Consciousness and the Two-Track Mind

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Consciousness and the Two-Track Mind

RESOURCES

Brain States and Consciousness

The Biology of Consciousness

Lecture/Discussion Topic: The Mind-Body Problem

You might introduce cognitive neuroscience by noting that the field revisits a very old question: What is the relationship between mind and body? Does the mind exist separate from the body? Dualists answer yes. Dualists believe that the mind and body are interacting but distinct entities. On the other hand, monists deny the separation of mind and body. They argue that mind and body are different aspects of the same thing. In essence, the mind is what the brain does.

In his very helpful A Student’s Guide to Cognitive Neuroscience, Jamie Ward traces the history of this issue, suggesting it be reframed as the mind-brain problem, because the brain is the key part of the body responsible for cognition. Ward notes that philosophers as well as scientists have long been interested in the question of how a physical substance could produce our thoughts and emotions.

One position is that the mind and brain are made up of different kinds of substances. René Descartes is perhaps the most famous proponent of this idea. He argued that the mind was nonphysical and immortal whereas the body was physical and mortal. More specifically, Descartes suggested that mind and body interact in the pineal gland at the center of the brain. Stimulation of the sense organs presumably causes vibrations in the brain that are picked up in the pineal gland and create our sense of awareness. (Today, the pineal gland is recognized as part of the endocrine system.)

Some of Descartes’ contemporaries disagreed. For example, Spinoza argued that mind and brain were two different levels of explanation for the same thing (but clearly not two different things). As Ward explains, this idea, which has been called dual-aspect theory, remains...
popular with some current researchers. An analogy can be drawn to wave-particle duality in physics in which the same entity (e.g., an electron) can be described both as a wave and as a particle.

An alternative answer to the mind-body issue, endorsed by many contemporary thinkers, is reductionism. Although cognitive, mind-based concepts such as thoughts and emotions are currently useful for scientific exploration, eventually they will all be replaced by purely biological constructs (for example, patterns of neuronal firings, neurotransmitter release). Ultimately, as we learn more about the brain, psychology will be reduced to biology. Proponents of this position note that there are many historical examples of once-useful constructs being abandoned when better explanations were found. For example, seventeenth-century scientists maintained that when flammable materials were burned, they released a substance called phlogiston. This was similar to the classical notion that fire was a basic element along with water, air, and earth. Eventually, this construct was replaced by an understanding of how chemicals combine with oxygen. The process of burning became merely one example (along with rusting) of this particular chemical reaction.

Some contemporary researchers believe that mind-based concepts along with conscious experiences may gain the same questionable status as phlogiston in the future understanding of the brain. In contrast, proponents of dual-aspect theory would argue that an emotion will still feel like an emotion even if we were to fully understand its neural basis. Thus cognitive, mind-based concepts will always remain useful.


PsychSim 6: Who’s In Charge?

This module begins with a brief description of the controversies surrounding free will and conscious decisions. It includes a simulation of the classic Libet experiment showing the build-up of the “readiness potential” that allows researchers to predict when the participant will “decide” to make a response.

Lecture/Discussion Topic: Automatic Processing

While conscious awareness enables us to exert voluntary control and to communicate our mental states to others, consciousness is but the tip of the information-processing iceberg. As explained in the text discussion of memory, we process a great deal of information outside of awareness.

Because students are likely to perceive themselves as having far more control over their everyday behavior than they actually do, you may want to extend the text discussion of dual processing in class. John Bargh and Tanya Chartrand provide several persuasive examples of how everyday behaviors and feelings may be controlled by automatic processes. Students will find them fascinating.

First, Bargh and Chartrand describe the automatic effect of perception on action. In one study, participants were exposed to words related either to rudeness (e.g., impolite, obnoxious), politeness (e.g., respect, considerate), or neither. In this supposed “language experiment,” students were then given an opportunity to interrupt a conversation (to say they were ready for the next task). Significantly more of those in the “rude” priming condition interrupted (67%) than did those in the control condition (38%). Only 16 percent of those primed with “polite” words interrupted the conversation.

Second, the authors describe automatic goal pursuit. Goals are represented mentally and are capable of being activated without conscious awareness. In a supposed “word search” task, experimental participants were first primed with synonyms of achievement (e.g., strive, succeed); control participants received no such priming. Priming the achievement goal in this way led the experimental group to significantly outperform the control group on verbal tasks. As was true in all the studies, extensive questioning of the participants revealed no awareness of the possible effect of the priming task on later performance.

Third, Bargh and Chartrand describe a continual automatic evaluation of our experience. We all have been in certain moods without knowing why. One reason may be because of the automatic evaluations being made in our current environment. In a supposed reaction-time task, research participants were subliminally primed with nouns associated with either strongly positive attitudes (e.g., music, friends), strongly negative attitudes (e.g., cancer, cockroach), mildly positive attitudes (e.g., parade, clown), or mildly negative attitudes (e.g., Monday, worm). Following this alleged reaction-time task, participants moved on to what they thought was an unrelated experiment in which they completed two personal mood measures. On both measures, mood was found to be a direct, increasing function of the evaluative mood measures. On both measures, mood was found to be a direct, increasing function of the evaluative mood measures. On both measures, mood was found to be a direct, increasing function of the evaluative mood measures. On both measures, mood was found to be a direct, increasing function of the evaluative mood measures.

Bargh and Chartrand conclude that everyday behaviors, prejudices, and feelings may be controlled by automatic processes of which we are not consciously aware, thus leaving the conscious mind free to roam.

For much more discussion of this topic, see Incognito: The Secret Lives of the Brain by neuroscientist David Eagleman (Random House, 2011) and Thinking, Fast and Slow by Nobel Prize–winning psychological scientist Daniel Kahneman (Farrar, Straus and Giroux, 2011).
Lecture/Discussion Topic: Blindsight

The following are good examples and possible explanations for the existence of blindsight. Those with blindsight, argues Anthony Marcel of Cambridge University, have superb vision but they don’t know they can see. Employing a high-speed camera, Marcel tracked the vectors of participants’ arms, hands, and fingers as they reached for objects they could not consciously see. The films indicate that their reach was quite precise. This suggests that their vision remains intact; only the neural areas that bring vision into awareness are impaired.

For students to see blindsight in action, show the following 38-second YouTube video of a man with blindsight navigating obstacles in a hallway: youtu.be/GwGmWqX0MnM.

Psychologist Lawrence Weiskrantz (1997) and his colleagues at Oxford University have investigated blindsight extensively. They report, for example, that 20 years ago, a young male patient who had lost the left half of his vision because of damage to the visual cortex could nonetheless identify things in the blind field. For instance, he could distinguish between an X and an O and tell whether a line of light was vertical or horizontal. However, he did this only when the researchers urged him to guess. He would be astonished that his answers were correct: “I couldn’t see anything, not a darn thing.”

When visual signals leave the retina via the optic nerve, the signals take parallel routes to the visual cortex in the occipital lobes. One route goes through the lateral geniculate nucleus (LGN), a structure in the thalamus. The other route goes through the superior colliculus (SC), a structure just below the thalamus (SC) (Kolb and Whishaw, 2014).

Current research suggests that when the visual cortex is damaged, it is these areas that produce blindsight. It is tempting to say, then, that the visual cortex is the structure responsible for conscious awareness of what we “see.” However, damage to the visual cortex does not guarantee blindness, and that is especially true when the damage occurs when the person is very young (Leopold, 2012).

Those of us without damage to our visual cortex can experience blindsight. When images are flashed quickly, the signals may be picked up by these routing visual areas but not be strong enough to continue on to the visual cortex.

You and your students may test yourselves for blindsight by visiting serendip.brynmawr.edu/bb/blindsight.html.


Lecture/Discussion Topic: Psychological Distance and Evaluative Judgments

To illustrate the mind’s hidden power, introduce Lawrence Williams and John Bargh’s (2008) fascinating study demonstrating how psychological distance affects our thoughts, emotions, and evaluative judgments. Sometimes we use the term psychological distance to capture this link between space and feeling—for example, we may feel “too close” to a situation and thus need to “get away” or “put some distance” between ourselves and others. This idea, as Wray Herbert (2008) explains, was originally proposed in feng shui, the ancient Chinese art of placement that is rooted in the belief that space, distance, and the arrangement of objects affects our emotions and even our sense of well-being. Williams and Bargh sought to test whether the experience of spatial distance might automatically have an impact on a variety of emotional judgments.

First, to bolster research participants’ unconscious feeling of congestion or wide-open spaces, they had them plot two points much like one would on an ordinary piece of graph paper. In some cases, the points were very close together. In others cases, they were far away. This simple exercise is known to affect people’s unconscious feeling of either congestion or wide-open spaces. Next, they tested whether this sense of psychological distance might affect the participants’ judgments.

For example, in one test they had participants respond to an embarrassing literary passage. They asked them whether the excerpt was enjoyable and entertaining, and if they would like to read more of the same. Rather amazingly, those primed for spaciousness were less disturbed by the embarrassing passage. Indeed, they found it more enjoyable than those with a cramped perception of the world.

In another study, the literary passage was extremely violent rather than embarrassing. This time those primed for closeness found the violent events much more aversive, just as we would find an airplane crash in our own community more troubling than a crash in another country. Williams and Bargh believe this judgment relates to the brain’s deep-wired connection between distance and safety.
In yet a third study, the investigators explored more directly the association between psychological distance and safety by having their research participants judge the number of calories in both healthy and “junk” food. They reasoned that people primed for closeness would be more sensitive to the health threat. The results confirmed the hunch. Those made to feel crowded thought there were more calories in junk food than did those feeling open and free. Judgments of healthy food, on the other hand, were the same.

Finally, the investigators ran a test on the issue of personal security. They asked the participants about the strength of their emotional bonds to their parents, siblings, and hometown. Compared with those primed with closeness, those experiencing greater psychological distance expressed weaker ties to family members and hometowns.

Conclude by noting that all of these important judgments take place out of awareness and highlight the mind’s hidden power and our two-track mind. Remarkably, the spatial distance between two arbitrary objects (two dots on a graph) automatically and unconsciously impacted some significant emotional and social judgments.


Lecture/Discussion Topic: The Deliberation-Without-Attention Effect
Research demonstrating the “deliberation-without-attention effect” provides a dramatic example of the two-track mind. Sometimes, when we are confronted with a difficult decision, we put it out of our conscious mind for some time. Outside of awareness, our unconscious mind continues to deliberate and seemingly helps us to later arrive at a sudden and often correct decision. Before presenting the research findings, you might ask volunteers in class to share their experience of the “let me sleep on it effect.”

In a series of studies, Ap Dijksterhuis and his research team (2006) assessed the notion that it is not always advantageous to engage in thorough conscious deliberation before choosing. They tested the hypothesis that simple choices (say, between different towels) may produce better results after conscious thought, but more difficult, complex choices (say, between different houses) should be left to unconscious thought. The investigators’ hypothesis was confirmed in four studies on consumer choice, both in the laboratory and among actual shoppers. They found purchases of complex products were viewed more favorably when decisions had been made in the absence of attentive deliberation.

For example, in one study Dijksterhuis and his colleagues asked research participants to choose the best car from four alternatives. In the simple condition, the participants considered four characteristics of the cars; in the complex condition, they weighed 12 characteristics. In every case, one car was characterized by 75 percent positive attributes (that is, it was the best car), two by 50 percent positive attributes, and one by 25 percent positive attributes. After reading all the information about the cars, half the participants were assigned to the conscious deliberation condition and half to the unconscious deliberation condition. In the former, they were asked to think about the information for four minutes before choosing the best car. In the unconscious condition, they were distracted for four minutes by being asked to solve anagram problems before deciding. Results indicated that in the simple decision condition (with only four attributes to consider), participants who consciously deliberated made the best decisions. However, with complex decisions, participants who “unconsciously” deliberated made the best decisions. The authors conclude that it would “benefit the individual to think consciously about simple matters and to delegate thinking about more complex matters to the unconscious.”


Classroom Exercise: Mindful Attention Awareness Scale and Mindfulness Training
Research indicates that we vary in our “mindfulness,” that is, our awareness of and attention to what is taking place in the present. Handout 1 is Kirk Warren Brown and Richard M. Ryan’s Mindful Attention Awareness Scale (MAAS). To score, students should add the numbers before all 15 items to obtain a total score. Scores can range from 15 to 50, with higher scores reflecting greater mindfulness, that is, greater attention to and awareness of current experiences. Those with higher scores tend to be more observant of what is occurring both internally and externally. One large sample of undergraduates obtained an average (mean) score of 55.8.

Scale scores are positively linked with diverse measures of flourishing, including life satisfaction, optimism, and self-esteem. Similarly, higher scores are associated with less anxiety, depression, and hostility.
Researchers suggest that mindfulness fosters well-being and happiness by adding clarity and vividness to experience. It may also facilitate our choosing behaviors that are consistent with our needs, values, and interest.

In a study of Chinese students, those who scored lower on this mindfulness scale were more likely to smoke. Mindfulness may lead to better decision making (Black, et al., 2012).

In a comprehensive review of the literature, Brown, Ryan, and J. David Creswell (2007) examined theory and evidence for the role of mindfulness in reducing negative functioning and enhancing positive outcomes in numerous life domains, including mental health, physical health, behavioral regulation, and interpersonal relationships. At the same time, they acknowledged that too much reality contact may sometimes be detrimental to well-being. For example, attention to physical or emotional pain may initially worsen the subjective experience of it, but accepting this state of affairs may lead to better coping.

Clinicians have begun trying out mindfulness training with people in drug and alcohol treatment programs. In one experiment, those who received the mindfulness training were less likely to experience drug/alcohol relapses 6 months or 12 months later. The researchers think that when people can do a better job of “being in the moment,” they are better able to cope with stress and cravings (Bowen, et al., 2014).

Can it help people cope with the stress of cancer? Participants who had been diagnosed with cancer were given a pretest asking about their mood and levels of stress; they were also given the MAAS. After 8 weeks of mindfulness training, MAAS scores went up, stress levels went down, and mood improved (Garland, 2012).

Mindfulness training has even helped college students with poor eating habits to skip fewer meals and overeat less (Bahl, et al., 2013).

If your institution has a counseling center, check with those on staff to see if they offer mindfulness training for students. If not, they should be able to provide referrals for your students.


### Selective Attention and Inattention

#### Classroom Exercise: Human Earphones

The text defines selective attention as the focusing of conscious awareness on a particular stimulus. Researchers use dichotic listening procedures to study this phenomenon: They have research participants wear earphones through which a different message is simultaneously presented to each ear. Participants are instructed to repeat one of the messages aloud as it comes into one ear—a technique referred to as “shadowing.” The important question concerns the impact of the message not being shadowed. Although its content is generally not perceived, certain aspects—for example, the gender of the speaker of the second message—may be recalled.

Many listeners will also remember hearing their name, even though they were attending to a different message. C. James Goodwin (1988) suggests an excellent class demonstration of the dichotic listening procedure; you simply need two students to serve as the earphones, three chairs, and two books. The earphone volunteers should be of the same gender and their voices should be similar in pace, tone, loudness, and so on. Goodwin suggests that you recruit them a day in advance for practice.

On the day of the demonstration, ask for three or four volunteers and send them out of the room. Briefly describe dichotic listening procedures to the class. Bring one of the students back in and have him or her sit between the two earphones. Each earphone should sit directly facing one of the student’s ears. Begin by giving the student brief practice in shadowing as both earphones read different passages from their books. Then, after the student has shadowed for a minute or two, ask about the information reported to the nonattended ear. Typically, little or nothing of its meaning will be recalled. Your class will fully appreciate the difficulty of the task.

To show that something of the nonshadowed message is heard, have that “earphone” do some attention-getting things, such as say the student’s name, switch from English to a foreign language, or shift the physical dimensions of the message, for example, from low to
high pitch. You might also attempt to replicate another dichotic listening finding: If a shadowed message suddenly switches to the other ear, people automatically follow, even when they have been specifically told to shadow only what is being heard in the first ear. Typically, they are not aware of making the switch. (Human earphones may need a bit more practice for this and be given a cue for making the switch.)

Michael Clump (2006) has suggested an alternative to Goodwin’s exercise. The activity involves dividing the entire class into groups of three students each (you can construct the groups independent of gender). Each group decides who will act as participant and who will be the two speakers. The participant will always shadow (listen to) speaker 1 and try to ignore speaker 2. Instruct participants to leave the room while you give the speakers their assignment.

Explain that speaker 1 (the shadowed speaker) should develop an interesting story (or stories) that he or she continuously tells in one of the participant’s ears under three different conditions. In the first condition, speaker 2 (the nonshadowed speaker) says random words and numbers at 1-second intervals in the other ear. In the second condition, speaker 2 occasionally intersperses the participant’s name among random words and numbers. In the third condition, if students know each other well, speaker 2 relates an interesting story that includes the participant’s name and information from classes, friends, jobs, relatives, or anything specifically relevant to the participant. If students are not close, the story could be readily modified to include more general class, campus, and community information that participants would find interesting. After the speakers have constructed their presentations (each condition should last about 1 minute), the participants return and the activity begins. Review again the participant’s role to shadow speaker 1 and ignore speaker 2.

After each condition, the participant should write down for 1 minute what he or she recalled from the shadowed and nonshadowed ears. During the brief writing interval after conditions 1 and 2, the speakers should mentally rehearse their next stories and lists. The group repeats this procedure for all three conditions.

Following the demonstration, ask all participants to describe the information they recalled from the shadowed and nonshadowed ears. They will inevitably describe how their recall is excellent for the shadowed material in the first two conditions but that their recall falters in the third condition. In contrast, their recall for nonshadowed information improves across conditions (they remember very little in the first condition, their names multiple times in the second condition, and most of the material in the third condition). As time permits, you might have the three students in each group rotate through the three roles and experience the activity from each perspective.


Classroom Demonstration: Inattentional Blindness Videos

YouTube has several short videos that do a wonderful job illustrating inattentional blindness. The most popular is a public service announcement that ran in London, encouraging drivers to look for bicyclists: youtu.be/Ahg6qcg0ay4.

You can access Dan Simons’ original gorilla video: atyoutu.be/vJG698U2Mvo. If you show or talk about the original gorilla video, show this 5-minute video of Dan Simons explaining inattentional blindness with a special guest appearance by the gorilla: www.youtube.com/watch?v=UtKt8YF7dgQ. See also the Classroom Demonstration about change blindness videos on the next page.

Lecture/Discussion Topic: Change Blindness

Change blindness, in which people fail to notice changes in the environment, is a form of inattentional blindness. Daniel Simons and Michael Ambinder (2005) provide an excellent review of the phenomenon. In the 1990s, Ronald Rensink and his colleagues developed the flicker task to study change detection. In this task, an original image and a modified image alternate repeatedly, separated by brief blank displays, until observers find the change. The flicker task contributed to interest in change blindness because it allowed the audience at talks or in classes to experience the phenomenon for themselves. Significant changes can go unnoticed for many seconds. For example, the appearance and disappearance of a building in the background may go unnoticed.

Simons and Ambinder indicate that the change-blindness literature has converged on a core set of findings. First, change blindness occurs whenever attention is diverted from the changed object. Second, changes to objects that are central to the meaning of the scene or changes in the environment, is a form of inattentional blindness.
The reviewers note that more research is needed to determine what draws attention to some scene elements and not to others in a change-detection task. Distinctiveness of specific features or expectations about a scene may be important. Individual differences of observers also need study. For example, experts in American football or European soccer or British cricket, for example, are better able to detect meaningful changes to the scenes than are those who are unfamiliar with the sport. Expertise seems to guide the focus of attention and indicates that some differences in change-detection ability can be attributed to knowledge of the observer rather than image properties.

Research findings indicate that observers sometimes recognize a previously attended object on a memory task even when they have failed to notice a change to that object. In fact, they even recognize both the prechange and postchange object at better-than-chance levels despite a failure to detect the change. Researchers are also testing whether changes are ever detected implicitly, that is, in the absence of conscious awareness of the change. For example, can observers guess the change location even if they report no awareness of anything changing or will their performance show evidence of change detection (for example, slowed responses in the presence of change)? Simons and Ambinder believe that the evidence for implicit change detection has been mixed.

This research has practical implications. People vastly overestimate their ability to detect change in their environment. We might assume that in driving an automobile we would automatically notice a pedestrian stepping into the street. The widespread use of cell phones—an attention-demanding task—demonstrates the extent of this assumption. Even admitting that cellphone conversations require attention, we may mistakenly believe that we would automatically notice any important change in our environment. Studies of change blindness indicate otherwise.


Classroom Demonstration: Change Blindness Videos

YouTube has some wonderful short videos illustrating change blindness. Footage (96 seconds) from the original “door study” shows an experimenter asking for directions, people carrying a door between them, and the experimenter switching with another experimenter. The participant does not notice. See youtu.be/v3iPrBrGSJM.

After you have discussed inattentional blindness and Dan Simons’ invisible gorilla, show the following video: youtu.be/IGQmndoK_ZFY. Yes, the gorilla appears among the young women passing the basketballs, and your students will see it. But because they are watching for the gorilla, they miss the other changes.

The “amazing colour-changing card trick” is a 3-minute illustration of change blindness (see youtu.be/v3iPrBrGSJM). Once your students are feeling confident that they can see the changes now that they know to look for them, show this 2-minute public service announcement: youtu.be/ubNF9QNEQLA. How many changes can your students spot?

Lecture/Discussion Topic: Driving and Cell-Phone Use

The text discusses the dangers of talking or texting while driving. Ask students using a classroom response system—or another method that provides anonymous responses—how many of them, in the last 30 days, have talked on a cell phone while driving? Have texted, read or sent, while driving?

Data from a 2011 survey (CDC, 2013) of cell-phone use while driving in the United States and Europe revealed that in the last 30 days

- Cell-phone talking while driving: In the United States, 68.7 percent of survey respondents (aged 18–64) had talked on their cell phone, as had 20.5 percent in the United Kingdom and to 59.4 percent in Portugal had.
- Texting (sending or reading) while driving: In the United States, 31.2 percent had texted (sent or read), as had 15.1 percent in Spain and 31.3 percent in Portugal had.

How dangerous is talking on a cell phone while driving? You are seven times more likely to be in an accident than when you are not talking on a cell phone (Klauer et al., 2014). And, no, it doesn’t matter if you are talking “hands-free” or not. How dangerous is texting while driving? You are four times more likely to be in an accident than when you are not texting. That’s twice the risk of driving while intoxicated (Klauer et al., 2014).

Students may ask if having a conversation on a cell phone is different from having a conversation with someone in the car, and it is. Researchers in David Strayer’s Applied Cognition Lab at the University of Utah have studied this very question using driving simulators. Passengers in the car, in addition to being conversationalists, provide an extra set of eyes that can help the driver (Drews, Pasupathi, & Strayer, 2008). A more astute student may ask, “What if the passenger is blind?” Yes, conversing with passengers who cannot see is just as dangerous as talking on a cell phone while driving.

In 2013, David Strayer gave a 55-minute talk at the Association for Psychological Convention on cell-phone use and driving. You can watch it in its entirety at vimeo.com/69575350.
Finally, your students may say, “OK. While driving, I can’t talk on my phone or text. Can I at least listen to music?” Australian researchers (Hughes, et al., 2013) say the answer is No. Participants in a driving simulator were exposed to three different conditions: no music, listening to music, and singing along with music. When listening to music or singing along with music, as compared with the no-music condition, participants were the worst drivers. They drove slower (presumably to compensate for the higher mental workload), had greater variability in their speed, and had decreased reaction time. Interestingly, in the listening condition participants were less likely to meander out of their own driving lane, and in both the listening and singing conditions participants were less likely to meander within their own driving lane. The researchers suggest that these latter two results may be due to “tunnel vision” that occurs under heavy mental workloads. If our focus is entirely on what is in front of us, it may be easier to maintain a steady course. Unfortunately it comes at a cost because when danger comes from the left or right, such as a child running into the street, the danger will be more difficult for us to detect.


**Student Project: Driving Behavior Observational Study**

The Center for Distracted Driving at the University of Utah gives your students the opportunity to learn about driving and cell-phone use in their community and to learn about observational research. It also provides valuable data for an important research project. Visit: www.psych.utah.edu/cellphonestudy.

On the website, click on “Professors Information” to set up an account, so when your students submit their data to the website, you will be able to access it.

Click on “Instructions” to download the data entry form. Students will work in pairs. By standing on opposite corners of an intersection for an hour, both students observe the same cars. Students need to decide in advance which lanes they will be observing. For each car that travels through the intersection in the designated lane, both students record whether the driver obeyed traffic laws, and whether the driver was talking on a cell phone, texting/dialing, or was not using a cell phone.

After students submit their data to the website, they will be given a summary of their data, which includes an interrater reliability statistic (kappa), the odds of how likely it is that a distracted driver won’t stop at an intersection, and the results of a test of statistical significance (chi square).

You may choose to just have students submit this summary data, or you may choose to have students write about their experiences. Handout 2 is a list of possible questions for students.

**Student Project: Raising Awareness: The Prevalence of Inattention**

National Geographic workers in Washington, D.C., divided a sidewalk into two lanes: “No cell phones” and “Cell phones: walk in this lane at your own risk” for a new TV series geared to exploring human behavior (Pegoraro, 2014).

Students who are interested in raising awareness of the prevalence of inattention might want to try this on your campus or in your community.

With written permission of your institution’s administration, or the City or Town Council, if doing this on a sidewalk in your community, students choose an appropriate sidewalk, perhaps a wide, well-travelled one. Cardboard can be used to create stencils. Lay the stencils on the sidewalk, and use sidewalk chalk or washable paint to make the markings.

Combine this awareness-raising project with a lesson on observational research. Students can identify behaviors they are interested in observing, and then operationally define those behaviors. For example, students may be interested in seeing how many cell-phone users walk in the designated cell-phone lane. Is a cell-phone user operationally defined as someone who is talking on the phone or looking at the screen? Does the user need to do that behavior before arriving at the lane?
Sleep and Dreams

Classroom Exercise: The Sleep IQ Test

You can also introduce the topic of sleep with the U.S. National Sleep Foundation’s Sleep IQ test (Handout 3). The National Sleep Foundation is a nonprofit organization that is “dedicated to improving public health and safety by achieving public understanding of sleep and sleep disorders and by supporting public education, sleep-related research and advocacy.”

Here are the answers and brief explanations to present in class:

1. False. The brain is very active during sleep, doing such things as consolidating memories.
2. True. Sleep is crucial for learning and memory. If you need an alarm clock to wake up, you are not getting enough sleep.
4. True. Rest is not the same as sleep. Sleep restores the body and brain in ways that rest cannot.
5. False. Snoring may be an indicator of sleep apnea. People with sleep apnea are awakened repeatedly throughout the night, but not be aware of it.
6. True. Some people may not remember their dreams, but everyone dreams.
7. False. Older people may get more interrupted sleep due to such things as pain, but that does not mean that the need is less.
8. False. In fact, you may experience microsleeps, brief bouts of involuntary sleeping, that you may not even notice.
9. False. If your brain is telling you it’s time to sleep, the best thing you can do is sleep. If you don’t, you run the risk of falling asleep when it is dangerous to do so, like when driving a car.
10. False. Sleep disorders such as narcolepsy and sleep apnea have biological roots.
11. True. Our circadian rhythm makes us sleepy between midnight and 6 a.m., even if we’ve been sleeping during the day.
12. False. Sleep disorders can have serious consequences for our health and need to be addressed. They will not disappear on their own.


Biological Rhythms and Sleep

Lecture/Discussion Topic: Circadian Rhythms, Jet Lag, and Sleeping In

Many of your students will, at some time in their lives, experience travel fatigue or jet lag. Psychological research on circadian rhythms, and the fact that our internal biological clocks can be “adjusted,” can help inform your students about how to avoid jet lag or reduce its negative effects when they travel.

Jet lag occurs when an individual’s internal rhythms are temporarily out-of-sync with the environment around them. The greater the asynchrony, the more symptoms of jet lag a person will experience. These include changes in sleep, appetite, mood, motivation, energy levels, susceptibility to illness, and many other symptoms. Research is very clear that eastbound air travel (when you land in an environment that is ahead in time relative to your schedule back where you departed from) is more difficult for travelers than reverse westbound flights. The more time zones you cross, the greater the difficulty in adjusting to the time schedule in your new surroundings (Arendt, Stone, & Skene, 2005).

The National Sleep Foundation has several recommendations for combatting jet lag. A few days before the trip, start adjusting your schedule to be closer to your schedule at your destination. If you are flying east, for example, go to bed earlier and get up earlier so that when you arrive, your circadian rhythm will more closely match that time zone. Once on the plane, if you wear a watch, change it to the time zone you’re flying to. This will give your brain another cue as to the time it is supposed to be operating on. When you arrive, try to stay awake until 10 p.m. The next day, stay out in the sun as much as possible. Sunlight is a powerful time-of-day cue for your brain (Jet lag and sleep, n.d.).

For students who may work with horses, yes, horses also experience jet lag, but they recover from it quickly (Tortonese & Short, 2012).

Have your students ever felt tired after sleeping in? Sleeping later than usual is essentially nontravel jet lag. If you normally get up at 6 a.m., but sleep in until 9 a.m., your circadian rhythm has been thrown off 3 hours, which is what happens to students over weekends. That’s the same as flying east to west over three time zones (Stockton, 2014).


PsychSim 6: EEG and Sleep Stages
This module contains a tutorial on EEG recording during sleep, describing the characteristic wave patterns of NREM-1 through NREM-3 sleep and REM sleep. It also includes a simulation of sleep research in which the student awakens a person at different stages of sleep to check for dreams.

Student Project: Keeping a Sleep Diary
For a picture of your sleep patterns, William Dement suggests keeping a sleep diary for at least a week (Handout 4). Or, you can use the elaborate sleep diary from the National Sleep Foundation (sleepfoundation.org/content/nsf-official-sleep-diary) or adapt it for your students. If you have an irregular sleep schedule, the diary will certainly reveal it. For example, is there consistency in the total amount of sleep you get each night? Do you go to bed and awaken at the same times each day? The sleep diary also enables you to see daily peaks and troughs in wakefulness. (Setting the alarm on a digital wristwatch will help you to make the necessary notations.) At what time of the day is your performance most efficient? Does the pattern resemble the standard shift of biological rhythm, dipping at 1 or 2 P.M., or does the dip come earlier or later? The latter may indicate a circadian pattern that is different from the population average. Dement suggests that sleep patterns on the weekend may indicate a backlog of sleep debt, particularly if there is a strong desire to nap even after sleeping later on Saturday and Sunday mornings.

Keeping a sleep diary may be the first step in identifying the existence of sleep deprivation as well as possible causes of sleep disorders. You might ask students to prepare a written report of what they have learned, or, alternatively, ask volunteers to share with the class insights they gained from keeping a sleep diary. The U.S. National Sleep Foundation suggests that the diary results be shared with one’s health care provider, particularly if there is concern over a possible sleep disorder.

Student Project: Catching the Hypnagogic State
Between waking and sleep is a twilight zone in which we may experience fantastic images different from both daydreams and night dreams. We may have the sensation of falling or of floating weightlessly. Can students catch the images of the “hypnagogic” state? One alerting technique is to hold a book or spoon in one hand while balancing the arm vertically, elbow on the bed. As the student passes into the twilight state, the arm will fall and the object will drop, startling him or her back to consciousness.

Using an alarm clock with a “snooze control” set to ring every 5 minutes may as likely catch the hypnopompic state (between sleeping and waking) as the hypnagogic state (between waking and sleeping). If the student remains sufficiently aware to depress the “alarm stop bar” every 5 minutes, the alarm will not sound. If awakened by the alarm, the student can record the content of his or her experience.

Classroom Exercise: Larks or Owls?
Our daily schedule of waking and sleeping is timed by a body clock known as circadian rhythm. We vary not only in the total amount of sleep we get but also in its timing. Ask your students whether they are larks or owls.

Only a small proportion of the population is in the extreme categories. The vast majority of us fall somewhere in between. Students are typically eager to talk about their own pattern and its effect on their work, recreation, and relationships. Typically, this will include comparisons with relatives, roommates, and friends who may be of a different type. Research indicates that extreme larks have difficulty adjusting to schedule changes such as those associated with shift work and jet lag. On the other hand, extreme owls seem to have little difficulty adjusting to new schedules.

A 2005 U.S. National Sleep Foundation poll reports that 55 percent of Americans think of themselves as larks and 41 percent consider themselves owls. The owls are more likely to experience insomnia and get less sleep than they need. There were no gender differences.

High school student owls, at least in one study (Praekel, et al., 2013), had lower GPAs than their lark counterparts, even when the researchers controlled for such factors as achievement motivation, conscientiousness, and need for cognition. Interestingly, though, being a lark was not one of the factors explaining their higher GPA. In other words, being an owl harms one’s GPA, but being a lark doesn’t improve it. The researchers carefully note that it might be the nature of their high-school-attending sample; most were owls. There may not have been enough larks in the sample to draw any meaningful conclusions about larks.


Praekel, F., Lipnevich, A. A., Boehme, K., et al. (2013). Morningness-eveningness and educational outcomes: the lark has an advantage over the owl at high school. British
Sleep Theories

Lecture/Discussion Topic: Sleep and Memory

During sleep, our brain is active in restoring and rebuilding the day’s memories. University of Chicago investigators have demonstrated that sleeping has an important and previously unrecognized effect on improving people’s ability to learn language.

Researcher Kimberly Fenn and her colleagues (2003) suggest that sleep may have two separate effects on learning. It consolidates memories, protecting them against subsequent interference or decay; it also appears to “recover” or restore memories.

The research team assessed students’ understanding of a series of common words that were produced in a mechanical, robotic way that made them difficult to understand. After measuring the students’ ability to recognize the words, the researchers trained them to understand the words and then measured the effectiveness of the instruction. The students never heard the same word more than once, so they had to learn how to figure out the pattern of sounds the synthesizer was making (something like learning to understand someone with a foreign accent).

A control group tested one hour after they were trained recognized 54 percent of the words as opposed to 21 percent before training. Another group was trained at 9 a.m. and tested at 9 p.m. These students lost much of their learning and, in contrast to the control group, showed only a 10 percent gain over pretraining scores. A third group was trained at 9 a.m. after being trained at 9 p.m. After a night’s sleep, those students improved their performance by 19 percentage points over their pretest scores.

Most important, the students who were trained at 9 a.m. were tested again after a night’s sleep, and, remarkably, their scores improved to the same level as the other students who had had a night’s sleep. Surprised by their results, the investigators concluded, “If performance is reduced by interference, sleep might strengthen relevant associations and weaken irrelevant associations, improving access to relevant memories.” In summary, if information is forgotten, sleep might help people restore a memory.

Harvard scientists provided additional insight into the possible role sleep plays in consolidating memories. Their participants were randomly assigned to one of four groups: One group memorized two lists of randomly paired words in the evening and was tested the next morning. A second group memorized the words in the morning and was tested in the evening. A third group memorized in the evening and was interrupted with another task before being testing in the morning. A fourth group memorized in the morning and was given another memory task before being tested in the evening.

Those who went to sleep without being interrupted by another task performed best, with 94 percent recall of the word pairs. Those who stayed awake without interference scored an average of 82 percent.

A night’s sleep, however, made a greater difference for the groups who did distracting tasks. Those who stayed awake scored only 32 percent; those who slept before their test scored 76 percent.

Not only is sleep important in consolidating memories, but it’s important for consolidating memories correctly. Steven Frenda and colleagues (2014) at the University of California, Irvine, found that when research participants were kept awake for 24 hours straight, they were more likely to develop false memories in response to being given misinformation, as compared with those who were not sleep-deprived.


Sleep Deprivation

Classroom Exercise: Am I Sleep Deprived?

Handout 5, designed by James Maas, assesses a respondent’s level of sleep deprivation. Maas suggests that a person who answers “true” to 3 or more of the 15 items is probably not getting enough sleep. He notes that the effect of sleep loss is cumulative. Each person maintains a personal sleep bank account. The sleep we get is an asset or deposit to the account, and any hour of wakefulness is a withdrawal or debt. A one-hour sleep loss every night for a week, he suggests, is the equivalent of pulling one all-nighter. When we do not get enough sleep, says Maas, we pay a price in terms of reduced productivity; reduced ability to concentrate, to remember, and to think critically and logically; and reduced creativity, vocabulary, and communication skills.

In his book Sleep Thieves, Stanley Coren cites evidence that extending people’s sleep to approximately 10 hours seems to improve performance, psychological
status, and mood. Data also suggest that when all time cues are removed, people tend to sleep 9 to 10 hours.

Coren cites the work of Thomas Wehr and his colleagues at the National Institute of Mental Health in Bethesda, Maryland. In their research, they tried to control people’s biological clocks by looking at the effects of 8 hours of darkness (characteristic of our electric-light-lit world) versus the 14 hours of darkness more typical of what our earliest ancestors might have experienced in the winter season. They found that people given 14 hours of darkness did not use all of it to sleep. Rather, they slept between 9 and 10 hours, indicating that this sleep range is adequate for most people. The research also showed that when these people were given standardized tests measuring their mood and daytime alertness, they were considerably happier and more energetic than they were with their standard 8-hour night. In contrasting sleep today with that of our ancestors, Wehr concluded, “There may have been a lot of rest going on that has been virtually abolished by our modern lifestyle.” In short, the overwhelming majority of us are running a sleep debt.


Lecture/Discussion Topic: How Long Can Humans Stay Awake?

When this question was posed to experts at scientificamerican.com, sleep researcher J. Christian Gillin (2002) at the University of California, San Diego, provided an informative response.

The easy answer, he wrote, is 264 hours or about 11 days. Randy Gardner, a 17-year-old high school student, set this apparent world record for a science fair in 1965. Research participants in more carefully monitored experiments have stayed awake for 8 to 10 days. All showed progressive and significant deterioration in concentration, motivation, perception, and other higher mental processes as the sleep deprivation continued. None, however, suffered serious medical or psychiatric problems. All recovered to relatively normal functioning within one or two nights of recovery sleep.

Gillin reports that in experiments involving rats conducted in Allan Rechtshaffen’s sleep laboratory at the University of Chicago, continuous sleep deprivation for two weeks or more caused death. The cause of death was associated with whole body hypermetabolism.

Fatal familial insomnia (FFI) is a rare brain disease, occurring in “more than 40 families (Provini, et al., 2013). Patients lose the ability to fall asleep. The inability to sleep is gradually degenerative and fatal in 6 to 30 months. Gillin (2002) suggests that the disorder is misnamed because death results from multiple organ failure rather than from sleep deprivation. That is, the thalamus degenerates, the sympathetic nervous system becomes overactive, and the person experiences tremors, weight loss, and a disruption of the body’s endocrine system. The onset of the disorder typically occurs between the ages of 40 and 60 but may begin in a person’s late 30s. As the term suggests, the disorder runs in families.

Researchers have identified four stages of the disease. The first stage is marked by progressive insomnia and typically develops over approximately four months. It includes psychological disorders such as panic attacks and bizarre phobias. The second stage lasts about five months and is marked by hallucinations, agitation, and sweating. The third stage, lasting about three months, includes total insomnia and weight loss. At this point, the person appears to have aged significantly and may experience incontinence. The fourth stage lasts for about six months and is marked by neurocognitive disorder. The victim becomes mute and dies. There is no treatment for FFI.


Classroom Exercise/Student Project: Epworth Sleepiness Scale

Murray Johns (1991) of Epworth Hospital in Melbourne, Australia, designed the Epworth Sleepiness Scale, Handout 6, to assess respondents’ level of daytime sleepiness. The scale is widely used by sleep experts and health care providers in determining the need for treatment. Students simply add their responses to the items to obtain a total score. A score of 10 or more is considered “sleepy,” and 18 or more is “very sleepy.” If students score 10 or more, they should consider whether they are getting enough sleep, need to improve their sleep hygiene, and/or need to see a sleep specialist. The issue might also be discussed with their personal physician.


Lecture/Discussion Topic: What Are the Effects of Sleep Deprivation?

Jeremy Dean, psychological scientist and author of PsyBlog (spring.org.uk), identifies a number of negative effects of sleep deprivation (2014). Among these are impaired short-term and long-term memory, and poor attention and planning. With those in mind, staying up all night to study is a really bad idea.

Consider asking your students how many of them have ever “pulled an all-nighter.” How many have done so this term? Have they noticed any difference in their performance/behavior after an all-nighter? What kinds of changes have they noticed? Have they thought about what they can do to avoid having to pull all-nighters?
Dean also notes that when we are sleep-deprived, it is harder for us to recognize the effects of sleep deprivation. The sleep-deprived think they are functioning just fine when in fact they are not.

Dean also notes one more downside to sleep deprivation: car crashes. An Australian study found that while sleep deprivation increases the risk of car accidents for everybody, the risk is even greater for adolescents (Shute, 2013). The less experience one has with driving, the more brain power it takes to make good driving decisions. Sleep deprivation obviously negatively affects those decision-making skills.


Lecture/Discussion Topic: Sleep Deprivation and Technology

Begin by asking your students if, at night, they at least sometimes leave a smart phone or tablet on in their bedrooms. If you collect these data in advance, also ask how many hours they sleep on an average night. If your student data is like that from the National Sleep Foundation poll of parents (2014), you will see a relationship.

That survey found that 28 percent of the parents kept a turned-on smart phone or tablet beside their bed, and 35 percent of parents reported that their children did as well.

How long are the children sleeping? According to parents, children who have a tablet or smart phone that is on at least sometimes at night sleep 7.4 hours per night. Those children who don’t have a mobile device in their room or turn it off at night sleep 8.3 hours per night.

A Finnish study (Nuutinen, 2013) reports similar results for kids with TVs or computers in their bedrooms. The more time the kids spent with those devices, the less time they slept.

Researchers offer two possible explanations for mobile devices causing sleep loss. One is that the person awakens intermittently to answer or read incoming text messages, e-mail, or social media notifications. Another is the light emitted from those electronic devices (Sample, 2013). The light from most of our electronics appears to mimic sunlight, tricking the hypothalamus into thinking it is day. No problem when it actually is daytime, but when it is midnight and we are supposed to be asleep, there’s a problem.

Challenger your students to turn off their mobile devices at night. If your students don’t think they can do it every night, encourage them to make a few nights a week device-free. If you issue this challenge, bring it up again when you cover schedules of reinforcement. Perhaps your students could reward themselves for every five nights they keep their mobile devices off.


Sleep Disorders

Lecture/Discussion Topic: Narcolepsy

The National Institute of Neurological Disorders and Stroke provides an up-to-date narcolepsy fact sheet that covers everything from symptoms to treatment. See www.ninds.nih.gov/disorders/narcolepsy/detail_narcolepsy.htm.

Lecture/Discussion Topic: Sleep Apnea

The National Heart, Lung, and Blood Institute provides an up-to-date sleep apnea fact sheet that covers everything from symptoms to treatment. See www.nhlbi.nih.gov/health/topics/sleepapnea.

Dreams

Lecture/Discussion Topic: Dream Content

According to the continuity theory of dream content, what we spend our days thinking about, we spend our nights dreaming about. Students involved in sports spend more time dreaming about sports than do other students. Political science majors spend more time dreaming about politics than do other students (Kern, 2014).

Initial research suggests that White students at predominantly White colleges dream largely about White people. Black students at predominantly Black colleges dream largely about Black people. The researchers note that more than half their participants said they hadn’t paid much attention to the race of the people in their dreams before this study, so the results may be a reflection of the demands of the study (Hoekstra, et al., 2012).

What about when you start dating someone? Yes, they start showing up in dreams. After breaking up, the former love interest will disappear from dreams (Schredl & Reinhard, 2012).

Children diagnosed with ADHD tend to have dreams with more negative content, such as being the...
target of physical aggression (Schredl & Sartorius, 2010).

The dreams of Canadian soldiers who had served in Afghanistan, as compared to the dreams of civilians, contained more weapons, combat, aggression, and death. They were also, perhaps unsurprisingly, more emotionally intense (Dale, DeCicco, & Miller, 2013).

Ask your students for examples from their own lives. Students may report after spending hours studying psychology, they dream about psychology.


**Student Project: Dreaming and Problem Solving**

Can we solve problems in our dreams? Nobel Prize–winner Albert Szeht-Gyorgyi stated, “My work is not finished when I leave my workbench in the afternoon. I go on thinking about my problems all the time, and my brain must continue to think about them when I sleep because I wake up, sometimes in the middle of the night, with answers to questions that have been puzzling me.”

Ulrich Wagner and his colleagues (2004) found that research participants who had 8 hours of sleep after confronting a math problem were later much more likely to identify the hidden rule for solving the problem than were sleep-deprived participants. These findings seem consistent with biochemical studies of the brain that indicate memories are restructured before they are stored, perhaps in such a way that makes problems easier to solve. Many experts believe that this memory restructuring occurs during REM sleep. Participants may have been dreaming about the math problem.

The question, though, is whether the sleeping brain is actively working on the problem or if sleep is merely keeping interference at bay. Ut Na Sio and his colleagues (Sio, Monaghan, & Ormerod, 2013) have evidence that it is the former, that the sleeping brain is working on the problem, at least for difficult problems. The control group and the two experimental groups were individually given 12 problems to solve. After attempting to solve all of the problems, the control group was immediately given the missed problems again. One experimental group (“incubation” group) was given the problems at 9 A.M., and then the missed problems again at 9 P.M. (no napping permitted!). The other experimental group (“sleep” group) was given the problems on one day and then after a night of sleep given the missed problems again. The “sleep” group outperformed both the control group and the “incubation” group on the difficult problems, but not on the easy problems. The three groups did not differ on the easy problems.


**Drugs and Consciousness**

**Tolerance, Withdrawal, and Addiction**

*Lecture/Discussion Topic: Incentive-Sensitization Theory*

You can extend a discussion of addiction with a consideration of Terry Robinson and Kent Berridge’s (1993) *incentive-sensitization theory*, which suggests that liking and wanting a drug are two different things. After trying a drug, users may find the effects pleasurable. Because they like it, they seek it out. As tolerance develops and the items, people, and places associated with taking the drug become classically conditioned, drug use is no longer about the pleasure it produces. It is now about wanting the drug, craving the drug.


**Classroom Exercise: Drug Effects and the Nervous System**

The Biology of Mind unit in these resources includes a lecture designed to help students understand how drugs work and why they have the effects they do. If you did not use it then, you may want to do so now in line with your discussion of substance use disorders.
Classroom Exercise/Student Project: Signs of Drug Abuse

Handout 7 contains two brief surveys that can be used to introduce or conclude your class discussion of drug use. (Because of the sensitive nature of this material, and to provide complete anonymity, you may be wise to permit students to complete the surveys out of class.) The first survey comes from Toronto’s Center for Addiction and Mental Health and the second from the U.S. National Institute on Alcohol Abuse and Alcoholism. No specific norms are provided for the second questionnaire. However, if respondents obtain a total score of 8 or more on the AUDIT (Alcohol Use Disorders Identification Test), they may be abusing drugs or alcohol. (High scores on the AUDIT’s first three questions suggest hazardous alcohol use, elevated scores on items 4 through 6 imply the presence or emergence of alcohol use disorder, and high scores on the remaining items suggest harmful alcohol use.) You may want to provide the sources of help available in your community.

Lecture/Discussion Topic: Overcoming Addictions

In response to the notion that addiction can’t be overcome voluntarily and that therapy is a must, Stanton Peele effectively argues that such fatalistic thinking does not fit the facts. More people overcome addictions than fail, and the overwhelming majority do so without therapy. Quitting may take several tries, but eventually most succeed in shaking an addiction.

Peele cites the National Longitudinal Alcohol Epidemiologic Survey conducted by the U.S. National Institute on Alcohol Abuse and Alcoholism. In one of the largest surveys of substance abuse ever, the researchers interviewed more than 42,000 Americans about their lifetime drug and alcohol use. Of the more than 4500 respondents who had ever abused alcohol, only 27 percent had sought treatment of any kind, including Alcoholics Anonymous (AA). In this group, one-third were still abusing alcohol. Of those who never had any treatment, only about one-quarter were currently diagnosable as alcohol abusers. From these results, Peele concludes that treatment is neither a cure-all nor is it really necessary. The vast majority of Americans who abused alcohol never underwent treatment, and fewer of them were abusing alcohol than were those who were treated.

Most people quit addictions on their own. They succeed when they realize that their addiction (1) interferes with something they value and (2) when they develop the confidence that they can change. In short, successful treatment places the responsibility for change squarely on the individual and recognizes that positive events in other realms may jump-start the change.

Self-help manuals are highly successful. So is the “community-reinforcement” approach, which addresses the person’s capacity to deal with marital relationships, work issues (as simple as getting a job), leisure planning, and social-group formation (a support person might be provided, as AA does, to encourage sobriety). This approach focuses on developing life skills such as resisting pressure to drink, coping with stress, and building communication skills.

Peele identifies the following principles of change:

1. The belief that one can change is the key to change. It fosters a commitment to the process and increases the probability of success.
2. The type of treatment is not as important as the individual’s own commitment to change. People can select how they want to pursue change in line with their own values and preferences. They need not be told how to change.
3. Brief treatment can change long-standing habits. What is important is not the length of treatment but rather its focus on inspiring continued efforts in that direction.
4. Life skills can be the key to overcoming addiction. The community reinforcement approach emphasizes the development of such skills.
5. Repeated efforts are essential to change. People typically do not get better overnight. It usually takes multiple efforts.
6. Improvement without abstinence counts. All movement in the right direction should be accepted and rewarded. It is counterproductive to dismiss people from therapy for failing to abstain. Recognizing improvement in the absence of abstinence is termed harm avoidance.


Psychoactive Drugs

PsychSim 6: Your Mind on Drugs

This activity describes the basic types of psychoactive drugs and the neural mechanisms of drug action. The student explores the behavioral effects of some common drugs that influence the brain, producing changes in arousal level, mood, perception of the environment, and actions.

Lecture/Discussion Topic: Mouse Party

The web-based program Mouse Party (learn.genetics.utah.edu/content/addiction/mouse), created by University of Utah’s Genetics Science Learning Center, lets you and your students explore the workings of six different drugs: heroin, marijuana, cocaine, alcohol, ecstasy, and LSD. Click and drag one of the
animated drugged mice into the chair to see how that drug works at the synapses and the brain structures that are affected.

You may choose to show one or two drugs during lecture and then assign students to review the remaining drugs on their own.

Classroom Exercise/Student Project: Drug Awareness
Kerri A. Goodwin suggests a helpful small-group exercise to promote active learning and open discussion of controversial issues surrounding drug use.

Divide your class into small groups of four to six students each. Assign to each group a specific drug (you can select from those identified in the text or the many others not covered) and a specific discussion question (for example, for Adderall, ask, “Is it OK to use Adderall casually, especially around exam time?”) Give your groups a week to develop PowerPoint presentations that include descriptions of the class of drug substance, its neurological effects, its behavioral effects, and its potential for abuse. Give each group 15 minutes to make their presentation to the full class and to facilitate discussion as time allows.

Goodwin reports that the active learning technique of group presentations generates high interest, raises awareness, and, importantly, allows students to make more informed decisions about drug use without glorification of drug use. The strategy is clearly more engaging than hearing lectures about the drugs or simply reading the text.


Lecture/Discussion Topic: Alcohol Consumption in the United States
The U.S. National Survey on Drug Use and Health, conducted annually since 1971, involves interviews with more than 67,000 randomly selected people 12 years and older in respondents’ homes. For most of the interview, the participant works alone on a computer, making the responses anonymous.

Share with students some of the alcohol-related highlights of the 2012 survey. You may choose to ask students to guess the results before sharing the percentages.

- 52.1% drink alcohol (45.8% of 18- to 20-year-olds; 69.2% of 21- to 25-year-olds).
- 56.5% of males drink alcohol (62.9% of 18- to 25-year-olds).
- 47.9% of females drink alcohol (57.5% of 18- to 25-year-olds).
- 23% binge drank (5 or more drinks in one outing) in the past month (39.5% of 18- to 25-year-olds).
- 11.2% drove while intoxicated in the last year
- 18.4% of 18- to 25-year-olds drove while intoxicated in the last year (down from 26.6% in 2002).

The survey also compared full-time college students with nonstudents of the same age:

<table>
<thead>
<tr>
<th></th>
<th>Full-time college students aged 18—22</th>
<th>Everyone else aged 18—22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current drinking</td>
<td>60.3%</td>
<td>51.9%</td>
</tr>
<tr>
<td>Binge drinking</td>
<td>40.1%</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>(44.4% in 2002)</td>
<td>(38.9% in 2002)</td>
</tr>
<tr>
<td>Heavy drinking</td>
<td>14.4%</td>
<td>10.7%</td>
</tr>
</tbody>
</table>

See the summary report for more data, including percentages by race and geographical location.


Lecture/Discussion Topic: Caffeine—Is It Harmful?
Caffeine is perhaps the most popular, as well as one of the most ancient, drugs. Nearly everyone ingests this drug every day in the form of coffee, tea, cocoa, soft drinks, or headache remedies. The drug occurs naturally in more than 60 plants and trees that have been cultivated by humans since the beginning of recorded history.

Caffeine is one of the methylxanthines that stimulate certain neurotransmitters in the central nervous system. It can temporarily increase heart rate, metabolism, and stomach-acid secretion. In addition, it dilates some blood vessels and constricts others, it wards off drowsiness, and it increases alertness. Research has indicated that caffeine shortens reaction time but has little effect on verbal fluency, numerical reasoning, or short-term memory. Although some researchers have claimed that caffeine may enhance an athlete’s endurance, evidence is inconclusive. However, caffeine can produce trembling, chronic muscle tension, throbbing headaches, depression, and insomnia, depending on weight, physical condition, and the amount consumed.

Many of the inconsistencies in the literature on the effects of caffeine may be explained by a failure to distinguish between habitual caffeine consumers and the volunteer who only ingests large doses over the course of an experiment. A dose of 250 milligrams (about two cups of brewed coffee), for example, may have no effect on a regular coffee drinker but may temporarily...
raise the blood pressure, heart rate, blood glucose concentration, and cholesterol level of a nonuser.

Does caffeine have lasting adverse effects on a person’s health? At one time or another, caffeine has been accused of causing pancreatic cancer, heart disease, high blood pressure, high blood cholesterol levels, and birth defects. A review of the literature concludes that a healthy adult can continue to enjoy coffee or tea with very little negative effect.

Scientists believe that an average of 400 mg of caffeine a day is the safest dose. That’s about 24 ounces of coffee or 40 ounces of Red Bull. Caffeine, in high enough doses—approximately 10 grams—becomes toxic (BrainFacts.org, 2014). Indeed, caffeine can kill. Logan Stiner, 18, died in May 2014, from ingesting a lethal amount of caffeine powder. His autopsy found 70 micrograms of caffeine per milliliter of blood (Murdock, 2014). The coroner says that energy drinks have 3 to 15 micrograms of caffeine, and 50 micrograms is considered a lethal amount (“Eighteen-year-old Logan Stiner dies from taking too much caffeine powder,” 2014). Caution students that these are rough guidelines. The amount of caffeine in beverages such as coffee vary widely (Carpenter, 2014). And what is a safe amount of caffeine for one person can be toxic in someone else.


**Influences on Drug Use**

**Student Project: Debates on Drugs and Society**

To foster students’ critical thinking about drug use and misuse, have them prepare classroom debates individually or in small groups. Raymond Goldberg’s *Taking Sides: Clashing Views in Drugs and Society* provides a wonderful resource for getting them started. The book considers 19 issues that are debated by leading social scientists and health care professionals. For each issue, Goldberg provides a concise introduction and postscript summary. Among the issues raised are the following: Are drinking-age laws effective? Should laws prohibiting marijuana use be relaxed? Is alcohol dependence hereditary? Should schools drug-test students? and Does drug abuse treatment work?


**Lecture/Discussion Topic: Factors in Drug Abuse and Addiction**

The text identifies a number of biological, psychological, and social-cultural factors that influence drug use. The National Institute on Drug Abuse (2014) provides a brief summary of the key environmental and biological factors that increase the likelihood of drug abuse and addiction.

**Environmental:**

- Parents/older family members engaging in alcohol or drug abuse increase the risk for the children in the family.
- Peers can convince nondrug users to try drugs for the first time.
- Poor academic and social skills are associated with drug use.

**Biological:**

- Genetics make some people more vulnerable to addiction.
- Psychological disorders may prompt some people to “self-medicate” with illegal drugs.
- Stage of development, particularly adolescence, plays a role. The earlier one starts abusing drugs, the greater the likelihood it will become a problem. Adolescents are particularly vulnerable because their not-yet-fully-developed frontal lobes sometimes leads to poor decision-making.
- Drugs that are inhaled or injected, because they hit the brain faster and more powerfully, are more likely to lead to addiction.

Challenge students to consider ways to reduce these factors in their families or communities. You can expand this into a student project by having students look at drug abuse prevention programs in their communities. How are these programs addressing these risk factors?

Lecture/Discussion Topic: Treating Alcohol Use Disorder

A U.S. national survey conducted in 2001–2002 found that only 14 percent of those who abuse alcohol received treatment. When most people think of treatment for alcohol abuse, they think of Alcoholics Anonymous (AA). This is only one treatment option among many.

The National Institute on Alcohol Abuse and Alcoholism (2011) concisely summarizes the current treatment options as outlined in a special 2011 edition of the journal *Alcohol Research and Health*.

1. **Medications:** Antabuse, Vivitrol, and Campral are all approved for treatment of alcohol use disorder by the U.S. Federal Drug Administration (FDA). For long-term recovery, medications are effective when combined with behavioral therapies.

2. **Behavioral therapies:** Any approach that focuses on behavioral change falls under this category: Goal setting, developing new coping skills, couples/family therapy that addresses communication and problem-solving in relationships, and brief interventions such as those that can be provided by a primary care physician. The common elements in effective behavioral therapy are social support, developing goals and the means to reach those goals, modeling/rewarding behavior, and strengthening coping skills.

3. **Screening:** A primary care physician asking about alcohol use during a routine office visit provides an opportunity to address any alcohol abuse issues that may be present or developing.

4. **Mutual-help groups (MHGs):** AA is the largest self-help group, but it is certainly not the only one. Anonymous, free, and convenient meeting times and locations make MHGs popular. The social support from MHGs, combined with behavioral therapy, makes for an especially effective treatment.

5. **Emerging technologies:** Web-based screening, behavioral change mobile phone apps, and continuous access to social support are new options that come with Internet access.

Below is a collection of statements about your everyday experience. Using the 1–6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Almost</td>
<td>Very</td>
<td>Somewhat</td>
<td>Somewhat</td>
<td>Very</td>
<td>Almost</td>
</tr>
<tr>
<td></td>
<td>Always</td>
<td>Frequently</td>
<td>Frequently</td>
<td>Infrequently</td>
<td>Infrequently</td>
<td>Never</td>
</tr>
</tbody>
</table>

___ 1. I could be experiencing some emotion and not be conscious of it until some time later.
___ 2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
___ 3. I find it difficult to stay focused on what’s happening in the present.
___ 4. I tend to walk quickly to get where I’m going without paying attention to what I experience along the way.
___ 5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
___ 6. I forget a person’s name almost as soon as I’ve been told it for the first time.
___ 7. It seems I am “running on automatic,” without much awareness of what I’m doing.
___ 8. I rush through activities without being really attentive to them.
___ 9. I get so focused on the goal I want to achieve that I lose touch with what I’m doing right now to get there.
___ 10. I do jobs or tasks automatically, without being aware of what I’m doing.
___ 11. I find myself listening to someone with one ear, doing something else at the same time.
___ 12. I drive places on ‘automatic pilot’ and then wonder why I went there.
___ 13. I find myself preoccupied with the future or the past.
___ 15. I snack without being aware that I’m eating.

HANDOUT 2

Driving Behavior Observational Study

After you have completed your observations, answer the following questions.

1. What intersection did you and your partner choose? Why?

2. Was the task easier, more difficult, or the same as you expected? Explain.

3. What did the data tell you about drivers at this intersection?

4. If you were to do this same study again, what would you do differently? What would you keep the same? Explain.

5. After having completed this study, what additional research questions do you have about distracted driving that could be researched with another observational research study?

Additional comments:
The National Sleep Foundation's Sleep IQ Test

Answer true or false to each of the following statements:

1. During sleep, your brain rests.  
2. Sleeping just one hour less a night can prevent you from learning or functioning normally.  
3. Boredom makes you feel sleepy, even if you have had enough sleep.  
4. Resting in bed with your eyes closed cannot satisfy your body’s need for sleep.  
5. Snoring is not harmful as long as it doesn’t disturb others.  
6. Everyone dreams every night.  
7. The older you get, the fewer hours of sleep you need.  
8. No matter how sleepy you are, you can force yourself to stay awake.  
9. If you’re sleepy, raising the volume of your radio is a great way to stay awake while driving.  
10. Sleep disorders are mainly due to worry or psychological problems.  
11. The human body never adjusts to night shift work.  
12. Most sleep disorders go away, even without treatment.

Source: The National Sleep Foundation’s Sleep IQ Test. For further information see www.sleepfoundation.org. National Sleep Foundation Online by National Sleep Foundation. Reproduced with permission of National Sleep Foundation permission conveyed via Copyright Clearance Center.
HANDOUT 4

Sleep Diary

Date ________________

Complete after awakening:
Time you went to bed ________________
Time you fell asleep ________________
Time you woke up ________________
Number of times awakened during the night ________________
Amount of time awake during the night ________________

Total Nighttime Sleep ________________

Comments on quality of night’s sleep:

__________________________________________________________

Did you feel groggy after getting up in the morning? Yes _____ No _____

If yes, for how long? ________________

Complete at the end of the day:

Naps:
Time fell asleep ________________
Time awoke ________________

Total Nap Time ________________

Comments on quality of naps:

__________________________________________________________

Using the Stanford Sleepiness scale below, note your alertness during the day.

| Feeling active, vital, alert, wide awake | 6 AM | 4 PM |
| Functioning at a high level, not at peak | 8 AM | 6 PM |
| Relaxed, not full alertness, responsive | 10 AM | 8 PM |
| A little foggy, not at peak, let down | NOON | 10 PM |
| Fogginess, losing interest, slowed down | 2 PM | MDNT |
| Sleepiness, prefer to be lying down | | |
| Almost in a reverie, hard to stay awake | | |

How was your overall sleepiness/alertness today (1–7)? ________________

Other comments on mental and physical:

__________________________________________________________

Source: Excerpt(s) from THE PROMISE OF SLEEP: A PIONEER IN SLEEP MEDICINE EXPLAINS THE VITAL CONNECTION BETWEEN HEALTH, HAPPINESS, AND A GOOD NIGHT’S SLEEP by William C. Dement, copyright © 1999 by William C. Dement. Used by permission of Dell Publishing, an imprint of Random House, a division of Penguin Random House LLC. All rights reserved.
HANDOUT 5

Am I Sleep Deprived?

Respond to each of the following items by circling “T” for true or “F” for false.

1. I need an alarm clock in order to wake up at the appropriate time. T F
2. It’s a struggle for me to get out of bed in the morning. T F
3. Weekday mornings I hit the snooze button several times to get more sleep. T F
4. I feel tired, irritable, and stressed-out during the week. T F
5. I have trouble concentrating and remembering. T F
6. I feel slow with critical thinking, problem solving, and being creative. T F
7. I often fall asleep watching TV. T F
8. I often fall asleep in boring meetings or lectures or in warm rooms. T F
9. I often fall asleep after heavy meals or after a low dose of alcohol. T F
10. I often fall asleep while relaxing after dinner. T F
11. I often fall asleep within five minutes of getting into bed. T F
12. I often feel drowsy while driving. T F
13. I often sleep extra hours on weekend mornings. T F
14. I often need a nap to get through the day. T F
15. I have dark circles around my eyes. T F

Source: Reprinted with permission from Dr. James Maas, Cornell University.
**Epworth Sleepiness Scale**

The Epworth Sleepiness Scale is used to determine your level of daytime sleepiness. Use the following scale to choose the most appropriate number for each situation:

0 = would never doze or sleep  
1 = slight chance of dozing or sleeping  
2 = moderate chance of dozing or sleeping  
3 = high chance of dozing or sleeping

<table>
<thead>
<tr>
<th>Situation</th>
<th>Chance of Dozing or Sleeping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td></td>
</tr>
<tr>
<td>Sitting inactive in a public place</td>
<td></td>
</tr>
<tr>
<td>Being a passenger in a motor vehicle for an hour or more</td>
<td></td>
</tr>
<tr>
<td>Lying down in the afternoon</td>
<td></td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td></td>
</tr>
<tr>
<td>Sitting quietly after lunch (no alcohol)</td>
<td></td>
</tr>
<tr>
<td>Stopped for a few minutes in traffic while driving</td>
<td></td>
</tr>
<tr>
<td>Total score (add the numbers)</td>
<td></td>
</tr>
</tbody>
</table>

Drug Abuse Screening Test, DAST-10

The following questions concern information about your possible involvement with drugs not including alcoholic beverages during the past 12 months.

“Drug abuse” refers to (1) the use of prescribed or over-the-counter drugs in excess of the directions, and (2) any nonmedical use of drugs.

The various classes of drugs may include cannabis (marijuana, hashish), solvents (e.g., paint thinner), tranquilizers (e.g., Valium), barbiturates, cocaine, stimulants (e.g., speed), hallucinogens (e.g., LSD) or narcotics (e.g., heroin). Remember that the questions do not include alcoholic beverages.

Please answer every question. If you have difficulty with a statement, then choose the response that is mostly right. Circle Yes or No. In the past 12 months…

1. Have you used drugs other than those required for medical reasons?
2. Do you abuse more than one drug at a time?
3. Are you unable to stop abusing drugs when you want to?
4. Have you ever had blackouts or flashbacks as a result of drug use?
5. Do you ever feel bad or guilty about your drug use?
6. Does your spouse (or parents) ever complain about your involvement with drugs?
7. Have you neglected your family because of your use of drugs?
8. Have you engaged in illegal activities in order to obtain drugs?
9. Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?
10. Have you had medical problems as a result of your drug use (e.g. memory loss, hepatitis, convulsions, bleeding)?

Scoring: Score 1 point for each question answered “Yes,” except for question 3 for which a “No” receives 1 point.

Score: ______________

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HANDOUT 7 (continued)
The AUDIT Questionnaire

Circle the appropriate answer to the left of each question.

1. How often do you have a drink containing alcohol?
   (0) Never
   (1) Monthly or less
   (2) Two to four times a month
   (3) Two to three times a week
   (4) Four or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?
   (0) 1 or 2
   (1) 3 or 4
   (2) 5 or 6
   (3) 7 to 9
   (4) 10 or more

3. How often do you have six or more drinks on one occasion?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of drinking?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily
7. How often during the last year have you had a feeling of guilt or remorse after drinking?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?
   (0) Never
   (1) Less than monthly
   (2) Monthly
   (3) Weekly
   (4) Daily or almost daily

9. Have you or someone else been injured as a result of your drinking?
   (0) No
   (2) Yes, but not in the last year
   (4) Yes, during the last year

10. Has a relative, friend, doctor, or other health worker been concerned about your drinking or suggested that you should cut down?
    (0) No
    (2) Yes, but not in the last year
    (4) Yes, during the last year

Source: U.S. Department of Health and Human Services, National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism.