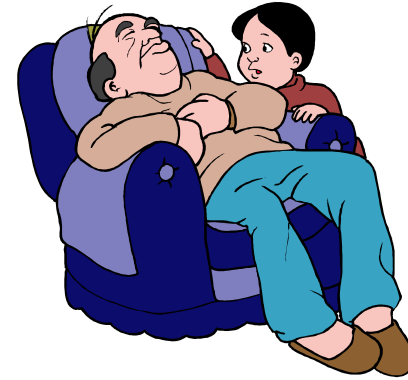

sleep.



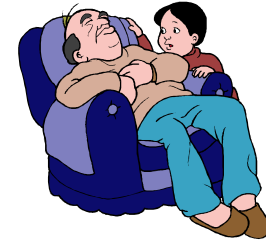
- Sleep occupies 1/3 of our time. What we are interested in when we study sleep:
 - What function is served by sleep?
 - What happens when we are deprived of sleep?
 - Why do all animals sleep?
 - Why do different animals have different sleep patterns?
-

sleep.



- There are a number interesting facts that have emerged from research into sleep.
- (a) Not as peaceful/passive as you might think individuals are often quite active.
- (b) Being asleep is not a total loss of consciousness, but a gradual descent into reduced awareness.
- (c) Sleep occurs in stages therefore there are qualitative differences between the stages and that these stages follow a regular sequence.

Sleep



- A technique known as Electroencephalograph (EEG) was an important invention as without we would not be able to measure sleep activity. Without this objective measurement researchers would rely solely upon self reports.
 - There are two main readings: Amplitude and frequency.
 - Amplitude: half the distance between high and low points of an oscillation.
 - Frequency: No. of oscillation of EEG activity per second.
-

-
- ▶ A subject prepared for a night's sleep in a sleep laboratory.



A Physiological and Behavioral Description

Stages of Sleep

□ Alpha activity:

- A smooth electrical activity of 8 – 12 Hz recorded from the brain; generally associated with a state of relaxation. (Slow eye rolling reduction in muscle tension and heart rate .A state of drowsiness)

□ Beta activity:

- Irregular electrical activity of 13 – 30 Hz recorded from the brain; generally associated with a state of arousal. (Waves slower & larger duration 20 mins, still be woken easily, k-complexes still present)

□ Theta activity:

- EEG activity of 3.5 - 7.5 Hz that occurs intermittently during early stages of slow wave sleep and REM sleep.(Brain waves slow down- descending the sleep staircase-some sleep spindles).

□ Delta activity:

- Regular, synchronous electrical activity of less than 4 Hz recorded from the brain; occurs during the deepest stages of slow-wave sleep. (Hard to be woken- growth hormones now secreted sleep walking/night terrors, body temp drops-need bed covers).
-

Sleep...



- REM sleep. Also known as rapid eye movement, this stage consists of active (beta 13-20hz) brain waves.
 - Once the sleeper has worked through the first four stages he/she reverses the process: 1 2 3 4 then 4 3 2 1 5. A complete cycle lasts about 90 minutes a sleeper completes about five ultradian rhythms during a normal nights sleep with less SWS and more REM as the morning approaches.
 - A researcher named Jouvet called this stage paradoxical sleep because of the contradictions- eye movement heart rate etc are increased...but the body is in a state of near paralysis!
-

Sleep...An evaluation!



- The data collected about sleeping rhythms/dreaming are often produced in sleep laboratories thus they are highly artificial conditions. The participants are often woken during sleep to ask about their dreams...What are the problems with conducting research within artificial environments? (Think back to PYA3-Research Methods).
-

Research studies of sleep deprivation.

- One way of discovering how important sleep is to humans is to deprive them of sleep and see what happens next!
 - It could be argued that the kind of problems and impairments experienced by sleep deprived individuals are those that sleep is designed to prevent.
 - **Example:** Peter Tripp a New York DJ managed to stay awake for 8 days (200hrs) in a wakeathon for charity. He suffered delusions and hallucinations. His delusions were so severe it was near impossible to test his psychological functioning. Some reports suggest that Peter experienced psychotic episodes for months/years after. (It is not a for gone conclusion that the sleep deprivation caused these episodes.) As a case study.....what are the limitations of this study?
-

Research studies of sleep deprivation.

- **Example 2: (Horne 1988)**

Randy Gardner remained awake for 264 hrs/ 11 days in 1964. Toward the end of the 11 days he suffered from slurred speech blurred vision and paranoia. He had less symptoms than Peter Tripp but was a awake an extra 3 days.

After his deprivation Randy slept for 15 hours he slept for longer than usual for a few nights after but soon reverted back to his usual sleep pattern. He only recovered about 25% of the sleep lost (80-90hrs) if sleep were that essential you would expect him to have recovered more.

Research studies of sleep deprivation

REM sleep.

■ Example 1:

Dement (1960) carried out research into NREM & REM.

Some of his participants were deprived of sleep over a period of several days and others were deprived of NREM sleep.

Results:

The effects of REM sleep deprivation were more severe incl: increased aggression poor concentration. They entered REM sleep 12 x the first night but this rose to 26 on the 7th night. When they were free to sleep undisturbed most spent longer than usual in REM sleep. .this is known as the REM rebound effect.

Research studies of sleep deprivation

REM sleep.

■ Example 1:

Jouvet (1967) carried out research into NREM & REM.

Using non-human participants (cats and other animals) using the flower-pot technique. He placed an up-turned flower pot on water and put the cats on top of the flower pot and eventually fall asleep. In NREM they remained balanced, but when they moved into REM sleep and lost muscle tension they fell into the water. Soon the cats learnt to sit wake up when they felt their heads nod.

Results:

The cats eventually died leading us to believe that a lack of REM sleep had been fatal...what else could have been the reason for their deaths?

Theories of sleep

Several theories of sleep have been proposed and we should keep in mind:

- (1) That animals do sleep so it must serve some important function.
 - (2) The area of the brain that governs sleep is the oldest therefore all animals have /will need sleep.
 - (3) Different species have different sleep patterns. This suggests that sleep is an evolutionary adaptation to environmental conditions.
 - (4) Sleep deprivation studies have shown there are some physical effects of both REM and REM and NREM but these maybe related to motivation as much as some reduced capacity.

 - Restoration theory
This is also known as (aka recuperative, restitutive theories)

 - Ecological theory.
This is also known as (aka behavioural theories)
-

Restoration Theory

- An important function of sleep is to restore tissue and save energy. The **physiological** system is of primary concern in this theory.
 - Restorative theories (aka recuperative, restitutive theories) are based on the idea that animals sleep so that physiological and biochemical repairs can take place. Thus, without sleep, an animal's health (physical and/or mental) deteriorates. Three major mechanisms have been proposed: (i) the need to breakdown an unwanted substance which accumulates in the body during activity; (ii) the need to carry out some essential process of chemical synthesis, which is inefficient or impossible during wakefulness; and (iii) to allow the recovery of neural components or pathways which fatigue during arousal. Oswald (1974) has proposed that body restoration occurs during S-sleep, and that brain restoration processes occur during D-sleep, partially through stimulating neural protein synthesis.
-

Restoration Theory

- **Psychological restoration.**

- Insomniacs have less sleep and worry more...but it is not clear whether this is an cause or effect of sleep deprivation.

Berry & Webb (1983) found that when people slept well during the night their levels of anxiety were lower the following day than when they had a poor nights sleep.

Restoration Theory

Physiological restoration:

Evidence 1

- Sharpiro et al (1981) studied runners who took part in a marathon covering 57 miles. These runners slept about an 1 ½ hrs longer than a normal on the 2 nights following the ultra marathon. There was an increase in the amount of SWS.

Evidence 2

- Newborns babies spend the majority of their time in REM sleep.
 - However conflicting evidence has shown that when participants are given a number of exhausting tasks they slept faster but not for longer (Horne and Minard 1985)
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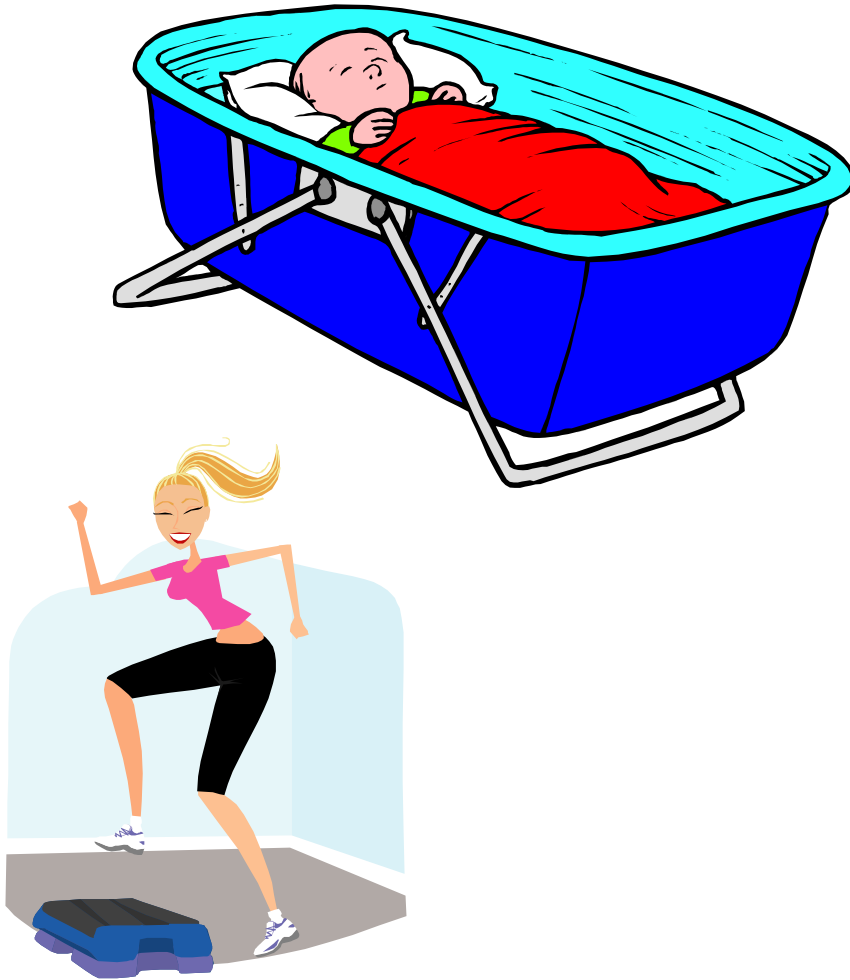
Ecological/Evolutionary Theory.

- All mammals sleep. Given its universal nature and the fact that this unconscious and defenceless state seems a dangerous behaviour to show, sleep probably has important evolutionary function possibly to:
 - Conserve energy when food gathering has been complete or is more difficult.
 - Avoid damage from nocturnal predators or accidents by remaining motionless.
 - Meddis suggested the duration of sleep a species shows depends upon its food requirements and predator avoidance.
-

Ecological/Evolutionary Theory.

- This is linked directly to Darwin's 'survival of the fittest theory'. Any properties we have now are a result of what has been useful in the past, therefore we sleep because it is useful for our survival, or was at one time.
 - **Hibernation Theory.**
 - Sleep can even be useful in keeping the animal/human out of reach of predators and might have stayed with us for that reason.
 - Webb (1982) put forward the idea that sleep is useful in itself, because those animals who slept more were more likely to survive. Sleep keeps us quiet, Webb's theory is an evolutionary one, but is often called the hibernation theory of why we sleep.
-

Evaluation of Restoration Theory.



- ☺ Logical- More energy you expend the more you look forward to going to bed.
- ✘ Lack of exertion does not necessarily mean you will sleep less.
- ✘ Cause 'n effect still unclear what causes insomnia
- ✘ REM sleep involves increase in energy expenditure and blood flow which *inhibits* protein synthesis.
- ☺ Sleep is greater after periods of stress and improves mood.

Evaluation of evolutionary theory.



- ☺ Lions and squirrels do sleep longer. Whilst cattle do sleep less.
 - ✘ Some evolutionary arguments suggest animals sleep less to keep constant vigil whilst others suggest they sleep longer to keep motionless, thus staying away from harm. The two ideas contradict each other.
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