

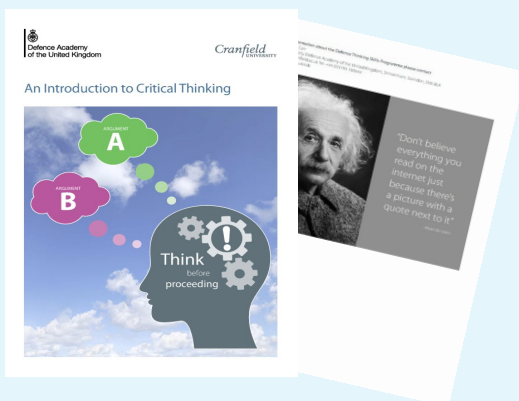


September's edition of the newsletter explored brain development and the affects of ageing on cognitive ability. In this month's edition of the newsletter we examine sleep and its importance in learning and memory.

THINKING SKILLS PROGRAMME: NEWS

New publication: *An Introduction to Critical Thinking*

This short booklet by Dr Michael Dunn offers an easy-read overview of an important thinking skill for evaluating an argument. Critical thinking is an approach based on reflective testing and analysis of the validity of a conclusion or the justification for an inference. It helps protect you from accepting fallacies and you can use it to build strong arguments. This skill is an indispensable element in a comprehensive suite of thinking skills that should be deployed according to the needs of the situation.



The booklet is available on the Thinking Skills VLE.

Coming soon! *An Introduction to Systems Thinking* by Jeremy Hilton.

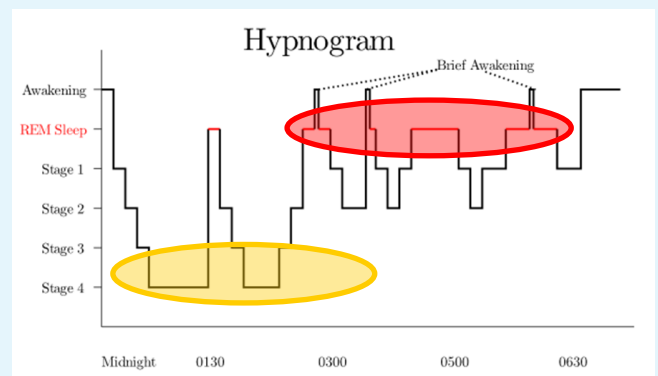
SLEEP

“Learn—Reward—Nap”. This is one way in which we can use sleep to enhance our ability to learn. Read on to understand how sleep affects our brains.

WHAT IS SLEEP?

Sleep is driven by oscillations and rhythms; different areas in the brain and brainstem are important in the control of our sleep-wake state. When we sleep, different types of sleep occur in cycles. There are 2 main

types of sleep, these are: rapid eye movement (REM) and slow wave sleep (SWS). SWS is 5 times longer during the early stages of sleep than late stages. Whereas REM sleep is twice as long in the later stages of our sleep¹. This means that the longer we sleep, the longer our periods of dreaming (which occurs during REM sleep). One of the many features of sleep is paralysis in REM sleep to reduce levels of muscular activity during dreaming (to help prevent us from acting out our dreams/sleep walking)². The full function of sleep remains elusive, however lots of hypotheses have been proposed including: energy conservation, brain thermoregulation, brain detoxification, that sleep has implication on brain plasticity and that sleep is favourable for learning and memory in the adult brain³.



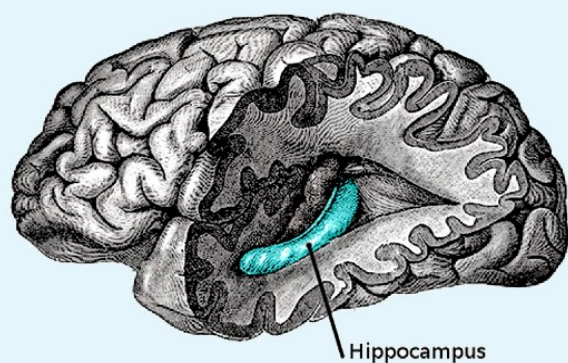
A. Hypnogram: shows typical sleep cycles. Stages 1-4 are progressively deeper sleep, the yellow oval showing slow wave sleep (SWS) and the red oval showing Rapid Eye Movement (REM - dreaming) sleep.

ADVANTAGES OF SLEEP

Recent research suggests that sleep not only protects our memories from being forgotten but also makes them easier to recall⁴. Different types of memory and learning benefit depending on the phase of sleep. For example, declarative memory (type of long-term memory that can be consciously recalled such as facts and verbal knowledge) improves more during SWS phases of our sleep. Whereas procedural memory (long-term memory on how to perform certain procedures, such as walking and talking) improves more during the REM phase of our sleep¹.

It is commonly thought that sleep processes help to consolidate what we have just learnt. This mainly involves helping an area of the brain called the hippocampus to convert new learning into long-term

memory. Recently learnt material is vulnerable to interference and disruption from other on-going mental activities, so it is important to have a period of reduced mental activities in order to retain learning⁵. Reduced mental activity occurs during the SWS phase of sleep but can also occur by other means, like wakeful rest⁴. So a relaxed, unoccupied mind can be helpful if sleep is not possible. However, sleep deprivation (depending on the phase of sleep interrupted) impairs learning.



B. Illustration of the brain showing the position of the hippocampus.

MAXIMISING YOUR MEMORY

When learning new skills and information, how can we improve our memory to be able to remember and recall information better?

Firstly, sleep is important. Brief awakenings will not cause problems but in general around 3 hours are needed for consolidating knowledge followed by a further 2 or 3 hours to achieve enough 'dream sleep' to help build new skills.

Secondly, recent research shows that by combining 2 different methods we make the most of our learning processes⁶. Combining rewards with naps has been shown to enhance learning. An 'effective' nap should be 20-30 minutes. This allows SWS to occur for consolidation of recently acquired facts; but it avoids the start up of any REM sleep so you don't wake up feeling 'groggy' but feeling refreshed. A reward that is contingent on successful learning adds contextual information about that memory (e.g. "If I remember everyone's name, I'll have a free lunch"). This can contribute to an increase in confidence about recalling that information. Therefore, during sleep, that new skill is consolidated more compared to that of information with a lower reward. This means that the memory associated with the reward will more likely be transferred to long-term memory.

REFERENCES

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- ^ARazer, M. (2011) Available at: https://commons.wikimedia.org/wiki/File:Sleep_Hypnogram.svg
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TEASER SECTION:

ANSWER TO JULY'S TEASER

If Neil and Diane grow leeks,
Alec and Lisa grow carrots
and Jacob and Chloe grow beans.

Do Tom and Andrea grow courgettes or marrows?

Answer: Marrows. The last letters of the two names are the first two of the vegetable they produce.

THIS MONTH'S TEASER

What number should replace the question mark?

42 --- 170

93 --- 840

18 --- 26

54 --- 274

67 --- ?

Find the solution in next month's edition.

GOOD LINKS TO LOOK AT:

A repository, Think! Evidence, is available with access to literature of interest to Thinking skills. To take a look visit: <https://evidence.thinkportal.org/>

CONTACT US:

If you've enjoyed reading this and wish to be added to the mailing list or have any general feedback, please feel free to contact us (defac-tsp-admin@defenceacademy.mod.uk)