States of Consciousness

An Unconscious Killing

During the night of May 23, 1987, Kenneth Parks, a 23-year old Canadian with a wife, a baby daughter, and heavy gambling debts, got out of his bed, climbed into his car, and drove 15 miles to the home of his wife’s parents in the suburbs of Toronto. There, he attacked them with a knife, killing his mother-in-law and severely injuring his father-in-law. Parks then drove to a police station and stumbled into the building, holding up his bloody hands and saying, “I think I killed some people…my hands.” The police arrested him and took him to a hospital, where surgeons repaired several deep cuts on his hands. Only then did police discover that he had indeed assaulted his in-laws.

Parks claimed that he could not remember anything about the crime. He said that he remembered going to sleep in his bed, then awakening in the police station with bloody hands, but nothing in between. His defense was that he had been asleep during the entire incident and was not aware of his actions (Martin, 2009).[^1]

Not surprisingly, no one believed this explanation at first. However, further investigation established that he did have a long history of sleepwalking, he had no motive for the crime, and despite repeated attempts to trip him up in numerous interviews, he was completely consistent in his story, which also fit the timeline of events. Parks was examined by a team of sleep specialists, who found that the pattern of brain waves that occurred while he slept was very abnormal (Broughton, Billings, Cartwright, & Doucette, 1994).[^2] The specialists eventually concluded that sleepwalking, probably precipitated by stress and anxiety over his financial troubles, was the most likely explanation of his aberrant behavior. They also agreed that such a combination of stressors was unlikely to happen again, so he was not likely to undergo another such violent episode and was probably not a hazard to others. Given this combination of evidence, the jury acquitted Parks of murder and assault charges. He walked out of the courtroom a free man (Wilson, 1998).[^3]

Consciousness is defined as our subjective awareness of ourselves and our environment (Koch, 2004).[^4] The experience of consciousness is fundamental to human nature. We all know what it means to be conscious, and we assume (although we can never be sure) that other human beings experience their consciousness similarly to how we experience ours.

The study of consciousness has long been important to psychologists and plays a role in many important psychological theories. For instance, Sigmund Freud’s personality theories differentiated between the unconscious and the conscious aspects of behavior, and present-day psychologists distinguish between automatic (unconscious) and controlled (conscious) behaviors and between

[^1]: Martin, 2009
[^2]: Broughton, Billings, Cartwright, & Doucette, 1994
[^3]: Wilson, 1998
[^4]: Koch, 2004
Implicit (unconscious) and explicit (conscious) memory (Petty, Wegener, Chaiken, & Trope, 1999; Shanks, 2005).

Some philosophers and religious practices argue that the mind (or soul) and the body are separate entities. For instance, the French philosopher René Descartes (1596–1650) was a proponent of dualism, the idea that the mind, a nonmaterial entity, is separate from (although connected to) the physical body. In contrast to the dualists, psychologists believe that consciousness (and thus the mind) exists in the brain, not separate from it. In fact, psychologists believe that consciousness is the result of the activity of the many neural connections in the brain, and that we experience different states of consciousness depending on what our brain is currently doing (Dennett, 1991; Koch & Greenfield, 2007).

The study of consciousness is also important to the fundamental psychological question regarding the presence of free will. Although we may understand and believe that some of our behaviors are caused by forces that are outside our awareness (i.e., unconscious), we nevertheless believe that we have control over, and are aware that we are engaging in, most of our behaviors. To discover that we, or even someone else, has engaged in a complex behavior, such as driving in a car and causing severe harm to others, without being at all conscious of one’s actions, is so unusual as to be shocking. And yet psychologists are increasingly certain that a great deal of our behavior is caused by processes of which we are unaware and over which we have little or no control (Libet, 1999; Wegner, 2003).

Our experience of consciousness is functional because we use it to guide and control our behavior, and to think logically about problems (DeWall, Baumeister, & Masicampo, 2008). Consciousness allows us to plan activities and to monitor our progress toward the goals we set for ourselves. And consciousness is fundamental to our sense of morality—we believe that we have the free will to perform moral actions while avoiding immoral behaviors.

But in some cases consciousness may become aversive, for instance when we become aware that we are not living up to our own goals or expectations, or when we believe that other people perceive us negatively. In these cases we may engage in behaviors that help us escape from consciousness, for example through the use of alcohol or other psychoactive drugs (Baumeister, 1998).

Because the brain varies in its current level and type of activity, consciousness is transitory. If we drink too much coffee or beer, the caffeine or alcohol influences the activity in our brain, and our consciousness may change. When we are anesthetized before an operation or experience a concussion after a knock on the head, we may lose consciousness entirely as a result of changes in brain activity. We also lose consciousness when we sleep, and it is with this altered state of consciousness that we begin our chapter.
5.1 Sleeping and Dreaming Revitalize Us for Action

LEARNING OBJECTIVES

1. Draw a graphic showing the usual phases of sleep during a normal night and notate the characteristics of each phase.
2. Review the disorders that affect sleep and the costs of sleep deprivation.
3. Outline and explain the similarities and differences among the different theories of dreaming.

The lives of all organisms, including humans, are influenced by regularly occurring cycles of behaviors known as biological rhythms. One important biological rhythm is the annual cycle that guides the migration of birds and the hibernation of bears. Women also experience a 28-day cycle that guides their fertility and menstruation. But perhaps the strongest and most important biorhythm is the daily circadian rhythm that guides the daily waking and sleeping cycle in many animals.

Many biological rhythms are coordinated by changes in the level and duration of ambient light, for instance, as winter turns into summer and as night turns into...
day. In some animals, such as birds, the pineal gland in the brain is directly sensitive to light and its activation influences behavior, such as mating and annual migrations. Light also has a profound effect on humans. We are more likely to experience depression during the dark winter months than during the lighter summer months, an experience known as seasonal affective disorder (SAD), and exposure to bright lights can help reduce this depression (McGinnis, 2007).¹

Sleep is also influenced by ambient light. The ganglion cells in the retina send signals to a brain area above the thalamus called the suprachiasmatic nucleus, which is the body’s primary circadian “pacemaker.” The suprachiasmatic nucleus analyzes the strength and duration of the light stimulus and sends signals to the pineal gland when the ambient light level is low or its duration is short. In response, the pineal gland secretes melatonin, a powerful hormone that facilitates the onset of sleep.

Sleep Stages: Moving Through the Night

Although we lose consciousness as we sleep, the brain nevertheless remains active. The patterns of sleep have been tracked in thousands of research participants who have spent nights sleeping in research labs while their brain waves were recorded by monitors, such as an electroencephalogram, or EEG.

Sleep researchers have found that sleeping people undergo a fairly consistent pattern of sleep stages, each lasting about 90 minutes. These stages are of two major types: Rapid eye movement (REM) sleep is a sleep stage characterized by the presence of quick fast eye movements and dreaming. REM sleep accounts for about 25% of our total sleep time. During REM sleep, our awareness of external events is dramatically reduced, and consciousness is dominated primarily by internally generated images and a lack of overt thinking (Hobson, 2004).² During this sleep stage our muscles shut down, and this is probably a good thing as it protects us from hurting ourselves or trying to act out the scenes that are playing in our dreams. The second major sleep type, non-rapid eye movement (non-REM) sleep is a deep sleep, with some stages characterized by very slow brain waves (slow-wave sleep), that is further subdivided into stages. Each of the sleep stages has its own distinct pattern of brain activity (Dement & Kleitman, 1957).³
During a typical night, our sleep cycles move between REM and non-REM sleep, with each cycle repeating at about 90-minute intervals. The deeper non-REM sleep stages usually occur earlier in the night.

As you can see in Figure 5.5 "EEG Recordings of Brain Patterns During Sleep", the brain waves that are recorded by an EEG as we sleep show that the brain’s activity changes during each stage of sleeping. When we are awake, our brain activity is characterized by the presence of very fast beta waves. When we first begin to fall asleep, the waves get longer (alpha waves), and as we move into stage N1 sleep, which is characterized by the experience of drowsiness, the brain begins to produce even slower theta waves. During stage N1 sleep, some muscle tone is lost, as well as most awareness of the environment. Some people may experience sudden jerks or twitches and even vivid hallucinations during this initial stage of sleep. Often, the non-REM sleep stages (referred to as Stages N1, N2, and N3) here are divided into 4 stages with Stages 3 and 4 being referred to as “slow-wave sleep” due to the presence of slow waves. The Delta waves seen during Stage N3 sleep (Stages 3 and 4) reflect neural synchrony – neurons in the brain are firing together, resulting in large and slow waves. This is in contrast to the highly random activity seen in the awake brain and during REM.
Each stage of sleep has its own distinct pattern of brain activity.
Normally, if we are allowed to keep sleeping, we will move from stage N1 to stage N2 sleep. During stage N2, muscular activity is further decreased and conscious awareness of the environment is lost. This stage typically represents about half of the total sleep time in normal adults. Stage N2 sleep is characterized by theta waves interspersed with bursts of rapid brain activity known as sleep spindles.

Stage N3, also known as slow wave sleep, is the deepest level of sleep, characterized by an increased proportion of very slow delta waves. This is the stage in which most sleep abnormalities, such as sleepwalking, sleep-talking, nightmares, and bed-wetting occur. The sleepwalking murders committed by Mr. Parks would have occurred in this stage. Some skeletal muscle tone remains, making it possible for affected individuals to rise from their beds and engage in sometimes very complex behaviors, but consciousness is distant. Even in the deepest sleep, however, we are still aware of the external world. If smoke enters the room or if we hear the cry of a baby we are likely to react, even though we are sound asleep. These occurrences again demonstrate the extent to which we process information outside consciousness.

After falling initially into a very deep sleep, the brain begins to become more active again, and we normally move into the first period of REM sleep about 90 minutes after falling asleep. REM sleep is accompanied by an increase in heart rate, facial twitches, and the repeated rapid eye movements that give this stage its name. People who are awakened during REM sleep almost always report that they were dreaming, while those awakened in other stages of sleep report dreams much less often. REM sleep is also emotional sleep. Activity in the limbic system, including the amygdala, is increased during REM sleep, and the genitals become aroused, even if the content of the dreams we are having is not sexual. A typical 25-year-old man may have an erection nearly half of the night, and the common “morning erection” is left over from the last REM period before waking.

Normally we will go through several cycles of REM and non-REM sleep each night (Figure 5.5 "EEG Recordings of Brain Patterns During Sleep"). The length of the REM portion of the cycle tends to increase through the night, from about 5 to 10 minutes early in the night to 15 to 20 minutes shortly before awakening in the morning. Dreams also tend to become more elaborate and vivid as the night goes on. Eventually, as the sleep cycle finishes, the brain resumes its faster alpha and beta waves and we awake, normally refreshed.

**Sleep Disorders: Problems in Sleeping**

According to a recent poll (National Sleep Foundation, 2009), about one-fourth of American adults say they get a good night’s sleep only a few nights a month or less. These people are suffering from a sleep disorder known as insomnia, defined as persistent difficulty falling or staying asleep. Most cases of insomnia
are temporary, lasting from a few days to several weeks, but in some cases insomnia can last for years.

Insomnia can result from physical disorders such as pain due to injury or illness, or from psychological problems such as stress, financial worries, or relationship difficulties. Changes in sleep patterns, such as jet lag, changes in work shift, or even the movement to or from daylight savings time can produce insomnia. Sometimes the sleep that the insomniac does get is disturbed and nonrestorative, and the lack of quality sleep produces impairment of functioning during the day. Ironically, the problem may be compounded by people’s anxiety over insomnia itself: Their fear of being unable to sleep may wind up keeping them awake. Some people may also develop a conditioned anxiety to the bedroom or the bed.

People who have difficulty sleeping may turn to drugs to help them sleep. Barbiturates, benzodiazepines, and other sedatives are frequently marketed and prescribed as sleep aids, but they may interrupt the natural stages of the sleep cycle, and in the end are likely to do more harm than good. In some cases they may also promote dependence. Most practitioners of sleep medicine today recommend making environmental and scheduling changes first, followed by therapy for underlying problems, with pharmacological remedies used only as a last resort.

Another common sleep problem is sleep apnea, a sleep disorder characterized by pauses in breathing that last at least 10 seconds during sleep (Morgenthaler, Kagramanov, Hanak, & Decker, 2006). In addition to preventing restorative sleep, sleep apnea can also cause high blood pressure and may raise the risk of stroke and heart attack (Yaggi et al., 2005).

Most sleep apnea is caused by an obstruction of the walls of the throat that occurs when we fall asleep. It is most common in obese or older individuals who have lost muscle tone and is particularly common in men. Sleep apnea caused by obstructions is usually treated with an air machine that uses a mask to create a continuous pressure that prevents the airway from collapsing, or with mouthpieces that keep the airway open. If all other treatments have failed, sleep apnea may be treated with surgery to open the airway.

Narcolepsy is a disorder characterized by extreme daytime sleepiness with frequent episodes of “nodding off.” The syndrome may also be accompanied by attacks of cataplexy, in which the individual loses muscle tone, resulting in a partial or complete collapse. It is estimated that at least 200,000 Americans suffer from narcolepsy, although only about a quarter of these people have been diagnosed (National Heart, Lung, and Blood Institute, 2008).

Narcolepsy is in part the result of genetics—people who suffer from the disease lack neurotransmitters that are important in keeping us alert (Taheri, Zeitzer, &
— and is also the result of a lack of deep sleep. While most people descend through the sequence of sleep stages, then move back up to REM sleep soon after falling asleep, narcolepsy sufferers move directly into REM and undergo numerous awakenings during the night, often preventing them from getting good sleep.

Narcolepsy can be treated with stimulants, such as amphetamines, to counteract the daytime sleepiness, or with antidepressants to treat a presumed underlying depression. However, since these drugs further disrupt already-abnormal sleep cycles, these approaches may, in the long run, make the problem worse. Many sufferers find relief by taking a number of planned short naps during the day, and some individuals may find it easier to work in jobs that allow them to sleep during the day and work at night.

Other sleep disorders occur when cognitive or motor processes that should be turned off or reduced in magnitude during sleep operate at higher than normal levels (Mahowald & Schenck, 2000). One example is somnambulism (sleepwalking), in which the person leaves the bed and moves around while still asleep. Sleepwalking is more common in childhood, with the most frequent occurrences around the age of 12 years. About 4% of adults experience somnambulism (Mahowald & Schenck, 2000).

Sleep terrors is a disruptive sleep disorder, most frequently experienced in childhood, that may involve loud screams and intense panic. The sufferer cannot wake from sleep even though he or she is trying to. In extreme cases, sleep terrors may result in bodily harm or property damage as the sufferer moves about abruptly. Up to 3% of adults suffer from sleep terrors, which typically occur in sleep stage N3 (Mahowald & Schenck, 2000).

Other sleep disorders include bruxism, in which the sufferer grinds his teeth during sleep; restless legs syndrome, in which the sufferer reports an itching, burning, or otherwise uncomfortable feeling in his legs, usually exacerbated when resting or asleep; and periodic limb movement disorder, which involves sudden involuntary movement of limbs. The latter can cause sleep disruption and injury for both the sufferer and bed partner.

Although many sleep disorders occur during non-REM sleep, REM sleep behavior disorder (Mahowald & Schenck, 2005) is a condition in which people (usually middle-aged or older men) engage in vigorous and bizarre physical activities during REM sleep in response to intense, violent dreams. As their actions may injure themselves or their sleeping partners, this disorder, thought to be neurological in nature, is normally treated with hypnosis and medications.
The Heavy Costs of Not Sleeping

Our preferred sleep times and our sleep requirements vary throughout our life cycle. Newborns tend to sleep between 16 and 18 hours per day, preschoolers tend to sleep between 10 and 12 hours per day, school-aged children and teenagers usually prefer at least 9 hours of sleep per night, and most adults say that they require 7 to 8 hours per night (Mercer, Merritt, & Cowell, 1998; National Sleep Foundation, 2008).[^14] There are also individual differences in need for sleep. Some people do quite well with fewer than 6 hours of sleep per night, whereas others need 9 hours or more. The most recent study by the National Sleep Foundation suggests that adults should get between 7 and 9 hours of sleep per night (Figure 5.8 "Average Hours of Required Sleep per Night"), and yet Americans now average fewer than 7 hours.

*Figure 5.8 Average Hours of Required Sleep per Night*

<table>
<thead>
<tr>
<th>Age</th>
<th>Sleep needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborns (0–2 months)</td>
<td>12 to 18 hours</td>
</tr>
<tr>
<td>Infants (3–11 months)</td>
<td>14 to 15 hours</td>
</tr>
<tr>
<td>Toddlers (1–3 years)</td>
<td>12 to 14 hours</td>
</tr>
<tr>
<td>Preschoolers (3–5 years)</td>
<td>11 to 13 hours</td>
</tr>
<tr>
<td>School-age children (5–10 years)</td>
<td>10 to 11 hours</td>
</tr>
<tr>
<td>Teens (10–17 years)</td>
<td>8.5 to 9.25 hours</td>
</tr>
<tr>
<td>Adults</td>
<td>7 to 9 hours</td>
</tr>
</tbody>
</table>

*The average U.S. adult reported getting only 6.7 hours of sleep per night, which is less than the recommended range propose by the National Sleep Foundation. Source: Adapted from National Sleep Foundation. (2008). Sleep in America Poll. Washington, DC: Author. Retrieved from [http://www.sleepfoundation.org/sites/default/files/2008%20POLL%20SOF.PDF](http://www.sleepfoundation.org/sites/default/files/2008%20POLL%20SOF.PDF).*
Getting needed rest is difficult in part because school and work schedules still follow the early-to-rise timetable that was set years ago. We tend to stay up late to enjoy activities in the evening but then are forced to get up early to go to work or school. The situation is particularly bad for college students, who are likely to combine a heavy academic schedule with an active social life and who may, in some cases, also work. Getting enough sleep is a luxury that many of us seem to be unable or unwilling to afford, and yet sleeping is one of the most important things we can do for ourselves. Continued over time, a nightly deficit of even only 1 or 2 hours can have a substantial impact on mood and performance.

Sleep has a vital restorative function, and a prolonged lack of sleep results in increased anxiety, diminished performance, and, if severe and extended, may even result in death. Many road accidents involve sleep deprivation, and people who are sleep deprived show decrements in driving performance similar to those who have ingested alcohol (Hack, Choi, Vijayapalan, Davies, & Stradling, 2001; Williamson & Feyer, 2000). Poor treatment by doctors (Smith-Coggins, Rosekind, Hurd, & Buccino, 1994) and a variety of industrial accidents have also been traced in part to the effects of sleep deprivation.

Good sleep is also important to our health and longevity. It is no surprise that we sleep more when we are sick, because sleep works to fight infection. Sleep deprivation suppresses immune responses that fight off infection, and can lead to obesity, hypertension, and memory impairment (Ferrie et al., 2007; Kushida, 2005). Sleeping well can even save our lives. Dew et al. (2003) found that older adults who had better sleep patterns also lived longer.

Dreams and Dreaming

Dreams are the succession of images, thoughts, sounds, and emotions that passes through our minds while sleeping. When people are awakened from REM sleep, they normally report that they have been dreaming, suggesting that people normally dream several times a night but that most dreams are forgotten on awakening (Dement, 1997). The content of our dreams generally relates to our everyday experiences and concerns, and frequently our fears and failures (Cartwright, Agargun, Kirkby, & Friedman, 2006; Domhoff, Meyer-Gomes, & Schredl, 2005).

Many cultures regard dreams as having great significance for the dreamer, either by revealing something important about the dreamer’s present circumstances or predicting his future. The Austrian psychologist Sigmund Freud (1913/1988) analyzed the dreams of his patients to help him understand their unconscious needs and desires, and psychotherapists still make use of this technique today. Freud believed that the primary function of dreams was wish fulfillment, or the idea that dreaming allows us to act out the desires that we must repress during the day. He differentiated between the manifest content of the dream (i.e., its literal actions) and its latent content (i.e., the hidden psychological meaning of
the dream). Freud believed that the real meaning of dreams is often suppressed by the unconscious mind in order to protect the individual from thoughts and feelings that are hard to cope with. By uncovering the real meaning of dreams through psychoanalysis, Freud believed that people could better understand their problems and resolve the issues that create difficulties in their lives.

Although Freud and others have focused on the meaning of dreams, other theories about the causes of dreams are less concerned with their content. One possibility is that we dream primarily to help with consolidation, or the moving of information into long-term memory (Alvarenga et al., 2008; Zhang (2004).[22] Rauchs, Desgranges, Foret, and Eustache (2005).[23] found that rats that had been deprived of REM sleep after learning a new task were less able to perform the task again later than were rats that had been allowed to dream, and these differences were greater on tasks that involved learning unusual information or developing new behaviors. Payne and Nadel (2004) [24] argued that the content of dreams is the result of consolidation—we dream about the things that are being moved into long-term memory. Thus dreaming may be an important part of the learning that we do while sleeping (Hobson, Pace-Schott, and Stickgold, 2000).[25]

The activation-synthesis theory of dreaming (Hobson & McCarley, 1977; Hobson, 2004)[26] proposes still another explanation for dreaming—namely, that dreams are our brain’s interpretation of the random firing of neurons in the brain stem. According to this approach, the signals from the brain stem are sent to the cortex, just as they are when we are awake, but because the pathways from the cortex to skeletal muscles are disconnected during REM sleep, the cortex does not know how to interpret the signals. As a result, the cortex strings the messages together into the coherent stories we experience as dreams.

Although researchers are still trying to determine the exact causes of dreaming, one thing remains clear—we need to dream. If we are deprived of REM sleep, we quickly become less able to engage in the important tasks of everyday life, until we are finally able to dream again.

**KEY TAKEAWAYS**

- Consciousness, our subjective awareness of ourselves and our environment, is functional because it allows us to plan activities and monitor our goals.
- Psychologists believe the consciousness is the result of neural activity in the brain.
- Human and animal behavior is influenced by biological rhythms, including annual, monthly, and circadian rhythms.
- Sleep consists of two major stages: REM and non-REM sleep. Non-REM sleep has three substages, known as stage N1, N2, and N3.
- Each sleep stage is marked by a specific pattern of biological responses and brain wave patterns.
• Sleep is essential for adequate functioning during the day. Sleep disorders, including insomnia, sleep apnea, and narcolepsy, may make it hard for us to sleep well.

• Dreams occur primarily during REM sleep. Some theories of dreaming, such as Freud’s, are based on the content of the dreams. Other theories of dreaming propose that dreaming is related to memory consolidation. The activation-synthesis theory of dreaming is based only on neural activity.


5.2 Altering Consciousness With Psychoactive Drugs

LEARNING OBJECTIVES

1. Summarize the major psychoactive drugs and their influences on consciousness and behavior.
2. Review the evidence regarding the dangers of recreational drugs.

A psychoactive drug is a chemical that changes our states of consciousness, and particularly our perceptions and moods. These drugs are commonly found in everyday foods and beverages, including chocolate, coffee, and soft drinks, as well as in alcohol and in over-the-counter drugs, such as aspirin, Tylenol, and cold and cough medication. Psychoactive drugs are also frequently prescribed as sleeping pills, tranquilizers, and anti-anxiety medications, and they may be taken, illegally, for recreational purposes. The four primary classes of psychoactive drugs are stimulants, depressants, and hallucinogens.

Psychoactive drugs affect consciousness by influencing how neurotransmitters operate at the synapses of the central nervous system (CNS). Some psychoactive drugs are agonists, which mimic or increase the activity of a neurotransmitter; some are antagonists, which decrease the activity of a neurotransmitter.

<table>
<thead>
<tr>
<th>Psychoactive Drugs by Class</th>
<th>Drug</th>
<th>Dangers and side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stimulants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhanced mood and increased energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caffeine</td>
<td>May create dependence</td>
<td></td>
</tr>
<tr>
<td>Nicotine</td>
<td>Has major negative health effects if smoked or chewed</td>
<td></td>
</tr>
<tr>
<td>Cocaine</td>
<td>Decreased appetite, headache</td>
<td></td>
</tr>
<tr>
<td>Amphetamines</td>
<td>Possible dependence, accompanied by severe “crash” with depression as drug effects wear off, particularly if smoked or injected</td>
<td></td>
</tr>
</tbody>
</table>
Drug Dangers and side effects

### Depressants

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dangers and side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Impaired judgment, loss of coordination, dizziness, nausea, and eventually a loss of consciousness</td>
</tr>
<tr>
<td>Barbiturates and benzodiazepines</td>
<td>Sluggishness, slowed speech, drowsiness, in severe cases, coma or death</td>
</tr>
<tr>
<td>Toxic inhalants</td>
<td>Brain damage and death</td>
</tr>
</tbody>
</table>

### Calming effects, sleep, pain relief, slowed heart rate and respiration

- **Opium**
  - Side effects include nausea, vomiting, tolerance, and addiction.
- **Morphine**
  - Restlessness, irritability, headache and body aches, tremors, nausea, vomiting, and severe abdominal pain
- **Heroin**
  - All side effects of morphine but about twice as addictive as morphine

### Hallucinogens

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dangers and side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana</td>
<td>Mild intoxication; enhanced perception</td>
</tr>
<tr>
<td>LSD, mescaline, PCP, and peyote</td>
<td>Hallucinations; enhanced perception</td>
</tr>
</tbody>
</table>

In some cases the effects of psychoactive drugs mimic other naturally occurring states of consciousness. For instance, sleeping pills are prescribed to create drowsiness, and benzodiazepines are prescribed to create a state of relaxation. In other cases psychoactive drugs are taken for recreational purposes with the goal of creating states of consciousness that are pleasurable or that help us escape our normal consciousness.

The use of psychoactive drugs, and especially those that are used illegally, has the potential to create very negative side effects. This does not mean that all drugs are dangerous, but rather that all drugs can be dangerous, particularly if they are used regularly over long periods of time. Psychoactive drugs create negative effects not so much through their initial use but through the continued use, accompanied by increasing doses, that ultimately may lead to drug abuse.
The problem is that many drugs create tolerance: an increase in the dose required to produce the same effect, which makes it necessary for the user to increase the dosage or the number of times per day that the drug is taken. As the use of the drug increases, the user may develop a dependence, defined as a need to use a drug or other substance regularly. Dependence can be psychological, in which the drug is desired and has become part of the everyday life of the user, but no serious physical effects result if the drug is not obtained; or physical, in which serious physical and mental effects appear when the drug is withdrawn. Cigarette smokers who try to quit, for example, experience physical withdrawal symptoms, such as becoming tired and irritable, as well as extreme psychological cravings to enjoy a cigarette in particular situations, such as after a meal or when they are with friends.

Users may wish to stop using the drug, but when they reduce their dosage they experience withdrawal—negative experiences that accompany reducing or stopping drug use, including physical pain and other symptoms. When the user powerfully craves the drug and is driven to seek it out, over and over again, no matter what the physical, social, financial, and legal cost, we say that he or she has developed an addiction to the drug.

It is a common belief that addiction is an overwhelming, irresistibly powerful force, and that withdrawal from drugs is always an unbearably painful experience. But the reality is more complicated and in many cases less extreme. For one, even drugs that we do not generally think of as being addictive, such as caffeine, nicotine, and alcohol, can be very difficult to quit using, at least for some people. On the other hand, drugs that are normally associated with addiction, including amphetamines, cocaine, and heroin, do not immediately create addiction in their users. Even for a highly addictive drug like cocaine, only about 15% of users become addicted (Robinson & Berridge, 2003; Wagner & Anthony, 2002). Furthermore, the rate of addiction is lower for those who are taking drugs for medical reasons than for those who are using drugs recreationally. Patients who have become physically dependent on morphine administered during the course of medical treatment for a painful injury or disease are able to be rapidly weaned off the drug afterward, without becoming addicts. Robins, Davis, and Goodwin (1974) found that the majority of soldiers who had become addicted to morphine while overseas were quickly able to stop using after returning home. Addiction is defined by the behavior of the user, not the impact of the drug on the body. Addiction is best thought of as psychological dependence that may or may not be accompanied by signs of physiological dependence (tolerance and withdrawal).

This does not mean that using recreational drugs is not dangerous. For people who do become addicted to drugs, the success rate of recovery is low. These drugs are generally illegal and carry with them potential criminal consequences if one is caught and arrested. Drugs that are smoked may produce throat and lung cancers and other problems. Snorting (“sniffing”) drugs can lead to a loss of the
sense of smell, nosebleeds, difficulty in swallowing, hoarseness, and chronic runny nose. Injecting drugs intravenously carries with it the risk of contracting infections such as hepatitis and HIV. Furthermore, the quality and contents of illegal drugs are generally unknown, and the doses can vary substantially from purchase to purchase. The drugs may also contain toxic chemicals.

Although all recreational drugs are dangerous, some can be more deadly than others. One way to determine how dangerous recreational drugs are is to calculate a safety ratio, based on the dose that is likely to be fatal divided by the normal dose needed to feel the effects of the drug. Drugs with lower ratios are more dangerous because the difference between the normal and the lethal dose is small. For instance, heroin has a safety ratio of 6 because the average fatal dose is only 6 times greater than the average effective dose. On the other hand, marijuana has a safety ratio of 1,000. This is not to say that smoking marijuana cannot be deadly, but it is much less likely to be deadly than is heroin. The safety ratios of common recreational drugs are shown in Table 5.2 "Popular Recreational Drugs and Their Safety Ratios".

Table 5.2 Popular Recreational Drugs and Their Safety Ratios

<table>
<thead>
<tr>
<th>Drug</th>
<th>Description</th>
<th>Street or brand names</th>
<th>Safety ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heroin</td>
<td>Strong depressant</td>
<td>Smack, junk, H</td>
<td>6</td>
</tr>
<tr>
<td>GHB (Gamma hydroxy butyrate)</td>
<td>“Rave” drug (not Ecstasy), also used as a “date rape” drug.</td>
<td>Georgia home boy, liquid ecstasy, liquid X, liquid G, fantasy</td>
<td>8</td>
</tr>
<tr>
<td>Isobutyl nitrite</td>
<td>Depressant and toxic inhalant</td>
<td>Poppers, rush, locker room</td>
<td>8</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Active compound is ethanol</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>DXM (Dextromethorphan)</td>
<td>Active ingredient in over-the-counter cold and cough medicines</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>May be injected or smoked</td>
<td>Meth, crank</td>
<td>10</td>
</tr>
<tr>
<td>Cocaine</td>
<td>May be inhaled or smoked</td>
<td>Crack, coke, rock, blue</td>
<td>15</td>
</tr>
<tr>
<td>MDMA (methylene-dioxymethamphetamine)</td>
<td>Very powerful stimulant</td>
<td>Ecstasy</td>
<td>16</td>
</tr>
<tr>
<td>Codeine</td>
<td>Depressant</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Drug</td>
<td>Description</td>
<td>Street or brand names</td>
<td>Safety ratio</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Methadone</td>
<td>Opioid</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Mescaline</td>
<td>Hallucinogen</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Benzodiazepine</td>
<td>Prescription tranquilizer</td>
<td>Centrax, Dalmane, Doral, Halcion, Librium, ProSom, Restoril, Xanax, Valium</td>
<td>30</td>
</tr>
<tr>
<td>Ketamine</td>
<td>Prescription anesthetic</td>
<td>Ketanest, Ketaset, Ketalar</td>
<td>40</td>
</tr>
<tr>
<td>DMT (Dimethyltryptamine)</td>
<td>Hallucinogen</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>Usually prescribed as a sleeping pill</td>
<td>Luminal (Phenobarbital), Mebaraland, Nembutal, Seconal, Sombulex</td>
<td>50</td>
</tr>
<tr>
<td>Prozac</td>
<td>Antidepressant</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>Often inhaled from whipped cream dispensers</td>
<td>Laughing gas</td>
<td>150</td>
</tr>
<tr>
<td>Lysergic acid diethylamide (LSD)</td>
<td></td>
<td>Acid</td>
<td>1,000</td>
</tr>
<tr>
<td>Marijuana (Cannabis)</td>
<td>Active ingredient is THC</td>
<td>Pot, spliff, weed</td>
<td>1,000</td>
</tr>
</tbody>
</table>

**Drugs with lower safety ratios have a greater risk of brain damage and death.**


**Speeding Up the Brain With Stimulants: Caffeine, Nicotine, Cocaine, and Amphetamines**

A stimulant is a *psychoactive drug that increases neuronal activity and arouses some body functions*. Often the impact of these drugs is to increase in the activity of the sympathetic division of the autonomic nervous system (ANS). Effects of stimulants include increased heart and breathing rates, pupil dilation, and increases in blood sugar accompanied by decreases in appetite. For these reasons, stimulants are frequently used to help people stay awake and to control weight.
Used in moderation, some stimulants may increase alertness, but used in an irresponsible fashion they can quickly create dependency. A major problem is the "crash" that results when the drug loses its effectiveness and the activity of the neurotransmitters returns to normal. The withdrawal from stimulants can create profound depression and lead to an intense desire to repeat the high.

Caffeine is a bitter psychoactive drug found in the beans, leaves, and fruits of plants, where it acts as a natural pesticide. It is found in a wide variety of products, including coffee, tea, soft drinks, candy, and desserts. In North America, more than 80% of adults consume caffeine daily (Lovett, 2005). Caffeine acts as a mood enhancer and provides energy. Although the U.S. Food and Drug Administration lists caffeine as a safe food substance, it has at least some characteristics of dependence. People who reduce their caffeine intake often report being irritable, restless, and drowsy, as well as experiencing strong headaches, and these withdrawal symptoms may last up to a week. Most experts feel that using small amounts of caffeine during pregnancy is safe, but larger amounts of caffeine can be harmful to the fetus (U.S. Food and Drug Administration, 2007).

Nicotine is a psychoactive drug found in the nightshade family of plants, where it acts as a natural pesticide. Nicotine is the main cause for the dependence-forming properties of tobacco use, and tobacco use is a major health threat. Nicotine use can lead to both psychological and physical dependence.. Nicotine content in cigarettes has slowly increased over the years, making quitting smoking more and more difficult. Nicotine is also found in smokeless (chewing) tobacco.

Cocaine is an addictive drug obtained from the leaves of the coca plant. In the late 19th and early 20th centuries, it was a primary constituent in many popular tonics and elixirs and, although it was removed in 1905, was one of the original ingredients in Coca-Cola. Today cocaine is taken illegally as recreational drug.

Cocaine has a variety of adverse effects on the body. It constricts blood vessels, dilates pupils, and increases body temperature, heart rate, and blood pressure. It can cause headaches, abdominal pain, and nausea. Since cocaine also tends to decrease appetite, chronic users may also become malnourished. The intensity and duration of cocaine’s effects, which include increased energy and reduced fatigue, depend on how the drug is taken. The faster the drug is absorbed into the bloodstream and delivered to the brain, the more intense the high. Injecting or smoking cocaine produces a faster, stronger high than snorting it. However, the faster the drug is absorbed, the faster the effects subside. The high from snorting cocaine may last 30 minutes, whereas the high from smoking “crack” cocaine may last only 10 minutes. In order to sustain the high, the user must administer the drug again, which may lead to frequent use, often in higher doses, over a short period of time (National Institute on Drug Abuse, 2009). Cocaine has a safety ratio of 15, making it a very dangerous recreational drug.
Amphetamine is a stimulant that produces increased wakefulness and focus, along with decreased fatigue and appetite. Amphetamine is used in prescription medications to treat attention deficit disorder (ADD) and narcolepsy, and to control appetite. Some brand names of amphetamines are Adderall, Benzedrine, Dexedrine, and Vyvanse. But amphetamine ("speed") is also used illegally as a recreational drug. The methylated version of amphetamine, methamphetamine ("meth" or "crank"), is currently favored by users, partly because it is available in ampoules ready for use by injection (Csaky & Barnes, 1984). Meth is a highly dangerous drug with a safety ratio of only 10.

Amphetamines may produce a very high level of tolerance, leading users to increase their intake, often in "jolts" taken every half hour or so. Although the level of physical dependency is small, amphetamines may produce very strong psychological dependence, effectively amounting to addiction. Continued use of stimulants may result in severe psychological depression. The effects of the stimulant methylenedioxymethamphetamine (MDMA), also known as “Ecstasy,” provide a good example. MDMA is a very strong stimulant that very successfully prevents the reuptake of serotonin, dopamine, and norepinephrine. It is so effective that when used repeatedly it can seriously deplete the amount of neurotransmitters available in the brain, producing a catastrophic mental and physical "crash" resulting in serious, long-lasting depression. MDMA also affects the temperature-regulating mechanisms of the brain, so in high doses, and especially when combined with vigorous physical activity like dancing, it can cause the body to become so drastically overheated that users can literally "burn up" and die from hyperthermia and dehydration.

Slowing Down the Brain With Depressants: Alcohol, Barbiturates and Benzodiazepines, and Toxic Inhalants

In contrast to stimulants, which work to increase neural activity, a depressant acts to slow down consciousness. A depressant is a psychoactive drug that reduces the activity of the CNS. Depressants are widely used as prescription medicines to relieve pain, to lower heart rate and respiration, and as anticonvulsants. Some depressants change consciousness by acting as GABA agonists and decreasing the production of the neurotransmitter acetylcholine, usually at the level of the thalamus and the reticular formation. The outcome of depressant use (similar to the effects of sleep) is a reduction in the transmission of impulses from the lower brain to the cortex (Csaky & Barnes, 1984).

The most commonly used of the depressants is alcohol, a colorless liquid, produced by the fermentation of sugar or starch, that is the intoxicating agent in fermented drinks. Alcohol is the oldest and most widely used drug of abuse in the world. In low to moderate doses, alcohol first acts to remove social inhibitions by slowing activity in the sympathetic nervous system. In higher doses, alcohol acts on the cerebellum to interfere with coordination and balance, producing the staggering gait of drunkenness. At high blood levels, further CNS depression
leads to dizziness, nausea, and eventually a loss of consciousness. High enough blood levels such as those produced by “guzzling” large amounts of hard liquor at parties can be fatal. Alcohol is not a “safe” drug by any means—it's safety ratio is only 10.

Alcohol use is highly costly to societies because so many people abuse alcohol and because judgment after drinking can be substantially impaired. It is estimated that almost half of automobile fatalities are caused by alcohol use, and excessive alcohol consumption is involved in a majority of violent crimes, including rape and murder (Abbey, Ross, McDuffie, & McAuslan, 1996).[^9] Alcohol increases the likelihood that people will respond aggressively to provocations (Bushman, 1993, 1997; Graham, Osgood, Wells, & Stockwell, 2006).[^10] Even people who are not normally aggressive may react with aggression when they are intoxicated. Alcohol use also leads to rioting, unprotected sex, and other negative outcomes.

Alcohol increases aggression in part because it reduces the ability of the person who has consumed it to inhibit his or her aggression (Steele & Southwick, 1985).[^11] When people are intoxicated, they become more self-focused and less aware of the social situation. As a result, they become less likely to notice the social constraints that normally prevent them from engaging aggressively, and are less likely to use those social constraints to guide them. For instance, we might normally notice the presence of a police officer or other people around us, which would remind us that being aggressive is not appropriate. But when we are drunk, we are less likely to be so aware. The narrowing of attention that occurs when we are intoxicated also prevents us from being cognizant of the negative outcomes of our aggression. When we are sober, we realize that being aggressive may produce retaliation, as well as cause a host of other problems, but we are less likely to realize these potential consequences when we have been drinking (Bushman & Cooper, 1990).[^12] Alcohol also influences aggression through expectations. If we expect that alcohol will make us more aggressive, then we tend to become more aggressive when we drink.

Barbiturates are depressants that are commonly prescribed as sleeping pills and painkillers. Brand names include Luminal (Phenobarbital), Mebaraland, Nembutal, Seconal, and Sombulex. In small to moderate doses, barbiturates produce relaxation and sleepiness, but in higher doses symptoms may include sluggishness, difficulty in thinking, slowness of speech, drowsiness, faulty judgment, and eventually coma or even death (Medline Plus, 2008).[^13]

Related to barbiturates, benzodiazepines are a family of depressants used to treat anxiety, insomnia, seizures, and muscle spasms. In low doses, they produce mild sedation and relieve anxiety; in high doses, they induce sleep. In the United States, benzodiazepines are among the most widely prescribed medications that affect the CNS. Brand names include Centrax, Dalmane, Doral,
Halcion, Librium, ProSom, Restoril, Xanax, and Valium. Barbiturates and benzodiazepines are powerful GABA agonists.

*Toxic inhalants* are also frequently abused as depressants. These drugs are easily accessible as the vapors of glue, gasoline, propane, hair spray, and spray paint, and are inhaled to create a change in consciousness. Related drugs are the nitrites (amyl and butyl nitrite; “poppers,” “rush,” “locker room”) and anesthetics such as nitrous oxide (laughing gas) and ether. Inhalants are some of the most dangerous recreational drugs, with a safety index below 10, and their continued use may lead to permanent brain damage.

Opioids drugs are depressants. Opioids are *chemicals that increase activity in opioid receptor neurons in the brain and in the digestive system, producing euphoria, analgesia, slower breathing, and constipation*. Their chemical makeup is similar to the endorphins, the neurotransmitters that serve as the body’s “natural pain reducers.” Natural opioids are derived from the opium poppy, which is widespread in Eurasia, but they can also be created synthetically.

Opium is *the dried juice of the unripe seed capsule of the opium poppy*. It may be the oldest drug on record, known to the Sumerians before 4000 BC. Morphine and heroin are *stronger, more addictive drugs derived from opium*, while codeine is a *weaker analgesic and less addictive member of the opiate family*. When morphine was first refined from opium in the early 19th century, it was touted as a cure for opium addiction, but it didn’t take long to discover that it was actually more addicting than raw opium. When heroin was produced a few decades later, it was also initially thought to be a more potent, less addictive painkiller but was soon found to be much more addictive than morphine. Heroin is about twice as addictive as morphine, and creates severe tolerance, moderate physical dependence, and severe psychological dependence.

**Hallucinogens: Cannabis, Mescaline, and LSD**

The drugs that produce the most extreme alteration of consciousness are the hallucinogens, *psychoactive drugs that alter sensation and perception and that may create hallucinations*. The hallucinogens are frequently known as “psychodelics.” Drugs in this class include lysergic acid diethylamide (LSD, or “Acid”), mescaline, and phencyclidine (PCP), as well as a number of natural plants including cannabis (marijuana), peyote, and psilocybin. The chemical compositions of the hallucinogens are similar to the neurotransmitters serotonin and epinephrine, and they act primarily as agonists by mimicking the action of serotonin at the synapses. The hallucinogens may produce striking changes in perception through one or more of the senses. The precise effects a user experiences are a function not only of the drug itself, but also of the user’s preexisting mental state and expectations of the drug experience. In large part, the user tends to get out of the experience what he or she brings to it. The hallucinations that may be experienced when taking these drugs are strikingly
different from everyday experience and frequently are more similar to dreams than to everyday consciousness.

Cannabis (marijuana) is the most widely used hallucinogen. Until it was banned in the United States under the Marijuana Tax Act of 1938, it was widely used for medical purposes. In recent years, cannabis has again been frequently prescribed for the treatment of pain and nausea, particularly in cancer sufferers, as well as for a wide variety of other physical and psychological disorders (Ben Amar, 2006). While medical marijuana is now legal in several American states, it is still banned under federal law, putting those states in conflict with the federal government. Marijuana also acts as a stimulant, producing giggling, laughing, and mild intoxication. It acts to enhance perception of sights, sounds, and smells, and may produce a sensation of time slowing down. It is much less likely to lead to antisocial acts than that other popular intoxicant, alcohol, and it is also the one psychedelic drug whose use has not declined in recent years (National Institute on Drug Abuse, 2009).

Why We Use Psychoactive Drugs

People have used, and often abused, psychoactive drugs for thousands of years. Perhaps this should not be surprising, because many people find using drugs to be fun and enjoyable. Even when we know the potential costs of using drugs, we may engage in them anyway because the pleasures of using the drugs are occurring right now, whereas the potential costs are abstract and occur in the future.

Individual ambitions, expectations, and values also influence drug use. Vaughan, Corbin, and Fromme (2009) found that college students who expressed positive academic values and strong ambitions had less alcohol consumption and alcohol-related problems, and cigarette smoking has declined more among youth from wealthier and more educated homes than among those from lower socioeconomic backgrounds (Johnston, O'Malley, Bachman, & Schulenberg, 2004).

Drug use is in part the result of socialization. Children try drugs when their friends convince them to do it, and these decisions are based on social norms about the risks and benefits of various drugs. In the period 1991 to 1997, the percentage of 12th-graders who responded that they perceived "great harm in regular marijuana use" declined from 79% to 58%, while annual use of marijuana in this group rose from 24% to 39% (Johnston et al., 2004). And students binge drink in part when they see that many other people around them are also binging (Clapp, Reed, Holmes, Lange, & Voas, 2006).
Despite the fact that young people have experimented with cigarettes, alcohol, and other dangerous drugs for many generations, it would be better if they did not. All recreational drug use is associated with at least some risks, and those who begin using drugs earlier are also more likely to use more dangerous drugs later (Lynskey et al., 2003). Furthermore, as we will see in the next section, there are many other enjoyable ways to alter consciousness that are safer.

KEY TAKEAWAYS

- Psychoactive drugs are chemicals that change our state of consciousness. They work by influencing neurotransmitters in the CNS.
- Using psychoactive drugs may create tolerance and, when they are no longer used, withdrawal. Addiction may result from tolerance and the difficulty of withdrawal.
- Stimulants, including caffeine, nicotine, and amphetamine, increase neural activity by blocking the reuptake of dopamine, norepinephrine, and serotonin in the CNS.
- Depressants, including alcohol, barbiturates, and benzodiazepines, decrease consciousness by increasing the production of the neurotransmitter GABA and decreasing the production of the neurotransmitter acetylcholine.
- Opioids, including codeine, opium, morphine and heroin, produce euphoria and analgesia by increasing activity in opioid receptor neurons.
- Hallucinogens, including cannabis, mescaline, and LSD, create an extreme alteration of consciousness as well as the possibility of hallucinations.
5.3 Altering Consciousness Without Drugs

LEARNING OBJECTIVE

1. Review the ways that people may alter consciousness without using drugs.

Although the use of psychoactive drugs can easily and profoundly change our experience of consciousness, we can also—and often more safely— alter our consciousness without drugs. These altered states of consciousness are sometimes the result of simple and safe activities, such as sleeping, watching television, exercising, or working on a task that intrigues us. In this section we consider the changes in consciousness that occur through hypnosis, sensory deprivation, and meditation, as well as through other non-drug-induced mechanisms.
Changing Behavior Through Suggestion: The Power of Hypnosis

Franz Anton Mesmer (1734–1815) was an Austrian doctor who believed that all living bodies were filled with magnetic energy. In his practice, Mesmer passed magnets over the bodies of his patients while telling them their physical and psychological problems would disappear. The patients frequently lapsed into a trancelike state (they were said to be “mesmerized”) and reported feeling better when they awoke (Hammond, 2008). Although subsequent research testing the effectiveness of Mesmer’s techniques did not find any long-lasting improvements in his patients, the idea that people’s experiences and behaviors could be changed through the power of suggestion has remained important in psychology. James Braid, a Scottish physician, coined the term hypnosis in 1843, basing it on the Greek word for sleep (Callahan, 1997).

Hypnosis is a trance-like state of consciousness, usually induced by a procedure known as hypnotic induction, which consists of heightened suggestibility, deep relaxation, and intense focus (Nash & Barnier, 2008). Hypnosis became famous in part through its use by Sigmund Freud in an attempt to make unconscious desires and emotions conscious and thus able to be considered and confronted (Baker & Nash, 2008).

Because hypnosis is based on the power of suggestion, and because some people are more suggestible than others, these people are more easily hypnotized. Hilgard (1965) found that about 20% of the participants he tested were entirely unsusceptible to hypnosis, whereas about 15% were highly responsive to it. The best participants for hypnosis are people who are willing or eager to be hypnotized, who are able to focus their attention and block out peripheral awareness, who are open to new experiences, and who are capable of fantasy (Spiegel, Greenleaf, & Spiegel, 2005).

People who want to become hypnotized are motivated to be good subjects, to be open to suggestions by the hypnotist, and to fulfill the role of a hypnotized person as they perceive it (Spanos, 1991). The hypnotized state results from a combination of conformity, relaxation, obedience, and suggestion (Fassler, Lynn, & Knox, 2008). This does not necessarily indicate that hypnotized people are “faking” or lying about being hypnotized. Kinnunen, Zamansky, and Block (1994) used measures of skin conductance (which indicates emotional response by measuring perspiration, and therefore renders it a reliable indicator of deception) to test whether hypnotized people were lying about having been hypnotized. Their results suggested that almost 90% of their supposedly hypnotized subjects truly believed that they had been hypnotized.

One common misconception about hypnosis is that the hypnotist is able to “take control” of hypnotized patients and thus can command them to engage in
behaviors against their will. Although hypnotized people are suggestible (Jamieson & Hasegawa, 2007), they nevertheless retain awareness and control of their behavior and are able to refuse to comply with the hypnotist's suggestions if they so choose (Kirsch & Braffman, 2001). In fact, people who have not been hypnotized are often just as suggestible as those who have been (Orne & Evans, 1965).

Another common belief is that hypnotists can lead people to forget the things that happened to them while they were hypnotized. Hilgard and Cooper (1965) investigated this question and found that they could lead people who were very highly susceptible through hypnosis to show at least some signs of posthypnotic amnesia (e.g., forgetting where they had learned information that had been told to them while they were under hypnosis), but that this effect was not strong or common.

Some hypnotists have tried to use hypnosis to help people remember events, such as childhood experiences or details of crime scenes, that they have forgotten or repressed. The idea is that some memories have been stored but can no longer be retrieved, and that hypnosis can aid in the retrieval process. But research finds that this is not successful: People who are hypnotized and then asked to relive their childhood act like children, but they do not accurately recall the things that occurred to them in their own childhood (Silverman & Retzlaff, 1986). Furthermore, the suggestibility produced through hypnosis may lead people to erroneously recall experiences that they did not have (Newman & Baumeister, 1996). Many states and jurisdictions have therefore banned the use of hypnosis in criminal trials because the “evidence” recovered through hypnosis is likely to be fabricated and inaccurate.

Hypnosis is also frequently used to attempt to change unwanted behaviors, such as to reduce smoking, overeating, and alcohol abuse. The effectiveness of hypnosis in these areas is controversial, although at least some successes have been reported. Kirsch, Montgomery, and Sapirstein (1995) found that adding hypnosis to other forms of therapies increased the effectiveness of the treatment, and Elkins and Perfect (2008) reported that hypnosis was useful in helping people stop smoking. Hypnosis is also effective in improving the experiences of patients who are experiencing anxiety disorders, such as PTSD (Cardena, 2000; Montgomery, David, Winkel, Silverstein, & Bovbjerg, 2002), and for reducing pain (Montgomery, DuHamel, & Redd, 2000; Paterson & Jensen, 2003).

Reducing Sensation to Alter Consciousness: Sensory Deprivation

Sensory deprivation is the intentional reduction of stimuli affecting one or more of the five senses, with the possibility of resulting changes in consciousness. Sensory deprivation is used for relaxation or meditation purposes, and in physical and mental health-care programs to produce enjoyable changes in
consciousness. But when deprivation is prolonged, it is unpleasant and can be used as a means of torture.

Although the simplest forms of sensory deprivation require nothing more than a blindfold to block the person’s sense of sight or earmuffs to block the sense of sound, more complex devices have also been devised to temporarily cut off the senses of smell, taste, touch, heat, and gravity. In 1954 John Lilly, a neurophysiologist at the National Institute of Mental Health, developed the sensory deprivation tank. The tank is filled with water that is the same temperature as the human body, and salts are added to the water so that the body floats, thus reducing the sense of gravity. The tank is dark and soundproof, and the person’s sense of smell is blocked by the use of chemicals in the water, such as chlorine.

The sensory deprivation tank has been used for therapy and relaxation. In a typical session for alternative healing and meditative purposes, a person may rest in an isolation tank for up to an hour. Treatment in isolation tanks has been shown to help with a variety of medical issues, including insomnia and muscle pain (Suedfeld, 1990b; Bood, Sundequist, Kjellgren, Nordström, & Norlander, 2007; Kjellgren, Sundequist, Norlander, & Archer, 2001), headaches (Wallbaum, Rzewnicki, Steele, & Suedfeld, 1991), and addictive behaviors such as smoking, alcoholism, and obesity (Suedfeld, 1990a).

Although relatively short sessions of sensory deprivation can be relaxing and both mentally and physically beneficial, prolonged sensory deprivation can lead to disorders of perception, including confusion and hallucinations (Yuksel, Kisa, Avdemin, & Goka, 2004). It is for this reason that sensory deprivation is sometimes used as an instrument of torture (Benjamin, 2006).

Meditation

Meditation refers to techniques in which the individual focuses on something specific, such as an object, a word, or one’s breathing, with the goal of ignoring external distractions, focusing on one’s internal state, and achieving a state of relaxation and well-being. Followers of various Eastern religions (Hinduism, Buddhism, and Taoism) use meditation to achieve a higher spiritual state, and popular forms of meditation in the West, such as yoga, Zen, and Transcendental Meditation, have originated from these practices. Many meditative techniques are very simple. You simply need to sit in a comfortable position with your eyes closed and practice deep breathing.

Brain imaging studies have indicated that meditation is not only relaxing but can also induce an altered state of consciousness. Cahn and Polich (2006) found that experienced meditators in a meditative state had more prominent alpha and theta waves, and other studies have shown declines in heart rate, skin conductance, oxygen consumption, and carbon dioxide elimination during meditation (Dillbeck, Glenn, & Orme-Johnson, 1987; Fenwick, 1987). These
studies suggest that the action of the sympathetic division of the autonomic nervous system (ANS) is suppressed during meditation, creating a more relaxed physiological state as the meditator moves into deeper states of relaxation and consciousness.

Research has found that regular meditation can mediate the effects of stress and depression, and promote well-being (Grossman, Niemann, Schmidt, & Walach, 2004; Reibel, Greeson, Brainard, & Rosenzweig, 2001; Salmon et al., 2004). Meditation has also been shown to assist in controlling blood pressure (Barnes, Treiber, & Davis, 2001; Walton et al., 2004). A study by Lyubimov (1992) showed that during meditation, a larger area of the brain was responsive to sensory stimuli, suggesting that there is greater coordination between the two brain hemispheres as a result of meditation. Lutz and others (2004) demonstrated that those who meditate regularly (as opposed to those who do not) tend to utilize a greater part of their brain and that their gamma waves are faster and more powerful. And a study of Tibetan Buddhist monks who meditate daily found that several areas of the brain can be permanently altered by the long-term practice of meditation (Lutz, Greischar, Rawlings, Ricard, & Davidson, 2004).

It is possible that the positive effects of meditation could also be found by using other methods of relaxation. Although advocates of meditation claim that meditation enables people to attain a higher and purer consciousness, perhaps any kind of activity that calms and relaxes the mind, such as working on crossword puzzles, watching television or movies, or engaging in other enjoyed behaviors, might be equally effective in creating positive outcomes. Regardless of the debate, the fact remains that meditation is, at the very least, a worthwhile relaxation strategy.

**KEY TAKEAWAYS**

- Hypnosis is a trance-like state of conscious consisting of heightened susceptibility, deep relaxation, and intense focus.
- Hypnosis is not useful for helping people remember past events, but it can be used to alleviate anxiety and pain.
- Sensory deprivation is the intentional reduction of stimulation to one or more of the senses. It can be used therapeutically to treat insomnia, muscle tension, and pain.
- Meditation refers to a range of techniques that can create relaxation.


5.4 Chapter Summary

Consciousness is our subjective awareness of ourselves and our environment.

Consciousness is functional because we use it to reason logically, to plan activities, and to monitor our progress toward the goals we set for ourselves.
Consciousness has been central to many theories of psychology. Freud’s personality theories differentiated between the unconscious and the conscious aspects of behavior, and present-day psychologists distinguish between automatic (unconscious) and controlled (conscious) behaviors and between implicit (unconscious) and explicit (conscious) cognitive processes.

The French philosopher René Descartes (1596–1650) was a proponent of dualism, the idea that the mind, a nonmaterial entity, is separate from (although connected to) the physical body. In contrast to the dualists, psychologists believe the consciousness (and thus the mind) exists in the brain, not separate from it.

The behavior of organisms is influenced by biological rhythms, including the daily circadian rhythms that guide the waking and sleeping cycle in many animals.

Sleep researchers have found that sleeping people undergo a fairly consistent pattern of sleep stages, each lasting about 90 minutes. Each of the sleep stages has its own distinct pattern of brain activity. Rapid eye movement (REM) accounts for about 25% of our total sleep time, during which we dream. Non-rapid eye movement (non-REM) sleep is a deep sleep characterized by very slow brain waves, and is further subdivided into three stages: stages N1, N2, and N3.

Sleep has a vital restorative function, and a prolonged lack of sleep results in increased anxiety, diminished performance, and if severe and extended, even death. Sleep deprivation suppresses immune responses that fight off infection, and can lead to obesity, hypertension, and memory impairment.

Some people suffer from sleep disorders, including insomnia, sleep apnea, narcolepsy, sleepwalking, and REM sleep behavior disorder.

Freud believed that the primary function of dreams was wish fulfillment, and he differentiated between the manifest and latent content of dreams. Other theories of dreaming propose that we dream primarily to help with consolidation—the moving of information into long-term memory. The activation-synthesis theory of dreaming proposes that dreams are simply our brain’s interpretation of the random firing of neurons in the brain stem.

Psychoactive drugs are chemicals that change our states of consciousness, and particularly our perceptions and moods. The use (especially in combination) of psychoactive drugs has the potential to create very negative side effects, including tolerance, dependence, withdrawal symptoms, and addiction.

Stimulants, including caffeine, nicotine, cocaine, and amphetamine, are drugs that increase activity in the synapses of the central nervous system (CNS). Some amphetamines, such as Ecstasy, have very low safety ratios and thus are highly dangerous.
Depressants, including alcohol, barbiturates, benzodiazepines, toxic inhalants, and opioids reduce the activity of the CNS. They are widely used as prescription medicines to relieve pain, to lower heart rate and respiration, and as anticonvulsants. Toxic inhalants are some of the most dangerous recreational drugs, with a safety index below 10, and their continued use may lead to permanent brain damage.

Opioids, including opium, morphine, heroin, and codeine, are chemicals that increase activity in opioid receptor neurons in the brain and in the digestive system, producing euphoria, analgesia, slower breathing, and constipation.

Hallucinogens, including cannabis, mescaline, and LSD, are psychoactive drugs that alter sensation and perception and which may create hallucinations.

Even when we know the potential costs of using drugs, we may engage in using them anyway because the rewards from using the drugs are occurring right now, whereas the potential costs are abstract and only in the future. And drugs are not the only things we enjoy or can abuse. It is normal to refer to the abuse of other behaviors, such as gambling, sex, overeating, and even overworking as “addictions” to describe the overuse of pleasant stimuli.

Hypnosis is a trance-like state of consciousness, usually induced by a procedure known as hypnotic induction, which consists of heightened suggestibility, deep relaxation, and intense focus. Hypnosis also is frequently used to attempt to change unwanted behaviors, such as to reduce smoking, eating, and alcohol abuse.

Sensory deprivation is the intentional reduction of stimuli affecting one or more of the five senses, with the possibility of resulting changes in consciousness. Although sensory deprivation is used for relaxation or meditation purposes and to produce enjoyable changes in consciousness, when deprivation is prolonged, it is unpleasant and can be used as a means of torture.

Meditation refers to techniques in which the individual focuses on something specific, such as an object, a word, or one’s breathing, with the goal of ignoring external distractions. Meditation has a variety of positive health effects.