

1.14 Issues and Perspectives in Modern Contemporary Psychology

Syllabus : Computer application in the psychological laboratory and psychological testing; Artificial intelligence ; Psycho cybernetics; Study of consciousness - sleep - wake schedules; dreams, stimulus deprivation, meditation, hypnotic/drug induced states; Extrasensory perception; Intersensory perception, Simulation studies.

Previous Years' Questions

2016

Q. Explain different types of psycho-active drugs and patterns of their use. 10 marks [2016]

Q. Describe the physiological changes that are accompanied by shifts in consciousness in the process of sleep. Also discuss major sleep disorders. 20 marks [2016]

2015

Q. Why are we awake at certain times and asleep at others ? Explain this with help of opponent process model. 15 marks [2015]

2014

Q. What are the main types of meditation ? Describe their effects on cognitive functioning. 10 marks [2014]

Q. Compare the limits of artificial intelligence and human information processing system. Discuss their implications for human performance. 15 marks [2014]

2013

Q. How the psychoanalytic view differs from physiological or cognitive view of dream? 25 marks [2013]

2012

Q. Enumerate different stages of sleep. Discuss the effects of sleep deprivation. 20 marks [2012]

2011

Q. Elaborate upon the salient developments in consciousness studies and indicate the effect of 'meditation' on psychological functions. 30 marks [2011]

2010

Q. What is REM sleep and how is it related to dreaming ? 10 marks [2010]

2009

Q. What are the different stages of sleep? How are these stages assessed experimentally? Citing relevant research studies discuss the effects of sleep deprivation on cognitive, affective and behavioral dimensions. 60 marks [2009]

2008

Q. Artificial Intelligence and cognitive psychology have a symbolic relationship. Elaborate this statement. 20 marks [2008]

Sleep

Q. What is sleep ?

It is Psychologically defined as *a process in which important physiological changes and slowing down of basic bodily functions are accompanied by major shifts in consciousness.*

Q. How do we study sleep ?

It is done in a laboratory - consisting of several bedrooms next to an adjoining observation room. The major changes studied are :

1. The electrical activity in the brain - studied using of **EEG** (Electroencephalogram) - Electrodes are placed on the scalp.
2. Changes in electrical activity in various muscles using **EMG** (Electromyogram) - Electrodes placed on chin
3. Changes in the potential of the eyes using **EOG** (Electrooculogram) - electrodes put on eyes
4. Changes in heart rate, respiration, skin conductance and also measured.

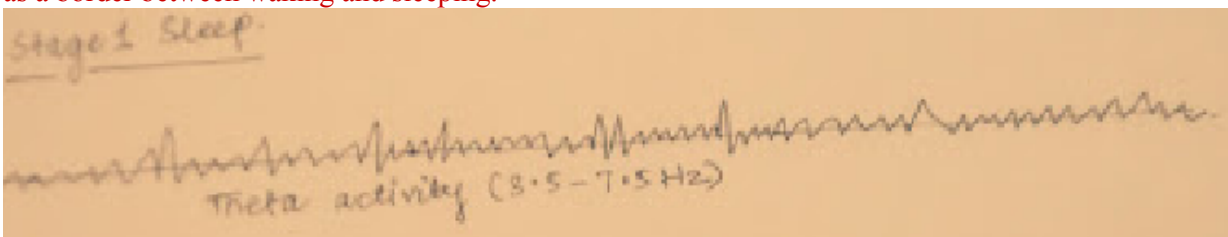
Q. What are the different stages of sleep that have been found using the above methods ?

Fully awake stage - EEG contains many **beta waves**, which are relatively high frequency (14-30 Hz), low voltage (amplitude) activity.



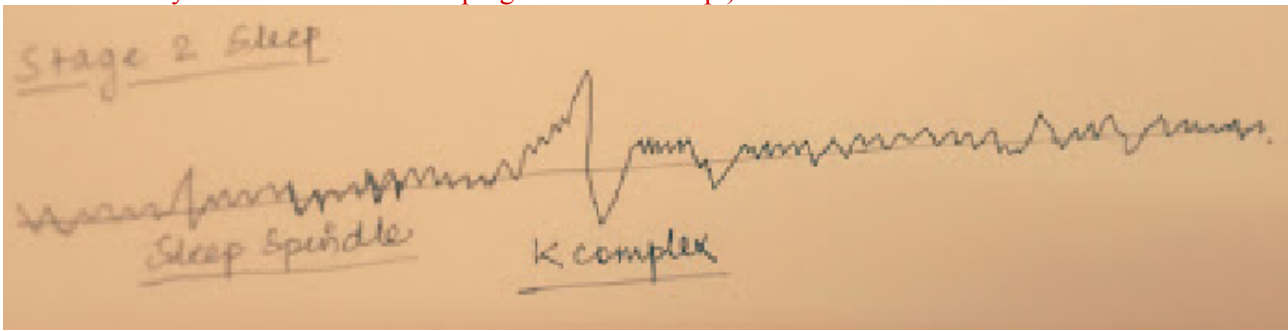
Quite resting stage e.g. just after getting into bed and turning off the lights : beta waves are replaced by **alpha waves** (EEG activity somewhat lower in frequency ~ 8-12 Hz) but slightly higher in voltage (amplitude)

Stage 1 Sleep : Occurs when we begin to fall asleep : **theta activity** occurs (EEG ~ 3.5.-7.5 Hz) : The stage is considered as a border between waking and sleeping.

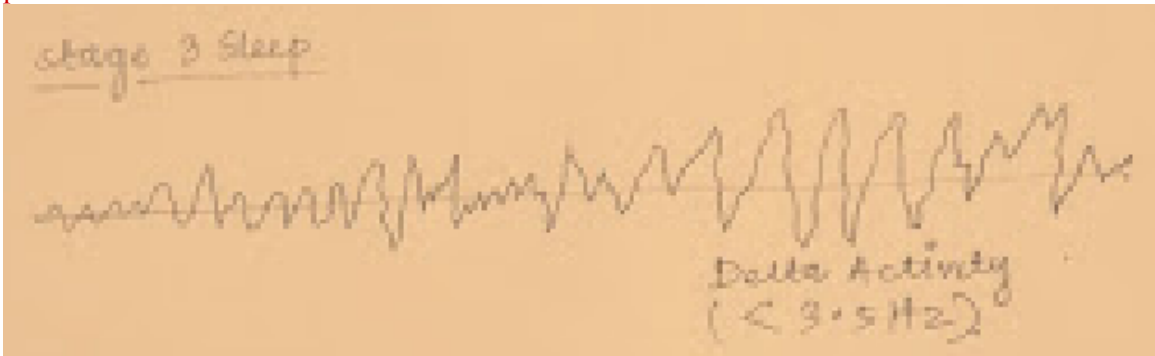


Stage 2 Sleep : marked by **sleep spindles** (short bursts of waves of 12-14 Hz that occur 2-5 times per minute. They may represent the activity of a mechanism that helps us enter deeper stages of sleep by reducing brain's sensitivity to sensory

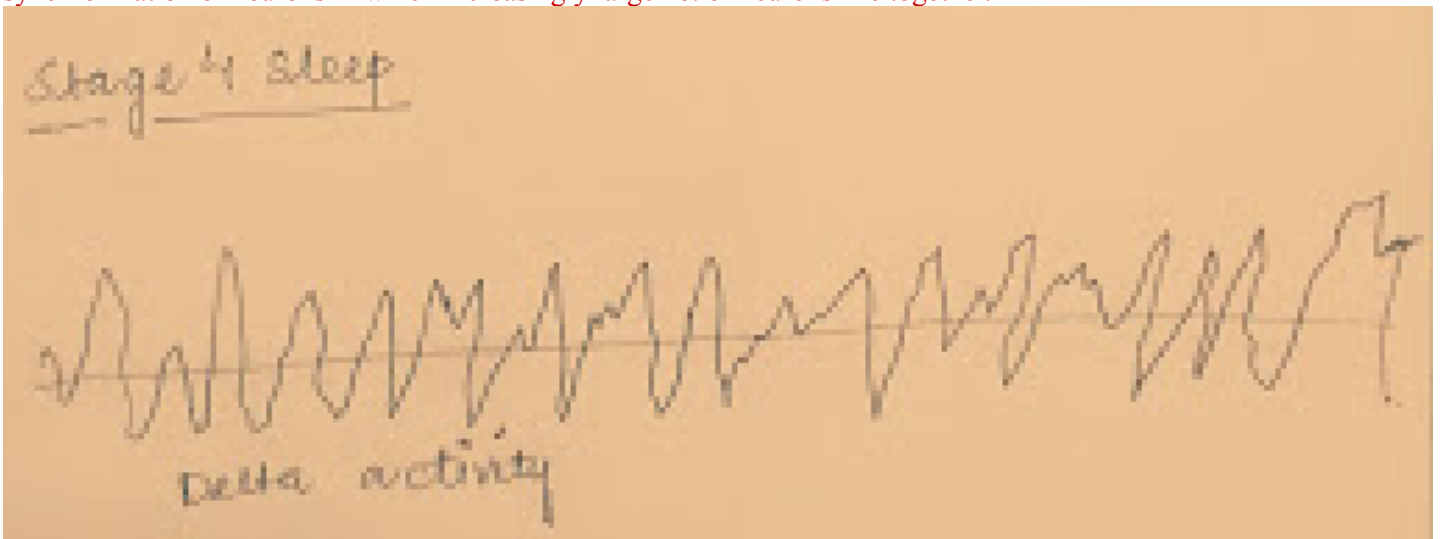
input) and **k complexes** (sudden, sharp waveforms that occur about once each minute. They can also be triggered by noises and may also be involved in helping us remain asleep.)



Stage 3 Sleep : Marked by appearance of **delta activity** (high amplitude waves of < 3.5 Hz) ; 20-50 % delta activity is present



Stage 4 Sleep : proportion of delta activity increases (> 50 %). Some researchers believe that delta activity represents a synchronization of neurons in which increasingly large no. of neurons fire together.



REM Sleep : 90 minutes after the process of sleep begins, several dramatic changes occur as individuals enter a distinctive this phase of sleep called REM sleep. Following are its characteristics:

- electrical activity of the brain changes rapidly starting to resemble closer to the EEG activity shown when people are awake.
- delta activity disappears and low voltage-high frequency activity reappears.
- In addition, periods of REM sleep through the stages 1 to 4 , contain an increasing proportion of stage 2 sleep and less and less of Stages 3 and 4 (which are together called **slow-wave sleep**)



- sleepers' eyes begin to move rapidly beneath their closed eyelids.
- there is almost total suppression of activity in body muscles.
- these shifts in bodily processes and brain activity are accompanied, in many cases by **dreams**. Individuals awakened during REM sleep often report dreaming.
- in some cases, eye movements during such sleep seem to be related to the content of dreams. (**Dement, 1975**). However, this relationship between REM sleep and dreams is uncertain, but the possibility of such a relation cannot be denied.
- periods of REM sleep continue to alternate with the other stages of sleep throughout the night.
- the duration is variable but REM periods tend to increase in length towards morning. Thus, while the 1st REM period may last for only 5-10 minutes, the final ones from which many people awake may last for 30 minutes or more. (**Hartmann 1971, Kelly, 1981**)

Q. What functions does sleep serve ? / Why do we sleep ?

Possible fn. of slow-wave sleep

Restorative Function : allowing us , especially our brains to rest and recover from the wear and tear of the day's activities. Some indirect evidences for this fn. are :

1. PET scans have shown that parts of the brain which have undergone intense activity during the day, exhibit more delta-activity (slow-wave) during sleep (**Kattler et al, 1994**)
2. The the 2 cerebral hemispheres of some marine mammal species take turns in sleeping. This suggests that sleep does permit the brain to rest in some manner. (**Carlson,1999**)
3. Vigorous physical exercise seems to increase slow wave or *resting* sleep, but only if such an exercise raises brain's temperature (**Horne, 1988**). (higher temp. in brain raises its metabolism). Thus it is generally advised to *take a hot bath for a good night's sleep.*

Circadian Rhythms : A/c to this evolutionary view, sleep is merely the neural mechanism that evolved to encourage species to stay various species (including humans), to remain inactive during those times of the day when they usually do not engage in activities related to their survival. A/c to the well known sleep researcher - **Webb, 1975**- "*Sleep is nature's way of keeping us quiet at night, a dangerous time for our ancestors and for us , since we are not equipped with sensory capabilities suited for nighttime activity.*"

Possible fn. of REM sleep

Learning : Some researchers like **Crick & Mitchison, 1995** suggest that REM sleeps aids in learning, consolidating memories of the day, or perhaps eliminating unnecessary memories and other mental clutter from our brains.

Evidence for this relation b/w learning and REM sleep comes from validation of the following through assumptions : If REM sleep aids in learning then :

1. If some animals are subjected to some kind of learning on a task but are denied REM sleep, they will perform poorer on the task than animals who engaged in REM sleep.
2. Animals will show more REM sleep after intense learning than at other times.

Both the above predictions have been validated in some studies. e.g. **Block, Hennevin and Leconte (1977)** trained rats to run through a complex maze. As the learning progresses, rats exhibited more and more REM sleep.

Q. What are the different kinds of sleep disorders ?

Insomnia : inability to fall asleep or maintain sleep once it is attained.

Narcolepsy : individuals are overcome by *sleep attacks* - the uncontrollable urge to sleep during waking hours. (they sleep for 2-5 mins. then wake up refreshed :P)

Cataplexy : a symptom of Narcolepsy in which individuals fall down all of a sudden like a sack of flour.

Somnambulism : aka "sleep walking" - individuals get up and move about while still asleep.

Night Terrors : Extremely frightening dream-like experiences that occur during *non-REM* sleep

Apnea : people stop breathing while in sleep and thus wake up many times each night.

Q. What are the effects of sleep deprivation ?

Mixed picture - e.g. one **Randy Gardener** (also the Guinness world record holder) stayed awake for 264 hours and 12 minutes (~ 11 days). Even after this, Randy slept for just 14, 10 and < 9 hours on the following days. Interestingly, his sleep on these nights showed increased proportions of slow wave and REM sleep but no major effect in stage 1 and stage 2 sleep; as if the brain was trying to make up for the deprivation in the slow wave and REM sleep but could get along fine without compensating for the losses in stages 1 and 2. There were no lasting physical or psychological harm for Randy due to his long waking duration.

However, some harmful effects of sleep deprivation have indeed been found.

e.g. a disorder called **Fatal Familial Insomnia (Gallassi et al , 1996)** is a genetic disorder in which individuals experience increasingly severe difficulties in sleep. The disease is fatal - which indicates that sleep disorder *might* affect physical well being. However, whether the fatality is due to sleep disturbances themselves or whether sleep disturbances are simply a sign of other neurological problems, remains uncertain.

sleep deprivation also affects animals. e.g. **Rechtschaffen** and colleagues have conducted experiments on rats in which 2 rats are put on a platform surrounded by water. The moment the *experimental* rat begins to sleep, the platform is rotated and the rat has to wake up to avoid falling into water. The *control* rat is also forced to move but this might not affect its sleep as it may or may not be asleep at that time. These procedures reduce the sleep by 87% in the experimental animal but only by 31.5% in the control animal.

Results indicate that while the control animals remain in perfect health, the experimental ones become :

- a) weak
- b) uncoordinated
- c) lose the ability to regulate their body temperature

Thus sleep deprivation does seem to have serious consequences for health and might affect our :

- a) cognitive abilities
- b) physical well being, health and discomfort
- c) can increase chances of serious accidents

Q. What are some tactics to counter occasional insomnia and ensure a good night's sleep ?

1. Reading something pleasant or relaxing just before going to sleep
2. Arranging schedule to sleep at same time each night. (circadian rhythms)
3. Avoiding tea/coffee late in the day.
4. Exercising everyday (but not just before going to sleep)
5. Not smoking
6. Light dinner
7. Not taking naps during the day

Q. What is drug dependency insomnia ?

Insomnia caused by the side effects of ever increasing large doses of sleeping medicines (pills). Initially these pills induce sleep but *tolerance* to them develops very soon so that larger and larger doses are needed.

Dreams

<https://owlcation.com/social-sciences/Dreaming-Minds>

Psychodynamic View :

Physiological View :

Cognitive View : Q. What do you mean by 'Dreams of absent-minded transgression (DAMIT dreams)' ? How do such dreams provide support to the cognitive view of dreams ?

Psychocybernetics

Psycho-Cybernetics is based on the principle of substituting negative thinking with encouraging and strengthening thoughts to build confidence. i.e. *“How you think makes ALL the difference.”*

Psycho-Cybernetics was started by cosmetic surgeon **Dr. Maxwell Maltz**.

The term 'Cybernetics' refers to a self regulating feedback system (e.g like a thermostat) and thus Psycho-Cybernetics explains the mechanisms used to create a **positive self image**.

Dr Maltz was a plastic surgeon. He noticed that some of his patients after surgery suffered from low self-esteem. These patients had emotional scars from their past, leading to an inaccurate self-image. The old self image they had would sabotage their attempt to change. Dr. Maltz saw the unhappy behaviour as the result of **negative self feedback**. The negative feedback came from focusing on an old memory, rather than focusing on the corrective action.

The solution was to create an accurate and positive view of themselves.

He theorised that everyone has an **Automatic-Success Mechanism** (ASM)- a natural ability to achieve goals. Generally when people lack confidence it is caused by paying too much attention to the past. To activate the automatic-success mechanism the person would vividly visualise a successful and encouraging future.

Dr. Maltz found he could improve a persons confidence by helping the individual create a positive and accurate mental image of themselves. The process is referred to as **theatre of the mind**, or synthetic experience.

The Basketballers' study

In an example of how ASM works, Dr. Maltz had three teams of basketball players, train in three different ways:

- One team practices making free throws.
- The second team doesn't practice.
- The third team sits on a bench and mentally practices making free throws.

When the three teams are tested, the team that practiced out-scored the team that didn't practice. However, the team that mentally practiced performs nearly as well as the team that actually practiced.

Setting Goals

To program our ASM, we need to set our goals in a clear, precise and detailed manner. One needs to have a sense of direction. One doesn't need to know how to get there - she just has to be clear about her intended destination.

Stimulus Deprivation / Sensory Deprivation (SenDep)/ Perceptual Isolation

Sensory deprivation (Sendep) or perceptual isolation is the deliberate reduction or removal of stimuli from one or more of the senses. Simple devices such as blindfolds or hoods and earmuffs can cut off sight and hearing, while more complex devices can also cut off the sense of smell, touch, taste, thermoception (heat-sense), and 'gravity'. Sensory deprivation has been used in various alternative medicines and in psychological experiments (e.g. with an isolation tank).

Short-term sessions of sensory deprivation are described as relaxing and conducive to meditation; however, extended or forced sensory deprivation can result in extreme anxiety, hallucinations, bizarre thoughts, and depression.

Genzfeld Effect : A related phenomenon is perceptual deprivation (*not isolation*), aka the **Ganzfeld Effect**. In this case a constant uniform stimulus is used instead of attempting to remove the stimuli; this leads to effects which have similarities to sensory deprivation. It is caused by exposure to an unstructured, uniform stimulation field. The effect is the result of the brain amplifying neural noise in order to look for the missing visual signals. The noise is interpreted in the higher visual cortex, and gives rise to hallucinations. It has been most studied with vision by staring at an undifferentiated and uniform field of colour. The visual effect is described as the loss of vision as the brain cuts off the unchanging signal from the eyes. The result is "seeing black", an apparent sense of blindness.

Meditation

Meditation refers to a family of self-regulation practices that focus on training attention and awareness in order to bring mental processes under greater voluntary control and thereby foster general mental well-being, development and/or specific capacities such as calm, clarity, and concentration

Main Types of Meditation

1. Opening-up meditation : attempting to relax completely and 'let go' one's mind and body; watching the internal and external processes as an 'inactive observer'
2. Concentrative meditation : concentrating on one particular thing, idea or mental imagery

Effects of Meditation:

After a few sessions of concentrative meditation directed on a particular thing (e.g. a vase), people typically report a no. of effects :

1. an altered, more intense perception of the thing
2. some time shortening, particularly in retrospect
3. conflicting perceptions, as if the thing fills the visual field and does not fill it
4. decreasing effectiveness of the external stimuli (less distraction and eventually less conscious registration)
5. an impression of meditative state as pleasant and rewarding

In one experimental study by **Davidson et al. (2003)** on individuals who underwent an 8-week training in meditation practices, experimenters found that trainees (compared to a wait-listed control group) reported :

1. reductions in anxiety and other such negative affects
2. increase in activity in areas of brain associated with positive affect

3. enhanced immune system functioning

Meditation is increasingly being incorporated into interventions for people with stress related disorders.

Some researchers like **Holmes, 1984** argue that benefits of meditation come largely from relaxation of the body.

In one study by **Younger et al , 1975** , EEG readings for people practicing transcendental meditation found that most of the participants spent considerable portion of their meditation periods in physiological sleep

Other researchers like **Teasdale, 2000** suggest that Psychological benefits of meditation may be due to the learning to put aside repetitive and troubling thoughts.

Psychoactive Drugs

Q. Explain different types of psycho-active drugs and patterns of their use.[2016]

Psychoactive drugs that alter consciousness states can be classified into **#DOSH** :

1. Depressants
2. Stimulants
3. Opiates/Psychedelics/Narcotics
4. Hallucinogens

Depressants

Functions :

Examples : alcohol, barbiturates (contained in sleeping pills and relaxants)

Patterns of use :

1. steady drinkers : consume large amounts of alcohol, generally have a history of antisocial activities like fighting, lying etc. ; this kind of pattern seems to be affected by genetic factors. e.g in a large scale study carried out in Sweden by **Sigvardsson et al , 1996** on people who were adopted early in life showed that men whose genetic fathers were *steady drinkers* had 7 times stronger tendency to become a steady drinkers themselves than men whose biological fathers didn't show this pattern. All this regardless of whether their adoptive fathers abused alcohol.

2. binge drinking :

Stimulants

Functions :

Examples :

Patterns of use :

Opiates

Functions :

Examples :

Patterns of use :

Hallucinogens

Functions :

Examples :

Patterns of use :