Dreaming

Dreams are not like normal waking consciousness. In contrast to our waking experiences, dreams often seen disjointed, illogical and generally bizarre.

Empson (1993) suggests that they differ from waking experiences in several important ways:

- Dreams happen to us rather than being a product of conscious control. In dreams, we are usually 'spectators'. **Lucid dreams**, where the person is in control of their actions, are relatively rare.
- The logic of waking consciousness does not usually apply in dreams. Things happen that, on waking reflection, seem very bizarre, but during the dream, we accept such things as making sense.
- Dreams are quickly forgotten. What seemed like an epic experience at the time fades quickly from memory so, later in the day it may be reduced to a collection of unconnected images.

Hobson (1995) identifies some of the important characteristics of dream experiences. These include:

- **Hallucinations** (i.e. sensory experiences that do not correspond to reality). These are mainly visual although auditory (i.e. hearing), tactile (i.e. touch) and movement sensations are quite common. Smell and taste rarely appear in dreams and pain almost never.
- **Cognitive abnormalities**. Things happen in dreams that are impossible in the waking world.
- **Emotional intensification**. Where dreams involve emotion, the emotion is often experienced as much stronger than most waking emotions.

Because of the differences between waking and dreaming experience, many writers suggest that dreams are much more closely related to abnormal states of mind (e.g. schizophrenia and delirium) than to waking consciousness.

Studies of REM Sleep and Dreaming

Dreams are closely associated with REM sleep. When a person is woken from REM sleep, they are more likely to report having been dreaming and are likely to be able to give more detail about what the dream was about. However, dreams seem to occur in NREM sleep too. Otherwise, people would not be able to sleepwalk, which cannot happen in REM sleep because the skeletal muscles are paralysed.

Dement & Kleitman (1957)
Aim: to establish the relationship between REM, NREM and dreaming.
Sample: nine adult volunteers.
Design: laboratory observational study.
Method: pps slept in the sleep laboratory, connected to an EEG. During NREM and REM sleep they were awakened every so often by a doorbell next to their bed. On awakening, they were instructed to relate the content of their dream into a tape recorder next to the bed.
Result: pps woken in REM reported dreaming about 80% of the time, compared to only 15% of the time for those woken in NREM sleep. Pps could quite accurately estimate the length of time they had been dreaming. In most cases, there was a correspondence between the eye movements observed and the visual content of the dream (e.g. one pp whose eye movements were mainly up and down reported he had dreamt he was standing at the bottom of a cliff looking up.
Conclusion: most dreams happen in REM sleep, although less vivid dreams may occur in NREM sleep.

Faraday (1972)
Aim: to see whether the eye movement in dreams is related to the dream's content.
Sample: student volunteers.
Design: laboratory study.
Method: pps spent time sleeping in a sleep laboratory. Observations were taken of their eye movements during REM sleep. PPs were then woken and asked what they had been dreaming about.
Result: eye movement and dream content appeared to be related. Small and sparse eye movements coincided with passive, peaceful dreams whereas large and rapid eye movements corresponded to active, emotional dreams.
Conclusion: Although there is no one-to-one correspondence (i.e. if a person was dreaming about a tennis match, their eyes would not necessarily dart left and right) some information about a dream's content is available from the dreamer's eye movements.

Ball et al (1995)
Aim: so see whether dream activity could correspond to actual behaviour.
Sample: domestic cats.
Design: laboratory vivisection study.
Method: damage was caused to the pons, the brain areas that paralyses an animal during REM sleep. The cats were then observed during their sleep periods.
Result: during REM sleep, the cats were observed to walk around, chase after things that were not there and jump as if startled.

Conclusion: because the cats were not paralysed during REM sleep, they acted out their dreams.

Of course, this final study was done on cats and it may not be safe to generalise to humans. However, some people suffer from **REM behaviour disorder**, where they appear to act out their dreams. This problem may be related to abnormalities in the pons (**Kalat, 1998**).

Brain Activity during REM Sleep and Dreaming

During REM sleep, electrical activity in the brain increases in a number of areas. The most important sort of electrical activity during REM sleep is the appearance of **PGO waves**. PGO stands for *pons-geniculate-occipital*, which describes the route they take upwards through the brain. The waves start in the **pons**, situated in the brainstem. As we have seen, the pons seems to be important in REM sleep, especially because it paralyses the skeletal muscles and stops you from acting out your dreams. The **lateral geniculate nucleus** is important for vision and so is the **occipital cortex**. Fig 1 shows the route of PGO waves through the brain.

Fig. 1 – Diagram of the brain showing the route of PGO waves.

The fact that electrical activity is focused on the geniculate nucleus and the occipital cortex should not be surprising. These areas are very important for vision, so it makes sense that they are activated during dreams, which are primarily a visual phenomenon.

As the period of REM sleep progresses, so electrical activity spreads outwards to include more of the **thalamus** and the **cerebral cortex**. These areas are involved in the other senses, including hearing, touch and movement. Therefore, it should be the case that dreams start out as primarily visual but, as they progress, they involve the other senses more.

However, the parts of the brain involved in smell and taste do not become activated during REM sleep, so this would explain why these particular senses do not appear in dreams very often.

Brain Chemicals involved in REM Sleep

REM sleep involves two important brain chemicals. These are **serotonin** and **acetylcholine**.

- Serotonin is needed to get REM sleep started. Drugs that block serotonin activity, such as **alcohol**, prevent the onset of REM sleep.
- Acetylcholine is needed to keep REM sleep going. Drugs that block acetylcholine activity cause a person to come out of REM sleep very quickly. Similarly, if a person in NREM sleep is injected with the drug **carbachol**, which increases acetylcholine activity, they quickly alter to a state of REM sleep.

Conclusions

Dreaming is related to what the brain is doing during sleep. As different parts of the brain become active, we have different types of dreaming experiences. So when the occipital cortex (vision) is activated, we have visual dreams and so on. The more active the brain is, the more likely we are to dream, so in REM sleep, where brain activity rises, we have more dreams and they are more vivid. The brain treats dreams as if they were real experiences, which is why we need to be paralysed by the pons to stop us acting out our dreams. However, none of this explains the purpose of dreaming, for which we need to look at some theories of dreaming.