SLEEPING AND DREAMING

Stefan Geyer

MATURA 2016

TECHNOLOGY AND SCIENCE

Table of contents

1 Sleep in general

- Natural recurring state of animals and humans
- Occurs in repeating periods; Body alternates between REM and SWS
- REM = “rapid eye movement”, SWS = “slow wave sleep”, described later
- REM and SWS alternate within 1 sleep cycle (~ 90 minutes)
- A balance of both phases is required in order to consolidate memories for future use
- The growth and rejuvenation of the immune, nervous skeletal and muscular systems are accentuating
- The internal “circadian” clock tens to promote sleep during a regular time of the day / night
- Sleep is influenced by what we do during the day
- Brain activity during REM-sleep sleep is most like wakefulness

2 Sleep Quality

- We have the best sleep around the age of 8-10 years.
    - After that our sleep quality often worsens
- Also influenced by who we sleep with.
    - Couples that share a sleeping space
        - Negative effect on the sleep quality of the women
        - No difference on the sleep quality for the men

3 Stages of sleep

3.1 Stage 1

- Beginning of the sleep cycle
- Relatively light stage of sleep
- Considered as transition period between wakefulness and sleep
- Brain produces very slow waves (theta waves)
- Lasts around 5-10 minutes

3.2 Stage 2

- Brain produces bursts of rapid and dynamic waves (sleep spindles)
- Body temperature starts decreasing
- Heart rate begins to slow
- Lasts around 20 minutes

3.3 Stage 3

- Brain produces slow waves (delta waves)
- People become less responsive to noises / activities
- Transition period between light sleep and a very deep sleep
- Bed-wetting and sleepwalking might occur

3.4 Stage 4

- Dreaming occurs during this stage (REM-sleep)

3.5 Sequence of Sleep Stages

- Starts in Stage 1
- Progresses into Stage 2 and 3
- Stage 2 is repeated
- Entering REM-Sleep
- We enter REM sleep about 90 minutes after falling asleep

4 Types of sleep

4.1 REM “rapid eye movement” sleep

- Discovered 1950 by Eugene Aserinsky
- Eyes start moving randomly
- Low muscle tone throughout the body
- Sometimes also called paradoxical sleep
- There is a good chance that people will remember their dreams if they wake up during the REM phase

4.2 SWS “slow wave sleep” sleep (aka. Non-REM sleep or NREM)

- We dream about information from the hippocampus during SWS dreams
- Hippocampus = Section in brain where a lot of the things we learn is stored
- SWS dreams are
    - usually more static
    - involve older memories
    - emotionally charged

5 The necessity of sleep

- Deep sleep is required for
  - physical renewal
  - growth
- Without enough deep sleep one is more likely to
  - gets sick
  - feel depressed
  - have problems with memory and difficulties concentrating
  - single tasks are challenging; Multitasking almost impossible

6 Dreaming

- The content is influenced by age and gender
- Example of a dream:
  - Females:
    - lots of bright colours
  - Males:
    - Hardly any colours
- Objects and people in dreams are familiar
- We dream about stuff we learned or actually experienced
  - Not about things we have never seen before (E.g. A real alien from another planet)
- The purpose why we dream is unknown
  - Some think: Dreams serve no real purpose
  - Others: Dreams are essential to mental, emotional and physical well-being
- Length can vary
  - Between a few seconds and about 20-30 minutes
- About 3-5 dreams per night
- Natures can vary
  - e.g. frightening, exciting, magical, melancholic, adventurous, …
- In modern times: Connection to the unconscious mind
  - Range from normal and ordinary to surreal and bizarre
- During a lifespan, a person spends 6 years dreaming
  - Two hours each night
- People don't know that they are dreaming most of the time
  - Brain region responsible for logic and planning is inactive during sleep
- Dream reports
  - Can be reported 50% of the time when we are awakened prior to the end of the first REM period

6.1 Sigmund Freud's theory of dreaming

- Dreams are a representation of unconscious desires, thoughts & motivation
- Aggressive and sexual instincts are repressed from conscious awareness
- Two different components of dreams
  - Manifest content

        - Actual images, thoughts and content
    - Latent content
        - Hidden psychological meaning of the dream

6.2 Carl Jung's theory of dreaming

- Dreams are messages to the dreamer
- Dreamers should pay attention for their own good
- Dreamer is neglecting an issue related to the dream
- Memories formed throughout the day also play a role in dreaming
- Dreams are seen as projections of parts of the self that have been ignored

6.3 Activation- Synthesis Model of Dreaming

- Proposed by J. Allan Hobson and Robert McCarley in 1977
- During REM sleep circuits in the brain become activated
    - Areas of the limbic system become active
        - Emotions
        - Sensations
        - Memories
    - Brain synthesizes and interprets those activities → Result: dreaming

6.4 Information-Processing Theories

- Humans process lots of the information that we get during the day while sleeping
- Dreaming is a by-product / active part on this Information-processing
- While the information is processed we see it in our dreams

6.5 Interesting aspects of other theories

- Dreams serve to clean-up cutter from the mind
    - Like a clean-up operation on a computer
    - Refreshes the mind for the next day
- Dreams function as a form of psychotherapy
    - Dreamer creates connections between different thoughts and emotions in a save environment

7 Lucid Dreams

- Is a dream where the dreamer knows that he is dreaming
- Can be realistic and vivid
- Scientific evidence was produced in the 1980s
    - Lucid dreamers were able to demonstrate they were aware of being in a dream state (eye signals)
- Pre-lucid dreams
    - A dream where the dreamer is not sure if he is sleeping or not

7.1 Seven conditions of clarity that a dreamer must have to be in the lucid dream state

- Awareness that he is dreaming
- Awareness of the ability to make decisions
- Awareness of the memory functions
- Awareness of the dreamer himself
- Awareness of the dream environment
- Awareness of the meaning of the dream
- Awareness of concentration and focus

7.2 Start of a lucid dream

- D.I.L.D (dream-initiated lucid dream)
  - Starts as a normal dream
  - Dreamer eventually concludes it is a dream
- W.I.L.D (wake-initiated lucid dream)
  - Goes from normal waking state directly into a dream state
  - Happens when the sleeper enters REM sleep while knowing that he is sleeping

7.3 Four corollaries of lucid dreaming

- The dreamer is aware that they are dreaming
- Objects disappear after waking
- Physical laws don’t need to apply in the dream
- The dreamer knows about his life in the waking world

8 Index

English	German
rejuvenation	Erfrischung / Verjüngung
accentuate	hervorheben / betonen
consolidate	festigen
transition	Übergang
vivid	lebhaft
corollary	logische Folge

9 Sources

https://www.psychologytoday.com/blog/your-brain-food/201102/sleep-and-dreams
http://psychology.about.com/od/statesofconsciousness/a/SleepStages.htm
http://psychology.about.com/od/statesofconsciousness/p/dream-theories.htm
http://en.wikipedia.org/wiki/Dream
http://en.wikipedia.org/wiki/Lucid_dream