

# MODULE IV

## CONSCIOUSNESS

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Biological rhythms: circadian rhythms, Long term biological rhythms; individual differences in circadian rhythms – waking states of consciousness: controlled and automatic processing, self awareness – Sleep: basic facts – functions of sleep. Dreams: basic facts, psychodynamic, physiological and cognitive views – altered states of consciousness: hypnosis, Meditation – Consciousness altering drugs.

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Consciousness is an old term in psychology, dating to the very beginnings of experimental psychology, a little more than a century ago. At that time, psychology was defined as the study of consciousness, not as the study of behavior. However, with the emergence of behaviorism, the study of consciousness was abandoned as being too mentalistic. The term disappeared from mainstream psychology for many years, but in the last part of this century, it has made a comeback, largely due to the growth of the cognitive approach in contemporary psychology.

Initially, those who studied consciousness investigated the process of perception, emotion and thinking, all normal activities in an awake individual. These processes are still considered part of consciousness. Yet in today's usage, the term consciousness includes not only the various waking states, but also altered states of consciousness such as sleep, dreaming, drug induced states, hypnosis and mediation. Thus, we can think of consciousness as the state of awareness of our world and ourselves. In an altered state of consciousness, awareness has been changed in some way from normal waking consciousness.

### Biological Rhythms

It means the regular fluctuations in our bodily processes (and therefore in consciousness) over time. Many of these fluctuations occur over the course of a single day and are known as *circadian rhythms*. A cycle of wakefulness and sleep is normally 24 hours. A circadian rhythm is a cycle that is connected with the 24 hour

period of the earth's rotation. The circadian rhythm includes endocrine activity, metabolic functions, and body temperature.

Circadian rhythms can exert important effects on us in many respects. When other biological rhythm takes place within shorter periods of time, they are known as ultradian rhythms. For example, many people become hungry every two or three hours. And during sleep, periods of dreaming seem to occur at roughly 90 minute intervals. Finally, some biological rhythms occur over longer periods, such the menstrual cycle experienced by women, which spans approximately twenty-eight days. Such rhythms often have a relationship of states of consciousness.

### **Nature of circadian rhythms**

Most people are aware of fluctuations in their alertness, energy, and moods over the course of a day. Such circadian shifts reflect actual change in underlying bodily states. Many bodily processes show daily cyclical changes. It has been found that the production of various hormones fluctuates across the day; their levels are high at some points in time but much lower at others. Similarly, for many persons, core body temperature, blood pressure, and several other processes are highest in the late afternoon or evening, and lowest in the early hours of the morning.

These cyclic fluctuations in basic bodily functions are reflected in performance on many tasks. Tasks requiring physical activity are performed best at times, when body temperature and other processes are at or near their peaks. The same is true for simple cognitive (mental) tasks. However, as the complexity of cognitive tasks increases, the closeness of the link between them and circadian rhythms seem to weaken.

The fluctuations in the circadian rhythms are due to some internal biological mechanism within the body. In other words, we must possess a biological clock that times various circadian rhythms. Scientists believe that it is located in a portion of the hypothalamus – specifically in the suprachiasmatic nucleus. This nucleus responds to visual input from the eyes and either stimulates or inhibits activity in the pineal gland.

This gland secretes melatonin, a hormone. Melatonin exerts a sedative effect, reducing activity and increasing fatigue.

Exposure to day light stimulates the suprachiasmatic nucleus, and this in turn reduces the secretion of melatonin. In contrast, darkness enhances it. Thus if you spent all of your time in a dimly lit environment, your biological clock would respond as if you were living in night. Melatonin secretion would be increased, and you would probably feel quite tired most of the time. Perhaps this is one reason why many people report depression, a seasonal affective disorder. Experience during the winter months, supposedly stemming from a lack of exposure to sunlight.

### **Individual differences in circadian rhythms**

There are individual differences in circadian rhythms. Some people are larks i.e., they are more alert and energetic during day times and some others are owls i.e., they are more alert and energetic during night times. In addition, morning people are seem to be most susceptible to hypnosis in the morning and early afternoon, while night people are most susceptible to hypnosis in the afternoon and evening.

### **Disturbances in circadian rhythms**

Under normal conditions, the existence of circadian rhythms creates no special problems. Most people are aware of their personal highs and lows and try to schedule their activities accordingly. Unfortunately, though, there are circumstances under which circadian rhythms may get badly out of phase with our daily activities.

The first of these situations occurs as a result of modern travel especially by jet plane. When individuals cross several time zones, they often experience considerable difficulty in adjusting to their new location. The reason is that their internal biological clocks are calling for one level or type of activity, while the external world is calling strongly for another one.

A second cause of difficulties with respect to circadian rhythms is shift work. Here individuals must work at times when they would normally be sleeping (say

midnight to 8 am). Shift workers who must constantly reset their biological clocks suffer even stronger effects, such as high levels of fatigue, and serious sleep disorders. In addition, they may suffer from increased rates of heart disease and ulcers; increased rates of automobile and industrial accidents; and increased use of alcohol, sleeping pills and other drugs, relative to non shift workers.

## **WAKING STATES OF CONSCIOUSNESS**

Fluctuations are normal part of life because during our waking hours, we shift frequently between contrasting states of consciousness. For example, while teaching many students of the class are paying attention to what the teacher says, others are lost in their own thoughts, day dreaming, planning dinner, and so on. After a while they may tune in again on what the teacher is saying but then may shift back into some other states of consciousness.

### **I. Controlled and Automatic Processing: *The limits of Attention***

Our attentional or information processing capacities are quite limited. We do not have the ability focus on several different stimuli or events at once. Rather, we shift back and forth between events that we wish to make the centre of our current attention. For example, we comb our hair while thinking about the days coming events. This ability involves the fact that there are two contrasting ways of controlling ongoing activities – different levels of attention to, or conscious control over, our own behavior.

The first level is the ‘automatic pilot’. Psychologists call this automatic processing because it involves the performance of activities with relatively little conscious awareness. Such processing seems to make little demand on our attentional capacity. Thus, several activities each under automatic control can occur at the same time. You are demonstrating automatic processing when you drive your car and listen to the radio at the same time. Automatic processing with respect to a given activity tends to develop with practice.

In contrast, controlled processing involves more effortful and conscious control behavior. While it is occurring, you direct careful attention to the task at hand and concentrate on it. Obviously processing of this type does consume significant attentional capacity. As a result, only one task requiring controlled processing can usually be performed at a time.

## **II. Daydreams and Fantasies: *Self-induced shifts in consciousness***

Most of us have day dreams, imaginary scenes or events that occur while a person is awake. For many people, such experiences can keep us away from the external world at least temporarily. The content may be success or failure, aggression or hostility, sexual or romantic fantasies, guilt or problem solving.

While a majority of persons report daydreaming at least occasionally, large individual differences exist with respect to this activity. First, people differ greatly in the frequency with which they day dream or fantasize. While some report spending up to half their free time in this activity, others indicate that they rarely have fantasies or day dreams. Second, the intensity of such experiences also varies greatly. Some persons report that their fantasies and day dreams are so vivid and life like that they are almost real and even become confused with reality. In such experiences are not readily controlled by the persons who have them, they may be said to border on being hallucinations – vivid perceptual experiences that occurs in the absence of an external stimulus.

If people spend a considerable amount of time engaging in day dreams and fantasies changing their own consciousness, then these activities must serve some useful function. First, day dreams and fantasies may serve as a kind of safety valve, permitting persons to escape, however briefly from the stresses and boredom of everyday life. Second, they often provide us with a ready means of altering our own moods, primarily in a positive direction. Third, they help people to find solutions to actual problems in their lives.

Finally, fantasies may play an important role in the self-regulation of behavior. By imagining negative outcomes people may strengthen their inhibitions against dangerous or prohibited behaviors. Similarly, by dreaming about potential rewards, people may enhance their own motivation and performance.

### ***III. Self consciousness: Some effects of look inward***

Self consciousness is the increased awareness of oneself as a social object or of one's own values and attitudes.

According to the control theory of self consciousness (Carver and Scheier, 1990), people compare their current behavior and states with important goals and values. Then they alter their behavior to close any gaps they observe. In this sense, self consciousness is an important component in the self regulation of our behavior.

Scheier and Carver and many other psychologists distinguish between two forms of self consciousness: private self consciousness and public self consciousness. Private self consciousness is our tendency to reflect on private aspects of the self i.e., our feelings, attitudes and values. In contrast, public self-consciousness is our tendency to think about aspects of the self that are presented to others i.e., how we appear in other's eyes.

Many other factors may also cause to enter this state of consciousness. One of these is the personal tendency or disposition to become self consciousness. Some persons spend more time thinking about themselves – their feeling and reactions, the kind of impression they are making on strangers – than others.

Another factor that influences self consciousness is the familiarity of a given situation. In general, the more familiar and comfortable with a situation people are, the greater their tendency to think about themselves while in it, and so the greater their self consciousness.

A third factor that strongly influences self-consciousness is our current mood. Persons experiencing happy or sad moods are more likely to focus their attention inward than are persons in a neutral mood.

### **The effects of self consciousness: Reduced performance but increased self insight**

Research suggests a mixed effect of self consciousness. One negative side is a phenomenon known as choking under pressure. According to this phenomenon, sometimes people do worse when confronted with strong pressures to perform than on other occasions. For example, athletes who do very well in practice when pressure is low may choke up during important games. Heightened self-consciousness such as that induced by a huge audience of cheering fans leads to low performance.

There are also potential benefits from entering a state of increased self-consciousness. In particular, it appears that doing so can sometimes increase our self insight.

## **ALTERED STATES OF CONSCIOUSNESS**

### **HYPNOSIS**

Hypnosis is state in which the subject displays heightened suggestibility and distortions of perception or memory. The induction of hypnosis involves two major elements: deep relaxation and imagery. Deep relaxation is achieved by directly suggesting that the participant relax, by describing relaxing imagery or by using both techniques together.

### **Theories of Hypnosis**

According to neodissociation theory of Hilgard, hypnosis causes the subject to focus his attention selectively on one thing, typically the hypnotist's suggestions. Other stimuli are still processed subconsciously, but the conscious and subconscious are dissociated or separated.

In an alternative theory, Martin Orne hypothesizes that hypnosis is primarily a matter of role playing. The subject knows that a hypnotized person is supposed to lose consciousness, appear to be in a trance, lose inhibitions, and follow the instructions of the hypnotist.

A third theory is offered by Theodore X. Barber who proposes that hypnosis is the result of suggestibility and motivation. According to Barber, the hypnotic suggestion produced a set of motives and expectations to which the person responds by following the instructions of the hypnotist. Thus hypnosis is no more than a state of heightened suggestibility.

### **Uses of Hypnosis**

- To reduce the pain of child birth, surgery, and dental work, particularly in highly hypnotizable subjects.
- To reduce blood pressure and may be as effective as biofeedback.
- Used in the treatment of a number of psychological problems.

### **SLEEP**

Sleep is a process in which important physiological changes (including shifts in brain activity and slowing of basic bodily functions) are accompanied by major shifts in consciousness. We spend about one third of our adult lives asleep. Most of us complain when we do not sleep at least 6 hours or so. Some people, sleep for an hour or two a night.

A major tool of sleep researchers is the electroencephalograph (EEG). The EEG measures the electrical activity of the brain or brain waves. During the various stages of sleep, the brain emits waves with different frequencies and amplitudes. Brain waves that are high in frequency are associated with wakefulness. The amplitude of the brain waves reflects their strength. The strength or energy of brain waves is expressed in volts.

## **Sleep: Its basic nature**

When you are fully awake and alert, your EEG contains many beta waves: relatively high frequency (14 to 30 Hz), low voltage activity. As you enter a quiet resting state (for example, just after getting into bed and turning out the light) beta waves are replaced by alpha waves: EEG activity that is somewhat lower in frequency (8 to 13 Hz) but slightly higher in voltage.

Although such phases suggest that the onset of sleep is gradual, it is actually quite sudden. Sleep was not a uniform activity but that produced a variety of different brain waves through out the night. On the basis of research conducted by Eugene Aserinsky and Nathaniel Kleitman in (1953) we recognize two radically different types of sleep that are regulated by different brain systems and different neurotransmitters. They are also characterized by a multitude of physiological, biochemical, and psychological differences. One type of sleep is called Rapid Eye Movement Sleep (REM); the other is Non-rapid Eye Movement Sleep (NREM).

Today we recognize the existence of five distinct stages of sleep that cycle throughout the night. Four of these five stages are part of NREM sleep and simply numbered 1, 2, 3, &4. The fifth stage of sleep is REM sleep.

Each stage has distinct different character. The transition from wakefulness to sleep occurs with the onset of Stage 1 sleep. During this stage, a mixed but relatively slow, low-voltage EEG pattern emerges. The alpha waves are replaced with theta waves and breathing and heart rate slow down as muscles relax and body temperature falls. At this point individuals can still be readily awakened by external stimuli. After about 5 or 10 minutes, they move into stage 2. During this stage mixed EEG activity is present along with high voltage special brain waves called sleep spindles. Spindles occur throughout stage 2 in mammals. In stage 2, sleepers are much more difficult to awaken than they were during stage 1. Stage 3 and 4 are the deepest form of NREM sleep at least as defined in terms of arousal to external stimuli. We enter stage 3 when 20% of the overall EEG activity includes delta waves and stage 4 when the record

shows 50% or more delta waves. Collectively, stages 3 and 4 are called slow wave sleep (SWS) or delta sleep. Delta waves are lower in frequency but higher in voltage.

Throughout the night we cycle in and out of REM and NREM sleep in a fairly reliable 90 minutes cycle. This cycle defines the period between the onset of one REM sleep period and the onset of the next. In a typical night of sleep a person has between four and six such cycles. About 90 minutes after the sleep process begins, people enter Rapid Eye Movement (REM) sleep. During this phase, the electrical activity of the brain changes rapidly. It now closely resembles that shown when people are awake. Hence REM sleep is also called paradoxical sleep. Delta waves disappear, and fast, low voltage activity returns. Second, sleepers eye begin to move about rapidly beneath their closed eyelids. Third, there is an almost total suppression of activity in body muscles. Yet at the same time, males may experience erections and females corresponding to changes in their sexual organs.

These observable shifts in brain activity and bodily process are accompanied by dreams. An individual awakened during REM sleep often reports dreaming. In some cases, eye movements during such sleep seem to be related to the content of dreams. The relationship between rapid eye movements and dream content is still uncertain.

### **Functions of sleep**

Sleep serves important functions. These functions are explained by some theories.

The first is the restorative or recuperative theory, which suggests that sleep provides the rest we require to recover from the wear and tear of the day's activities. While this view seems consistent with our subjective impressions, there is little evidence for it. Even prolonged deprivation of sleep does not seem to produce large or clear-cut effects on behavior.

A second theory emphasizes the relationship of sleep to basic circadian rhythms. According to this view, sleep is merely the neural mechanism that evolved

to encourage various species, including human beings, to remain inactive during those times of day when they do not usually engage in activities related to their survival.

Another possibility is that only certain component of sleep is crucial. It has been suggested REM sleep is essential to our health and well-being and that being deprived of such sleep will induce harmful effects. Studies have indicated that selectively depriving individuals of REM sleep (by waking them whenever their EEGs indicate that they have entered this phase) may interfere with their ability to retain newly learned information. These findings suggest that REM sleep may play an important role in the integration of newly acquired information with existing memories and knowledge. On the other hand, some studies indicate that the only effect of depriving individuals of REM sleep is to increase the amount of such sleep they have on subsequent nights.

Most sleep researchers believe that sleep probably serves both the restorative and the circadian functions. To support this reasoning, some findings suggest that the amount of time people spend in slow wave sleep (NREM) is related to how long they have been awake, while the amount of time they spend in REM sleep is related mainly to circadian rhythms, the daily cycles of activity and rest. Further, there is an important relationship between sleep and waking moods. The more effectively people sleep, the more positive are their waking moods, and less anxiety they experience. So in sum, sleep seems to serve important functions for us. Falling asleep is a function of both restorative and circadian factors, and sleep itself fulfills needs related to both.

### **DREAMS: Stimulation in the midst of sleep**

Dreams are cognitive events, often vivid but disconnected that occur during sleep. Most dreams take place during REM sleep.

### **Psychodynamic View of Dreams**

Sigmund Freud viewed dreams as a guide to the unconscious, all those thoughts, impulses and wishes that lie outside the realm of conscious experience. He

proposed that dreams represented unconscious wishes that dreamers wish to be fulfilled. However, because these wishes are threatening to the dreamer's conscious awareness, the actual wishes – called the latent content of dreams – are disguised. The true subject and meaning of a dream then may have little to do with its overt story line called by Freud the manifest content of dreams. To Freud, it was important to pierce the armor of a dream's manifest content to understand its true meaning.

### **Dreams: The physiological view**

According to this perspective, dreams are simply our subjective experience due to random neural activity in the brain. Such activity may reflect ongoing information processing tasks, or may occur simply because a minimal amount of stimulation is necessary for our cognitive systems to make sense out of this neural activity.

### **Dreams: The cognitive view**

This perspective proposed by Antrobus (1991) suggests that two facts about REM sleep are crucial to understanding the nature of dreams. (1) During REM sleep areas of the brain in the cerebral cortex that play a key role in waking perception, thought and regulation of motor processes are highly active (2) Yet at the same time, there is massive inhibition of input from sensory systems and muscles which are suppressed during REM sleep. As a result, the cortical structures that normally regulate perception and thought have only their own output as input. The result is that this activity forms the basis for the imagery and ideas in dreams.

## **MEDITATION**

When traditional practitioners of the ancient eastern religion of Zen Buddhism want to achieve greater spiritual insight, they turn to a technique that has been used for centuries to alter their states of consciousness. This technique is called meditation.

Meditation involves procedures designed to produce altered states of consciousness in which awareness of and contact with the external world are reduced.

Many different varieties of meditation exist. One technique that attained widespread popularity during the 1970's is known as transcendental meditation (TM). Practitioners of TM repeat a word or set of words, known as their mantra over and over again, focusing their attention entirely on this activity and on the mantra rather than on the world around them. If they find their thoughts beginning to wander to something else, they attempt to bring them back to the mantra. This requires considerable cognitive discipline, but this skill must be learned if meditation is to be successful.

Following meditation people report feeling thoroughly relaxed. They sometimes relate that they have gained new insights into themselves and the problems they are facing. The long-term practice of meditation may even improve health.

Meditation brings about several physiological changes. For example, oxygen increases, heart rate and blood pressure decline, and brain wave pattern may change. Additional evidence indicates that after adopting TM, many people report finding it easier to give up the use of various drugs.

## **CONSCIOUSNESS ALTERING DRUGS**

Major drugs that can alter consciousness are alcohol and psychoactive drugs. Drugs that alter consciousness and thereby affect the psychological functioning of the individual are referred to as psychoactive drugs. When taken over time, most of these drugs can produce tolerance, in which continued use of the drug causes the body to adapt to it, such that ever-increasing doses are required to produce the desired effect. Some psychoactive drugs can also produce physiological dependence, or addiction in which biochemical functioning is altered in such a way that body needs the drug in order to function normally. Withholding the drug from an addicted individual will result in withdrawal symptoms, which may include severe physiological and psychological disturbances as the body attempts to adapt to the absence of the drug. In addition, most psychoactive drugs can produce psychological dependence, in

which the individual comes to need the drug to maintain a comfortable level of emotional functioning.

The different classes of psychoactive drugs are:

**Depressants:** Depressants decrease nervous system activity. In moderate doses, they reduce feelings of tension and anxiety, and produce a state of relaxed euphoria. In extremely high doses, depressants can slow down vital life processes to the point of death. Depressants include alcohol, the barbiturates and tranquilizers.

**Stimulants:** Stimulants increase neural firing and arouse the nervous system. They increase blood pressure, respiration, heart rate and overall alertness. Stimulants include caffeine, amphetamines and cocaine.

**Opiates:** Opiates have two major effects: they provide pain relief and cause mood changes which may include euphoria. Opiates stimulate receptors normally activated by endorphins, thereby producing pain relief. Opiates also increase dopamine activity, which may be one reason they induce euphoria. Morphine, codeine and heroin are called opiates.

**Hallucinogens:** Hallucinogens are powerful mind-altering drugs that produce hallucinations. The most common hallucinogens are mescaline, lysergic acid diethylamide (LSD), phencyclidine, psilocybin, and PCP.

**Marijuana:** Marijuana increases GABA activity, which slows down neural activity and produces relaxing effects. It also increases dopamine activity, which may account for some of its pleasurable subjective effects.

## SOME EFFECTS OF MAJOR DRUGS

Class	Typical Effects	Risks of High Doses and/ or chronic uses
<b>Depressants</b>		
Alcohol	Relaxation, lowered inhibition, impaired physical and psychological functioning	Disorientation, unconsciousness, possible death at extreme doses
Barbiturates, Tranquillizers	Reduced tension, impaired reflexes and motor functioning, drowsiness	Shallow breathing, clammy skin, weak and rapid pulse, coma, possible death
<b>Stimulants</b>		
Amphetamines, cocaine	Increased alertness, pulse, and blood pressure; elevated mood; suppressed appetite; agitation; sleeplessness, Ecstasy	Hallucinations, paranoid delusions, convulsions, long-term cognitive impairments, brain damage, possible death
<b>Opiates</b>		
Opium, morphine, codeine, heroin	Euphoria, pain relief, drowsiness, impaired motor and psychological functioning	Shallow breathing, convulsions, coma, possible death
<b>Hallucinogens</b>		
LSD, Mescaline, phencyclidine	Hallucinations and visions, distorted time perception, loss of contact with reality, nausea	Psychotic reactions (delusions, paranoia), panic, possible death
<b>Marijuana</b>	Mild euphoria, relaxation, enhanced sensory experiences, increased appetite, impaired memory and reaction time	Fatigue, anxiety, disorientation, sensory distortions, possible psychotic reactions, exposure to carcinogens