MODULE 8

Sleep and Dreams

Module Preview

Our daily schedule of waking and sleeping is governed by a biological clock known as circadian rhythm. Our sleep also follows a repeating cycle. Awakening people during REM sleep yields predictable "dreamlike" reports that are mostly of ordinary events. Freud's view that dreams can be traced back to erotic wishes is giving way to newer theories, for example, that dreams help us process information and fix it in memory or that dreams erupt from neural activity.

Module Guide

Biological Rhythms and Sleep

- ➤ Lectures: Afternoon Naps; The Neural Basis of Biological Rhythms
- ➤ Exercises: The Sleep and Dream Information Questionnaire-Revised; The Sleep IQ Test; Larks or Owls?
- ➤ Videos: Module 13 of *The Brain* series, 2nd ed.: *Sleep and Circadian Rhythms;* Module 9 of *Psychology: The Human Experience: Circadian Rhythms;* Segments 13 and 15 of the Scientific American *Frontiers* series, 2nd ed.: *Catching Catnaps* and *Can You Beat Jet Lag?*

8-1. *Describe the cycle of our circadian rhythm, and identify some events that can disrupt this biological clock.*

Our daily schedule of waking and sleeping is governed by a biological clock known as ***circadian rhythm***. Our body temperature rises as morning approaches, peaks during the day, dips for a time in early afternoon, and then begins to drop again before we go to sleep. Thinking is sharpest and memory most accurate when people are at their peak in circadian arousal.

This cycle is in part a response to light striking the retina, signaling the *suprachiasmatic nucleus* in the hypothalamus to trigger alterations in the level of biochemical substances, including decreased output of sleep-inducing *melatonin* by the pineal gland. The cycle lasts about 24 hours, but it can be disrupted by bright light, time changes, and alterations in our sleep schedule (such as staying up late and sleeping in on weekends).

- ➤ Projects: Keeping a Sleep Diary; Catching the Hypnagogic State
- ➤ PsychSim 5: EEG and Sleep Stages
- ➤ Videos: Modules 14 and 15 of *The Brain* series, 2nd ed.: *Sleep: Brain Functions* and *REM Sleep and Dreaming*

8-2. *List the stages of the sleep cycle, and explain how they differ.*

We pass through a cycle of five sleep stages that total about 90 minutes. As we lie awake and relaxed, before we ***sleep,*** our EEG shows relatively slow ***alpha waves.*** Stage 1 sleep is characterized by fantastic images resembling ***hallucinations*** (*hypnagogic sensations*). Stage 2 sleep (the

stage in which we spend the most time) follows about 20 minutes later, with its characteristic *sleep spindles.* Starting in Stage 3 and increasingly in Stage 4, the brain emits large, slow ***delta waves***. These two slow-wave sleep stages last for about 30 minutes, during which we are hard to awaken. Reversing course, we retrace our path through these stages with one difference. About an hour after falling asleep, we begin approximately 10 minutes of ***REM*** (rapid eye movement) ***sleep*** in which most dreaming occurs. In this fifth stage (also known as *paradoxical sleep*), we are internally aroused but outwardly paralyzed. The sleep cycle repeats several times during a normal night's sleep, with periods of Stage 4 sleep progressively shortening and periods of REM sleep lengthening.

Why Do We sleep?

- ➤ Exercise: Am I Sleep Deprived?
- ➤ Exercise/Project: Epworth Sleepiness Scale
- ➤ Lectures: How Long Can Humans Stay Awake?; Sleep and Memory
- ➤ Instructor Video Tool Kit: *Sleep and Sleepiness; The Effects of Sleep Deprivation: Three Brave Souls*

8-3. *Describe individual differences in sleep duration and the effects of sleep loss, noting five reasons that we need sleep.*

People differ in their individual sleep requirements. For example, newborns sleep twice as much as adults. These age-related changes are rivaled by differences in the normal amount of sleep among individuals of any age. Twin studies suggest that these differences may be partially genetic. Sleep patterns are also culturally influenced. People in modern industrialized nations get less sleep because of shift work and social diversions, for example.

People today suffer from sleep patterns that thwart their having an energized feeling of well-being. Findings suggest that sleep deprivation puts people at risk for a depressed immune system; impaired concentration, creativity, and communication; irritability; and slowed performance with greater vulnerability to accidents. Chronic sleep deprivation can also alter metabolic and hormonal function, creating conditions that may contribute to obesity, hypertension, and memory impairment.

The first explanation of why we sleep is that sleep may have played a protective role in human evolution by keeping people safe during potentially dangerous times. A second idea is that sleep may help us recuperate, restoring and repairing brain tissue. A third explanation is that sleep restores and rebuilds our fading memories of the day's experiences. People trained to perform tasks recall them better even after a short nap. A fourth possible reason why we sleep is that sleep feeds creative thinking. After working on a task, then sleeping on it, people solve problems more insightfully than do those who stay awake. Finally, sleep may play a role in the growth process. During deep sleep, the pituitary gland releases a growth hormone.

Sleep Disorders

- ➤ Exercise: Sleep Strategies
- ➤ Instructor Video Tool Kit: *Sleep Terror Disorder*
- ➤ Lectures: Sleep Disorders; Treating Insomnia
- ➤ ActivePsych: *Digital Media Archive,* 2nd ed.: *Narcoleptic Dogs*

8-4. *Identify the major sleep disorders.*

One in 10 adults, and 1 in 4 older adults, complain of ***insomnia***—problems in falling or staying asleep. Rarer but more severe than insomnia are the sleep disorders ***narcolepsy*** and ***sleep apnea***. People with narcolepsy suffer periodic, overwhelming sleepiness, sometimes at the most inopportune times. The person sometimes collapses directly into a brief period of REM sleep. Those who suffer sleep apnea (mostly overweight men) intermittently stop breathing during sleep. After an airless minute or so, decreased blood oxygen arouses the sleeper to snort in air for a few seconds.

Still other sleepers, mostly children, experience ***night terrors.*** They sit up or walk around, talk incoherently, experience a doubling of heart and breathing rates, and appear terrified. Children also are most prone to *sleepwalking*.

Dreams

➤ Projects: Remembering Daydreams; Remembering Night Dreams; Dreaming and Problem Solving
➤ Video: Segment 14 of the Scientific American *Frontiers* series, 2nd ed.: *What's in a Dream?*

8-5. *Describe the most common content of dreams, and compare the five major perspectives on why we dream.*

Our ***dreams*** are mostly of ordinary events; they often relate to everyday experiences and more frequently involve anxiety or misfortune than triumphant achievement. The story line of our dreams—what Sigmund Freud called their ***manifest content***—sometimes incorporates traces of previous days' experiences and preoccupations. Only 1 in 10 dreams among young men and 1 in 30 among young women have sexual overtones. The sensory stimuli of our environment may also intrude on our dreams.

Freud believed that a dream's manifest content is a censored version of its ***latent content,*** which gratifies our unconscious wishes. The *information-processing* perspective suggests that dreams help us process information and fix it in memory. Some physiological theories propose that REM-induced regular brain stimulation helps develop and preserve neural pathways in the brain. The *activation-synthesis* explanation is that REM sleep triggers impulses in brain areas that process visual images, but not the visual cortex area, evoking visual images that our brain weaves into a story line. The brain-maturation/cognitive development perspective maintains that dreams represent the dreamer's level of development, knowledge, and understanding. Despite their differences, most theorists agree that REM sleep and its associated dreams serve an important function, as shown by the ***REM rebound*** that occurs following REM deprivation.