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In this chapter we will talk about:

- On the Nature of Consciousness
- Biological Rhythms and Sleep
- Sleep and Waking Cycle
- The World of Dreams
- Hypnosis: Altered Consciousness or Role Paying?
- Meditation: Seeking Higher Consciousness
- Altering Consciousness with Drugs

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Consciousness comprises 4 basic components:

- Awareness of external events
- Awareness of internal sensations
- Awareness of the self as a unique being experiencing these events
- And awareness of your thoughts about the experiences

It is being sentient, which means possessing the ability to have feelings and perceptions. In short, it is your personal awareness of your self.

But it is experienced in different levels along a continuum of awareness.

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Different patterns of brain wave activity are seen during different states of consciousness as seen in this table.

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Biological rhythms are periodic fluctuations in physiological functioning. The existence of these rhythms means that organisms have internal "biological clocks" that somehow monitor the passage of time.

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These graphs show how alertness, core body temperature, and the secretion of growth hormone typically fluctuate in a 24-hour rhythm.

Circadian rhythms are also seen for many other physiological functions.

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If you ignore your natural circadian rhythms and don't sleep at your usual times, or if you get out of "sync" with it by flying across time zones it can cause poor quality of sleep and what is known as "jet lag".

Studies have shown that shifts workers who are constantly disrupting their circadian rhythms have a higher incidence of physical diseases, including cancer, diabetes, ulcers, high blood pressure, and heart disease.

There is new research that suggests small doses of the hormone melatonin can help alleviate negative effects of disruptions.

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Characteristic brain waves vary depending on one's state of consciousness. Generally, as people move from an awake state through deeper stages of sleep, their brain waves decrease in frequency (cycles per second) and increase in amplitude (height).

However, brain waves during REM sleep resemble "wide awake" brain waves.

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The white line charts how a typical, healthy young adult moves through the various stages of sleep.

Dreams and rapid eye movements tend to coincide with REM sleep. Posture changes occur in between REM periods.

Notice how the person cycles into REM four times, as descents into non-REM sleep get shallower and REM periods get longer.

Thus, slow-wave sleep is prominent early in the night, while REM sleep dominates the second half of a night's sleep.

Although these patterns are typical, sleep patterns vary from one person to another and that they change with age.

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REM sleep is not unique to humans. Nearly all mammals and birds exhibit REM sleep. The only known exceptions among warm-blooded vertebrates are dolphins and some whales (Morrison, 2003).

Dolphins are particularly interesting, as they sleep while swimming, resting one hemisphere of the brain while the other hemisphere remains alert.

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Both the total amount of sleep per night and the portion of sleep that is REM sleep change with age. Sleep patterns change most dramatically during infancy, with total sleep time and amount of REM sleep declining sharply in the first two years of life.

After a noticeable drop in the average amount of sleep in adolescence, sleep patterns remain relatively stable, although total sleep and slow-wave sleep continue to decline gradually with age.

It has typically been thought that culture did not have any significant effect on sleep patterns around the world. However recent studies seem to shown that there differences in ethnic groups in the U.S., with whites and African Americans reporting the worst quality of sleep and Asians the best.

Many countries in tropical or hotter climates adjust their sleep patterns to allow for rest during the heat of the day. They are called "siesta cultures".

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According to William Dement, a leading researcher on the subject, "sleep deprivation is a major epidemic in our society. Americans spend so much time and energy chasing the American dream that they don't have much time left for actual dreaming."

Many traffic accidents occur because drivers get drowsy or fall asleep at the wheel.

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Sleep deprivation is linked with hormonal changes that increase hunger and may be a factor in the obesity epidemic we are currently experiencing.

There is also evidence to links with childhood obesity, and factors correlating lack of sleep and mortality rates.

In a study of over 100,000 subjects followed for 10 years, Tamakoshi et al. (2004) estimated mortality rates in relation to typical sleep duration. The lowest mortality rate was found among those who slept 7 hours. Using that as a baseline, higher mortality rates are associated with both shorter sleep durations and longer sleep durations. Mortality rates were especially elevated among those who reported that they slept 10 or more hours per night.

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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.

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There are a wide variety of sleep disorders.

The most common is **Insomnia**. It occurs in three basic patterns:

- difficulty falling asleep
- difficulty staying asleep
- and persistent early-morning awakening.

It is seen in about 30 to 35% of adults, and is more prevalent in women and seems to increase with aging.

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Other disorders include:

- **Narcolepsy** – a disease marked by sudden and irresistible onsets of sleep during normal waking periods
- **Sleep Apnea** – which involves frequent, reflexive gasping for air that awakens a person and disrupts sleep, and is accompanied by loud snoring
- **Somnambulism** – as depicted in this cartoon – is sleepwalking, and occurs when a person arises and wanders about while remaining asleep. It is seen in about 15% of children and 3% of adults.

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Although there is evidence that dreaming occurs in all stages of sleep, for the most part the most vivid dreams occur in the REM sleep stage.

Certain themes tend to be more common in dreaming, which can be seen in the chart on page 156 of your text.

They include being nude in public, being chased, being late as in missing a train, and the feeling of falling. It is a **common myth** that if you don't awaken before you hit the ground you will actually die, but since people who have died in their sleep can't actually tell us if they were dreaming of falling, we can't really verify that.

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Dreams can be explained in a variety of ways. Freud stressed the wish-fulfilling function of dreams.

Cartwright emphasizes the problem-solving function of dreams.

Hobson asserts that dreams are merely a by-product of periodic neural activation.

All three theories are speculative and have their critics.

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

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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- influences of suggestions made during the hypnosis session on subjects' later behavior ("you will remember nothing that occurred during your hypnotized state").

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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.

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Meditation refers to a family of practices that train attention to heighten awareness and bring mental process under greater voluntary control.

They include yoga, zen, and transcendental meditation, and all are rooted in eastern religions of Hinduism, Buddhism, and Taoism.

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The physiological changes shown in the graph are evidence of physical relaxation during the meditative state. However, critics argue that similar changes may also be produced by systematic relaxation procedures.

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Like hypnosis and meditation, drugs are commonly used to deliberately alter consciousness.

The principal types of recreational drugs include narcotics, sedatives, stimulants, hallucinogens, cannabis, and alcohol.

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The neural circuits shown here in blue make up the **mesolimbic dopamine pathway**. Axons in this pathway run from an area in the midbrain through the medial forebrain bundle to the *nucleus* **accumbens** and on to the prefrontal cortex. Recreational drugs affect a variety of neurotransmitter systems, but theorists believe that heightened dopamine activity in this pathway—especially the portion running from the midbrain to the nucleus accumbens—is responsible for the reinforcing effects of most abused drugs.

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Overuse and abuse of drugs can create a drug dependency. Physical dependence exists when a person must continue to take a drug to avoid withdrawal symptoms that can include chills, shaking, vomiting, and convulsions.

Psychological dependence exists when a person must continue to take a drug to satisfy intense mental and emotional cravings.

Tolerance, dependence, and potential health risks vary.

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Any drug can be fatal if a person takes enough of it, but some drugs are much more dangerous than others.

In 2011, after years of struggling with substance abuse, singer Amy Winehouse died from an accidental overdose of alcohol. Her tragic death illustrates the seductive risks of psychoactive drugs and that alcohol by itself can be quite dangerous.

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In some cases, drugs cause tissue damage directly.

For example: chronic snorting of cocaine can damage nasal membranes.

The negative effects of drugs on physical health are often indirect results of the drugs' impact on behavior. For instance, people using stimulants often do not eat or sleep properly.

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The health risks of marijuana have generated considerable debate in recent years.

Most studies agree that chronic use increases the risk of respiratory and pulmonary disease, and some have indicated a connection to lung cancer also exists. There have even been links found between psychotic disorders, including schizophrenia.

Although most agree the dangers are real, they think the dangers are exaggerated, and contrary to popular reports it appears there is no meaningful reduction to the immune system or significant effects on male smokers' fertility or sexual functioning.