LEARNING OBJECTIVES

- LO 1 Define consciousness.
- LO 2 Explain how automatic processing relates to consciousness.
- LO 3 Describe how we narrow our focus on specific stimuli to attend to them.
- LO 4 Identify how circadian rhythm relates to sleep.
- LO 5 Summarize the stages of sleep.
- LO 6 Recognize various sleep disorders and their symptoms.
- LO 7 Summarize the theories of why we dream.
- LO 8 Define psychoactive drugs.
- LO 9 Identify several depressants and stimulants and know their effects.
- LO 10 Discuss some of the hallucinogens.
- LO 11 Explain how physiological and psychological dependence differ.
- LO 12 Describe hypnosis and explain how it works.
WHAT IS CONSCIOUSNESS?

- Is state of being aware of oneself, one's thoughts, and/or the environment
- Implies one can be asleep and still be aware
- Can be altered by drugs to ease pain and anxiety
Dr. Robert Julien is an anesthesiologist, a physician who keeps patients comfortable and monitors their vital signs during surgery.

Anesthesiologists administer drugs that interfere with pain, paralyze the muscles, and induce a sleeplike state.

How these substances alter consciousness is still somewhat mysterious.
Ancient times: Pain relief approaches

- Dipping wounds in cold rivers and streams
- Concocting mixtures of crushed roots, barks, herbs, fruits, and flowers

Contemporary: Pain relief approaches

- Many of the plant chemicals discovered by early peoples are still given to patients today in slightly different forms.
- Opium was used by ancient Egyptians (El Ansary, Steigerwald, & Esser, 2003), and its chemical relatives are used by modern-day physicians and hospitals all over the world (for example, morphine for pain relief and codeine for cough suppression).
Ancient Opium

- Wall art from the Tomb of Horemheb in Egypt's Valley of the Kings depicts a person holding two round vessels representing poppy flowers.
- The ancient Egyptians used the poppy opiate morphine for pain relief, but its therapeutic role was controversial. (El Ansary et al., 2003)
Consciousness: Studying Consciousness

Wilhelm Wundt and Edward Titchener
- Founded psychology as science based on study of consciousness

William James
- Proposed consciousness as “stream” that provides sense of day-to-day continuity
- Psychologists refer to one's awareness of oneself, one's thoughts, and the environment as consciousness.
- Thoughts interweave and overtake each other like currents of flowing water; sometimes they are connected by topic, emotion, events, but other times they seem to not be connected by anything other than your stream of consciousness.
John Watson, B.F. Skinner and others

- Insisted psychology should only study observable behavior, not consciousness. This attitude persisted until the 1950s and 1960s, when psychology underwent a revolution of sorts.
- Researchers began to direct their focus back on the unseen mechanisms of the mind.
- Cognitive psychology, the scientific study of conscious experiences such as thinking, problem solving, and language, emerged as a major subfield.
Students often confuse the words “conscious” (the topic of this lecture) and “conscience.” “Conscious” means to be awake and aware, whereas “conscience” means knowing right from wrong. A quick way to clarify this is to talk about what happens if a boxer punches someone really hard—he knocks them “unconscious.” In such a case, the individual would be neither awake nor aware. Jiminy Cricket’s role in Pinocchio (as well as the angel and devil who sat on many a cartoon character’s shoulders) exemplifies conscience—Jiminy Cricket helped Pinocchio make moral decisions. This mnemonic is helpful: “There is a ‘science’ to making good moral decisions (conscience).”

The textbook reminds you that “supra” in suprachiasmatic nucleus is the Latin word for “above,” but it also helps students to learn that “chiasm” is the Latin word for “cross.” The optic chiasm is the place where the axons from the optic nerve cross over (some continuing to the occipital lobe on the same hemisphere and some going to the opposite hemisphere). The suprachiasmatic nucleus is located directly above the optic chiasm in the hypothalamus.
BEHAVIOR, BEHAVIOR, BEHAVIOR

B. F. Skinner works with a pigeon in the laboratory. A die-hard behaviorist, Skinner believed that psychology should restrict itself to the study of observable behaviors.

Consciousness and other unseen mental activities were beyond the realm of psychological research.

Sam Falk/Science Source
Psychologists today

- must first agree on relevant topics in study of consciousness
- utilize advanced technology for brain studies, but recognize challenges in researching subjective behavior

How do you define consciousness?

G. William Farthing said that consciousness is “the subjective state of being currently aware of something either within oneself or outside of oneself” (1992, p. 6). **Consciousness** is best defined as the state of being aware of oneself, one’s thoughts, and/or the environment. According to this definition of subjective awareness, one can be asleep and still be aware (Farthing, 1992). Example: ability to register sounds while asleep

With respect to the current study of consciousness in psychology, understanding conscious experience is now an important goal in psychology
Consciousness and Memory: Automatic Processing and Consciousness

- Sensory system absorbs huge information load. One of the major functions of the brain is to sift through that information, determining what is important and needs immediate attention, what can be ignored, and what can be processed and stored for later use if necessary.

- Unconscious processes and involuntary activity guide many behaviors.

- Information is detected, encoded, and sometimes stored without awareness.

- Human factors researchers have conducted numerous studies to determine the types of sounds most likely to arouse a sleeping person, as well as individual differences (for example, age, gender, sleep deprivation, hearing ability, and sleep stages) that affect whether a person will register and/or wake up to a sound (Bruck & Ball, 2007).
Consciousness and Memory: Automatic Processing and Consciousness

• Dr. Julien gave Versed (midazolam) to a patient to help her relax, but not enough to knock her out. (Versed belongs to a class of calming drugs called depressants.) The Versed interfered with the production of a protein needed for memory creation.

• Let’s not confuse consciousness with memory.

• There are individuals that can engage in meaningful conversations, but are unable to form new memories due to Alzheimer’s, dementia and for taking consciousness-altering drugs.

• In very rare cases, people taking certain types of prescription pills have been known to “sleep-drive” or get behind the wheel in a trance-like state (Dolder & Nelson, 2008; Southworth, Kortepeter, & Hughes, 2008; Zammit, 2009).
Barriers to the scientific study of consciousness:
Consciousness is inherently subjective.
Consciousness is always changing.
Sophisticated technology is needed to penetrate the brain basis of consciousness.
Consciousness and Memory: Selective Attention

- Includes the ability to focus awareness on a small segment of information that is available through sensory systems.
- Influenced by negative emotions, repeated exposure to stimuli, and age.
- Cocktail-party effect you can block out the chatter and noise of the party and get lost in a deep conversation, a very efficient use of selective attention (Koch, Lawo, Fels, & Vorlander, 2011).
“Looking without seeing” involves attention failure to notice an unexpected visual stimulus when other attention-demanding tasks are being performed.

Neisser (1979) first illustrated this using the umbrella task.
What Umbrella?
DIFFERENT LEVELS OF CONSCIOUSNESS

- Levels include wakefulness, sleepiness, drug induced states, dreaming, hypnotic states, and meditative states, to name but a few.

DEFINING LEVELS OF CONSCIOUSNESS

- Levels may be defined by control over awareness at a given time. Concentrating on a task or daydreaming.
- Causes of change in a level provide insight.
- Whatever your attention is focused at this moment, that is your conscious experience.
Show What You Know: Part 1

1. When researchers try to study participants’ conscious experiences, one barrier they face is **subjective** that consciousness is pertaining only to the individual who experiences it.

2. While studying for an exam, your sensory systems absorb an inordinate amount of information from your surroundings, most of which you are not aware of. Because of **automatic processing**, generally you do not get overwhelmed with incoming sensory data.

   a. consciousness
   b. **automatic processing**
   c. depressants
   d. encoding
3. In attentional blindness is the tendency to “look without seeing.” Researchers have determined that most people do not notice a variety of events. Given what you know about selective attention, what advice would you give someone about defending against “looking without seeing”?

The ability to focus awareness on a small segment of information that is available through our sensory systems is called selective attention. Although we are exposed to many different stimuli at once, we tend to pay particular attention to abrupt or unexpected changes in the environment. Such events may pose a danger and we need to be aware of the them. However, selective attention can cause us to be blind to objects directly in our line of vision. The “looking without seeing” can have serious consequences, as we fail to see important occurrences in our surroundings. Our advice would be to try to remain aware of the possibility of inattentional blindness, in particular when you are in situations that could involve serious injury.
Meet Matt

- Matt Utesch was a seemingly normal teenager with a lot of energy—and a developing condition.
- He fell asleep while driving and collided with another vehicle, seriously injuring the other driver. When he went to the woman’s home to bring her flowers, she invited him in to talk.
- Right in the middle of the conversation, he fell asleep.
- Was this simply a case of an exhausted teenager?
An Introduction to Sleep

HUMAN SLEEP NEEDS VARY.

- Range is from 4 to 11 or more hours.
- Most people require between 7 and 8 hours – more or less a third of the day – a third of your life.

ALL ANIMALS SLEEP OR REST

- Dolphins snooze while swimming, keeping one eye cracked open at all times.
- Horses usually sleep standing up.
- Some birds appear to doze in mid-flight.
- Some require much sleep: bats and opossums sleep 18 to 20 hours a day.
- Others require barely any sleep: elephants and giraffes get by on 3 to 4 hours.
CIRCADIAN RHYTHM

- Daily patterns roughly follow the 24-hour cycle of daylight and darkness driven by our circadian rhythm; 24-hour cycle of physiological and behavioral functioning.
- The sleep-wake cycle exemplifies a circadian rhythm.
- Desire for sleep greatest between 2:00 and 6:00 A.M. and mid-afternoon around 2:00 or 3:00 P.M.
- Many things your body does, including sleep, are regulated by a biological clock.
- Growth hormone is released at night, and levels of the stress hormone cortisol soar in the morning, reaching levels of 10 to 20 times higher than at night (Wright, 2002).
- Every 28 or 29 days, Danielle menstruates. Danielle’s cycle exemplifies a biological rhythm.
SUPRACHIASMATIC NUCLEUS (SCN)

- Miniclocks are found in cells all over your body, but a master clock is nested deep within the hypothalamus, a brain structure whose activities revolve around maintaining homeostasis, or balance, in the body’s systems.
- This king of clocks, known as the suprachiasmatic nucleus (SNC), actually consists of two clusters, each no bigger than an ant, totaling around 20,000 neurons (Forger & Peskin, 2003; Wright, 2002).
- Involves master inner clock nested within hypothalamus
- The SNC plays a role in our circadian rhythm by communicating with other areas of the hypothalamus, which regulates daily patterns of hunger and temperature, and the reticular formation, which regulates alertness and sleepiness (Infographic 4.1).
- Although tucked away in the recess of the brain, the SCN knows the difference between day and light. That is because it receives signals from a special type of light sensing cells in the eye, called retinal ganglion (light sensing) cells.
Sleep

• One way the suprachiasmatic nucleus (SCN) keeps you on schedule is by indirectly communicating with the pineal gland, a part of the endocrine system, to regulate the release of melatonin, a hormone that promotes sleep.

• In dark conditions, the clock commands the pineal gland to produce melatonin, making it easier to sleep.
The Suprachiasmatic Nucleus

The suprachiasmatic nucleus (SCN) of the hypothalamus is the body's internal master clock, playing a role in regulating our circadian rhythms. These rhythms roughly follow the 24-hour cycle of daylight and darkness. But one doesn't have to consciously perceive light for the SCN to function properly; there is a dedicated, somatosensory pathway that carries light information from the eyes to the SCN.

The SCN is located deep in the brain, far away from visual processing areas. How does it get information about light? Our eyes contain a separate visual pathway made of retinal ganglion cells. This pathway projects directly to the SCN.

For the 20% of the U.S. workforce doing shift work, normal sleep schedules are disrupted. This can lead to health problems and increased accidents (Sherwin, 2003). Using what we know about how the SCN works, researchers are helping industries solve these effects. Bright lights, such as those installed in this power station control room, contain a high proportion of the blue light that induces morning surges, making the SCN more sensitive to light exposure. That makes it easier for workers to synchronize sleep patterns with work schedules.
Sleep: Part 3

LARKS
- Early riser; energized and alert early in morning; more accomplished early in day; weary at end of day
- Prefer going to bed by 11:00 P.M. and rising before 8:00 A.M.

OWLS
- Late riser; energy level builds slowly through day; more productive at end of day
- Prefer staying up late and sleeping “in”
About 20% of us are true owls, 20% are genuine larks, and the rest fall somewhat in between.

JET LAG – physical and mental consequences

- Defined as delayed adjustment to time zone change
- Includes symptoms of concentration difficulty, headaches, and gastrointestinal distress
- Can usually be reset in 1 to 2 hours per day, eventually falling into step with the new environmental schedule
SHIFT WORK

- Found in 20 percent of workforce in U.S. and other developed countries.
- Irregular sleep schedule may lead to insomnia and other conditions.
- 5 to 10 percent of shift workers diagnosed with circadian rhythm sleep-wake disorders.
- An irregular sleep schedule may lead to symptoms of insomnia, or difficulty falling asleep and sleeping soundly.
- Insomnia resulting from shift work can lead to decreased job productivity, depression, anxiety, diabetes, and other chronic diseases (Morin et al., 2006; Vgonzas et al., 2009).
- Studies also show that shift workers face an elevated risk of becoming overweight, and developing stomach ulcers and heart disease (DiLorenzo et al., 2003; Knutson, 2003).
- The frequency of insomnia is positively correlated with the frequency of vivid hypnagogic hallucinations.
• *Have you ever watched someone sleeping?* The person looks blissfully tranquil: body still, face relaxed, chest rising and falling like a lazy ocean wave.
• Underneath the body’s quiet front is a very active brain, as determined by an electroencephalogram (EEG).
The Stages of Sleep

KEY TERMS

• **Beta waves**
  - Brain waves that indicate an alert, awake state
  - High-frequency brainwaves that appear when you are solving a math problem, reading a book, or whenever you are alert.

• **Alpha waves**
  - Brain waves that indicate a relaxed, drowsy state
  - Now let’s say you climb into bed, close your eyes and relax. As you become more and more drowsy, the electrical activity measured by an EEG would likely begin showing alpha waves, which are lower in frequency than beta waves (Cantero, Atienza, Salas, & Gomez, 1999). At some point you drift into a different level of consciousness known as sleep.
The Stages of Sleep

• Non-rapid eye movement (non-REM)
  ▪ Non dreaming sleep that occurs during sleep Stages 1 to 4
  ▪ A normal sleeper begins the night in non-rapid eye movement (non-REM), or nondreaming sleep, which has four stages.
    ▪ Stage 1 sleep, also known as “light sleep.” Muscles go limp and body temperature starts to fall. The eyeballs may move gently beneath the lids.
    ▪ If looked at an EEG of person in Stage 1, you would likely see theta waves, which are lower in frequency than both beta and alpha waves. This is the type of sleep that many people deny having. It is also during this initial phase of sleep that hallucinations, or imaginary sensations, can occur. Perhaps you have felt a sensation of falling or swinging and then jerked your arms or legs in response? False perceptions that occur during the limbo between wakefulness and sleep are called hypnagogic hallucinations, and they are no cause for concern, in most cases.
The Stages of Sleep

• Non-rapid eye movement (non-REM)
  ▪ Non dreaming sleep that occurs during sleep Stages 1 to 4
  ▪ A normal sleeper begins the night in non-rapid eye movement (non-REM), or nondreaming sleep, which has four stages.
    ▪ After a few minutes in Stage 1, you move to the next phase of non-REM sleep, called Stage 2 sleep, which is slightly deeper than Stage 1, so it is harder to awaken the sleeper.
    ▪ Theta waves continue showing up on the EEG, along with little bursts of electrical activity called sleep spindles and large waves called K-complexes appearing every 2 minutes or so. Researchers suspect sleep spindles and associated with memory consolidation and intelligence (Fogel & Smith, 2011).
    ▪ The exact function of K-complexes is up for debate: Some suggest they are the brain’s way of being ready to awake when the need arises, others believe they are the mechanism for remaining asleep in spite of disturbing stimuli (Colrain, 2005).
The Stages of Sleep

• Non-rapid eye movement (non-REM)
  ▪ Non dreaming sleep that occurs during sleep Stages 1 to 4
  ▪ A normal sleeper begins the night in non-rapid eye movement (non-REM), or nondreaming sleep, which has four stages.
    ▪ The sleeper descends into Stage 3, and then into an even deeper Stage 4, when it is most difficult to awaken.
    ▪ Both Stages 3 and 4 are known as slow-wave sleep, because they are characterized by tall, low-frequency delta waves.
    ▪ Stages 3 & 4 are very similar, but Stage 4 (remain here for about 40 minutes) contains a higher proportion of delta waves (delta waves are evident more than 50% of the time).
    ▪ Waking a person from a slow-wave sleep is not easy, and if you succeed, be prepared. Most us will get groggy, disoriented, and downright irritated when jarred from a slow-wave slumber.
    ▪ This is also the time of greatest secretion of growth hormone, which helps children to grow taller and stronger, and to build tissue (Awikunprasert & Sittipraparon, 2012).
When learning the progression of electrical activity (as measured by an EEG) during the stages of sleep, students may find this little mnemonic helpful: **BATS Drink Blood.**

**Beta waves** (awake/alert)

**Alpha waves** (drowsy)

**Theta waves** (Stage 1) initial phase of sleep that hallucinations, or imaginary sensations, can occur. False perceptions that occur during the limbo between wakefulness and sleep are called hypnagogic hallucinations, and they are no cause for concern, in most cases.

**Spindles and K complexes** (Stage 2) Harder to awaken the sleeper. Little bursts of electrical activity called sleep spindles and large waves called K-complexes appearing every 2 minutes or so. Researchers suspect sleep spindles are associated with memory consolidation and intelligence. The exact function of K-complexes is up for debate: Some suggest they are the brain’s way of being ready to awake when the need arises, others believe they are the mechanism for remaining asleep in spite of disturbing stimuli.

**Delta waves** (Stages 3 and 4) Deeper sleep. Waking a person from a slow-wave sleep is not easy, and if you succeed, be prepared. Most of us will get groggy, disoriented, and downright irritated when jarred from a slow-wave slumber. This is also the time of greatest secretion of growth hormone, which helps children to grow taller and stronger, and to build tissue.

[then back to] **Beta waves** (awake)
REM sleep Fifth stage (Paradoxical sleep because the sleeper appears to be quiet and resting, but the brain is full of electrical activity)

- Associated with dreaming
- Characterized by bursts of eye movements
- Brain activity changes from those slower brain waves to faster and shorter brain waves
- Has brain activity similar to that of a waking state, but with a lack of muscle tone
- Involves neurons in the brainstem that control the voluntary muscles, keeping most of the body still
The Stages of Sleep

KEY TERMS

Beta waves
- Brain waves that indicate an alert, awake state

Alpha waves
- Brain waves that indicate a relaxed, drowsy state

Non-rapid eye movement (non-REM)
- Non dreaming sleep that occurs during sleep Stages 1 to 4

Theta waves
- Brain waves that indicate the early stage of sleep
Sleep

Looking at the deep sleep, you’ll see that the brain is actually very active during sleep, cycling through non-REM (NREM) stages and ending in REM sleep approximately five times during the night. Transitions between stages are clearly visible in EEG patterns.

Graphs illustrating the human sleep cycle typically span an 8-hour time span, as shown here. But this doesn’t tell the whole story of sleep.

The amount of time spent sleeping and the content of our sleep changes across the lifespan. And while a normal night’s deep sleep is approximately 7 hours for a healthy young adult, 60% of working adults get 6 hours or fewer of sleep per night (Centers for Disease Control and Prevention, 2015).

**Human Sleep Stages**

![Graph showing human sleep stages](image)

**As we age, we need fewer hours of sleep, and the proportion of time spent in REM decreases.**
A typical night's sleep has 4 or 5 multistage sleep cycles, each lasting approximately 90 minutes.

Each cycle includes at least 1 NREM and 1 REM stage.

Pattern and duration of stages differ over the course of the night.
Non-Rem Sleep: Non dreaming Sleep

FOUR STAGES

- **Stage 1**: Light sleep; theta waves; hallucinations can occur
- **Stage 2**: Theta waves; sleep spindles and K-complexes
- **Stage 3**: Deeper sleep; delta waves
- **Stage 4**: Deepest sleep; highest proportion of delta waves; slow wave sleep; greatest hormone secretion
REM sleep: Part 1

**REM sleep** Fifth stage (*Paradoxical sleep because the sleeper appears to be quiet and resting, but the brain is full of electrical activity*)

- Associated with dreaming
- Characterized by bursts of eye movements
- Brain activity changes from those slower brain waves to faster and shorter brain waves
- Has brain activity similar to that of a waking state, but with a lack of muscle tone
- Involves neurons in the brainstem that control the voluntary muscles, keeping most of the body still
REM Sleep: Part 2

REM is 50% of total sleep time at birth.

REM decreases to 20% of total sleep by age 85.
Sleep Architecture

- Stages 1, 2, 3, and 4 of the REM sleep and ending with a dream-packed episode of REM. **Each of these cycles lasts about 90 minutes**, and the average adult sleeper loops through five of them per night.
- These cycles are not identical because they change in composition throughout the night. During the first two cycles, a considerable amount of time is devoted to the deep Stages 3 and 4.
- Halfway through the night, however, Stage 3 and 4 vanish. Meanwhile, the REM periods become progressively longer, and an adult will average approximately four to five REM cycles.
- The first REM episode may last a mere 5 to 10 minutes, whereas the final one may drag on for nearly a half-hour (Siegel, 2005).
- The sleep stage where we spend the most time – nearly half the night – is the Stage 2 (Epstein & Mardon, 2007). Therefore, we pack the most restorative sleep early in the night and most dreaming toward the end.
- About **1 in 5 Americans** gets fewer than 6 hours of sleep on a typical weeknight.
- An individual who averages less than 6 hours of sleep per night is an **operational definition** of a short sleeper.
As we age, the makeup of our sleep cycles, or sleep architecture, changes. Older people spend less time in REM sleep and the deeply refreshing stages of non-REM sleep (3 and 4). Instead, their periods of light (Stages 1 and 2, which can be interrupted easily by noises and movements) are longer (Ohayon, Carskadon, Guilleminault, & Vitello, 2004).

This may be why many older people complain of sleeping poorly, waking up often, and feeling drowsy during the day. Not all elderly people have trouble sleeping, of course. Like most everything sleep patterns vary considerably from one individual to the next.
Disable the neurons responsible for this paralysis and you will see some very interesting behavior—the cat will act out its dream.

This cat may be dreaming of chasing mice and birds, but its body is essentially asleep.
Sleep: Nature and Nurture

What kind of sleeper are you?

- Average American sleeps 6 hours and 40 minutes.
  - 20 percent: < 6 hours
  - 28 percent: >8 hours
- Sleep needs may be inherited from parents.
- Sleep patterns are also influenced by life circumstances.
- If the short sleepers from the study were getting sufficient sleep, then we wouldn’t expect them to show signs of sleep debt. Sleep patterns, like virtually every psychological phenomenon, appear to be dictated by both nature and nurture.
NARCOLEPSY
- Neurological disorder characterized by excessive daytime sleepiness and other sleep-related disturbances, which includes lapses into sleep and napping. Sleepiness can strike anytime, anywhere...

CATAPLEXY
- Sudden episodes of total loss of muscle tone or strength that occur when a person is awake.
- During a severe cataplectic attack, some muscles go limp, and the body may collapse slowly to the floor like a rag doll.
- Cataplexy may completely disable the body, but it produces no loss of consciousness.
Tired Teen? *Yes and No.*
Shortly after the car accident, Matt was diagnosed with **narcolepsy**.

His battle with narcolepsy climaxed during his junior year of high school. In addition to falling asleep 20 to 30 times a day, he was experiencing frequent bouts of **cataplexy**, or sudden episodes of muscle paralysis.

Cataplexy struck Matt anytime, anywhere—up to 100 times a day.
SLEEP PARALYSIS
- Temporary paralysis that strikes just before falling asleep or upon waking up
- Recall that the body becomes paralyzed during REM sleep, but sometimes this paralysis sets in prematurely or fails to turn off on time.
- Picture yourself lying in bed, awake and fully aware yet unable to roll over, climb out of bed, or even wiggle a toe. You want to scream for help, but your lips won’t budge.

HYPNAGOGIC HALLUCINATIONS
- Hallucinations which occur at the transition between sleeping and waking
- Visual, auditory, tactile, and kinetic sensations may all be experienced.
- Imagine seeing bloodthirsty vampires, ax murderers or space aliens standing at the foot of your bed just as you are about to fall asleep.
- Matt had a recurring hallucination of a man with a butcher knife racing through his doorway, jumping onto his bed, and stabbing him in the chest.
• Approximately 1 in 2,500 people suffer from narcolepsy (Ohayon, 2011). It is believed to result from a failure of the brain to properly regulate sleep patterns.
• Normally, the boundaries separating sleep and wakefulness are relatively clear – you are awake, in REM sleep, or in non-REM sleep.
• With narcolepsy, the lines separating these different realms of consciousness fade, allowing sleep to spill into periods of wakefulness.
• The loss of muscle tone during cataplexy, sleep paralysis, and dreamlike hypnagogic hallucinations experienced while falling asleep may be explained by occurrences of REM sleep in the midst of wakefulness (Attarian, Schenck, & Mahowald, 2000).
• In other words, REM sleep occurs in the wrong place, at the wrong time (see a summary of this and other sleep disturbances in TABLE 4.1).
REM SLEEP BEHAVIOR DISORDER
- Repeated disturbance associated with vocalizations and/or complex motor behaviors arising from REM sleep.

BREATHING-RELATED SLEEP DISORDERS
- Most common disorder is obstructive sleep apnea hypopnea characterized by a complete absence of air flow (apnea) or reduced air flow (hypopnea).
### Table 4.1 SLEEP DISTURBANCES

<table>
<thead>
<tr>
<th>Sleep Disturbance</th>
<th>Definition</th>
<th>Defining Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narcolepsy</td>
<td>Neurological disorder characterized by excessive daytime sleepiness, which includes lapses into sleep and napping</td>
<td>Irrepressible need to sleep; daytime napping; cataplexy; sleep paralysis; hypnagogic hallucinations.</td>
</tr>
<tr>
<td>REM Sleep Behavior Disorder</td>
<td>The mechanism responsible for paralysis during REM not functioning, resulting in the acting out of dreams.</td>
<td>Dreamers vocalize and act out dreams; violent and active dreams are common; upon awakening the dream is remembered; risk of injury to self and sleeping partners.</td>
</tr>
<tr>
<td>Obstructive Sleep Apnea Hypopnea</td>
<td>Serious disturbance characterized by a complete absence of air flow (apnea) or reduced air flow (hypopnea).</td>
<td>Upper throat muscles go limp; airway closes; breathing stops for 10 seconds or longer; sleeper awakens, gasping for air.</td>
</tr>
<tr>
<td>Insomnia</td>
<td>Inability to fall asleep or stay asleep.</td>
<td>Poor sleep quantity or quality; tendency to wake up too early; can’t fall back asleep; not feeling refreshed after a night’s sleep</td>
</tr>
<tr>
<td>Sleepwalking</td>
<td>Disturbance of non-REM sleep characterized by complex motor behavior during sleep.</td>
<td>Expressionless face; open eyes; may sit in bed, walk around, or speak gibberish; upon awakening has limited recall</td>
</tr>
<tr>
<td>Sleep Terrors</td>
<td>Disturbance of non-REM sleep generally occurring in children.</td>
<td>Screaming, inconsolable child; usually no memory of the episode the next day.</td>
</tr>
</tbody>
</table>

Problems can arise during both REM and non-REM sleep. This table outlines some of the most common sleep disturbances and their defining characteristics.
INSOMNIA

- Most prevalent disorder
- Characterized by inability to fall or stay asleep
- Results in sleepiness and often difficulties with cognitive tasks
- Experienced by about one-third of adults; 6 to 10 percent suffer from insomnia disorder
- Related to stress, anxiety, jet lag, aging, drug use
OTHER SLEEP DISTURBANCES

- **Sleepwalking**
  - Non-REM (typically stages 3 and 4)
  - 25 percent of children experience at least one incident; may have genetic component

- **Sleep talking**
  - REM or non-REM steep
  - Limited recall on awakening
Sleep: Other Sleep Disturbances

**Sleep terrors**
- Disturbance of non-REM sleep, generally occurring in children; characterized by screaming, staring fearfully, and usually no memory of the episode the following morning.
- Unlike nightmares, sleep terrors occur during non-REM sleep.

**Nightmares**
- Frightening dreams that occur during REM sleep.
Disorder of non-REM sleep and disturbance of REM sleep

• Occasionally, after having been asleep, Jane sits upright in bed. Eyes open and face blank, she begins speaking gibberish. Ted sometimes acts out violent dreams; he has even injured himself once or twice. Jane experiences a disorder of non-REM sleep. Ted experiences a disturbance of REM sleep.

• Fatigue and pain reflect deprivation of non-REM sleep. Emotional overreactions reflect deprivation of REM sleep.
NIGHTMARES MAY FUEL ANXIETY RATHER THAN SERVING AS AN EMOTIONAL RELEASE

- Recent research suggests nightmares are more likely to increase anxiety in waking life (Joeiving, 2010).
- It is unclear whether nightmares play causal role in anxiety or express an underlying problem.
- Having occasional nightmare is normal.
Who needs sleep?
- No one functions optimally without optimal sleep.
- Optimal sleep varies by individual, age, environment, and culture.

Cultural norms regarding sleep vary significantly around the world.

Driving after being awake and active for 24 hours straight is at least as dangerous as driving drunk.
SLEEP DEPRIVATION
- Rapid deterioration of mental and physical well-being
- Inability to sustain focused attention
- Micro sleep episodes

CHRONIC DEPRIVATION
- Increased risk for heart disease, diabetes, weight gain, and weakened immune system

Record-Breaking Randy
A half-century ago, 17-year-old Randy Gardner set the record for the longest documented period of self-imposed sleep deprivation.
REM DEPRIVATION: STAGES 3 AND 4 SLEEP

- Fatigue and more overall pain
- Emotional overreaction to threatening situations
- REM rebound when opportunity sleep follows deprivation
# Why Do We Sleep?

<table>
<thead>
<tr>
<th>Theory</th>
<th>Description</th>
<th>Reflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restorative</td>
<td>Sleep allows for growth and repair of the body and brain.</td>
<td>Growth hormone secreted during non-REM sleep; protein production increases during REM; replenishment of neurotransmitters.</td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Sleep serves adaptive function; evolved as it helped survival.</td>
<td>Dark environments were unsafe; humans have poor night vision compared to animals hunting at night.</td>
</tr>
<tr>
<td>Consolidation</td>
<td>Sleep aids in the consolidation of memories and learning.</td>
<td>Assists in creation of memories, learning difficult concepts; similar patterns of brain activity when learning and sleeping afterwards.</td>
</tr>
</tbody>
</table>

We spend approximately a third of our lives sleeping, yet the precise purpose of sleep is still to be established. Above are three of the dominant theories.
Think Again: 7 Sleep Myths

- Drinking alcohol before bed helps you sleep better.
- Exercising right before bed sets you up for a good night's sleep.
- Everyone needs 8 hours of sleep each night.
- Watching TV or tooling around on your computer just before bed will help get you into the sleep zone.
- You can catch up on accumulated sleep loss with one night of “super sleep.”
- Insomnia is no big deal. Everyone has trouble sleeping from time to time.
- Sleep aids are totally safe.
# Table 4.3  HOW TO GET A GOOD NIGHT’S SLEEP

<table>
<thead>
<tr>
<th>Getting Good Sleep</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get on a schedule.</td>
<td>The body operates according to daily cycles, or circadian rhythms. Putting your body and brain on a regular schedule—going to bed and waking up at roughly the same time every day—is critical.</td>
</tr>
<tr>
<td>Set the stage for sleep.</td>
<td>Turn down the lights, turn off your phone, and slip into soft pajamas. Do everything possible to create a quiet, dark, and comfortable sleeping environment.</td>
</tr>
<tr>
<td>Watch eating, drinking, and smoking.</td>
<td>Beware of foods that create heartburn, and avoid excessive use of alcohol, caffeine, and nicotine (known enemies of sleep) especially late in the day.</td>
</tr>
<tr>
<td>Move it or lose it.</td>
<td>Exercise is associated with better sleep, but not right before bed. Exercise 2 to 3 hours before bed can actually prevent good sleep.</td>
</tr>
</tbody>
</table>

If you frequently wake up feeling groggy and unrestored, there are several simple measures you can take to improve the quality of your sleep.
1. The suprachiasmatic nucleus obtains its information about day and night from:
   a. circadian rhythm.
   b. beta waves.
   c. K complexes.
   d. retinal ganglion cells.

2. In which stage of sleep do we spend the most time at night?
   a. Stage 1
   b. Stage 2
   c. Stage 3
   d. Stage 4
3. **Narcolepsy** is a neurological disorder characterized by excessive daytime sleepiness and other sleep-related disturbances such as **cataplexy**, which refers to the sudden loss of muscle tone that can occur when a person is awake.

4. Make a drawing of the 90-minute sleep cycle. Label each stage with the appropriate brain wave experienced.

Drawings will vary; see Infographic 4.2. A normal adult sleeper begins in non-rapid eye movement sleep. Stage 1, the lightest sleep, is associated with theta waves. Stage 2 includes evidence of sleep spindles. Stage 3 and 4 are associated with delta waves and deep sleep. Sleep then becomes less deep as the sleeper works back from stage 4 to stage 1. But instead of waking up, the sleeper enters rapid eye movement sleep (REM). Each cycle lasts about 90 minutes, with the average adult sleeper looping through five cycles per night.
Dreams are form of “wish fulfillment” or playing out of unconscious desires

- In 1900 Sigmund Freud laid out his theory in the now-classic *The Interpretation of Dreams*, proposing that dreams were a form of “wish fulfillment,” or a playing out of unconscious desires.
- As Freud saw it, many of the desires expressed in dreams are forbidden ones that would produce great anxiety in a dreamer if she were aware of them. In dreams these desires are disguised so they can be experienced without danger of discovery.
- Dreams have two levels of content:
  - Manifest: Apparent meaning of dream, is the actual story line of the dream itself – what you remember when you wake up.
  - Latent: Hidden meaning of dream, which represents unconscious conflicts and desires.
- During therapy sessions, psychoanalysts use the latent content of dreams to uncover the unconscious, by looking deeper than the actual story line in the dream. Freud would ask patients to recount the manifest content and then look for symbols and other clues that might expose what is otherwise hidden because of its threatening nature; that is, the latent content.
- Critics of Freud’s approach to dream analysis would note that there are an infinite number of ways to interpret any dream (all impossible to prove wrong).

Example: As a psychodynamic psychologist, Dr. Flaherty adheres to Freud's wish-fulfillment theory of the function of dreams. Which piece of evidence is potentially consistent with his theory? The fact that both of these pieces of evidence are consistent with wish-fulfillment theory.
ACTIVATION-SYNTHESIS MODEL: HOBSON & MCCARLEY

- During REM sleep, the motor areas of the brain are inhibited (remember, the body is paralyzed), but sensory areas of the brain hum with the excitement of a great deal of neural activity.
- No meaning in dreams; neural chatter
- Human response to random neural activity as if it has meaning

NEUROCOGNITIVE THEORY OF DREAMS: DOMHOFF

- A network of neurons exists in the brain, including some areas in the limbic system and the forebrain, that is necessary for dreaming to occur (Domhoff, 2001).
- People with damage to these areas of the brain either do not have dreams, or their dreams are not normal in some way.
- Another indication of the undelaying neurocognitive nature of dreams is that children seem to develop the ability to dream, as their dreams are not like those of adults. For example, until children are around 13 to 15 years old, their reported dreams are less vivid and seem to have less of a story line. The underlying neural network must develop or mature before a child can dream like an adult.
- The neurocognitive theory of dreams does not suggest, however, that dreams serve a purpose. Instead, they seem to be the result of how sleep and consciousness have evolved in humans (Domhoff, 2001).
- Dreams tied to neuronal network in brain, especially in limbic system and forebrain
- System matures with time; sleep and consciousness evolved
ABOUT DREAMS

Dream content
- Repetitive
- Similar to what is thought about when awake
- More likely to be sad than happy
- Relatively consistent across cultures

Dream duration
- Averages about 1 to 2 hours per night

Lucid dream
- Consists of dream itself with an awareness of dreaming
The Dreaming Brain
1. Freud believed dreams have two levels. The manifest content refers to the apparent meaning of the dream, whereas the latent content refers to its hidden meaning.

2. According to the activation-synthesis model, dreams have no meaning whatsoever. Instead, the brain is responding to random neural activity as if it has meaning.
   a. psychoanalytic perspective
   b. neurocognitive theory
   c. activation–synthesis model
   d. evolutionary perspective
3. What occurs in the brain when you dream?

Electroencephalogram (EEG) and PET scan technologies can demonstrate neural activity of the sleeping brain. During REM sleep, the motor areas of the brain are inhibited, but a great deal of neural activity is occurring in the sensory areas of the brain. The *activation – synthesis model* suggests dreams result when the brain responds to this random neural activity as if it has meaning. The creative human mind makes up stories to match the neural activity. The vestibular system is also active during the REM sleep, resulting in sensations of floating or flying. The *neurocognitive theory of dreams* proposes that a network of neurons in the brain (including some areas in the limbic system and forebrain) are necessary for dreaming to occur.
4. Your 6-year-old cousin does not have dreams with a true storyline; her dreams seem to be fleeting images. This supports the neurocognitive theory of dreams, as does the fact that:

a. until children are around 13 to 15 years old, their reported dreams are less vivid.
b. dream content is not the same across cultures.
c. children younger than 13 can report very complicated storylines from their dreams.
d. dream content is the same for people, regardless of age.
PSYCHOACTIVE DRUGS

To dull the perception of pain, Dr. Julien might administer Fentanyl, which belongs to a class of drugs called opioids. And, to stamp out your memory of the surgery, he would lull you into a sleep-like stupor with a drug such as Propofol and then maintain that state of sleep with other drugs.

Fentanyl and Propofol are considered psychoactive drugs because the chemicals in these drugs can cause changes in psychological activities such as sensation, perception, attention, judgement, memory, self-control, emotion, thinking, and behavior – all of which may be associated with our conscious experience.

90% of people in the United States regularly use caffeine, a psychoactive drug found in coffee, soda, tea, and medicines (Alpert, 2012; Gurpegui, Aguilar, Martinez-Ortega, Diaz, & de Leon, 2004).

Trailing close behind caffeine are alcohol (found in beer, wine, and liquor) and nicotine (in cigarettes and other tobacco products), two substances that present serious health risks. Another huge category of psychoactive drugs is prescription medications – drugs for pain relief, depression, insomnia, and just about any ailment you can imagine.

Don’t forget the illicit, or illegal drugs like LSD and Ecstasy. About a third of Americans age 12 and older have tried an illicit drug at least once in their lifetime, and some 11% have used drugs in the past year, according to reported estimates (Substance Abuse and Mental Health Services Administration [SAM-HAS], 2008).
PSYCHOACTIVE DRUGS

- contain chemicals that cause changes in psychological activities associated with conscious experiences
- include caffeine, nicotine, prescription medications
- alter consciousness in numerous ways
- They can rev you up, slow you down, let down your inhibitions, and convince you that the universe is on the verge of collapse.
- Three major categories of psychoactive drugs – stimulants, depressants, and hallucinogens – but keep in mind that some drugs fall into more than one group.
DEPRESSANTS

- **Depress** activity in the central nervous system, or slow things down. **Depressant** drug that decreases neural activity and reduces anxiety; a type of sedative.

- Pre-medicating with benzodiazepine to calm patients while they wait to be wheeled into the operating room. It acts as a tranquilizer – a type of depressant that has a calming, sleep-inducing effect. Other examples of tranquilizers are Valium (diazepam) and Xanax (alprazolam), which are used to treat anxiety disorders.

- A more recent addition to the tranquilizer family is Rohypnol (flunitrazepam), also known as the “date rape drug” or “roofies,” which is legally manufactured and approved as a treatment for insomnia in other countries, but banned in the U.S. (Drug Enforcement Administration [DEA], 2012).

Examples of depressant drugs: Benzodiazepines, barbiturates and opioids.
Sex predators slip roofies into their victims’ drinks, especially darker-colored cocktails where the blue pills dissolve unseen.

Rohypnol can cause confusion, amnesia, lowered inhibitions, and sometimes loss of consciousness, preventing victims from defending themselves or remembering the details of a sexual assault.
BARBITURATE

In the operating room Dr. Julien puts the patient to sleep, this process is called “induction,” and it is sometimes accomplished by using another type of depressant termed a **barbiturate** which is a sedative drug that decreases neural activity. In lower doses, barbiturates cause many of the same effects as alcohol – relaxation, lowering of spirits, or alternatively aggression (Julien et al., 2011) – which may explain why they have become so popular among recreational user.

These substances are addictive and extremely dangerous when taken in excess or mixed with other drugs. If barbiturates are taken alongside alcohol, for example, the muscles of the diaphragm may relax to the point of suffocation.
Depressants: Part 3

OPIOIDS

- The brain continues receiving pain impulses even when a patient is out cold on the operating table. Without proper painkilling drugs, these signals can give rise to what Dr. Julien calls “autonomic instability,” a disruption of heart rate, blood pressure, and other activities regulated by the autonomic nervous system.

- One way to maintain autonomic stability is to give the patient an opioid, a drug that minimizes the brain’s perception of pain.

- “Opioid” is an umbrella term for a large group of similarly acting drugs, some found in nature and others concocted in laboratories (synthesized replacements such as methadone).

- Opioids block pain, induce drowsiness and euphoria, and slow down breathing (Julien et al., 2011).

- Two types of opioids: the endorphins produced by your body, and the opiates found in the opium poppy.

- The poppy-derived opioid morphine alleviates patients’ pain. Morphine is also the raw material used in making the street drug heroin, which enters the brain more quickly and has 3 times the strength (Julien et al., 2011).

- Class of psychoactive drugs that minimizes perceptions of pain
Depressants: Part 4

OPIATES

- Class of psychoactive drugs that cause a sense of euphoria; a drug that imitates the endorphins naturally produced in the brain
DEPRESSANTS: Part 5

PRESCRIPTION DRUG ABUSE

- Less than 1 percent of people in U.S. use heroin; rate may be increasing.
- Synthetic painkiller use increasing (e.g., oxycodone, hydrocodone).
- Prescription drug abuse common among teenagers (1 in 10 high school students)
- Drug overdose common
Altered States of Consciousness: Part 2

**NORMAL GABA ACTIVITY**
- GABA activation, which calms nervous system activity, is essential for proper functioning of the central nervous system.
- Without GABA, nerve cells fire too frequently.
- GABA receptor
- GABA messenger

**ALCOHOL**
- Alcohol activates the same receptors, increasing GABA’s activity.
- When alcohol increases GABA’s inhibitory signals, excitatory and inhibitory signals in the central nervous system (CNS) are out of balance.
- Alcoho increases levels of alcohol, leading to drowsiness and coma.

**ALCOHOL + BARBITURATE**
- Barbiturates bind to and activate GABA receptors too, creating even more GABA-related inhibition.
- Together, alcohol and barbiturates further imbalance excitatory and inhibitory signals, suppressing heart rate and the urge to breathe.
ALCOHOL DEPENDENCE
- Involves about 8.5 percent of U.S. adults

Alcohol is the MOST widely used depressant in the United States.

Why, precisely, is one not supposed to mix alcohol and “downers” (i.e., barbiturates)?
- Such a mixture can relax the diaphragm to the point that breathing stops.

DEFINITION
- Substance related disorder
- Individual addicted to alcohol either physically or mentally
- Continued use of alcohol despite significant areas of dysfunction
BINGE DRINKING

- Binge drinking associated with reduced mental and physical health.
- Effect appears to intensify with increasing levels of alcohol ingestion.
- About 15 percent of adults and 25 percent of teenagers have engaged in binge drinking.
Blood Alcohol Concentration (BAC) and Effects on Behavior

- The effects of one drink—a 12-oz bottle of beer, 4-oz glass of wine, or 1-oz shot of hard liquor—vary depending on weight, ethnicity, gender, and other factors.

- Across most of the U.S., a BAC of 0.08 is the legal limit for driving. But even at lower levels, our coordination and focus may be impaired.
The Consequences of Drinking

POSITIVE

- Light consumption may have cardiovascular and cognitive benefits.

NEGATIVE

- Overuse of alcohol associated with malnutrition, cirrhosis, and Wernicke-Korsakoff Syndrome.
- It is also linked to heart disease, various cancers, traffic deaths, and fetal-alcohol syndrome.
Stimulants and Hallucinogens

COCAINÉ

- is addictive, illegal, and widely used drug in U.S.
- produces rush of pleasure/excitement by amplifying effects of dopamine and norepinephrine

AMPHETAMINES

- are stimulant drug; referred to as speed, uppers, or bennies
- stimulate the release of the brain's pleasure-producing neurotransmitter dopamine
- include methamphetamine
- cause brain damage with chronic use
This Is Your Face on Meth
### Stimulants: Part 1

<table>
<thead>
<tr>
<th>CAFFEINE</th>
<th>TOBACCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>- blocks action of neurotransmitter (adenosine) that normally muffles activity of excitatory neurons in brain</td>
<td>- causes most premature deaths in United States</td>
</tr>
<tr>
<td>- makes person feel physically and mentally wired</td>
<td>- contains nicotine, which causes release of epinephrine and norepinephrine</td>
</tr>
<tr>
<td>- linked to lower depression and suicide rates with moderate consumption</td>
<td>- used by 1 in 5 U.S. adults</td>
</tr>
<tr>
<td></td>
<td>- creates additional harm to others through secondhand smoke</td>
</tr>
</tbody>
</table>
The leading killers in this country—heart disease, cancer, and chronic lower respiratory diseases—are largely driven by smoking.

Tobacco exposure is behind nearly half a million deaths every year.

Source: Kochanek et al. (2012)
Hallucinogens: Key Terms

Hallucinogens

- Group of psychoactive drugs that can produce hallucinations (auditory, visual, or kinesthetic), distorted sensory experiences, alterations of mood, and distorted thinking

Lysergic acid diethylamide (LSD)

- Synthetically produced, odorless, tasteless, and colorless hallucinogen that is very potent; produces extreme changes in sensations and perceptions

Methylenedioxymethamphetamine (MDMA)

- Synthetic drug chemically similar to the stimulant produces a combination of stimulant and hallucinogenic effects
LSD Sheets

Lysergic acid diethylamide, or LSD, is usually taken by mouth, administered through candy, sugar cubes, or blotter sheets like the one pictured here. A popular drug during the “hippie” era of the 1960s and 1970s, LSD has now fallen out of favor.
Marijuana

*Cannabis sativa*

- Most commonly used illicit drug in the world
- Consumed by 2.6 to 5 percent of the adult population
- Contains tetrahydrycannabinol (THC) which alters pain perception, induces mild euphoria, and creates intense sensory experiences and time distortions
Worldwide, tobacco is the leading cause of premature death.

After an entire day without alcohol, Selena is sweaty and shaking. Taryn claims she needs to smoke marijuana daily to keep stress at bay. Selena displays physiological dependence. Taryn displays psychological dependence.
### Overuse and Addiction: Part 1

<table>
<thead>
<tr>
<th>PSYCHOLOGICAL DEPENDENCE</th>
<th>PHYSIOLOGICAL DEPENDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>With constant use of some psychoactive drugs, a strong desire or need to continue using the substance occurs without the evidence of tolerance or withdrawal symptoms.</td>
<td>With constant use of some psychoactive drugs, the body no longer functions normally without the drug.</td>
</tr>
</tbody>
</table>
CAN’T GET ENOUGH

- People worldwide are getting hooked on social media—so hooked in some cases people receive treatment for social media addiction.
- Research indicates the urge to resist media is harder to resist than sex, spending money, alcohol, coffee, or cigarettes.
- The APA does not consider behavioral addictions as mental disorders.

What do YOU think?
Overuse and Addiction: Key Terms

Tetrahydrcannabinol (THC)
- Active ingredient of marijuana

Withdrawal
- With constant use of some psychoactive drugs, a condition in which the body becomes dependent and then reacts when the drug is withheld
Delirium tremens

- Withdrawal symptoms that can occur when a heavy drinker suddenly stops or significantly cuts down alcohol consumption; can include sweating, restlessness, hallucinations, severe tremors, and seizures.

Tolerance

- With constant use of some psychoactive drugs, a condition in which the body requires more and more of the drug to create the original effect; a sign of physiological dependence.
# Psychoactive Drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Classification</th>
<th>Effects</th>
<th>Potential Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Depressant</td>
<td>disinhibition, feeling “high”</td>
<td>coma, death</td>
</tr>
<tr>
<td>Barbiturates</td>
<td>Depressant</td>
<td>decreased neural activity, relaxation,</td>
<td>loss of consciousness, coma, death</td>
</tr>
<tr>
<td></td>
<td></td>
<td>possible aggression</td>
<td></td>
</tr>
<tr>
<td>Caffeine</td>
<td>Stimulant</td>
<td>alertness, enhanced recall, elevated</td>
<td>heart races, trembling, insomnia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mood, endurance</td>
<td></td>
</tr>
<tr>
<td>Cocaine</td>
<td>Stimulant</td>
<td>energy, euphoria, rush of pleasure</td>
<td>heart attack, stroke, anxiety, psychosis</td>
</tr>
<tr>
<td>Heroin</td>
<td>Depressant</td>
<td>pleasure-inducing, reduces pain, rush</td>
<td>boils on the skin, hepatitis, liver disease,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of euphoria and relaxation</td>
<td>spontaneous abortion</td>
</tr>
<tr>
<td>LSD</td>
<td>Hallucinogen</td>
<td>extreme changes in sensation and perception,</td>
<td>depression, long-term flashbacks, other psychological</td>
</tr>
<tr>
<td></td>
<td></td>
<td>emotional roller coaster</td>
<td>problems</td>
</tr>
<tr>
<td>Marijuana</td>
<td>Hallucinogen</td>
<td>stimulates appetite, suppresses nausea,</td>
<td>respiratory problems, immune system suppression,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>relaxation, mild euphoria, distortion of</td>
<td>cancer, memory impairment, deficits in attention and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>time, intense sensory experience</td>
<td>learning</td>
</tr>
<tr>
<td>MDMA</td>
<td>Stimulant;</td>
<td>euphoria, heightened energy, anxiety,</td>
<td>blurred vision, dizziness, rapid heart rate,</td>
</tr>
<tr>
<td></td>
<td>hallucinogen</td>
<td>and depersonalization</td>
<td>dehydration, heat stroke, seizures, cardiac arrest</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and death</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>Stimulant</td>
<td>energy, alertness, increases sex drive,</td>
<td>lasting memory and movement problems, severe weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>suppresses appetite</td>
<td>loss, tooth decay, psychosis, sudden death</td>
</tr>
<tr>
<td>Opioids</td>
<td>Depressant</td>
<td>blocks pain, induces drowsiness, euphoria,</td>
<td>respiratory problems during sleep, falls, constipation,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>slows down breathing</td>
<td>sexual problems, overdose</td>
</tr>
<tr>
<td>Tobacco</td>
<td>Stimulant</td>
<td>relaxed, alert, more tolerant of pain</td>
<td>cancer, emphysema, heart disease, stroke, reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in life span</td>
</tr>
</tbody>
</table>

Most drugs can be classified under one of the major categories listed above, but there are substances, such as MDMA, that fall into more than one class. Psychoactive drugs carry serious risks.
Hypnosis

Altered state of consciousness allowing for changes in perceptions and behaviors, which result from suggestions made by a hypnotist.

Mesmerizing

A 19th-century doctor attempts to heal a patient using the hypnotic techniques created by Franz Mesmer in the 1770s.
False Claims about Hypnosis

- People can be hypnotized without consent.
- Hypnotized people will act against their own will.
- Hypnotized people can exhibit “superhuman” strength.
- Hypnosis helps people retrieve lost memories.
- Hypnotized people experience age regression. In other words, they act childlike.
- Hypnosis induces long-term amnesia.
THEORIES OF HYPNOSIS

- Hypnotized people experience a split in awareness or consciousness.
- Hypnosis is a role-playing exercise, not a distinct state of consciousness.

What do you think?
1. Match the agent in the left column with the most appropriate outcome in the right column:

b 1. depressant
a 2. opioid
d 3. alcohol
c 4. cocaine

a. blocks pain
b. slows down CNS activity
c. increases CNS neural activity
d. cirrhosis of the liver
2. An acquaintance described an odorless, tasteless, and colorless substance he took many years ago. He discussed a variety of changes to his sensations and perceptions, including seeing colors and spirals. It is likely he had taken which hallucinogen:

a. alcohol
b. nicotine
c. LSD
d. cocaine
3. Dr. Julien uses a variety of **psychoactive drugs** to dull the perception of pain, to inhibit memories of surgery, and to change a variety of psychological activities.
4. People often describe behaviors as being addictive. You might hear a character in a movie say that he is addicted to driving fast, for example. These descriptions often refer to dangerous or risky behaviors.

Given what you have learned about physiological and psychological dependence, how would you determine if these behaviors should be considered problematic?

• To determine if behaviors should be considered problematic, one could evaluate the presence of tolerance or withdrawal, both signs of physiological dependence. With tolerance, one’s system adapts to a drug over time and therefore needs more and more of the substance to re-create the original effect. Withdrawal can occur with constant use of some psychoactive drugs, when the body has become dependent and then reacts when the drug is withheld. In some cases, with psychological dependence, behaviors may be problematic when there is a strong desire or need to continue the behavior, but with no evidence of tolerance or withdrawal symptoms. If an individual harms himself or others around him as a result of his behavior, it is a problem. Overuse is maladaptive and causes significant impairment or distress to the user and/or his family. This might include difficulties at work or school, neglect of children and household duties, and physically dangerous behaviors.