also produce neurological and behavioral problems, such as dizziness, headache, movement
problems, anxiety, insomnia, depression, hallucinations, high blood pressure, and stroke. Overdose results in death; comedian John Belushi died from a cocaine/heroin overdose.

- **Hallucinogens**, also called psychedelics, are a diverse group of psychoactive drugs that alter moods, distort perceptions, and evoke sensory images in the absence of sensory input. Hallucinogens include lysergic acid diethylamide (LSD), phencyclidine (PCP), marijuana (THC), psilocybin from mushrooms, and mescaline (Peyote). Some users report profound, dreamlike feelings.