Consciousness deals with our sensing of both the world around us and our self.

Consciousness includes four components:
- Awareness of external events
- Awareness of internal sensations
- Awareness of the self as a unique being experiencing these events
- Awareness of thoughts about the experience

Freud delved into the nature of consciousness and recognized that the consciousness has levels—since according to his theory conscious actions are fuelled by unconscious desires, there must be levels in between.

Research has since backed the idea of levels of awareness, as people who are asleep can remain conscious of external stimuli, such as sounds.

Measuring variations of consciousness has historically been done by an electroencephalograph, or EEG.

The EEG records activity in the cortex with a series of brain-wave tracings that vary in amplitude and frequency.

Different EEG patterns are associated with different states of consciousness.

Brain wave activity is divided into four different bands: beta waves, which are correlated with alertness and problem solving; alpha waves, which are correlated with resting and relaxation; theta waves, which are correlated with low alertness and sleep; and delta waves, which are correlated.

This short clip shows how an EEG works.

Humans and other animals operate on a 24-hour biological cycle, called circadian rhythms. These daily cycles are particularly important in the regulation of sleep.
Exposure to light apparently affects the activity of a small structure in the hypothalamus called the suprachiasmatic nucleus, which sends signals to the nearby pineal gland, whose secretion of the hormone melatonin plays a key role in adjusting biological clocks.

This video shows a few possible treatments that can be used for jet lag, with varying efficacy.

Circadian rhythms also produce periodic variations in alertness, body temperature, and hormonal secretion.

[click]
Notice how body temperature drops when people fall asleep.

Getting out of sync with your circadian rhythms causes a reduction in the quality of sleep, as well as jet lag.

The speed of readjustment to the biological block depends on the direction traveled – traveling westward is generally easier than traveling eastward.

Jet lag has a significant enough impact that it affects the performance of sports teams, as you can see here.

Stage 1 is a brief stage of light sleep in which theta waves are prominent.

[Click to continue]
During stage 2, brief bursts of higher-frequency brain waves, called sleep spindles, appear against a background of mixed EEG activity.

[Click to continue]
Gradually, your brain waves become higher in amplitude and slower in frequency. As you move into stages 3 and 4, which are called slow-wave sleep, delta waves become prominent.

After about a half-hour in these deep stages of sleep, the cycle reverses itself, and you gradually move upward through lighter stages of sleep.

When you reach what should be stage 1 once again, you usually go into the fifth stage of sleep, which is called REM sleep.

EEG activity during REM sleep is dominated by high-frequency beta waves that resemble those observed when people are awake and alert.

REM sleep is the stage of sleep during which most dreaming occurs.
During the course of a night, people usually repeat the sleep cycle about four times.

As the night wears on, the cycle gradually changes. The first REM period is relatively short. Subsequent REM periods are longer, peaking at around 40 to 60 minutes. Additionally, non-REM intervals tend to get shorter, and descents into non-REM stages usually become shallower.

Babies get far more REM sleep than do adults – about 50% of their total sleep is spent in REM.

In old age, the proportion of light sleep increases and there is an increased frequency of nighttime awakenings.

Research suggests that the effects of sleep deprivation are impaired attention, reaction time, cognitive speed and accuracy, motor coordination, and decision making.

Drowsiness factors in to about 20% of all traffic incidents, as well as contributing to accidents in the workplace.

Sleep deprivation is also linked to health problems, including obesity, diabetes, hypertension, and coronary disease.

Sleep disorders are quite varied. The most common, however, is *insomnia*. Insomnia occurs in 3 different patterns…trouble falling asleep, trouble remaining asleep, and persistent early morning awakening.

Other sleep issues are *narcolepsy*, a disorder involving sudden and irresistible onsets of sleep, and *sleep apnea*, frequent, reflexive gasping for air that disrupts sleep.

Dreams are conventionally defined as mental experiences during REM sleep that are often based in vivid imagery, have a story-like quality, are often bizarre, and seem real to the dreamer.

Many recent theorists have, however, questioned almost every aspect of this definition. We know now that people dream in non-REM too, although the dreams are less story-like and vivid in imagery. Also, recent research shows that content is usually not bizarre, and that dreamers are often aware that they are dreaming.
Research shows that the content of dreams is usually familiar. Common themes in dreams include things like falling, being pursued, trying repeatedly to do something, school, sex, being late, eating, being frightened, etc.

Freud noticed that the contents of waking life tend to spill into dreams; he called this **day residue**.

Hypnosis is a systematic procedure that typically produces a heightened state of suggestibility as well as relaxation, narrowed attention, and enhanced fantasy.

Phenomena that can be produced through hypnosis are many, including experiences such as anesthesia during medical or dental procedures, hallucinations (seeing, hearing, feeling, tasting, or smelling something that is not there), disinhibition (doing things you would normally be more inhibited about doing, like taking off your clothes in public), and posthypnotic suggestions and amnesia—innocuous influences of suggestions made during the hypnosis session on subjects’ later behavior (“you will remember nothing that occurred during your hypnotized state”).

This news clip shows how hypnosis is used as anesthesia during surgery. Researchers argue about whether hypnosis is really an altered state of awareness or if it is simply people doing what they think they are supposed to do when they are hypnotized. The **dissociation** hypothesis holds that hypnosis splits consciousness into two streams, a divided consciousness.

One misconception about hypnosis is that it helps people to remember events more accurately. Actually, those being hypnotized may have trouble distinguishing between memory and fantasy, and may have an artificially inflated confidence about what they “remember.”

Other misconceptions include the idea that one must be relaxed to be hypnotized, hypnotized people lose control of themselves, and the idea that hypnosis can enable people to perform otherwise impossible feats.

Meditation is an ancient discipline which has recently become an area of growing interest.

Effects of meditation include decreased heart rate, respiration rate, etc., and a relaxed EEG, with predominant theta and alpha rhythm patterns. New research using the CT scan to track blood flow in the brain in experienced Tibetan Buddhist meditators shows high activity in the prefrontal cortex (an area important for focused attention) and low activity in parts of the parietal lobe that are known to process information about the body’s location in space...this may explain some of the transcendent experiences reported by many meditators.
Meditation results in a potentially beneficial physiological state whereby bodily arousal is suppressed, but it is unclear how meditation differs from other systematic relaxation training procedures which produce very similar effects.

Psychoactive drugs modify mental, emotional, or behavioral functioning. Drugs are used recreationally for pleasurable alterations in consciousness. Narcotics – including heroin, morphine, codeine, Demerol, and methadone produce an overwhelming sense of euphoria – a “who cares” quality.

This animation shows the effects of narcotics at receptor sites in the synapse.

Physical dependence occurs when a person must continue to take a drug to avoid withdrawal illness, which can have a variety of symptoms depending on the drug. Psychological dependence occurs when a person must continue to take a drug to satisfy intense mental and emotional craving for the drug. Theorists believe that there are physiological reasons for both types of dependencies, centered on the “reward pathway” in the brain.

Narcotics have high rates of physical and psychological dependence, as well as a high risk for fatal overdose. Other risks include infectious diseases (through sharing of needles), accidents, and immune suppression.

Sedatives are sleep inducing drugs that tend to decrease central nervous system activation and behavioral activity. The desired effects are euphoria, relaxation, anxiety reduction, and reduced inhibitions. Side effects include drowsiness, mood swings, and severe impairments in motor coordination and mental functioning.
Sedatives also have high rates of dependence and fatal overdose potential. They also increase the risk of accidental injuries because they severely impair motor coordination.

**Stimulants** include mild drugs such as caffeine and nicotine, as well as much stronger drugs such as cocaine and amphetamines. Cocaine and amphetamines have similar effects, except amphetamines last longer. The euphoria created by these drugs is very different from the “who cares,” very relaxed state of narcotics – more like an “I can conquer the world,” very alert state of being.

**Cocaine** exerts its effects at the norepinephrine and dopamine synapses by interfering with reuptake at these locations. As a result, more neurotransmitters are available to bind at receptor sites, causing more postsynaptic potentials, and greatly increasing activity at these synapses.

**Amphetamines** also affect dopamine and norepinephrine synapses by increasing the reuptake of neurotransmitters by presynaptic neurons and slowing the process of reuptake.

As a result, neurotransmitter molecules pile up, causing increased postsynaptic potentials.

The use of cocaine or amphetamines can eventually lead to a depletion of dopamine and norepinephrine, which appears to be the cause of the emotional crash after the effects wear off.

Stimulants have moderate to high levels of physical and psychological dependence, as well as risk of fatal overdose.

Other risks include sleep problems, malnutrition, nasal damage (from snorting), hypertension, respiratory disease (from smoking), stroke, liver disease, and heart attack.

**Cannabis** is the hemp plant from which marijuana, hashish, and THC are derived. THC, the active chemical ingredient, causes a mild, relaxed euphoria and enhanced sensory awareness.
There is no risk of physical dependence on marijuana, however there is a chance of becoming psychologically addicted.

Risks associated with marijuana use include accidents, lung cancer, respiratory disease, pulmonary disease, and increased vulnerability to psychosis.

Alcohol is the most widely used psychoactive drug. When people drink heavily, the effect is a relaxed euphoria that temporarily boosts self-esteem and decreases inhibitions.

Addiction to alcohol, both physically and psychologically, is moderately frequent. Overdose potential – known as alcohol poisoning – varies.

Alcoholism is associated with a diverse array of physiological maladies, such as liver disease, malnutrition, brain damage, neurological disorders, heart disease, stroke, hypertension, ulcers, cancer, and birth defects.

This clip shows how gender affects alcohol metabolism as well as the self-perception of intoxication vs. actual level of intoxication.

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