# GUIDELINE

*for teachers*

*To provide children with basic knowledge about the brain, and how this knowledge can improve their ability to learn (in class)*

**Teaching Kit – new edition**

**May 2021**

# CONTENTS

# PREFACE: WHY DO WE TEACH COGNITIVE NEUROSCIENCE IN CLASSROOMS?

The 21st century brings about an increasingly complex environment and children are confronted with a high load of information, distraction and temptation. At the same time, children are more and more expected to be autonomous in navigating this environment and regulate their own behaviour and the learning processes. For this reason, strengthening of the so-called '21st century skills' such as self-regulation has been put high on the Dutch national agenda for research and innovation in education.

Self-regulation and other '21st century skills' rely upon the understanding and manipulation of basic cognitive functions. 'Cognitive neuroscience', the science of the brain and cognitive functions should therefore play an important role in the development and implementation of 21st century skills. While relevant new research questions are being formulated, there is already a wealth of knowledge on cognitive neuroscience ready to be used. This knowledge could aid children in strengthening their self-regulation skills and thereby optimize learning.

- Knowledge about the brain's basic biology and cognitive functions such as learning, memory and attention provides the foundation for understanding how these functions can be regulated and optimized.
- The so-called 'executive functions' (inhibition, working memory, and cognitive flexibility) are involved in higher order or complex cognitive skills such as problem-solving, planning, reflection, and self-regulation. Understanding and training the executive functions could help improve these skills.
- To optimize learning it is also important to address which conditions affect the brain and indirectly cognitive function. Stress and emotions, but also food, sleep, and exercise all have a significant impact on the brain and on learning.

**With the Teaching Kit we aim to bring together the existing knowledge about the above topics from cognitive neuroscience and present it in child-friendly way so that children can use it to optimize their self-regulation and learning. Using cognitive neuroscience to ultimately optimize self-regulation and learning comes in three steps, which are all addressed in the Teaching Kit.**

## 1. To perceive

To be able to regulate the cognitive states involved in learning, children first need to be able to perceive these cognitive states. Therefore, we give pointers on how to recognize for example emotions, stress and a distracted mind.

## 2. To understand

We introduce new concepts and increase understanding of how the brain and cognitive functions work through comics, tales and games. Increased understanding of how the brain works will help children understand why some behaviours or strategies are more beneficial to their learning than others. This will increase their motivation to regulate these behaviours or encourage them to try out new strategies.

## 3. To regulate

We propose practical strategies and exercises to learn how to regulate attention, memory, stress, emotions, and practice executive functions. Furthermore, we provide tips on which conditions (sleep, food, exercise) will help optimize brain functioning and learning. All exercises and tips are based on recent scientific evidence.

# CHAPTER STRUCTURE

The teaching kit consists of six chapters, each covering a different topic in contemporary neuroscience. Each **chapter** is organized in the same way, consisting of three main parts. Chapters are composed of:

1. a ***Foreword***, which consist of a brief introduction of the topic of the chapter and its relevance in the context of "learning how to learn".
2. two to four ***Sessions,*** that represent about one hour activity in class. They are progressive, starting with more introduction, discovery, presentation of the neuroscience knowledge and, for the last session, practical application and tips to improve or train skills.
3. a ***Background information*** part where you can find more information to help you, as a teacher, better own the topic and answer question and relevant web links or reference to book about the chapter topic if you want to explore it further.

Each **Session** is also build with a specific frame:

1. the learning goals of the session, that you can announce to the children
2. session details, presenting what form of teaching is used and what material/annexe need to be used in this session, you can find digital version of the material (comics, template …) of each session in the folder with the number session
3. instructions of the activities (phase)
4. a take-home message that is specific to each session and describe also what the children can collect in their personal notebook across this session activities.

Following is a list of all chapters and sessions:

1. Neurobiology
    - S1: Discovering the brain: function and role
    - S2: Neurons
    - S3: Communication and Learning
2. Memory
    - S4: Different type of memory
    - S5: Working memory
    - S6: Tips from a memory champion
3. Emotions
    - S7: Emotions
    - S8: Emotion and memory
    - S9: Emotion regulation and cognitive reappraisal
4. Attention
    - S10: Attention
    - S11: Controlling the attention
5. Stress
    - S12: A stressful situation
    - S13: What is stress
    - S14: Mindfulness practice
6. Higher cognitive function and overview
    - S15: Basic executive functions
    - S16: Higher executive functions
    - S17: Needs of the brain

# INTRODUCTION

SESSION 0

## INTRODUCTION

**About**

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|---|
| **Learning goals**<br>This session is an introduction to the program.<br>The overall aims (perceiving, understanding, applying) are presented. |
| **Why?**<br>This will help set the mental map that will build on previous knowledge that students have about themself and their brain. |
| **What?**<br>The different types of context and stories associated to understanding (maya family - show image of each character) applying (bird academy - comic) are presented. |
| **How?**<br>Discussions, entire class<br>Individual or full class reading |

## Description

### PHASE 1 (10MIN) – AIM OF THE PROGRAM

You can summarize the foreword depending on the age of children and what would motive them most.

## PHASE 2 (20 MIN) – DEFINING INITIAL KNOWLEDGE

The aim of phase 2 is to inquire about students' initial knowledge. Particularly, you are encouraged to ask students about what they already know or think they know about the brain and take notes of their answers.

This exercise is very useful as after you have used the kit you will be able to come back to their initial state of knowledge and compare it to their end knowledge. This will enable you to evaluate how much students have learnt throughout the course.

If you indeed want to track the progression of students' learning for each chapter, then we suggest you to organise the notes about the knowledge of students in the following categories: neurobiology (content of the brain, organization …), cognitive function (memory, emotion …) and others.

Here are some questions to ask and guide this initial knowledge definition:

what do you need in your body to learn?

what do you use your brain for?

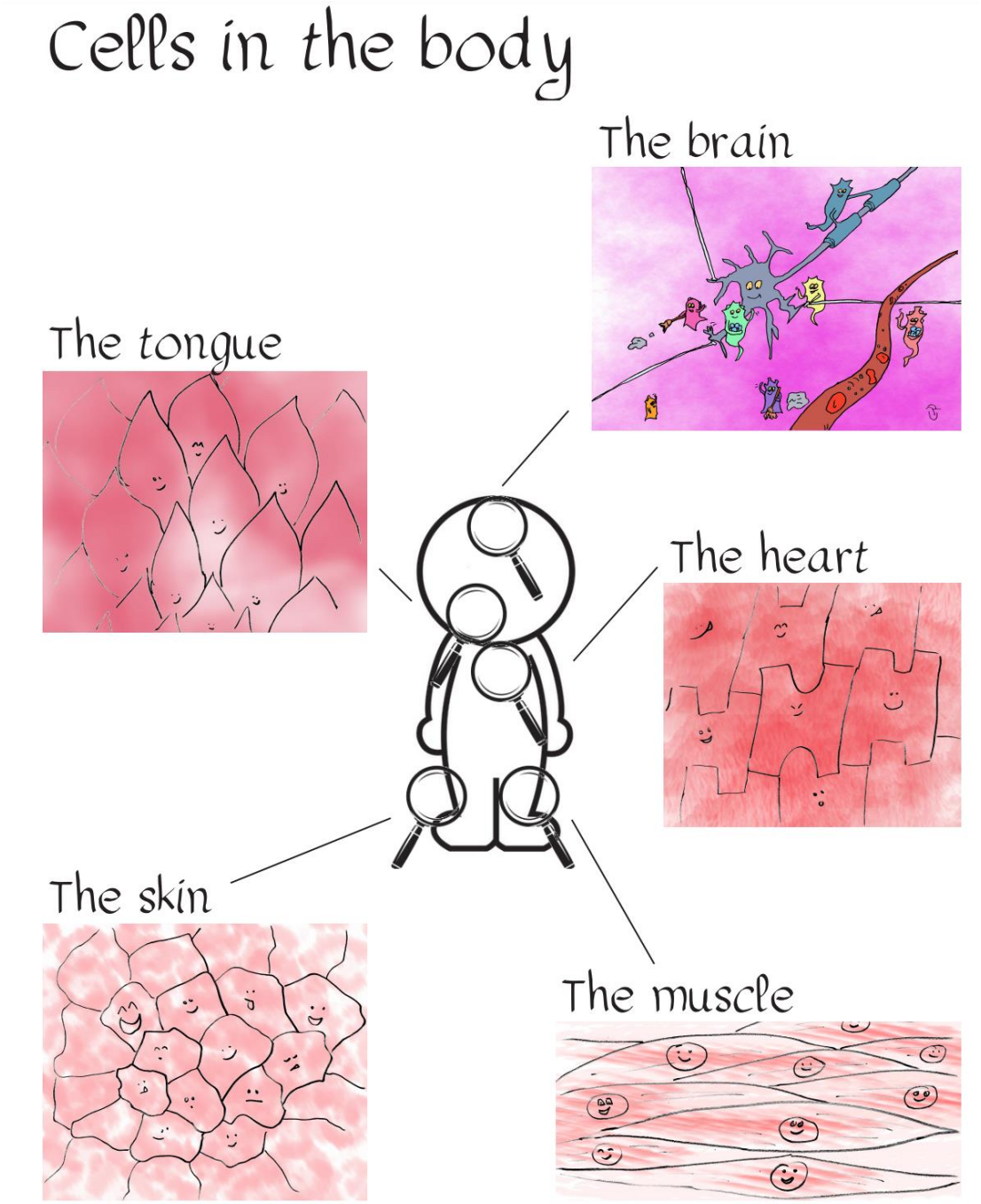
How does the brain do these things?

## PHASE 3 (10 MIN) - MIMI THE MICROGLIA AND MAYA'S FAMILY

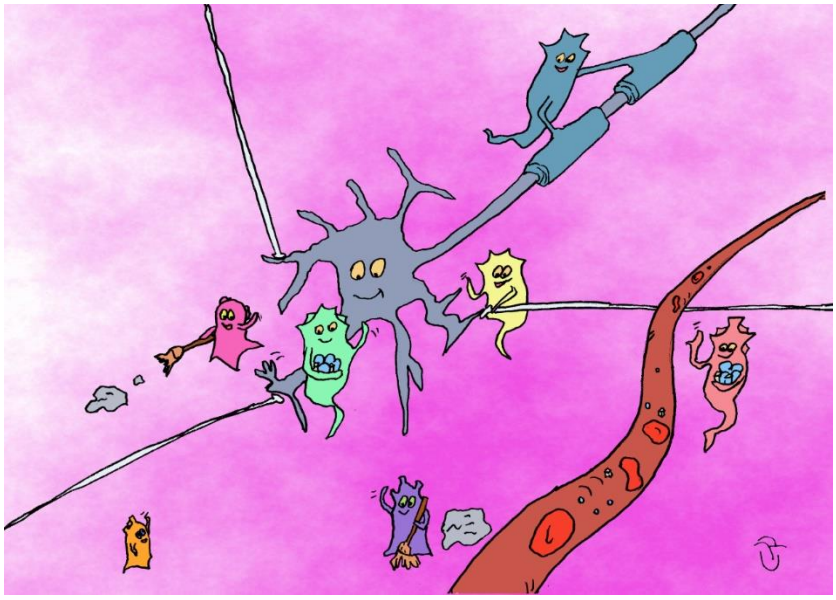
Explain to students that as they will be progressing through the chapters on different brain related topics, the corresponding content of the chapters will be introduced to them by some fictional characters.

Topics related to cells in the brain and their functioning will be guided by Mimi, a little brain cell. If students don't yet know what a "cell" refers to, you can explain to them that they are basic components of the body and that they exist in hundreds of types depending of the location and the

function in the body. You can also show them the drawing of cells that you can find in the material (poster : “cells in the body”).




Show the picture “the brain society” from the material and indicate Mimi, explain that they are multiple types of cells in the brain and they will discover their function.



There is another character that will accompany students on their explorative journey, that is Maya and her family. You can, again, show pupils the drawing of Maya's family, which you can find in the "Supplementary material" section of the kit.

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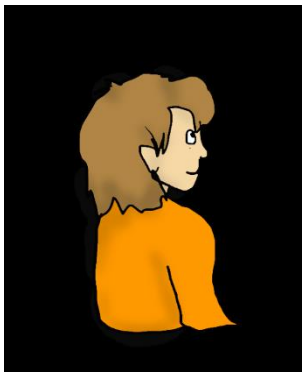
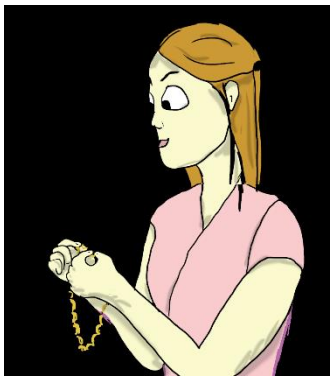
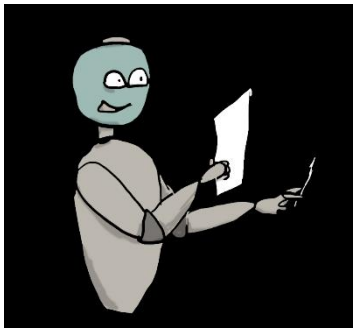
|  | Maya: she is a little girl in primary school, and she likes solving problem and working on building robot with her Grand ma but has trouble learning efficiently her lesson |
|  | Nico: He is the big brother of Maya and attends high school. He likes doing art, reading, and playing video games but he has more difficulty with solving complex problems, also he is very creative. |

| | |
|---|---|
|  | Mother: She is a working woman in a healthcare center, highly active and she has difficulty maintaining a routine as her working hours are very variable. |
|  | Grand ma: She is a retired engineer and continues creating machines and repairing all sorts of things at home. She enjoys showing her knowledge to Maya who shows curiosity in how things work. |
|  | Robi: it's a robot that Grand ma built to help take care of little tasks at home and released Mother from some chore. He is also able to research the internet and read scientific articles in order to advise on best practice and provide appropriate knowledge to everyone. |

## PHASE 4 (20 MIN) - THE BIRD'S ACADEMY

Explain to students that when it comes to practical knowledge that they will be able to apply, most of activities will take place in the bird academy. Why a bird academy? Let them read or display and read out loud the bird academy introduction comic.

| **Written record:**<br>**notes from phase 2** |
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# CHAPTER 1

## *Neurobiology*

## Take Home Message

In this chapter we begin with exploring what the brain is and how it works. We demonstrate that our brains have the same basic structure and perform the same cognitive functions. We start by challenging a common misconception that some children 'just don't have the brain for it'. The average brain is organized to perceive, plan new actions and thoughts, as well as integrate new information. In other words, our biology doesn't differ much. That is why, we can all learn to regulate our emotions, thoughts and behavior. Everyone will do these slightly differently due to the individual differences but important to remember is that everyone has the same capacity to learn anything.

Once children understand this, they need not worry about being more or less competent in relation to someone else, but to only focus on themselves.
We also explain similarities in cognitive functioning by explaining how the neurons work. There are different types of cells in the brain. Neurons are brain cells that form connections with each other. A larger set of interconnected neurons is called a 'network'. The neurons are constantly active in sending and receiving messages (information) within these networks and together all this information forms everything you see, hear, think and do. Neurons try to communicate as efficiently as possible by, improving and strengthening their connections with each other. This improvement is, in fact, the base of learning. So, this means that everyone is able to learn a new skill or deepen their understanding of a topic because this is what neurons are made to do. Furthermore, it's what our brains are doing all the time,be it making adjustments to an existing concept, being more precise with throwing a ball, or making corrections on grammatical structure.
We want to get across the message that we all have the necessary basic functions that enable us to learn and adapt. We want to show the children who believe that they were brought up in a less encouraging and privileged environment especially that they can learn equally well as anyone in their classroom. Even if at the start, it seems that one ability (physical or mental) is easier to learn than another, every brain is plastic and able to learn and improve. Practicing will always result in improvements.

SESSION 1

# DISCOVERING THE BRAIN: ITS FUNCTION AND ROLE

## About

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|---|
| **Learning goals**<br>• discovering the brain cells<br>• making a link between behaviour and brain activity |
| **Why?**<br>It's the basis of understanding learning mechanisms, what composed the brain as a building blocks of cognitive functions. |
| **What?**<br>• Tale: Mimi the microglia<br>• Puzzle of the brain<br>• Paper board, black board or a large sheet of paper allowing multiple people to make notes. |
| **How?**<br>Two half classes, or one full class |

## Description

### PHASE 1 (10 MIN) – INITIAL KNOWLEDGE

Have children express their ideas about the brain. Children can write on paper, on the board, on a tablet, or give their answer–by raising their hands up-to the following questions:

- Where is your brain?
- What is it made up of? (possible answers: water, cells, fat)
- What is it doing?

- If you did not have your brain, would you have difficulty with certain behaviour or actions?

If ideas are not directly shared with the whole class, make sure to collect all answers afterwards to make them available for everyone.

## PHASE 2 (10 MIN) – BRAIN PUZZLE

Teacher can ask children "Would you like to know if your ideas about the brain were correct? Would you like to learn even more about the brain? Let's play the brain puzzle!

## PHASE 3 (20 MIN SHORT VERSION, 45 MIN LONG VERSION) – TALE "MIMI THE MICROGLIA"

Read the tale: Mimi the microglia.

Short version: p. 1-28 + 37-38 + 47-54 + 71-77

In next session, various concepts introduced in this tale will be used and elaborated.

After reading, propose to children to draw the cells that you learnt from the tale. There are different types e.g., neurons, glial cells: oligodendrocytes, astrocytes, and microglia. N.B. There are different types of glial cells, with different functions, but this is not necessary for the children to know.

## TAKE HOME MESSAGE

There is multiple type of brain cells, they have different role. The principal cells for communication of information are the neurons and mainly, other cells are support cells, they are the glia.

**Written record**

**Individual answers to the questions about the role of the brain.**

**Drawing of the cells that you learnt from the tale.**

SESSION 2

# NEURONS

## About

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|---|
| **Learning goals**<br>• Learning about neurons and appropriate scientific vocabulary to describe them. |
| **Why?**<br>Neurons communicate and exchange information, this is the basis of cognition and what can be fashioned during learning processes. |
| **What?**<br>• Neuron game and explanation<br>• Comics about the different brain cells |
| **How?**<br>Individual and group work. |

## Description

### PHASE 1 (5 MIN) – RECALL

Conclusions from session 1 are repeated:

- With our brain, we are able to think, talk, walk, and do many different things.
- In the brain, there are many different cells that work together, the one type of cells that send information across the brain are called neurons.

## Phase 2 (15 min) – Let's focus on neurons

Conversation between teacher and children while presenting a neuron (one of the parts from the Neuron-shape game).

A neuron from the game is showed: What is it?

- A neuron - a cell that is in our brains

Describing four different parts of the neuron:

- hair-like: dendrites
- head-like: soma
- long arm as an axe: axon
- finger-like structures at the end of the axon: axonal terminals

How many neurons do we have in the brain? More than 100 million (~ 100 billion (100,000,000,000) neurons)

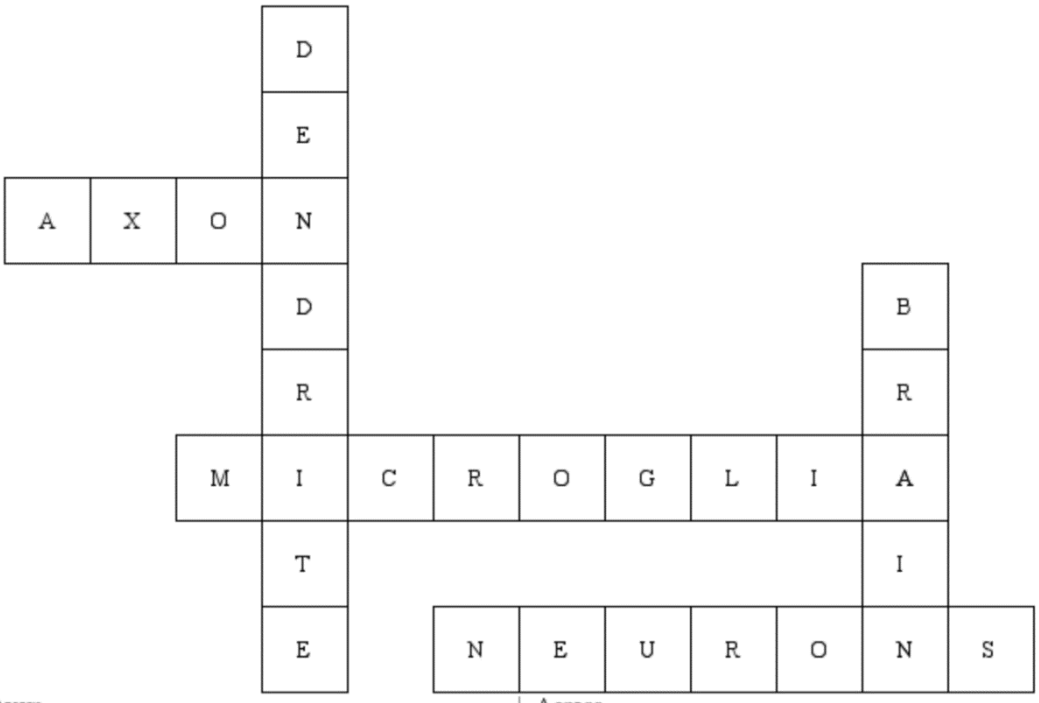
## Phase 3 (15 min) – Draw a neuron

Draw a neuron or make a shape of a neuron with e.g., modelling clay, play-doh, and name the four different parts.

## Phase 4 (25 min) – Comics

Read the comics mimi the microglia, all 4 episodes.

After reading the comics, let children filled in the cross words




Down

1. part of the neuron that receive information from other neurons

3. organ where these cells live and that is located inside the head

Across

2. part of the neuron that sent information

4. cell that clean the brain

5. cells that exchange information, most famous cells

## TAKE HOME MESSAGE

Neurons have a specific shape that enable them to send and receive messages. They make networks by connecting to each other. Their axon, that send information, can have (more or less or even not at all) myelin, that help the information to go faster.

**Written record**

**Comics about Mimi the microglia**

**Crosswords with definition**

SESSION 3

# COMMUNICATION AND LEARNING

## About

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|---|
| **Learning goals**<br>• Familiarising with the concept of electrical signalling and chemical synapses.<br>• Learning that neurons connect with each other and create synapses. |
| **Why?**<br>To understand that during learning when we learn we are making new synaptic connections. |
| **What?**<br>• Comic "Plasticity and learning"<br>• The neuron game (with accompanying explanation, see session 5)<br>• you will need a bike lamp |
| **How?**<br>Individual and group work. |

## Description

### PHASE 1 (25MIN) – COMMUNICATION

Use the neuron game.

Can you identify different cells from the comics and the Tale while playing the neuron game?

A network

Let's take more than one neuron (puzzle pieces fit together)

Can you connect them together? What do you notice about the neuron shape? Can you see how two neurons fit together to make a connection?

Can you connect hair-like part to another hair-like part? (Answer: No, you can not connect dendrite to dendrite) Do you need a specific orientation to make a connection? Which one? (Answer: axon terminal to dendrite)

Great, so let's connect all of them together - let's make a network. Note, this network does not have to be in a shape of a horizontal line, the connection can come full circle.

Information transfer: Electrical signal

Now, the neurons can send signals to one another. In this signal, information is carried.

Teacher:" Do you remember in the comic what type of message/information/signal is that? "

Teacher can take a bike lamp (if there is one available) and use it to mimic the electrical signal that passes over the network. (Importantly, this should be done in the following direction: dendrite -> soma -> axon, then moving on to the next neuron).

Children need to recognize the idea of the "electrical signal".

Optional: Children follow the teacher as he/she goes through the network by having them repeat the parts of the neuron after the teacher.

While making the network, each child can hold one neuron and when the light arrives at his/her neuron, he/she can take the light and make the light to pass it down through the neuron he/she is holding.

Afterwards, the child passes the light to the next child, who is holding the next connecting neuron.

Information transfer: Chemical message

Teacher asks children if they remember from the comic that they read, if aside from the electrical signal there is another important part of the neuron, that is involved in information transfer. This part is the axon terminal, the neurons were releasing little molecules: the neurotransmitters.

The electrical signal that goes along the neuron's axon triggers the release of the chemical message at the axon terminals. This message is passed on to the next neuron to which it is connected. To demonstrate this chemical reaction, the teacher can use a ball full of pearls and scatter them at the axon terminal. Alternatively, a bell can be used, by making it ring when the signal arrives at the axon terminal.

Both of these activities (with the light effect and the sound effect) can be used by children.

Then, the same activity as described above can be performed again but now with both items: the bike lamp and the sound effects, and then can be passed to next child.

## PHASE 2 (25 MIN)– LEARNING

Use the comic about Plasticity and learning

Activity 1 - Synapse (reminder from previous sessions):

When dendrites and axonal terminals connect, they make a synapse. So, information is transferred between neurons.

Each neuron is linked to around 10,000 other neurons, which means there are more than 1 million synapses in the brain. That is a lot of connections, can you imagine that?

Activity 2 - What is learning? (discussion)

This phase is aimed to provide discussion about the brain:

- From where does the information arrive to the brain? (Answer: by the senses) Where is the beginning of the information that goes to the brain?
- What is this information?

The brain is collecting information perceived by the senses. Information is transferred from neuron to neuron: this is how information is processed in the brain.

Do you remember where the information goes in the brain? The brain puzzle can be used to present an example. Imagine, we want to cross the road, so we look if any cars are coming. If we see a car, the information goes to the visual cortex, which is then passed to two regions: the parietal part of the brain to define the spatial information (where is the car) and the temporal part to define the content information (what am I seeing? = a car). If there is no car coming and the light is green, in frontal part of the brain the decision is made to cross the road and sends the request to the motor cortex that sends an order to the muscle/body.

For this information to be transferred, lots of neurons inside each of the brain areas that were mentioned are used.

Information is kept as a code between neurons.

If new information arrives, a neuron will need to create a code to stock it, this can be done by creating one or more new synapses.

## PHASE 3 (10MIN)– READ COMIC ABOUT PLASTICITY IN THE BRAIN

The forest metaphor is used to explain the change of connections neurons. N.B. For children who are under 6 years old metaphors it can be are difficult to grasp and link to the initial idea that is being illustrated.

- Imagine, in the beginning, there is no path in the forest
- So, we make one. Then we use the same path or make another one. Over time, one of these new paths ways gets more and more visible (becomes more cleared) because we have used it more often
- The paths that are not used often return to their initial state, (not easy to walk through them), whereas the ones used often become even more clear over time.
- The more we use a path, the easier it is to use it.
- If we stop using it, the vegetation state comes back

The path in the forest is the knowledge that gets printed/coded in the neural networks. The connections (intersections between paths) become stronger as we use them more. Just like in the forest, if we stop using the connections then they get weaker.

This means that it can be difficult to enter the forest for the first time, e.g., new concepts are hard to learn. However, once we have learned it and we continue to study the subject, then it gets easier and the knowledge can stay in our brains. So, knowledge and lessons need to be repeated more than once to be sure that the brain networks that help us remember this information become stronger.

Learning is the changing of networks by strengthening or weakening synapses in the networks.

Important: In general, there is no predetermining factor of whether someone is good or not at a certain activity. We are all able to learn because we all have neurons in the brains, and they all work in the same way, they create code to stock information.

## TAKE HOME MESSAGE

Learning is a creation of connections between neurons and, so it is changing the networks in the brain. Existing connections in the brain can be strengthen and/or new connections can be created, when the information is important and often used. Accordingly, if there is

information that we do not need, or do not use often, then the connections involved in this information may disappear.

**Written record:**

**At the end of the session children can draw two or more neurons connected to each other, as well as the electrical signal and chemical transfer, with a description of each part of the drawing.**

# CHAPTER 2

## *Memory*

## Take Home Message

Memory is the base of learning. The knowledge that we acquire is stored in our memory, in our brains. By understanding how memories of information are formed, how information is maintained (remember the phrase "don't use it, you lose it"?), and how information is retrieved for use, can help us become better learners. Having a good foundation for how we learn and memorise means that we will not be wasting the efforts of educators who spend countless hours planning and teaching classes, and correcting homework.

**1) on the importance of testing one's memorization**

Believing that we know is not knowing. First, the illusion of knowledge is very strong. We need to verify that the knowledge is there, by testing it. Memorizing is made of three mechanisms: encoding, storing, recalling. By reading a lesson, we activate the same mechanisms that when the information entered the brain the first time. The information is encoded, we have the feeling of knowing. But recalling the information without having it in front of the eyes is difficult, because we need to make sure that it was successfully stored and that we know how to recollect this information.

**2) on the importance of revising**

Storage of information decreases with time, it's a normal forgetting process. Even if on the day of the exam we knew everything very well, it's important to revise information regularly to keep them active and retrievable, so we can use these information in another context in the future.

**3) multiple type of memory**

To test or revise information should be done away from the first learning time, to maintain and update information in the long term memory.

However, learning and testing immediately after presenting the information is very useful for highlighting and summarizing the most important information and their links. This time however relies mainly on working memory. Knowledge that is stored in short term memory will be soon replaced by new one and will still never enter the long-term memory. So it is important to study this information at home, which will strengthen the long term memory.

SESSION 4

# DIFFERENT TYPE OF MEMORY

## About

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|---|
| **Learning goals**<br>• Find out what memory is, why we need it and how it works. |
| **Why?**<br>There is more than one type of memory for different information and activity. Training them independently is important. |
| **What?**<br>• Paper board, black board or a large sheet of paper allowing multiple people to make notes.<br>• Memory system comic |
| **How?**<br>Small groups |

## Description

### PHASE 1 (30 MIN) – "DISCUSSION HOUSE" (ALSO KNOWN AS WORLD CAFÉ)

Let's play a game called "Discussion House".

Create five groups with an owner of a 'discussion house'. During the game the role of the owner is to stay at the table, whereas the rest of the class is going to change location from one 'discussion house' to another.

(1) The rest of class will join the discussion houses. Either by themselves or by designation of the teacher.

To make the game more exciting, you can prepare a flag or have each owner of a house wear a hat in different colour.

(2) The class is asked a question, to which they need to provide a response.

(3) The owner starts with: "Welcome to my discussion house".

The discussion will last 5 minutes and notes can be made accordingly by the listeners.

After 5 minutes, the owner ends the discussion while the “audience” (the rest of class) moves to a new house. Children can be grouped and told to move in groups, or each child can independently choose a house of interest. You should ensure that there are not too many listeners at any one house.

Each owner will welcome a new group and explain quickly what had been said with the previous group, and the discussion starts again.

The game is stopped after the third run (not all houses will be visited).

Children move back to the centre while owner re-tell what they said in each round. The teacher summarises the responses of the three rounds.

Next round: Another question is asked and the activity starts again.

Depending on how much time this takes, one, two or three questions can be addressed.

**Aim:**

To illustrate variability and the possibility to the exchange of personal experiences. Learn to take notes, learn to have a synthetic/synoptic thinking, listening to others. Get to know that discussions with others enable creative thinking and creation of knowledge.

The following questions (with a funnel effect, going from basic to in-depth questions) can be asked:

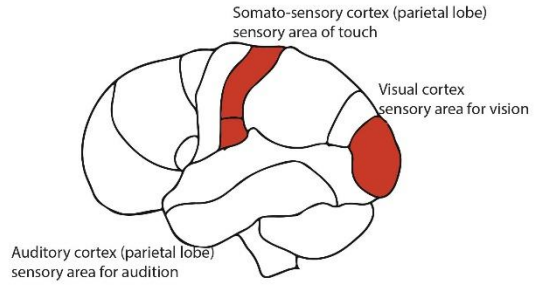
Question 1: What is memory? When did you encounter knowledge/information about memory?

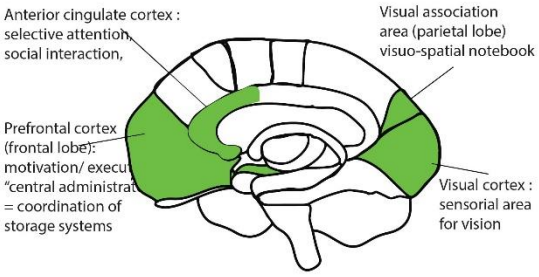
Question 2: What do we use memory for? When do we need memory?

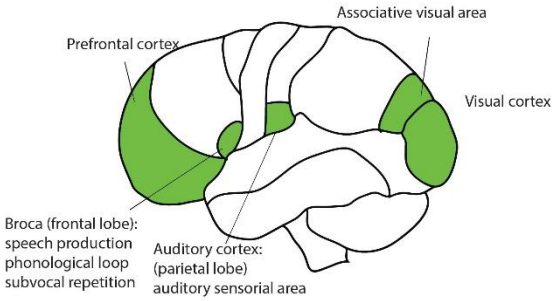
Question 3: What can affect the memory? When does it fail?

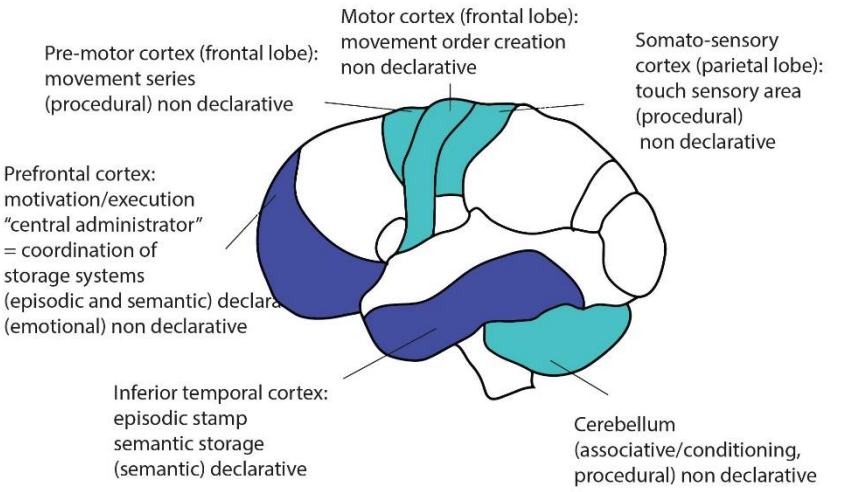
## PHASE 2 (15 MIN) – READ THE MEMORY COMIC

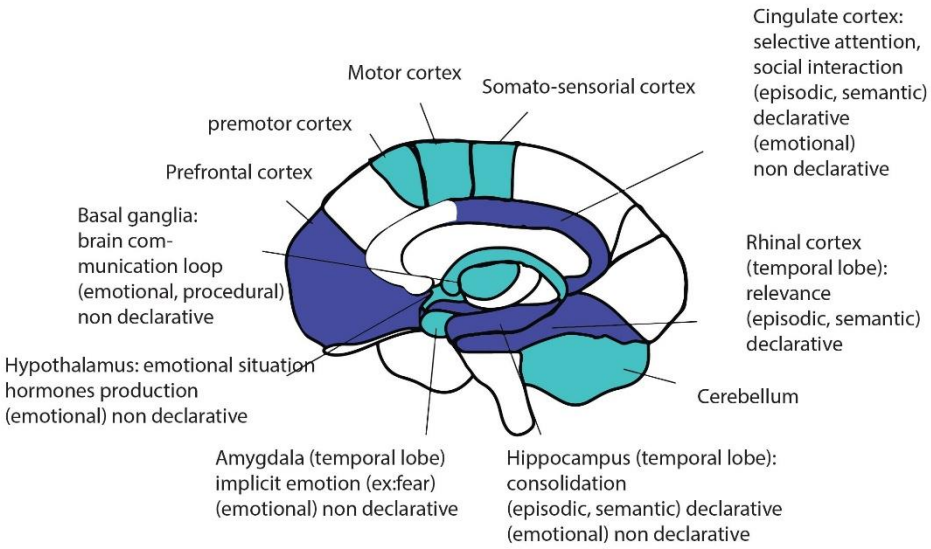
More information about the neurobiology:



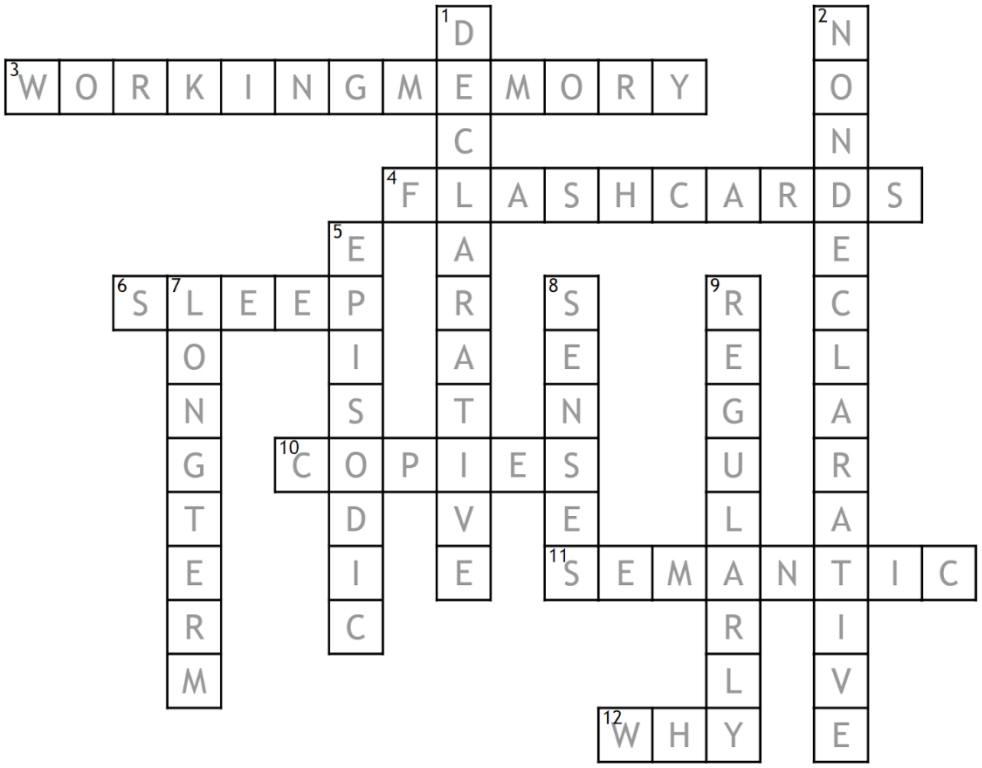






## PHASE 3 (15 MIN) – POST READING ACTIVITY

Students answer the crossword. You can help them by giving some letters away if the activity is too difficult.




**Across**

**3.** Which memory helps you keeping information in order to solve a problem you're trying to solve?

**4.** To help memorize, you can study couple of time using ..... .....

**6.** To help memorize, you need to ..... a lot enough to help your brain to be on top of itself

**10.** To help memorize, you can give your brain different ..... of the same information

**11.** The declarative long term memory where you can find all the things that you learn in class

**12.** To help memorize, you can answer a lot of question "..."

**Down**

**1.** The name of the long term memory that you can explain with words

**2.** the name of the long term memory for things that you can't explain with words

**5.** The declarative long term memory where memories of situations you've passed through in the past are stored

**7.** There are two type of memory: the short term memory and the .... .... memory

**8.** The short-term memory is the memory of the .....

**9.** To help memorize, you can study .....

## TAKE HOME MESSAGE

There are multiple types of memory: short versus long term memory

- Short memory can be sensory or working memory

- Long memory can be declarative (i.e. you can talk about it) or non declarative (e.g. motor memory)

Information goes from short to long term memory. Strategies can be used to help the transfer.

**Written record:**

**The comic can be kept and a diagram of the different types of memory can be drawn for written record.**

SESSION 5

# WORKING MEMORY

## About

| |
|---|
| **Learning goals**<br>• Discovering the limits of working memory<br>• Learning strategies to improve it |
| **Why?**<br>Working memory is engaged in all activities that are done in the classroom and can be trained. |
| **What?**<br>• Document with the item to memorize in the different exercise<br>• Comic about working memory |
| **How?**<br>Experiments, reading, discussion in full class |

## Description

### PHASE 1 (2MIN) – DEFINITION

Working memory allows us to hold information temporarily to make it available for processing. For instance, it allows us to remember a new phone number while dialing it or to remember our opponent's last move while playing chess. **Working memory refers to the ability to *manipulate* the stored information.**

### PHASE 2 (10MIN) – PHONE NUMBER GAME

Teachers should present students with a list of 10 digits (phone numbers), and see if they can remember them. We advise that they give students a

couple of minutes to study them. Count how many students succeed to memorize the 10 digits on each list.

| Number | Performance |
|---|---|
| 5213919356 | |
| 1236782345 | |
| 2226667777 | |
| 2351231348 | |

EXPECTED RESULTS & SOLUTIONS

| Number | Performance |
|---|---|
| (521) 391-9356 | This one should be the hardest given that all of the numbers are random. But, chunking them as shown on the left could help. |
| (123) 678-2345 | This one should be easier once the numbers are chunked since they follow a specific crescent order that students are *familiar* with. (123), then (678) and then (2345). |
| (222) 666-7777 | This one should be the easiest since the numbers are easily chunked by similarity. |
| (235) 123-1348 | This one is hard, but easy if the pattern is realized. Recognizing this pattern is a harder exercise of working memory than recognizing common features. Here, 2 + 3 =5, 1 + 2 = 3 and 1 + 3 + 4 = 8 |

POST-GAME DISCUSSION

This game highlights the importance of chunking and how it is easier to keep 3 items in mind than 10. It also shows how working memory helps with the identification of patterns.

## PHASE 3 (10MIN) – REHEARSAL GAME

Teachers should present students with a sentence or a sequence of numbers. After having the students repeat either the numbers or the sentence a couple of times (less than a minute), the teacher should ask the students to count backwards from 30 by 3 (30, 27, 24, 21 … 0). Upon reaching 0, students should be asked to recall either the sequence of numbers or the sentence. Counting backwards will occupy their working memory and interfere with their ability to remember the sentence or the sequence of numbers.

ACTIVITY

Number Sequence: 5408359810

Sentence: The intelligent boy got to school in the morning after swimming in the lake.

POST-GAME DISCUSSION

This game tests each students' working memory capacity. Students should have difficulty remembering the sentence and the number sequence. Remembering the sentence might be easier since the interference is being done with numbers (counting backwards). Given the category difference between numbers and letters, it might be easier to recall the sentence. This game also illustrates the interaction between attention and working memory since students will switch their attention from remembering the sentence or number sequence to counting and this will interfere with their memory.

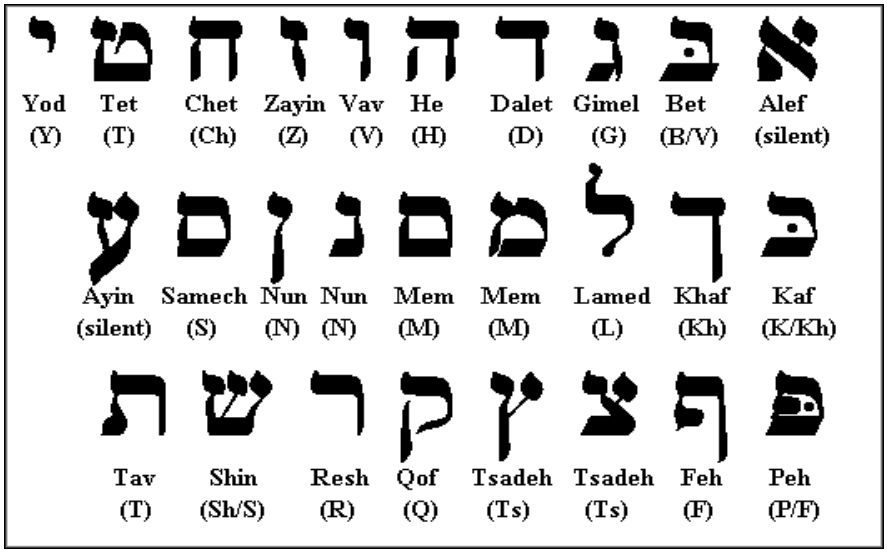
## PHASE 4 (5MIN) – THEORY: SPAN

Given how easy it is to forget parts of a phone number, it is not surprising that working memory has a limited capacity - a limited amount of items that can be held in memory. It is generally thought that people can hold between 7 +/- 2 in their working memory. This is why **chunking** functions as a technique. By grouping numbers when dictating a phone number, such as (201) 123-4567, this creates 3 "items" as opposed to 10 individual items. We are able to hold 3 items in our working memory, but are unable to hold 10. We are able to keep these items in our working memory by **rehearsing** and we can easily forget them if something else **interferes** with our rehearsal of them since this is only a form of temporary storage. For example: we might be rehearsing a phone number, but if we are distracted by the TV, we can look away and then will forget the phone number.

## PHASE 5 (10MIN) – SYMBOL GAME

Students should be introduced to a new "alphabet" that they do not have familiarity with. For example, the Hebrew Alphabet can be used. The classroom should be split up into two groups; one group will just have students say the alphabet and the other group will learn the alphabet with multiple senses. The purpose of this activity is to see which group will remember it better.

ACTIVITY




**Group 1:** Students should be taught to repeat "alef, bet, gimel, dalet, he, vav"

**Group 2:** Students should:

draw the alphabet letters

repeat the sounds of the letters

listen to other students say the letters too

Students should then be tested on who can better repeat the sequence of letters. If this proves to be too easy, a longer sequence of letters can be tested.

POST-GAME DISCUSSION

Students that are in Group 2 would be expected to perform better due to the multimodal nature of working memory. They are learning the same information by accessing different methods of memorization.

## PHASE 6 (2MIN) – THEORY: MULTIMODAL

There are two types of working memory - auditory and visual-spatial memory. Similar to watching a video, the memory of it is a combination of what you hear and what you see. This interaction between the two

modalities helps to strengthen the working memory. When you have this input from two modalities - hearing and seeing - and you are getting corresponding information from both of them, this can help strengthen and consolidate your memory of the event.

## PHASE 7 (5MIN) – READ THE COMIC ABOUT WORKING MEMORY

Individually or in full class, read the comic. The teacher can help with the reading to make sure all student have the same level of understanding.

## PHASE 8 (5MIN) – THEORY: THE IMPORTANCE OF WORKING MEMORY

### WORKING MEMORY & ATTENTION

Working memory is often studied in conjunction with attention. It is known that the same brain regions are involved in both and that one needs to pay attention in order to exercise their working memory. Likewise, working memory is needed in order to pay attention. Children, therefore, need to have strong working memory skills in order to maintain focus and concentration. Working memory to an extent can be trained but it also still naturally improves progressively with age in young children.

### WORKING MEMORY & LEARNING MATH & TO READ

Working memory is engaged in all activities that are done in the classroom. In most cases, there is an interaction between the different types of working memory, especially if input is coming in from different modalities. At a very simple level: learning math depends more on visual-spatial working memory and learning to read depends more on auditory working memory. Learning to solve math problems depends on seeing patterns and relationships between numbers. This relies on an ability to

remember previous information, visualize it and create sequences out of it. Similarly, reading depends on holding letters in mind until they form a word and then holding words in mind until they form a sentence. Therefore, working memory is crucial for children to develop their math problem solving and reading skills.

### WORKING MEMORY & INSTRUCTIONS

Working memory is crucial for remembering and following instructions. Children that have weaker working memories may have difficulties remembering and following instructions. Instructions require processing incoming information and remembering former information. Therefore, sometimes it might be important to present instructions in different ways to make sure that they are being processed and attended properly. As noted previously, working memory can be improved and trained with time.

## PHASE 9 (5MIN) – GAMES TO IMPROVE WORKING MEMORY

### UNO or GO FISH

Such card games are important for testing and improving working memory because they require the child to (1) remember the rules of the game, (2) remember what cards they have, (3) remember what cards have already been put down and (4) manipulate the information at hand.

### MODIFIED PICTIONARY

Teachers can have children learn a set of new words and pair with a game of pictionary. Students should be divided into two teams and be told to draw out the definitions of the words; the team that is able to guess what word the drawing is describing first wins! This game draws on the importance of visual representation in working memory for the student drawing and on the importance of rehearsal for the students on the teams.

## TAKE HOME MESSAGE

Working memory is important for any multi-step mental process. Therefore, it is important to improve weak working memories and this can be done with the different games presented in this session. Working memory exercises depend on repetition, creating context and visualizing the input. Simply having students repeat instructions or repeat stories after reading helps improve working memory and attention alike.

**Written record:**

**- The definition of working memory**

**- Simplified version of the theory on span, multimodality and the use of the working memory**

SESSION 6

# TIPS FROM A MEMORY CHAMPION

## About

| |
|---|
| **Learning goals**<br>Learning about mnemonics and how to apply them. Learning about the loci and the practice testing methods. |
| **Why?**<br>Strategy to memorise more efficiently exists and can be explained after understanding how the brain works |
| **What?**<br>• Comic with memoryman<br>• Exercises sheet for children and blank template for children to try making their own strategy to learn their own knowledge<br><br>The guide is divided into three parts. Each part links to one of the memorization methods described in the comic. |
| **How?**<br>Explanation in full class, reading in full class or alone, exercises alone<br>Each part addresses the following topics:<br><br>• In "**How to use the method**", step-by-step instructions are given for how the memorization method is used.<br>• In "**Example(s) from the comic**", we return to the example(s) that Memory Man used in the comic to explain to Maya how each method can be implemented. The step-by-step instructions are applied to the example(s).<br>• In "**Exercises**", exercises are described that the teacher can do with their pupils to try out and practice the memorization method.<br><br>Each part is followed by a number of **exercises sheets** that can be used to practice the method with the children. |

## Description

## PHASE 1 (5-10 MIN) – REMINDER

Take 5 minutes to discuss what students remember from the previous session on memory.

- How many memory types do we have ? What are the differences ?

Short versus long term memory. Short can be sensory or working memory. Long can be declarative (i.e. you can talk about it) or non declarative (e.g. motor memory)

- How many items can we store in working memory ?
- How do neurons learn ?

By making new or stronger connections

- Is memory fully stable ? Can we remember forever ?

It depends on the memory type but even long term memory need to be reactivated (studying or remembering) to make the knowledge/memories easy to be recalled.

## PHASE 2 (10-15 MIN) – READ THE MEMORY MAN COMIC

If you stop between part one and part two and do the phase 3 in between and then move to phases 4-5 or you can read both parts and then do phases 3-5.

## PHASE 3 (5 MIN) – THE MNEMONIC METHOD - EXPLANATION

HOW TO USE THIS METHOD

1. Take words or concepts that you have to remember together. This could be a word in a foreign language and its meaning in your native language.

2. Create a picture in your mind that reminds you of the new word or concept. Adjust the picture to include the existing word or concept that you know, so that the two can be better connected.

3. Remember the new picture. This will help you remember what you had to learn!

EXAMPLES FROM THE COMIC

The teacher can use the Spanish word examples from the comic to explain how to use the method. They can use the comic or the example exercise sheet for illustration.

ojo

1. In Spanish, 'ojo' means eye.

2. The word 'ojo' looks like a cartoon face: two eyes with a nose in between.

3. When you see the word 'ojo', you remember the picture of the eyes with the nose, and remember that 'ojo' means eye.

iglesia

1. In Spanish, 'iglesia' means church.

2. The word 'iglesia' reminds you of the word 'igloo', so you think of an igloo. You want to remember and connect this picture to the picture of a church. So you think of an igloo with a church tower.

3. When you see the word 'iglesia', you remember the igloo with the church tower. Then you remember that 'iglesia' means church.

## PHASE 3 BIS (10 MIN) – THE MNEMONIC METHOD - EXERCISES

SHOW THE MNEMONIC METHOD

The teacher can use the exercise sheet with Spanish examples from the comic to visualize the mnemonic method for their pupils. The Spanish

word is in the left column; the English word is in the right column. In the middle column is a picture that connects each Spanish word with the corresponding English word.

PRACTICE THE MNEMONIC METHOD

Children can practice the mnemonic method with one or more of the exercise sheets “Spanish animal words”, “Spanish house words”, and “extra Spanish words”. They draw a picture in the middle column that connects the words in the left and right column.

If children struggle to come up with what to draw, the teacher can refer to the sheet with exercise hints and give the children ideas.

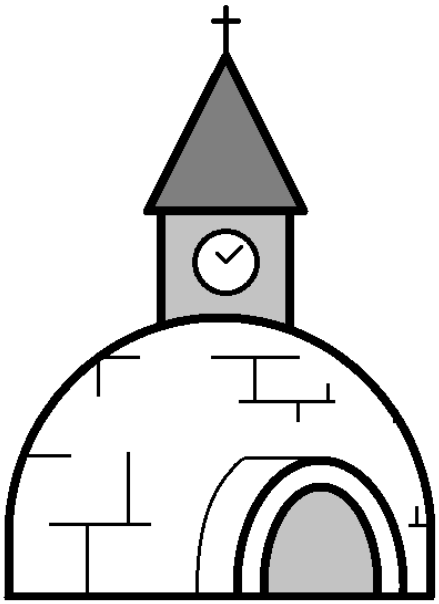
MAKE YOUR OWN EXERCISE

The teacher can also make their own exercises using the empty sheet. Put the words or concepts the child has to connect in the left and right column. Then, have them draw a picture in the middle column that connects these words or columns.

# MNEMONIC METHOD

## Spanish word examples from the comic

| SPANISH WORD | PICTURE | ENGLISH WORD |
|---|---|---|
| ojo |  | eye |

| SPANISH WORD | PICTURE | ENGLISH WORD |
|---|---|---|
| iglesia |  | church |

## MNEMONIC METHOD

Spanish animal words

| SPANISH WORD | PICTURE | ENGLISH WORD |
|---|---|---|
| cabra | | goat |
| gato | | cat |
| mosca | | fly |

## MNEMONIC METHOD

Spanish house words

| SPANISH WORD | PICTURE | ENGLISH WORD |
|---|---|---|
| casa | | house |
| ventana | | window |
| vaso | | glass |

## MNEMONIC METHOD

extra Spanish words

| SPANISH WORD | PICTURE | ENGLISH WORD |
|---|---|---|
| beber | | to drink |
| cola | | tail |

| | | |
|---|---|---|
| cola | | line<br>(standing in line) |

# MNEMONIC METHOD

## Exercise hints

**Important:** These hints are meant as an aid for the teacher, so that they can help children who struggle with the exercise. They are not an answer sheet. Any drawing that a child comes up with by themselves that helps them, as an individual, remember the connection between the two words is good.

| Spanish animal words | Drawing idea |
|---|---|
| 1. **cabra** means goat, but sounds like cobra<br>2. **gato** means cat, but sounds like gate or gator<br>3. **mosca** means fly, but sounds like Moscow or mosque or mocha | 1. a combination of a goat and a snake<br>2. a cat sitting under a gate; a combination of a cat and an alligator<br>3. a fly flying around a Russian building or a mosque; a fly in or on top of a cup of coffee |

| Spanish house words | Drawing idea |
|---|---|
| 1. **casa** means house, but sounds like case, like in bookcase or suitcase<br>2. **ventana** means window, but sounds like vent<br>3. **vaso** means glass, but sounds like vase | 1. a house inside of a suitcase or bookcase<br>2. a window with a vent<br>3. a glass used as a vase, with flowers sticking out of it |

| Extra Spanish words | Drawing idea |
|---|---|
| 1. **beber** means to drink, but sounds like | 1. a baby or Justin Bieber |

| | |
|---|---|
| baby or Bieber<br>2. **cola** means tail, but sounds like Coca-Cola<br>3. **cola** means line, but sounds like Coca-Cola | drinking something<br>2. a Coca-cola bottle with a tail<br>3. a line/queue of Coca-cola bottles |

## PHASE 4 (5 MIN) – THE LOCI METHOD - EXPLANATION

HOW TO USE THIS METHOD

Take a list of words or items that you have to remember, such as a shopping list.

Think of a series of locations, for example:

- the places in your house that you go as part of your bedtime routine;
- locations on your body from head to toe;
- spots in your room, like your bed, closet, lamp;
- rooms in your house;
- buildings you pass on your way to school;
- areas in the school building;
- spots in the classroom.

Connect each word or item from the list with a location. In your mind, make a picture of each word in its location. Don't be afraid to exaggerate! The funnier the picture, the more likely that you will remember it.

When you want to remember the list of words, mentally visit the locations. Remember the picture to remember the word.

EXAMPLE FROM THE COMIC

The teacher can use the example from the comic to explain how to use the method. They can use the comic or the exercise sheet with the example from the comic for illustration.

1. Maya needs to buy bananas, milk, spaghetti, and cheese.
2. Maya thinks about her bedtime routine. Before going to bed, Maya goes into the bathroom to the toilet. Next, she goes to the sink to brush her teeth. Then, she goes to the closet to put on her pyjamas. Finally, she gets into bed. The locations are: the toilet, the sink, the closet, the bed.
3. She connects each grocery with a location of her bedtime routine. There are bananas in the toilet, there is milk in the sink, spaghetti in the closet, and cheese as her pillow. She thinks of these images in her mind.
4. To remember the groceries, she thinks about the places she goes to before going to bed. By remembering the locations, she remembers the groceries.

## PHASE 4 BIS (10 MIN) – THE LOCI METHOD - EXERCISES

Children can practice the loci method with their teacher with the help of one or more of the **exercise sheets**.

To account for the age and ability of the children, the difficulty of the exercises can be modulated in the following ways:

- Changing the *number of items* to be remembered: fewer items makes it easier; more items makes it harder.
- Using a different *type of location*: rooms of the house, body parts, and locations that are visible to the child as they are doing the exercise tend to be easier because the child will be familiar with them or have easy access to them; types of locations to which the child has no immediate access or for which the child has to use

ordered information, like bedtime routine steps or places on their way from home to school, tend to be harder.

LOCI METHOD: BEDTIME ROUTINE / SPOTS IN THE ROOM

GOAL: Let children become acquainted with the loci method by mimicking the way it is used in the comic.

This exercise can be done individually by each child using the exercise sheet.

1. Explain to the children that they are going to try the loci method for themselves, using their own bedtime routine.
2. Let the children think of 3 or 5 (depending on their age and skill) locations they go before going to bed.
3. Have them connect each location with one of the items of the grocery list. They do not have to stick to the order of the list.
4. Instruct the children to imagine each grocery in that location and picture it in their mind. They have to remember the pictures that they make. If they want, they can try to draw it or write something down, but this is optional.
5. Continue with a different activity, such as their regular lessons or their lunch break.
6. Later (e.g. after an hour, after their break, or at the end of the day), have them recall the locations they go before going to bed. Do they remember the picture? Can they remember all the groceries?

Alternatively, instead of locations they go during their bedtime routine, they can think of spots in their room, like their window, their desk, their bed, etc.

LOCI METHOD: ROOMS IN YOUR HOUSE

GOAL: Let children practice the loci method using a different set of items and locations.

This exercise can be done in a group setting, but can also be done by each child individually using the exercise sheet.

1. Prepare, or have the children come up with at least 5 animals (e.g. a lion, a crocodile, a polar bear, etc.).
2. Have the children name a number of rooms in their house (e.g. living room, kitchen, bathroom, bedroom). The number should be the same as, or close to, the number of animals.
3. Have the children "put" (imagine) each animal in one of the rooms in their house. They can put more than one animal in the same room, if they want.
4. Have them imagine the animals in the room doing something. The funnier the scene, the better it is. For example, the lion and the crocodile are sitting at the living room table having an arm-wrestling competition, while the polar bear is in the kitchen stealing ice-cream from the freezer.
5. Continue with a different activity, such as their regular lessons, or their lunch break.
6. Later (e.g. after an hour, after their break, or at the end of the day), have them recall the rooms of their house. Do they remember what animals were there?

LOCI METHOD: PLACES-ON-YOUR-BODY EXPERIMENT

GOAL: Test the efficacy of the loci method using yet another set of locations.

This exercise requires at least two children or a larger number of children divided over two groups. Each child works individually using half of the exercise sheet.

1. Explain to the children that you are going to do an experiment to see whether the loci method helps them remember groceries.
2. Assign each child to either group 1 or group 2.

3. Group 1 receives a list of 7 groceries. Instruct them to memorize the list.
4. Group 2 receives a list of 7 groceries that are linked to body parts, in order from head to toe. Instruct them to imagine the combinations on their own body and to memorize them. Imagining the sensations may help them: patting their round watermelon belly or feeling the stickiness of their chocolate feet.
5. After a few minutes, have the children turn in their list.
6. Have an optional short break or different activity.
7. Test how well the children can recall the groceries by having them write the groceries down from memory. How many do they remember?
8. Are there differences between group 1 and 2 in how many groceries they remembered?

LOCI METHOD: PLACES ON YOUR BODY

GOAL: Let children practice the loci method using their body.

For this exercise, children work individually with the exercise sheet. It is also possible to do this exercise with the whole class together, as long as each child has their individual exercise sheet.

1. Explain to the children that they are going to try to use the loci method and their body to remember a list of objects.
2. Provide each child with a copy of the exercise sheet. This sheet contains a list of items and an empty outline of a body.
3. Instruct the children to combine each item with a location of their body. The locations do not have to be obvious (for example, the keys do not have to go in a pocket); it is better if they are interesting or funny (for example, keys as earrings).
4. Ask them to draw or write each item on the corresponding spot on the exercise sheet.

5. Ask them to imagine this item on that location of their own body. What would they see, hear, feel, smell, and taste? Any sensations they can imagine (like the jingling of the earrings as keys) can help them remember.
6. Have children memorize the items on the location of their body.
7. Have children turn in their sheets.
8. Continue with a different activity, such as their regular lessons, or their lunch break.
9. Later (e.g. after an hour, after their break, or at the end of the day), challenge them to recall the items by having them "scan" their body (from tip to toe, or vice versa) for the items. Can they remember them all?

Hints for possible combinations: keys as earrings, lit-up light bulb eyes, a remote control in their hand, piano keys as teeth, books as a chest armour plate, brooms as arms, colourful Lego toes, a tin can hat.

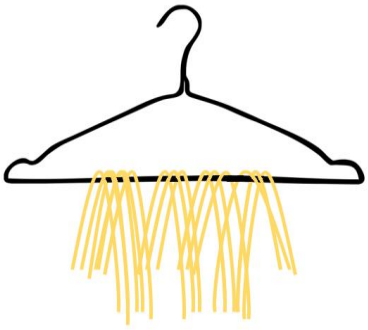
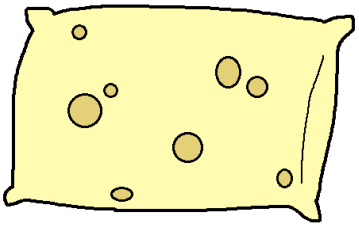
LOCI METHOD: MAKE YOUR OWN

The teacher can come up with their own loci exercise.

# LOCI METHOD

## example from the comic

| LOCATION | GROCERIES | COMBINATION |
|---|---|---|
| toilet | bananas |  |

| | | |
|---|---|---|
| sink | milk |  |
| closet | spaghetti |  |
| bed | cheese |  |

# LOCI METHOD

bedtime routine / spots in your room

**GROCERIES**:

rice / orange / pizza

**GROCERIES**:

peanut butter / soup / rice / orange / pizza

# LOCI METHOD

## places on your body - experiment

**GROCERIES**

Pineapple / carrots / cereal / juice / watermelon / teal / chocolate

*imagine you have...*answer

hair like the spiky top of a pineapple
carrots sticking out of your nose
a mouth full of cereal
a juice box balancing on your shoulder
a big, round watermelon belly
cup of tea in your lap
dirty feet from chocolate

**ITEMS:** keys, remote, light bulb, piano, book, broom, tin can, Lego

# LOCI METHOD

## rooms in your house

| ROOM | ANIMAL | DOING WHAT? |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

## PHASE 5 (5 MIN) – THE PRACTICE TESTING METHOD - EXPLANATION

HOW TO USE THIS METHOD

There are different ways to practice for a test:

- having someone else test you, for example a friend or parent
- testing yourself, for example by means of flashcards

EXAMPLE FROM THE COMIC

In the comic, Maya asks her friend to test her. This practice will help Maya remember the material better, and also help her practice for the real test.

## PHASE 5 BIS (10 MIN) – THE PRACTICE TESTING METHOD - EXERCISES

The exercises of this chapter may be used in combination with a topic the children are currently working on in class, such as words from a foreign or their native language, the multiplication tables, or countries and their capital cities. See the sheet with example topics for inspiration.

### MAKING FLASHCARDS

The teacher can give children this assignment before an upcoming test.

1. Encourage them to recruit a friend or parent to test them on the study materials, at least once, preferably a few days before the test. This way, they can find out which things they know well, and which things they have to go over a few more times.
2. After the test, have them talk about their experience. Did they feel like it helped them learn the material better? Did it help them feel more confident for the real test?

MAKING FLASHCARDS

Materials needed:

- (coloured) paper, preferably thick and sturdy
- scissors
- coloured markers
- list of at least 10 combinations to learn

1. Cut, or have children cut, the paper into smaller pieces, about the size of a credit card.
2. On one side of each piece of paper, have them write the item to be learned, e.g. 'iglesia' or '1 x 7'.
3. On the other side of each piece of paper, have them write the 'answer' for the item that is to be learned, e.g. 'church' or '7'.
4. Have them use the flashcards when they study: they read one side of the card, then flip the card over to see the answer.
5. Have them use the cards to test themselves: they read one side of the card and try to give the answer, then flip the card over to check their answer.
6. Have them use the cards to test each other. The child, the "learner" gives their flashcards to a classmate, the "tester", who sits across from the learner. This tester holds up a flashcard, showing one side to the learner. The learner tries to give the answer. The tester can see the correct answer on their side of the card, so they can check whether the learner has answered correctly.

Note: in many cases, the cards can be used to study and test combinations both ways, e.g. from 'iglesia' to 'church' as well as from 'church' to 'iglesia'.

# PRACTICE TESTING METHOD

## example topics

**Spanish words**

- iglesia church
- ojo eye
- casa house
- horno oven
- vaso glass
- etc.

**Synonyms**

- big large
- little small
- smart clever
- kind friendly
- hard difficult
- etc.

**Tables of multiplication**

- 1 x 7 7
- 2 x 7 14
- 3 x 7 21
- 4 x 7 28
- 5 x 7 35
- etc.

**Percentages and fractions**

- 10 % 1 / 10
- 20 % 1 / 5
- 25 % 1 / 4
- 50 % 1 / 2
- 75 % 3 / 4
- etc.

**Countries and their capital cities**

- United Kingdom London
- The Netherlands Amsterdam
- Belgium Brussels
- France Paris
- Germany Berlin
- etc.

**Countries and their continent**

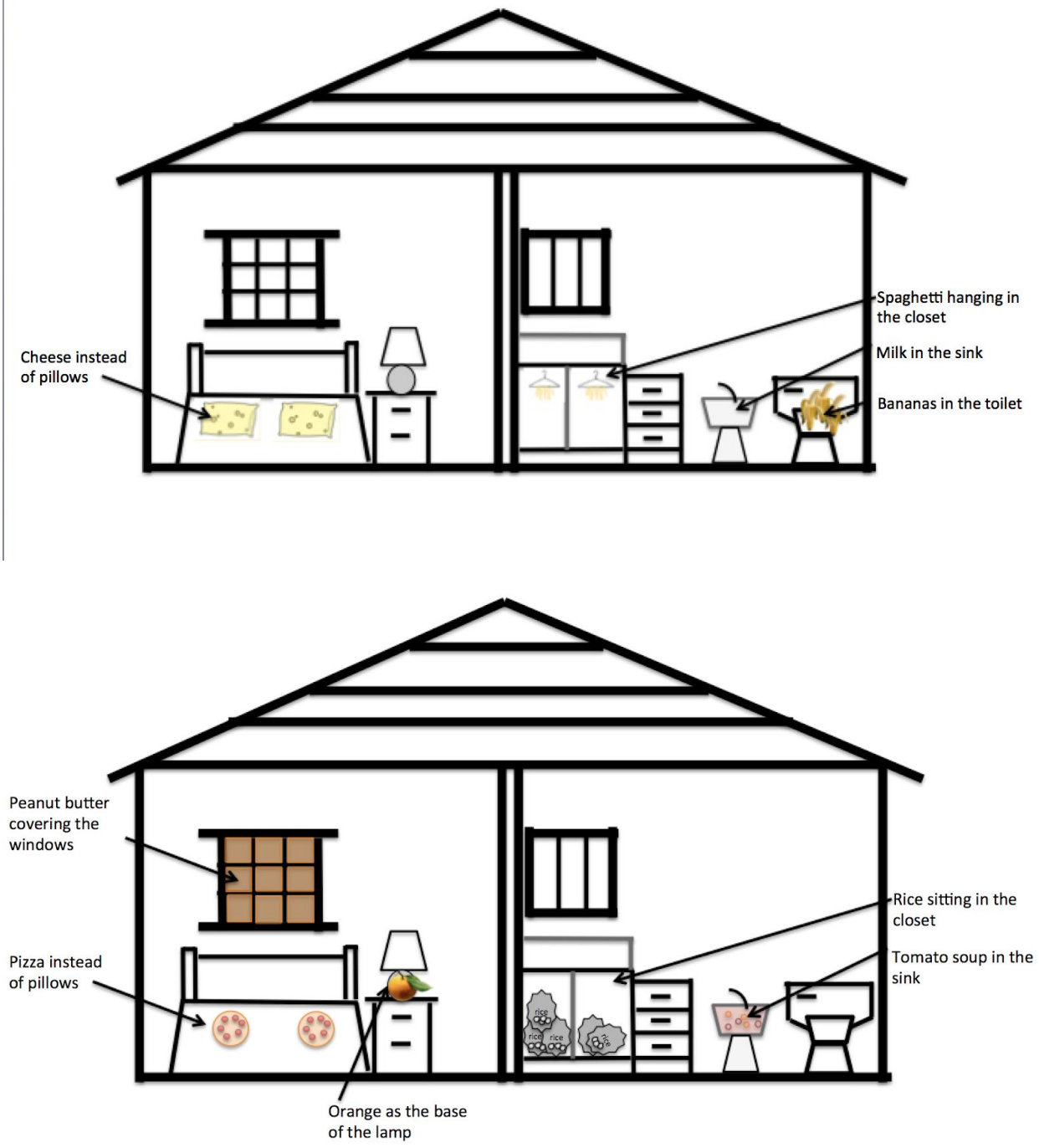
- Italy Europe
- India Asia
- Brazil South-America
- Canada North-America
- Australia Australia
- etc.

**Important periods in history**

- 500 - 1500 Middle Ages
- 1760 - 1830 Industrial Revolution
- 1789 - 1799 French revolution
- 1914 - 1918 World War 1
- 1939 - 1945 World War 2

etc.

Alternatives for the house locations:




## TAKE HOME MESSAGE

These exercises using brain mechanism to help the memorization:

- the mnemonic method uses association of knowledge and logic to help finding a path to the new information from already existing information

- the loci method uses well-known information and visual imagination to enforce remembering items
- the practice testing method use the repetition (multiple presentation of information) and test the recall part of the memory process to validate and strengthen the memorization.

These methods can be applied daily to learn lessons.

## Written record:

**The exercises sheet with answer will enable kids to recall the technic and reuse it**

# CHAPTER 3

## *Emotions*

### Take Home Message

To perceive emotional states is not easy or innate. It needs to be learned. Once this perception and understanding step is acquired and that children are able to identify and put words on the emotions they are feeling, we can start working on what to do when an emotional state happens. When this takes place in an adequate moment (e.g. when it's a time to learn or to focus), it can be regulated or children can choose how to react to them and not regret one's action later.
The aim of this session is not to teach children to suppress emotions, emotions are necessary, we do not recommend stopping them. We wish to teach to perceive their arrival and expression, to be able to choose the action plan and our thoughts.
It's a rather difficult exercise and each situation is different and even having worked on this knowledge before such a situation happens do not guarantee success in regulating actions and thoughts. In this session, the transfer of knowledge and application to real life situations will be surely one of the most difficult things from this kit.
This regulation of emotions uses inhibition, one of the executive functions that mature until adult age. Children have progress leeway and are in a good window to work on improving their skills.

Emotions are part of our life and they colour our lives. They serve a particular aim and "tell us how we feel". Importantly, they influence our memory and learning processes.
Thus, in this chapter you will find important information about:

- six basic emotions, their names and roles and how to recognize them [**session 6]**
- how they can influence our learning, i.e. enhance or impair it [**session7**]
- some methods that can help us to regulate our emotions [**session 8**]

SESSION 7

# EMOTIONS

## About

| |
|---|
| **Learning goals**<br>The goals of this session are to practice recognizing, expressing, talking about and understanding emotions.<br>(the emphasis is on the 6 basic emotions) |
| **Why?**<br>There are many emotions, but 6 of them are especially common and recognized all over the world. We will learn what they are and why they are useful to us.<br>Recognizing and understanding why we have emotions is a first step in eventually learning how to cope with them better. |
| **What?**<br>Game “help Robi”<br>Emotion games (materials and print-outs)<br>Comic about emotions |
| **How?**<br>Whole class discussion<br>Work in smaller groups<br>Full class activity |

# Description

## PHASE 1 (15MIN) – DISCUSSION ABOUT EMOTIONS

Give the children a few minutes to think about and write down some examples of feelings and/or emotions. Then the children can raise their hand to share their examples with the class. Collect their examples on the board.

Ask what they think think when they see the list of emotions.

Note that there are many. It can be a bit overwhelming to try and understand all of them. Some are pretty complex, like jealousy or loneliness. Luckily there are only 6 emotions that are the most important ones and easier to understand. All humans across the world express and recognize these basic 6 emotions.

Ask the children if they can guess which are the 6 basic emotions.

Answer: sadness, fear, joy, anger, disgust, surprise.

The rest of the session will be focussed on understanding basic emotions.

---

**NOTE FOR THE TEACHER:**

Explain the difference between emotion, feeling-sensation, feeling-sentiment.
**Sensation :** physiological response, we can localize it on the body.
ex. Butterfly in the belly
**Emotion :** m put a name on a range of physical sensation induced by an external element (person, situations, event …) or internal element (thought, pain …).
ex. I feel a ball in my belly and my breathing is fast → I am afraid (fear).
**Sentiment :** emotion that we nourish, ruminate and that settle down in time.

## Phase 2 (30 min) – Games to express and recognize emotions

Different versions of the game are developed. You can use the one that is most appropriate in terms of age and size of the groups/classes.

## Phase 3 (15 min) - Reading the emotion comic

Let the children read the emotion comic individually or go through it together.

## Phase 4 (30 min) - Game to teach Robi about emotions.

The children help Robot Robi learn when to experience which emotions and how to feel and express them. You distribute print-outs of the exercise per child or per small group, or you can put it on the board to go through it with the whole class. The print outs contain 15 descriptions of situations that Robi might find himself in. For each of the situations the children can discuss and write down which emotion would be appropriate/useful. Or would it be better to have not emotion at all in this situation? For each emotion the children can further draw or write down the corresponding feelings, facial expression, exclamations etc. Importantly, they can also discuss and write down what would be an appropriate course of action that fits this situation and emotion. There is an example table with answers provided for the teacher. Note that situations with a * might require some more discussion, this is also explained in the example table.

## Optional

You can discuss with the class if they can come up with additional situations for Robi to learn about emotions: When do they experience sadness, joy, disgust, anger, fear or surprise? This should be an open discussion without right or wrong answers.

## TAKE-HOME MESSAGE

We have 6 basic emotions (sadness, fear, joy, anger, disgust and surprise) that have evolved because they are useful for our survival. However, in some situations they can also bother us (feeling scared for exams) or lead to unwanted situations (getting angry and into an argument with a friend).

**Written record:**

**table of phase 4**

SESSION 8

# EMOTIONS AND MEMORY

## About

| |
|---|
| **Learning goals**<br>Understanding the influence of emotions in memory and learning. |
| **Why?**<br>Emotions can facilitate memory skills when they are related to the content to learn, but they can distract and impair our ability to memorize when they are not related to the study content. |
| **What?**<br>Memory game (powerpoint presentation, a red and green card for each child)<br>Comics about memory and emotions<br>Exercise to assimilate the content |
| **How?**<br>Game in pairs<br>Reading in group<br>Individual exercises |

## Description

### PHASE 0 (2 MIN) - PRE-ACTIVITY

We will start with a little experiment that will show children that emotion has an impact on what they remember.

In preparation of phase 2, without explanation, ask children to watch a series of pictures that they should remember:

- Use the powerpoint presentation with 20 pictures of scary things like a tarantula and 20 pictures of neutral things like a coffee cup.
- In the powerpoint presentation 'memory encoding' (which can play automatically with the correct timing of 5 s per pictures) the pictures are presented in a random order to the children, who have to try their best to remember the pictures they saw.
- Lead the introduction activity, so they engaged in some other activities to test their memory of scary and neutral pictures after.

## PHASE 1 (13 MIN)– INTRODUCTION ACTIVITY

Discuss with the class which memories the children can recall from when they were younger and why these memories stuck. It is likely that the events recounted by the children have a relatively strong emotional component, i.e., the children were particularly sad, angry, disgusted, surprised, happy, or anxious (the 6 basic emotions). This is because of the influence emotions have on memory.

## PHASE 2 (10 MIN)– EXPLANATION

Theory and experiment from Fernandez lab and WKRU : 

How does fear/anxiety influence our memory? (20 min excluding break time)

Anxiety helps remembering a dangerous situation so that we can respond even better the next time we encounter the same or a similar situation. This is why you can remember a particular scary or stressful situation quite well, even years after the event. Very 'normal events' are often more easily forgotten because they are not considered important by our brain. For example, remembering what you had for breakfast last week is not as important as remembering that a venomous snake is moving around in your garden. With a simple experiment researchers have shown that scary

things are remembered better than ‘normal’ things. You can try this experiment with the class.

**Back to the experiment**

- Remind children that they started this session by watching a series of pictures that they had to remember. Now they are going to test their memory of scary and neutral pictures.
- You can do this with a ‘recognition experiment’; in a new series of pictures (powerpoint presentation ‘memory recognition) the children have to point out whether they saw a certain picture before, or whether the picture is new.
- With the help of the response sheet, children can indicate whether they remember the picture or not (using check or cross)
- At the end, show the list of image again and ask children to show hand if they answer a check, count the score while recording on the board the number of children, in four different situation (sum the checks) : was the picture previously show or not and was it an emotional one or not (use the table bellow to make the four category).

| | neutal | | emotional | |
|---|---|---|---|---|
| | seen | new | seen | new |
| 1 | | | 1 | |
| 2 | | | | 1 |
| 3 | | | | 1 |
| 4 | 1 | | | |
| 5 | | | 1 | |
| 6 | | 1 | | |
| 7 | 1 | | | |
| 8 | | | 1 | |

| | | | | |
|---|---|---|---|---|
| 9 | | 1 | | |
| 10 | 1 | | | |
| 11 | | | | 1 |
| 12 | | 1 | | |
| 13 | | | | 1 |
| 14 | 1 | | | |
| 15 | | | 1 | |
| 16 | 1 | | | |
| 17 | | | 1 | |
| 18 | | 1 | | |
| 19 | 1 | | | |
| 20 | | 1 | | |
| 21 | | | 1 | |
| 22 | | 1 | | |
| 23 | | 1 | | |
| 24 | | 1 | | |
| 25 | | | 1 | |
| 26 | | 1 | | |
| 27 | 1 | | | |
| 28 | | | | 1 |
| 29 | | | | 1 |
| 30 | 1 | | | |
| 31 | | | | 1 |
| 32 | | | 1 | |
| 33 | | 1 | | |
| 34 | 1 | | | |

| | | | | |
|---|---|---|---|---|
| 35 | 1 | | | |
| 36 | | | | 1 |
| 37 | 1 | | | |
| 38 | | | 1 | |
| 39 | | 1 | | |
| 40 | | 1 | | |

- At the end of the series you can discuss with the class which pictures they recognized immediately and why.
- The goal of the experiment is to experience that scary pictures are more easily remembered than neutral pictures.
- The results of such an experiment with 25 participants is displayed in figure 1.

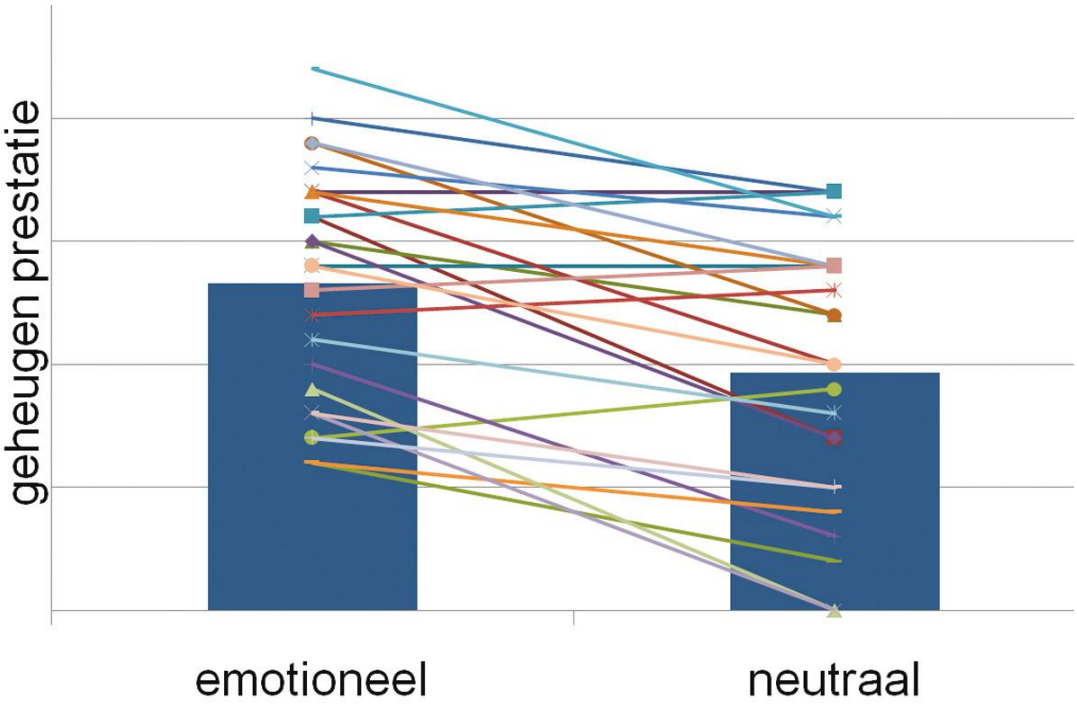



Figure 1. Emotional/scary things are remembered better than neutral things.

By the height of the bars you can see that the memory performance was on average better for emotional/scary pictures than neutral pictures. The coloured lines in the figure show the scores for the individual participants

You can see that most participants were indeed better at remembering scary pictures than neutral pictures. However, for some participants no difference can be observed, or the result is even the other way around! Some participants were better at remembering the neutral pictures.

This shows that there are individual differences in how people remember emotional pictures/information.

**(optional) Make your own memory experiment!**

It is not difficult to let the class make their own memory experiment with a powerpoint presentation. It could be fun to test a different emotion like 'happy'. Is it easier to remember happy pictures than neutral pictures? You can easily find pictures using an online search engine. Choose neutral pictures with things like a pen, football, spoon, animal, plant etc. For the happy pictures, you can select a birthday cake, party, funny animal, smiling person etc.

## PHASE 3 (20 MIN) – READING

Read the emotion and memory comic to clarify the goal. You can read to the whole group, if they are younger, or let them read in small groups or even individually. Take few minutes at the end to review possible questions of the children.

## PHASE 3 (15 MIN) – EXERCISING

Let's integrate knowledge from the session 6 (chapter 2) and use the loci method with emotional content.

You can choose a lecture that children are currently studying from another course (biology, history …) and map it into a walk that children knows. Example : going from their school to home or to the gymnasium. You can let the children choose. To had the emotional content, build a story around that walk:

1) the children just had a very good grade

2) he plays a bit with friend before going

3) he crosses a nice/playing dog while going

3) later, in front of …, he crosses by a long time no see friend

4) they walk a bit and cross a ice-cream seller, they eat ice cream (children can choose their favorite)

5) later, he have a special good meal for dinner / he beat his record while practising his sport

At each location associate an information that they need to remember. If the children succeed to associate an information that makes sense with the story it will be even easier to remember. Example: if the topic is geometry, the ice cream cone can be associated at the pi number or the periphery of a square formula to the size of the playground.

## TAKE HOME MESSAGE

Emotions act on our capacity to memorize. Therefore it is important to detect our emotional state of mind and acknowledge it before deciding if it is going to impair our ability to act appropriately in what we have to do : taking decision, learning. Not all emotional situation are impairing our cognitive abilities.

## Written record:

**- Take notes of your observations during your walk around (Phase 1)**

**- Write down the questions that came up after reading the comic**

**- Final exercise**

SESSION 9

# COGNITIVE EMOTION REGULATION

## About

| |
|---|
| **Learning goals**<br><br>Getting familiar with a cognitive tool to regulate emotions (cognitive reappraisal) |
| **Why?**<br><br>The previous sessions focussed on recognizing and understanding emotions; here we continue with how we can try to influence them.<br><br>Remind children that the aim of this session is not to learn how to stop emotions. Emotions have important functions and suppressing them could not be so healthy in the long run.<br><br>Yet, the aim is to get familiar with analyzing the thoughts that accompany an emotion. What are your thoughts about a situation that make you feel angry/sad/anxious? Are those thoughts fair, or could you think differently about the situation? Thinking differently about a situation might change how you feel about it and how you act on it. |
| **What?**<br><br>Comic about cognitive reappraisal (parrot gymnastics)<br>Table with 20 examples<br>Vocabulary examples from emotion game<br>Cognitive reappraisal cards (12 with accompanying thoughts (phase 2), 14 with just situations (phase3)) |
| **How?**<br><br>Work in pairs/smaller groups and full class discussions and activities |

## Description

In the emotion comic we saw that emotions have a physical (body) component and a cognitive (mind) component. Here we discuss a tool ('cognitive reappraisal') that can help regulate the mind, which in turn can influence the body.

1. I welcome my emotion : an emotion as a goal, to stop it just delay this goal. I let it come and listen to my body, my thoughts and my actions. I let it work.

2. I get aware of mye motion : after welcoming an emotion, we can after a time, write it down.

a) what do I feel : what are the physical sensation, how is my breathing?

b) what do I think : what do I think when I am in this emotion ?

c) what do I do : what are my action when facing this emotion? How do I behave ?

Be aware of an emotion enable to :

-rationalise and reduce the affective load

-identify what I can change to take control of it

Is it helful ? is it not?

Each emotion as a function, they push to act

- The fear : it might harm me if I try to study to protect me from a failure at the exam. It will help me when it stops me from driving a scooter without an helmet.

I don't judge my émotions, I evaluate its use in a given context.

We have specific thoughts about the various situations in our lives. These thoughts are a personal interpretation of the situation and they can influence how we feel and whether we react to the situation in a negative or positive way. The same situation can lead to different thoughts and feelings in different people. Cognitive reappraisal is a well-established technique (see references) which consists of analyzing and transforming negative (non-helping) thoughts about a situation into more neutral or positive (helping) thoughts, in order to feel better.

Of course, there are plenty of situations in which it is normal to feel bad for a while, or even for a long period (a death of a family member for example). The focus here is not on these extreme situations, but on those that are less severe or more ambiguous. That is, when we notice that our thoughts are blocking us for a longer-than-appropriate period of time, and we want to actively try and change those thoughts.

Here, we provide a short introduction in the technique, based on materials by the SPARK Resilience Programme, Op Volle Kracht and the Penn Resiliency Program (see references). While based on a principle that was found to be effective (cognitive reappraisal), do note that the effectiveness of the exercises included in this session, in reducing symptoms of for example anxiety and depression, has not been investigated.

## PHASE 1 (10MIN) – INTRODUCTORY COMIC

The teacher looks at the comic together with the class and discusses it. The comic is about the principle behind cognitive reappraisal.

We see that two parrots are undergoing the same situation (not being able to do a summersault).

The top parrot has non-helping thoughts, leading to a negative feeling.

The bottom parrot has helping thoughts, leading to a more neutral or a positive feeling.

The discussion should lead to the conclusion that how you think about a situation can influence how you will feel about it. Assessing the situation, taking a broader perspective, and changing non-helping thoughts into helping thoughts can make you feel better.

Common phrases that can help the children recognizing non-helping or helping thoughts:

Non-helping thoughts: I will fail; Something bad will happen; I am a loser; Nobody likes me; It is all their fault…

Helping thoughts: It is not true because…; A different way of looking at this is…; It is not so bad, because...; What could also happen is...

## PHASE 2 (25MIN) – IDENTIFICATION OF NON-HELPING AND HELPING THOUGHTS

This exercise is performed in pairs. Each pair receives a card with a parrot situation and accompanying thoughts. There are cards available for 12 pairs; if that is not enough, you can make the groups a bit bigger.

- First, each pair has to identify whether the **thoughts** on the card are helping or non-helping and write down their answer.
-

- Then, the children can draw and describe their own **associated feelings** with the thoughts. The emotion game vocabulary examples from the emotion session can be put on the board as an example.

When all pairs have finished, the situations are discussed with the whole class. The teacher describes the situations from the example table and asks the pairs that have that situation on the card to tell the rest of the

class the answer that they proposed: the thoughts and associated feelings. Furthermore, they can share with the class whether they think the thoughts are helping or non-helping.

Identification of helping versus non-helping thoughts will likely be straightforward. However, an open discussion is encouraged if it turns out that a thought is more ambiguous. The associated feelings may be a bit more mixed, but a relatively clear positive/negative distinction should emerge. The examples provided in the table are merely examples and are not an exhaustive list of possible feelings.

## PHASE 3 (25MIN)– PRACTICING WITH COMING UP WITH HELPING THOUGHTS

The teacher can choose between the following options or use both, preferably separated by a week to reinforce what children have learned. For these games, the cards describing only situations can be used.

Option 1: One child or a group will come up with non-helping thoughts, in turn, the other child or a group will come up with helping thoughts (taking turns). It could be done in the form of a friendly competition. The teacher can help with thoughts from the example table if needed. The conclusion will likely be that coming up with non-helping thoughts is easier; and it requires some effort and practice to counteract them with helping thoughts.

Option 2: A teacher takes on the role of the "parrot" and will say out loud the non-helping thoughts associated with the situation (using the example table). The children (raising their hand) have to come up with helping thoughts to make the "parrot" feel better.

## TAKE HOME MESSAGE AND TIPS

The thoughts you have about a situation influence how you feel about the situation.

A non-helping thought can lead to a negative feeling.

A helping thought can lead to more neutral or a positive feeling.

Learn to identify when you are having non-helping thoughts about a situation. Practice with coming up with helping thoughts. The more you practice, the easier this will get.

If you are stuck in a non-helping thought, ask your family and friends for suggestions for coming up with more helping thoughts.

## Written record:

**In phase 2, children have written down/drawn the feelings associated with the helping or non-helping thoughts.**

### 20 Examples

| Situations for Phase 2 | Non-helping thought | Feeling | Helping thought | Feeling |
|---|---|---|---|---|
| Parrot Coco has been sent out of the classroom a few times. Her parents got angry about this and she got grounded for two weeks. | My parents do not care about me. How they treat me is so unfair. | Angry, wronged | • My parents punish me because they want me to learn from my mistake and not because they do not care about me.<br>• Perhaps I deserved the punishment. What can I learn about | Ok, not so bad, optimistic |

| | | | | |
|---|---|---|---|---|
| | | | my behaviour? | |
| Parrot Pedro got a 4/10 for his English test. | I am a loser. You see, I cannot learn that well. I might as well quit school. I will never pass my final exam! | Sad, depressed, shamed, worried, anxious | • I did study well, but the test was very difficult.<br>• If I look at what mistakes I made, I will learn from that.<br>• Better luck next time!<br>• I can ask for help.<br>• Which parts were most difficult for me, and how can I improve?<br>• This is only the first time I failed English and the final exam is still miles away! | Ok, not so bad, optimistic |
| Parrot Paula saw a classmate from last year in the hallway, but the classmate did not say anything or look at her. | She does not like me enough. She already forgot about me. | Sad, lonely, depressed, rejected | • There is not really a reason why she would have stopped liking me. I guess she just did not see me. Next time I will say hi to her.<br>• That is ok, maybe she is busy with others and it is not personal.<br>• I have found new friends, and they are | Ok, not so bad, optimistic |

| | | | | |
|---|---|---|---|---|
| | | | more fun to be around. | |
| Parrot Lizzy had a day out at a theme park. The teacher asks how it was. | It was a stupid trip. We had to wait 40 minutes for the rollercoaster. | Disappointed | • It was not a stupid trip. Even though the wait was annoying, all the other activities were a lot of fun.<br>• It was ok, during the waiting time I talked with a friend, and it was nice. | Ok, not so bad, satisfied, relaxed |
| Parrot Bobby borrowed Luke's football and the football got a puncture. | I am so clumsy. It is my fault that the football is now useless. I must have done something wrong. Luke is going to be angry. | Guilt, shame, worry | • Accidents like this happen to everyone.<br>• Luke will understand that I did not do it on purpose.<br>• It is ok, it is not my fault that it hit something sharp. | Ok, not so bad, relieved, relaxed |
| Parrot Coco worked together with some other classmates on an assignment and they got a disappointing grade. | It is all their fault. They are so stupid! | Angry | • Maybe I overlooked something myself in the assignment or maybe we should have divided the tasks better.<br>• We are all responsible for the final grade.<br>• It was a new experience, with some parts being tricky, but other times | Ok, not too bad, friendly, optimistic, relaxed |

| | | | | |
|---|---|---|---|---|
| | | | it was fun to work together.<br>• Next time we need to come up with a better plan when working in groups. | |
| **Situations for Phase 3** | **Non-helping thought** | **Feeling** | **Helping thought** | **Feeling** |
| Parrot Pedro has to do a mathematics test tomorrow. | I will fail this mathematics test for sure. I will never be able to pass it. | Tense, anxious, nervous, worried | • I did everything I could to learn this subject.<br>• If I understand it today, I will also understand it tomorrow during the test!<br>• It is ok, this is just a test, if I fail I will still learn from it.<br>• I studied, so I know something. | Ok, not too bad, confident, optimistic, relaxed |
| Parrot Paula did not receive an invitation to Sabine's party, whereas many other classmates were invited. | It makes sense that she did not invite me. Who would want to be friends with a loser like me? No one likes me. Everyone thinks I am stupid. I am stupid. It is my own fault. | Sad, lonely, depressed, rejected | • It would be impossible for Sabine to invite the entire class.<br>• It is ok, maybe I am not one of Sabine's closest friends.<br>• Many other students did not get invited either, no big deal.<br>• There are | Ok, not too bad, understanding, friendly |

| | | | | |
|---|---|---|---|---|
| | | | many other students who like me and invite me to parties. | |
| Parrot Coco doesn't want to go to school this morning. | School is stupid; it is boring. I feel alone all day. My friends play silly games, and the lessons are not interesting. | Sad, depressed, angry, unmotivated | • I have to go anyway, so let's make the best out of it.<br>• At least I see my best friend and I like playing with her.<br>• I can suggest a game myself that I like.<br>• We are having a biology lesson today and I like that topic. | Ok, not too bad, friendly, optimistic, relaxed |
| Parrot Paula had to give a presentation in front of the class, but she forgot what to say and got tongue-tied. | I am so disappointed with myself. I looked like a fool. My classmates and teacher thought I was bad at presenting. | Anxious, embarrassed, ashamed | • The audience will not only focus on the part of your presentation that you forgot. It is ok to make a mistake and then continue with what you do know.<br>• A lot of people get nervous for presentations and stumble a | Ok, not too bad, relaxed, optimistic |

| | | | | |
|---|---|---|---|---|
| | | | bit on their words, my classmates will not judge me based on one instance.<br>• The classmates and teacher will not notice and remember that short moment as much as I do.<br>• If I practice a few more times out loud next time I will do fine. | |
| Parrot Lizzy knew all the answers in the lesson. She really tried hard to say her answers by raising her hand very high, but two other classmates were selected and two other classmates answered even without being asked. | It is so annoying; they don't even get the answers right.<br>That teacher is ignoring me.<br>No one gives me attention. | Not listened to, not cared about, angry, rejected, annoyed, upset | • The teacher is not ignoring me on purpose. He cannot notice everyone at the same time.<br>• I could talk to the teacher in private and point out that some children get the turn more often than others.<br>• The other classmates might have the answers wrong, but at least they are trying. | Ok, not too bad, friendly, optimistic, relaxed |
| Parrot Bobby did something super | No one believes that I did that. I | Not believed, sad, | • The people I care about | Ok, not too bad, |

| | | | | |
|---|---|---|---|---|
| cool, he made a bicycle kick and scored a goal, but his classmates don't believe what he said. | feel so sad that no one (might) believe me. They just think I am a loser. | depressed, rejected. | believe me, such as my good friends and my parents. I don't really care what the rest thinks.<br>• Now I know that next time I will make sure I have evidence – maybe take a video.<br>• My classmates are just jealous. | understanding, proud |
| Parrot Lizzy was playing with friends, but while running she fell in the mud and hurt herself a bit. Her friend helped her to the school's first aid person and helped her clean up. | My parents will be so angry, because I am so dirty now and ruined my new dress. Why did my friends run after me so much? It wasn't safe, they should have known. It is all their fault. | Angry, upset, worried, anxious | • It happened and there is nothing I can do about it now.<br>• It was not anyone's fault in particular, we were playing together<br>• We should be more careful next time.<br>• I am happy to have a friend who helped me.<br>• My parents care more about me than about the dress. They will understand that it was not on purpose. | Ok, not too bad, friendly, relieved, optimistic, relaxed |

| | | | | |
|---|---|---|---|---|
| Parrot Pedro was not selected by the teacher to play a major part in the musical which the class is going to perform, even though he wanted it. | It is always the same children that get selected for these things. It is not fair. I never get noticed by the teacher. The class just thinks I am a loser. | Annoyed, sad, disappointed, rejected, upset | • The teacher is not trying to annoy me, but just tries to make the best decision.<br>• Perhaps the other (smaller) part indeed suits me better.<br>• There are many children in the class and not everyone can have a major part.<br>• I could talk to the teacher in private and point out that some children seem to get selected more easily than others and that I would really like to try it.<br>• I could ask my teacher whether I can improve my acting to get a major part | Ok, not too bad, friendly, optimistic, relaxed |
| Parrot Bobby realises on Sunday that he has an art assignment due the day after, and it's too late to go to town to get the necessary | I'm always forgetting about things! My parents will be super upset about this and my teacher will give me a bad mark. My | Worried, anxious, ashamed, tense | • I could ask my parents what kind of materials they have at home. Maybe, it's possible to do my | Ok, not too bad, relieved, optimistic, relaxed |

| | | | | |
|---|---|---|---|---|
| materials for it. | friends will make fun of me for being so forgetful**.** | | homework without using the same exact materials that my teacher asked.<br>• I did not avoid the assignment on purpose, I just completely forgot. Everyone forgets things occasionally.<br>s and the teacher<br>l probably<br>derstand that.<br>• My friends will laugh at me for a bit, but who cares? They will forget it the next day. | |
| Parrot Lizzy had an argument with her best friend. Afterwards she tried calling and texting her but got no response. | Apparently, she does not wish to speak to me. Well if she behaves like that, I will not message her again. Maybe this is the end of the friendship. | Sad, angry, upset, rejected | • Maybe she wants to talk but is not in the opportunity to use her phone at the moment<br>• Maybe she does not want to talk for a bit, but that is also fine, she just needs some time to cool off and that is ok.<br>• Good friends have arguments occasionally | Ok, not too bad, optimistic, relaxed, friendly |

| | | | | |
|---|---|---|---|---|
| | | | and it does not have to mean the end of the friendship.<br>• She is my friend and even if she is being difficult in this moment, I should keep doing my best to solve the argument. | |
| Parrot Pedro is trying really hard to learn how to ride a bicycle, but he's constantly falling. | Oh, this is so difficult! I will never learn how to bike. All my friends can already do it; they will think I am such a loser. I might as well give up. | Frustrated, ashamed, disappointed, upset | • I can be proud that I keep trying and don't give up.<br>• I got a healthy brain, I will learn it sooner or later.<br>• There are things that I learn more easily than my friends, but some things require a bit more effort.<br>• If they are good friends, they will support me. | Ok, not too bad, optimistic, relaxed, confident |
| Parrot Coco has to change to a different school next year. | I will be miserable there. I will never be able to make new friends. | Sad, depressed, anxious, worried | • I have made new friends before so I will be fine. I just have to give myself some time.<br>• There will always be children | Ok, not so bad, relaxed, optimistic, confident |

| | | | | |
|---|---|---|---|---|
| | | | with whom I will have something in common.<br>• There will be other children who are new; we can help each other a bit. | |
| Parrot Paula celebrated her birthday yesterday and the teacher asked how it was. She is disappointed because she did not get the present that she wanted. | It was stupid; I did not get that game I asked for. | Disappointed, angry, frustrated | • The birthday was not all about presents, I had a lot of fun playing and eating cake.<br>• I received a lot of other cool presents.<br>• Perhaps I can save up some money to get the game myself or I can play it with a friend who has it. | Ok, not so bad, satisfied, relaxed optimistic |
| Parrot Bobby is having lunch and his friend is saying his food looks very weird. | Why does she not focus on her own lunch? Why is she interfering with mine? She is so annoying. | Annoyed, angry, irritated | • She does not have to eat my food, but I do, and I like it.<br>• She is right, it is quite an unusual lunch, but I like it.<br>• She is generally nice, and probably does not mean to annoy me.<br>• Maybe my friend is just | Ok, not too bad, friendly, understanding, relaxed |

| | | | | |
|---|---|---|---|---|
| | | | making a random comment to start a conversation.<br>• I am just tired, so that is why I get irritated more easily, I should let it go. | |

# CHAPITRE 4

## *Attention*

### Take Home Message

Attention is not continuous, it fluctuates. We have three subsystems of attention that enables us to understand how attention works and what can influence it:

- The **vigilance**, that move non-voluntarily toward target objects

Attention is **sensitive to distractors and to flow of thoughts**. Favor simplicity, attractive but not distractive.
The brain can wander, due to emerging flow of thoughts. Use vigilance to bring back attention: for example, a surprised element linked to the taught content, a change in prosody in the voice …

- **Selectivity**, that is the voluntary focus on object or detail

Attention is **partial**, it perceives only what we want to perceive (as in the video, we are focusing on the white players, or to solve the trick or the inquiry, we are not focusing on the change in the background and we do not perceive it or remember any of it). We should always highlight what needs to be in the focus, all the information that needs to be perceived: it is not because it is in front of the eyes that we focus on it and perceive it.
Attention is **limited**, we can only focus on one thing at a time. We can only do one thing at a time. It's like a bottleneck that enables us to perceive and to act. Once again, we need to focus on each information, one after the other. Showing multiple sensorial informations that are not coherent (hearing something and seeing something else, will not by strongly saved in memory)

- **Executive control**, attention that is hold for a long time or for a sequence of events

Attention is fluctuating, so we need to help it by giving small tasks to executive control. If a task is too long and repetitive, we need to cut it down into steps to reach: "I do 10 of them then the next 10 ones". Furthermore, reaching one step will give an extra reward to the brain that drives motivation up.
If the task is complex, it needs to be cut into small steps, to be aware of our progress. Once again, this gives rewards and keeps motivation up.
Finally, we need to **define clear aims**: what should I do? Why ? how ? with what ? what should I do next ? This will activate the executive control, which looks for a balance between difficulty and reward to persevere and reach a goal.

Managing one's attention time by cutting down tasks.

- If the task seems complex, you might want to give up: small steps will reassure on the feasibility.
- If the task is too easy, you will be cored: creating steps to visualize progress will help.

Do not try to accumulate too much information in one go.
Emotions or surprise can help keep someone focused if it is linked to the content to learn, otherwise, at contrary, it will distract from strengthening the knowledge in memory.

Give time to the mind to wander: attention need refilling and mind-wandering enables 1) to give a break to the mind, which is good for the memory system that have some time to rewind the new knowledge, send some part in long term memory instead of already replacing it with some new knowledge 2) to linked ideas together and think to creative solutions.

SESSION 10

# ATTENTION

## About

| |
|---|
| **Learning goals**<br><br>Understanding what attention is, how it works, how it is affected by other factors, how we can control attention, and why we are unable to multitask effectively. |
| **Why?**<br><br>Attention is a key skill underlying the ability to follow instructions or a lecture and it also plays a crucial role in memory formation. Attention can easily be influenced by numerous distractors and be lost without noticing. |
| **What?**<br><br>Videos about inattentional blindness<br>Comic about attention<br>Videos on the Internet<br>• http://www.dailymotion.com/video/xs2tco_un-tour-de-magie-qui-change-la-couleur-des-cartes_creation<br>• https://www.youtube.com/watch?v=vJG698U2Mvo<br>• https://www.youtube.com/watch?v=ubNF9QNEQLA |
| **How?**<br><br>Individual work and full class experiment. Comics can be read in full class or individually. |

## Description

### PHASE 1 (15 MIN) – SURPRISE

The teacher shows one (or more) of the above videos and asks the following questions: Did you notice the change or the surprising event? Do

you think the event was that surprising? Is there a way that would allow us to notice it?

The answers/ ideas are collected on the main board.

## PHASE 2 (30 MIN) – CARRY OUT AN EXPERIMENT

The teacher asks the children: What do you find distracting? – and then they are asked to make a list of these things.

In order to illustrate that, let's carry out an experiment.

Divide the group of students into two smaller groups. One group is told to read a piece of text, while the other group is asked to distract the reading group. You can use the "distractors" from the previously created list.

After the experiment, ask children about the results.

Question: Did the readers manage to stay focused? What methods did they use to pay attention (cover their ears/look away from distraction)? Which form of distraction was the most distracting?

## PHASE 3 (15 MIN) – READ ATTENTION COMIC

After reading the comic, students can play the scrambled letters and matching game. They have to reconstitute the words with randomly mixed letters and match them with their definition. They can use the comic as an help.

See exercise sheet for the student and below the answer.

| | | |
|---|---|---|
| attention | o 1 | 2o when one attend to relevant information |
| selectivity | o 2 | 4 o brain area close to the forehead |
| executive control | o 3 | 6 o when one is attentive to a situation |

| | | |
|---|---|---|
| frontal | o 4 | 3 o related to planning, select, initiate |
| training | o 5 | 1 o function of being focus on an object |
| vigilance | o 6 | 5o act of practicing something to improve |

## TAKE HOME MESSAGE

- Attention fluctuates and is attracted by distractors.
- It is difficult to do two things at the same time very well, since attention has to switch between objects and is not perfect on any of the items. Paying attention at a task and paying attention to a distractors is an example of multitasking behaviour
- There are three attentional systems
- They are related to different brain circuits and so they work independently
- Therefore we need to make sure that our learning environment is adapted to different types of distractors that can affect one or the other system

**Written record:**

**Attention comic and list of distractors**

SESSION 11

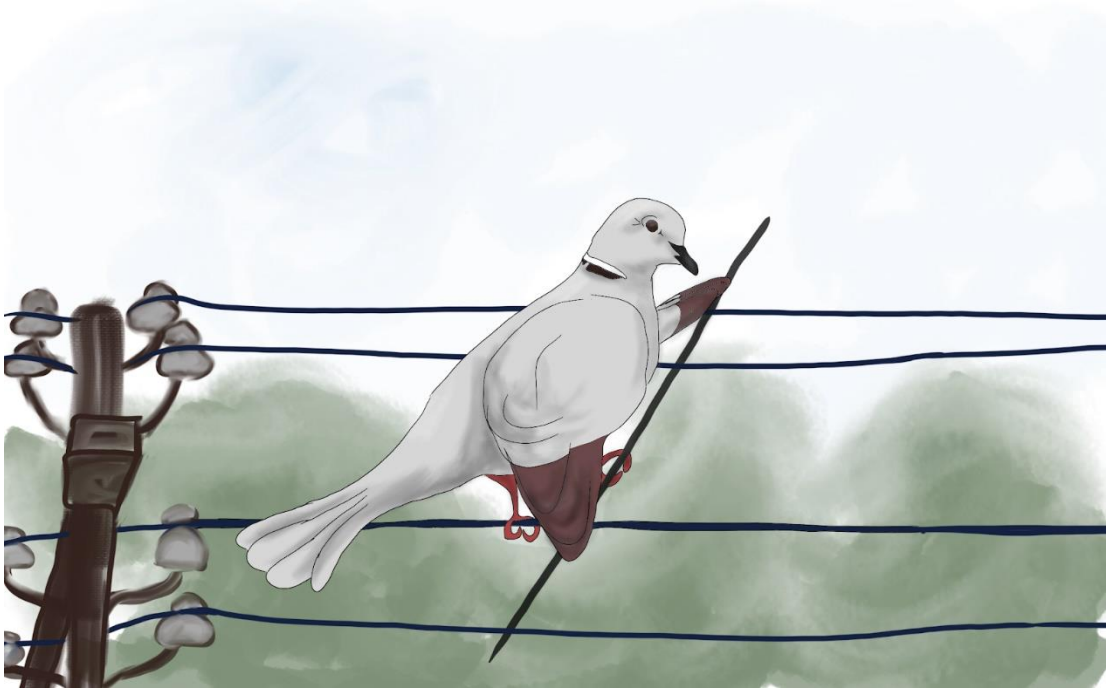
# CONTROLLING ATTENTION

## About

| |
|---|
| **Learning goals**<br>Learning to detect distractors.<br>Evaluating the difficulty of what you have to do.<br>Learning to perceive the fluctuations of attention. |
| **Why?**<br>Attention is a key skill underlying the ability to follow instructions or a lecture and it also plays a crucial role in memory formation. Attention can easily be influenced by numerous distractors and be lost without noticing. Therefore, it is important to learn how to regulate it. |
| **What?**<br>Within the bird academy, a funambulist turtledove will teach about distractors.<br>A series of situations (drawings), a student answer sheet and comics about mind wandering can be found in the material for this session.<br>You will need to set up some exercises in a gymnasium or big room. |
| **How?**<br>Individual and collaborative exercises. Comics can be read in full class or individually. |

## Description

### PHASE 1 (10 MIN)– TURTLEDOVE INTRODUCTION



Show the picture and read turtledove's statement. The turtledove is one of the teachers from the bird academy that teach about controlling attention.

> **turtledove statement**
> " When I need to stay or walk on an electrical cable in a city, like a funambulist, I need to to keep my attention focused so that I do not fall. So I am very good at staying focused and I use my concentration for many other things in life."

Explain to kids that attention depends on several cognitive systems. It changes through time as we get distracted. These distractors can be things around us (something moves or makes noise) or inside of us (sudden thoughts such as "I want chocolate"). We have the ability to choose whether we become distracted or just follow the flow of our thoughts.

Sometimes, it is very useful to let ourselves get distracted. Because we can start thinking of something else and maybe of another way to solve the problem or the task that we are doing, which can be more efficient ways of doing something. It can bring some creative thinking. But when we need to be focused on listening to someone talking or when we need to focus on a task, we need to maintain our attention.

**In practice:**

When we try to do a task, it is important to evaluate where the distractors are, to assess the difficulty of the task and to be aware of our attentional state. Is my attention low or is it decreasing? Do I need to focus again? Do I need a break so as to gain back my attention?

We can feel that our attention is changing when we notice changes in our environment instead of only being focused on the task. One other key point in successfully regulating our attention is to know where the distractors are. For example, if people are talking next to us, we know that we are likely to become distracted. Thus, in order to keep the focus on the task at hand we would need to pay even more attention to it.

It is difficult to maintain focus for a long period of time. Thus if the task is complicated or long, we have to remind ourselves that we can't stay focused indefinitely. When attention reaches its limits we will become more easily distracted.

It is important to learn how long our attention time-window is. This window depends on each person and on how likable, boring or difficult the task is. It is important that each pupil defines it according to their own preferences and abilities.

With the help of the following exercices, you will set up three rules that will help you control your attention.

## PHASE 2 (25 MIN)– LEARNING HOW TO RECOGNIZE DISTRACTORS

# *Instructions - Part 1: (15min)*

1 - Use the pictures of locations where Maya tries to study. Can pupils find one or more elements that could prevent them from focusing on their study?

You will find pictures in the material of the session with corresponding numbers in the pupils' answer sheet. Give the pupils some time to study the situation on the pictures, then check with them what distractors they found.

**Answers:**

- In the kitchen: the radio and the TV are on. There is also some cake on the side that Maya is eating without being conscious of it.

- In the bedroom: the phone is receiving notifications, the computer is on.

- In the living room: a family is having a conversation, Maya is playing with a game console.

- In the bedroom: it's 11PM, the moon is visible through the window, you need to listen to the needs of your body (sleep).

-In the bedroom: there is a pile of books on the side, several thinking bubbles coming from different items of the room, the mind is preoccupied.

-In the classroom: it's 11AM, the belly is rumbling, you need to listen to the needs of the body (low blood sugar).

2 - Write down and define the word "distractor"

possible definition: A distractor is an element or a signal that will interact with the attention and try to attract the attention to it. This element can be internal, like thoughts or body needs or can be external, like a movement or a sound. You can try to control or reduce the effects of distractors. For example by satisfying the body needs or going in quiet place.

3 (Optional) - You can list examples of distractors with children and establish a mind map or a table of the different distractors (Internal: thoughts, body needs … *vs* External: visual, auditory ...) and discuss about them.

# *Instructions - Part 2: (10min)*

1 - Let pupils look at each situation again. What can they do in order to reduce distractors and hence better focus on studying? Encourage pupils to give answers in front of the entire class and write down their advice on the blackboard.

Let pupils know that certain places are too full of distractors and are therefore not the most appropriate place to study. Sometimes, it is also not possible to eliminate distractors.

Possible pieces of advice:

- Have breaks (e.g. use the pomodoro technique)
- Use noise-cancelling headphones during break time.

2 - Define a series of questions that pupils can ask themselves before starting to study to check if they are keeping attention. For example: Should we continue or have a break? Should we change the location where we are studying or choose another moment of the day?

3 - At the end of the exercice, you will define the following first rule :

> "When I want to focus on the task at hand such as studying, I need to first define what distractors exist around me or inside me. I need to know that these distractors can affect my focus. I can then choose to let myself be affected by them or control them."

**Homework (optional)**: Ask pupils to take a picture of where they are most often studying. They should bring the picture to the next class.

Discuss how pupils deal with the distractors in different workplaces either in smaller groups or with the entire class. Pupils should try identifying possible distractors in others' pictures and come up with solutions to help improve others' workplaces.

## PHASE 3 (20 MIN) – DEFINING THE DIFFICULTY OF THE TASK

# *Instructions - Part 1: Table of tasks*

1- Read the list of tasks available in the student answer sheet to the classroom and let the students define the type of task by marking the right square in the table (long/short, repetitive or not, easy/difficult ...). You can take the first task as an example. After 10 min, discuss what pupils came up with.

**Possible answers:**

- Reading a book without pictures, i.e. an instruction book: long, difficult, possibly boring
- Classify buttons by size: long, repetitive, easy
- Learning a poem: difficult, long
- Telling all even numbers from 8 to 66: long, easy, repetitive, boring

2 - When you have done this ask pupils to make a list of their homeworks and chores for this week and write each of them in independent rows in the table. Then ask them to fill in the table by defining for each homework/chore the type of task.

**Instructions - Part 2: comic, first part**

1 - Read the comic on mind wandering and directed thoughts to the class or let students read individually depending of their age. They will learn about the concept of voluntary or involuntary thoughts and thoughts linked or not to the task at hand.

2 - At the end of the reading, ask students to imagine flying like Nocturna. Did you ever imagine yourself being able to fly and how would you do that? Student take a moment (20 seconds) before answering. Then you can ask them to share their thoughts while encouraging them to share their very first thought.

While pupils are answering ask them to identify what type of thought it was. Was it a voluntary or involuntary thought? Was it a thoughts linked to the task : was it a solution to fly ? If not, why?

**Here are some examples of possible answers:**

- Voluntary thought: I imagine myself as a heroine.
- Involuntary thought: I want to go the bathroom.
- Linked to the task: I already draw the plan of my jetpack / Would it work if I flutter my arms with a very huge clothe?
- Not linked to the task: I would love flying above mountains / in my dreams, I fall forever before waking up.

3 - After that, you can suggest a little activity: the polarity game Instruction reminder: this game is also used in the session 10 - phase 1. Define three locations in the room, each location corresponds to an answer. You will ask question and children have to move to the location of the good answer (or the answer that they think is the best).

e.g. left wall = voluntary thought, right wall = involuntary thought, front wall = I don’t know / I am not sure.

Explain to pupils that you are going to say a sentence out loud. They will have to keep the first thought that they have after hearing the sentence and then move to the corresponding wall. They should not take time to elaborate their thoughts, just move to the corresponding wall. Once, they all moved to one wall, ask few pupils about their thought and discuss their answer if they are unsure. Check their reason to answer, that it's indeed not always a clear cut answer.

Few example of sentences:

- I am looking forward for the break.
- Would I be bored if I was leaving alone on a desert island?
- When did I eat marshmallow for the last time?
- The summer is coming. / Holidays are coming.

## *Instruction - Part 3: Comic part 2*

1 - Read the comic to the class or let students read individually.

2- After reading, discuss with students examples in their daily life of tasks that can be sometimes too hard and sometimes too difficult.

3 - With the help of the comic, take two or three tasks from the homeworks/chores lists from Phase 2 and try to plan a strategy to make them easier to complete according to the type of task and the decision tree in the comic.

4 - At the end of this exercise, you are encouraged to come up with the second rule with pupils:

"I need to define the level of attention that I need to complete a task: is the task at hand long/repetitive/complicated? Should I divide the task in several steps: simpler or shorter steps? Reaching the end of each step will give me a feeling of efficiency and motivate me to reach the final goal."

## PHASE 4 (30 MIN) – LEARNING TO PERCEIVE FLUCTUATIONS OF YOUR ATTENTION

1- The aim of the exercice is to increase the temporal window of attention and to enable pupils to focus for longer periods of time. Ask pupils to go into groups of five, for example, and instruct them in the following way:

You will have to use your attention to do your best on the following rounds. To succeed, no use of using speed, you have to control your attention at every moment. At the end of each round, write down in the box below if you lost your attention, if you felt it before losing it and if you asked a friend for help.

ROUNDS:

- Don't spill anything: bring a full glass of water to a big vase. The aim is to make the vase full by having everyone in the class involved in this game. Predefine how many times each student fills in the vase. Don't give the pupils any time limit and allow them to take breaks (by asking other student to hold their glass) if needed.

- Avoid the ball falling while walking on a drawn line on the floor: students should place a small ball on a spoon they are holding, Then they should try walking on the line that is drawn on the floor. They can make as many breaks as they want, however if the ball falls they should start from the top.

For both rounds, you can make the path more or less difficult according to the pupils' age (and hence their abilities). You can encourage the pupils to try doing the exercises several times whilst making them more

challenging. You could do that for example by increasing the length of each round, creating stop areas to enable breaks instead of letting pupils to take breaks whenever they want, adding distance between the stop areas….

2- Ask for feedback from your pupils: Discuss with the class which signs of attention fluctuating or attention loss they recognised during the exercises (e.g. I am not looking at the ball anymore, I am listening to what other pupils are saying instead of looking at the path…).

If pupils have already practiced the mindful walking exercises from the mindfulness activities, you can remind them of it. This might help them perform better in these exercises.

3 - At the end of this exercises, setup the third rule with pupils:

> "I should make sure that my attention is not fluctuating. With training, I can identify when my attention is decreasing. If I feel like I am losing my attention, I can either let myself get distracted and take a break or I can try to control my attention and get back to the task."

## PHASE 5 (5 MIN) – TURTLEDOVE CONCLUSION

Show the picture of the turtledove again and read the following statement:

> When I am on an electrical cable:
>
> - I know what can make me fall (for example, a group of migrating birds passing by in the sky)
> - I am able to define the difficulty of the task (for example, the thinner the cable, the more difficult it is to walk on it, or, the longer the cable, the more I need to divide the path into multiple steps so as not to lose the focus)
> - At last, I know how to monitor my attention level (for example, by checking whether I'm losing or controlling my balance)

You can discuss analogy of the electric cable with daily tasks of the children and repeat the 3 rules that have been defined.

## TAKE HOME MESSAGE

- Fluctuations of attention are normal and need to be monitored
- Attention can be favoured by defining which distractors can affect it before doing the task, and by reducing them
- Attention need to be refilled with breaks and by adapting the way we handle different type of tasks

**Written record:**

**- Table of tasks**

**- 3 established rules**

Reference :
https://www.sciencedaily.com/releases/2018/01/180116151600.htm
https://www.sciencedaily.com/releases/2018/10/181030110632.htm
Atol Program, J.P. Lachaux

SESSION Attention BONUS

# DAILY LIFE

## About

| |
|---|
| **Learning goals**<br>Discover daily life distractors |
| **Why?**<br>Distractors are not obligatory obvious, they need to be explained. We propose two daily life example that need some contextual explaination. |
| **What?**<br>two explanation and experiment.. |
| **How?**<br>to read and experiment alone or read and discuss in class (depending on the age and reading skills of the students). |

## Description

### BONUS 1 : THE SMARTPHONE AND ATTENTION

*Multitasking is an illusion.*

Attention systems are comparable to a flashlight. It aims to only shine its light at one spot at a time.

All tasks that require some thinking, will need this 'flashlight of the brain'. Only things that go automatically, such as breathing, do not require attention at all.

There is a continuous battle going on between you, who wants to direct your attention (flashlight) at a certain task, and stimuli in the environment that want to draw your attention towards them, away from the task.

A smartphone contains a lot of those stimuli; all sorts of sounds, flashes and vibrations are continuously seducing you to move your attention away from the task towards the apps and communications with the online world. For the brain these are also 'tasks' that cost energy.

By moving your attention, switching from one task to another, your brain loses energy and concentration. This will result in a diminished performance on the task you wanted to do.

*Keeping your attention skills in shape requires training.* Attention is something that you have to train in order to keep the skill in good shape. By constantly being distracted, we lose the ability to keep our attention directed at a task for a longer period of time.

*So if we know it is bad, why do we let ourselves be distracted by our phones?* Our brain is designed to love new information. This can be very important for our survival. You don't want to miss the warning that a lion might be near!

Unfortunately, a brain does not immediately see the difference between important new information such as the lion, and unimportant new information such as your aunt's new haircut.

By the time your brain realizes it was not so important after all, your attention has already moved to your phone…

**Experiment**

Some Dutch students did an experiment where they handed in their

smartphones, tablets and laptops for seven days, to live offline completely.

The goal was not to make them give up these tools forever, but to make them think about and discuss their habits of using these tools in their day-to-day lives.

The experiment led the students to think about one of the most pressing issues in education: what is the meaning and importance of attention.

The students experienced that, during this offline period, their ability to sustain attention was improving notably.

Try the experiment with your own class and discuss your experiences!

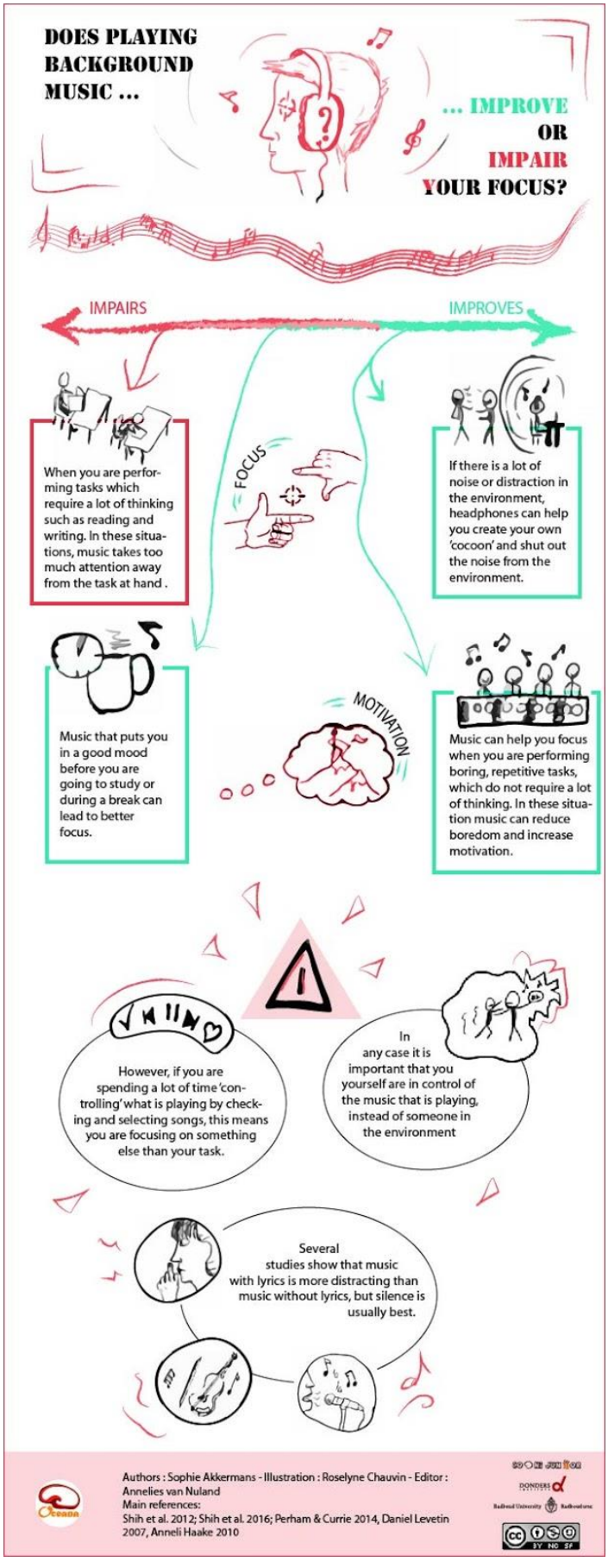
**Dutch sources:**

https://www.nrc.nl/nieuws/2018/04/24/genees-jezelf-van-infobesitas-en-twitteritis-a1600695
https://www.nrc.nl/nieuws/2016/11/14/allemaal-adhd-door-de-smartphone-4854932-a1531805

**Dutch/English sources:**

http://blog.donders.ru.nl/?p=3591
http://blog.donders.ru.nl/?p=7432

## BONUS 2 : MUSIC AND ATTENTION


DOES PLAYING BACKGROUND MUSIC ...
... IMPROVE OR IMPAIR YOUR FOCUS?
IMPAIRS
IMPROVES
When you are performing tasks which require a lot of thinking such as reading and writing. In these situations, music takes too much attention away from the task at hand .
FOCUS
If there is a lot of noise or distraction in the environment, headphones can help you create your own 'cocoon' and shut out the noise from the environment.
Music that puts you in a good mood before you are going to study or during a break can lead to better focus.
MOTIVATION
Music can help you focus when you are performing boring, repetitive tasks, which do not require a lot of thinking. In these situation music can reduce boredom and increase motivation.
However, if you are spending a lot of time 'controlling' what is playing by checking and selecting songs, this means you are focusing on something else than your task.
In any case it is important that you yourself are in control of the music that is playing, instead of someone in the environment
Several studies show that music with lyrics is more distracting than music without lyrics, but silence is usually best.
Authors : Sophie Akkermans - Illustration : Roselyne Chauvin - Editor : Annelies van Nuland
Main references:
Shih et al. 2012; Shih et al. 2016; Perham & Currie 2014, Daniel Levetin 2007, Anneli Haake 2010

# CHAPTER 5

## *Stress*

### Take Home Message

Nowadays, stress is an omni-present topic. Sadly, it seems as if it had become a constant companion of our modern lives. But what is stress? What happens in our body when being exposed to stress? And how can we deal with it?

From an evolutionary perspective, a stress reaction is a healthy bodily reaction meant to protect us from harm and danger. When confronted with a stressor, for instance a dangerous animal, it is an absolutely appropriate reaction of our body to accelerate respiration and heartbeat to be prepared to run away. This acute alertness of the body should be followed by a cooling down phase: Once we are in security again, the body calms down and comes back to its initial state. Normal bodily functions (such as digestion) which were interrupted during alertness can be taken up again. However, when we are continuously exposed to a stressor and we don't have time to calm down in between, this can have severe health consequences.

In everyday life we are usually not confronted with wild animals but stress is rather related to pressure at work, duties, or arguments in our social environment. Those stressors are often continuous and 'fleeing' from them is most of the time not possible or simply not an appropriate reaction. Rather we have to learn how to deal with them in a different way.

It's not only us adults who are exposed to stress. Also children often suffer from it from a very early age on. Pressure at school, exams, or quarrels with their peers or parents are commonly reported stressors. Learning from an early age on how stress evolves, how it can be detected and how to deal with it are therefore important skills. The aim of this chapter is to introduce children to the topic of stress by learning about

- what are typical signs of stress and how to identify them
- what happens in the body when confronted with a stressor
- making a distinction between a normal stress reaction and a chronic stress reaction
- 'healthy' ways of deal with stress

Summing up, stress is part of our life and they colour our lives. They serve a particular aim and "tell us how we feel". Importantly, they influence our memory and learning processes.

SESSION 12

# A STRESSFUL SITUATION

## About

| |
|---|
| **Learning goals**<br><br>Creating a stressful situation (giving an oral presentation) during a school activity to get students thinking, experiencing and discussing about stress. However, importantly, this exercise is not more than what children are normally asked to do at school.<br><br>Children are asked to present one of their skills or hobbies in front of their fellow students. After this exercise, they will write down how the performance went. This will be used for a group analysis/discussion of the experience (of both, the presenters and the audience). |
| **Why?**<br><br>Stress is an emotion more complex than the basic emotions seen in chapter 3. Recognizing stress when it is about to emerge can help prevent its detrimental long-term effects. Early detection of stress signs enables to initiate stress regulation techniques or to adjust one's environment by reducing stressors before it impacts physical and mental health. |
| **What?**<br><br>A video recording device is necessary to record the presentations.<br>Exercise sheets for students to take notes during presentation. |
| **How?**<br><br>whole class, with three students selected to give a talk at the start. Each student reflects on presentation and own experiences. |

# Description

## PHASE 1 (5 MIN) – INTRODUCTION TO THE SESSION

The teacher introduces the series of sessions as a project:

"Let us begin by introducing ourselves by telling the whole class about one of your talents. I know that all of you have one. For this talk, you will have one minute, and there will be only be 5 minutes of preparation. So, it's not going to be easy. As we want to watch back on the presentations during our next class, we will record them.

While one of you is presenting, the others will listen carefully and write down what was good about the presentation and what could be improved."

We ask children to talk about one of their skills as this should be a relatively easy topic. Everyone has at least one skill/hobby that they enjoy e.g. music, art, sports, learning, or cooking etc. At the end of the presentation, the performance is discussed according to some specific criteria that can convey signs of stress, e.g., appropriate loudness, speed of talking, body language (see exercise sheet) .

Here you give 5 minutes for the students to prepare their presentation, no more. You can put an alarm.

## PHASE 2 (25 MIN) – SKILL PRESENTATION

"As we do not have time for everyone today, let's have 3 of you present today."

Three children are asked to volunteer themselves to give a presentation, or teachers can choose who is going to present. They are asked to go in front of the camera (This is very likely going to produce some nervousness. ).

The speaker talks and all other students listen to him/her. Older children can take notes during the presentation (on the prepared exercise sheet (see annexe documents) or piece of paper); others can fill in the evaluation after the presentation. Presenters make notes as well, of their experience as a presenter and as an audience. Give students 5-7 minutes to write down their evaluation.

Distribute the exercise sheet with the list of questions.

## PHASE 3 (10 MIN)– GATHERING INFORMATION FOR GROUP DISCUSSION

Children are encouraged to share and express their thoughts and feelings of the experience of being a speaker or a listener. Possible questions could be: How did you feel during the presentation? What did you notice about the person giving the presentation? The children can answer various questions by raising their hands (and the teacher writes down all ideas on a board). Children will evaluate the presentation on aspects such as attention, stress, emotions felt, and the difficulty of preparing or giving the presentation. The exercise sheet they filled in after each presentation will help them to answer the questions.

The children's answers are to be written down on a blackboard, whiteboard, or large piece of paper. Please take and keep a picture of the board or store the paper with their answers as it will be reused in the upcoming session .

The following questions will be addressed in the next session: According to you, why do some people encounter difficulties giving a presentation? What do you think was going through their minds?

## PHASE 4 (10 MIN)– READING OF THE COMIC ABOUT STRESS

If there is not enough time to finish reading the comic, the start of the next session will be about reviewing/finishing reading the comic.

**Written record**

**the notes that they took while watching presentations and the comic about stress**

## Tips

Even if only three students can present in front of others , it is important that all students are made to believe that they could be chosen for presenting in front of the class. By doing this, students will very likely experience the stress/worry of having to present to others, and in this way, they can join the discussion about (potentially) being a presenter in a stressful situation.

After each presentation it is necessary to give the children a break to let them write down what they noticed and/or experienced during the presentation. For this purpose you can use ‘session 12 exercise sheet’.

SESSION 13

# ANALYSING THE VIDEO

## About

| |
|---|
| **Learning goals**<br>Learning more about stress signs and learning to perceive them using a list (reinforcement learning). |
| **Why?**<br>The idea is to continue the conversation on how we behave in stressful situations, and to provide the space for further questions about stress and learning. |
| **What?**<br>The recorded videos from the previous sessions.<br>The two lists of stress signs.<br>If needed the stress comic |
| **How?**<br>whole class |

## Description

### PHASE 1 (10 MIN) – REMINDER

Teacher: "What did we do during the last session? Do you remember the notes that we took last time?"

Review what students remember about the stress signs they observed during presentation and what they recall from the comic.

Reuse the picture or the black/white board.

“According to you, why do some people encounter difficulties giving a presentation? What do you think was going through their minds?”

Optional: if at the last session, students didn’t have time to finish reading the comic, leave time to finish reading or read the comic in whole class. (+ 10min)

## PHASE 2 (15 MIN) – READING THE STRESS SIGNS TABLES

Teacher: “We are going to look at the list of signs of stress and see what we came up with at the last session, and whether we can add a few more things to the list from the tables that I have here (handouts from the tools provided). Then, we will look at the recording of the presentation made last time of the three presentations and observe if we see the signs of stress.”

You can read and discuss the lists to make sure students have a good understanding of their meaning.

## PHASE 3 (20 MIN) – USING THE STRESS SIGNS TABLES

Students watch the videos with the aim to detect signs that are in the table. They put a cross when they detect one. Leave a minute after watching one video for students to finish filling in the table. You can, after each video or after watching all three videos, discuss with the whole class which signs they wrote down and why.

If you think that the videos made last week are not representative of the stress response, you can also ask three new students to present, instead of watching the video.

The teacher will lead a concluding discussion: if this conclusion is not drawn yet, conclude that giving an oral presentation is difficult because it is (generally) a stressful situation and then discuss what other situation can bring stress. The teacher can also use the questions: 'Why do some

students feel more comfortable than others when presenting?', 'What is stress?', 'Where does it come from?', 'How can stress be controlled?'

This last question will lead to the next session.

**Written record**

**summary table of signs of stress**

SESSION 14

# MINDFULNESS PRACTICE

## About

| |
|---|
| **Learning goals**<br>Learning about mindfulness.<br>Learning about bringing attention back to what we want to focus on.<br>Learning how to be non-judgmental toward ourselves.<br>Learning to perceive breath and breathe mindfully.<br>Learning how to walk mindfully. |
| **Why?**<br>Multiple cognitive functions such as executive control and attention are shown to benefit from the mindfulness practice. Mindfulness practice can also be used to regulate stress and emotion processing. |
| **What?**<br>The teacher will give some explanation about “what is mindfulness”.<br>Series of exercises (sitting or standing) led by the teacher.<br>A song that can be used in the background to create a calm atmosphere.<br>Illustrations or videos for each exercise. |
| **How?**<br>Introduction of the topic to the whole class.<br>Mindfulness exercises guided by a teacher. |

## Description

### INFORMATION FOR TEACHER

The aim of this document is to introduce the topic of mindfulness and propose several exercises for mindfulness meditation practice, which can

be easily and effectively used in the classroom without having a mindfulness training.

Importantly, the teacher should be attentive to how children take each of the exercises, and stop if they think it is too hard. In such cases, even talking about the exercises is going to be useful as it will make children aware of these exercises. To dive further into the practice of mindfulness, we recommend exploring the resources section at the end of the document.

***Basic concepts***

To initiate this practice session, begin by introducing **basic concepts** of mindfulness using the text below. The wording can be adapted or rephrased according to children's understanding. Then, explain the link between these concepts and what had been learnt previously about the brain. Below, you will find the text on **Link with other sessions.**

***Exercises***

The following documents introduce several mindfulness exercises that use the following objects of attention:

- Breathing: being aware of the air flow and the distinct moments that make up each breath;
- Walking: remaining mindful of the moment of the feet contact with the ground, the weight, balance and alignment of the body, as well as the speed;

Below, we describe each of the exercises for the mindfulness meditation practice. Some exercises will make use of mental imagery and are related to the storyline in the bird academy to help children execute them more easily. Whether you choose to do the exercise with or without imagery or the bird academy may depend on the children. Some might benefit from it and others will prefer exercises without extra tools. You might want to try out both and evaluate what works better.

As a reminder, we want to highlight that during the practice of mindfulness, it is normal that one's attention regularly deviates from the point of focus. It is normal to be thinking of a related topic, or what will happen after the practise session. Do not worry, this happens to everyone. While doing the exercises, simply remind children that if their mind starts to wander, they should accept the wandering, and welcome it. Then, they could try to gently come back to the exercise.

***Link with other sessions***

You will find some information related to research results linking the practice of mindfulness to different cognitive functions studied in other sessions of the kit. This background information can also be provided to children to make them aware about the link between the practical activities proposed in this session and all the knowledge that they previously acquired related to cognitive functions and learning.

**Resources**

In the resources section, you can find links to exercises using other objects of attention:

- Body scanning: being mindful of different parts of the body and how they are feeling;
- Sensing: taking time to notice and appreciate details and features of what we see, taste, feel, smell and hear.

## PHASE 1 (10 MIN)– INTRODUCTION OF MINDFULNESS: BASIC CONCEPTS

**Interactive question:** Ask children what are they thinking about when they are having lunch?

The aim of mindfulness meditation is to be **present** in the moment and to move away from our automatic pilot. In daily activities, we often behave automatically. For example, while eating, we often don't pay attention to the food on the plate and how it tastes, but instead we think about activities that we did during the day or the one that we are looking

forward to doing later in the day. As a result, it often happens that we have finished our meal without realizing it. This is an example of a situation in which we were on the 'auto-pilot' mode; that means we carried out an activity, in this case: eating, but we were not really aware of it, and we were instead "somewhere else" with our thoughts and attention. We can find a lot of examples of similar automatic behaviours in our daily lives.

**Interactive question**: Do you know any other examples of when you use the "auto-pilot" mode?
**Answer**: e.g. cycling to school, walking to a shop, brushing teeth, breathing.

Often, we are not aware of all the factors that are affecting our behavior. For example, we may automatically get hungry when smelling, e.g., fries, or lose our attention by hearing notifications from our phone. The ability to not switch to "auto-pilot" but instead stay aware of what is happening around us, allows us to make more conscious decisions, and choose how to react to things and situations in a more conscious way. For example, we could decide not to look at our phone.

In this session, we propose exercises that allow us to be more attentive to how our focus is shifting and to teach us to accept it and gently bring our attention back to what we choose to focus on. With time, we will be able to notice some background noise or irrelevant thoughts, and hopefully, will be able to come back to where we want our attention to be.

As an example, we can be mindful (aware) of our breathing (e.g., how deeply we breathe, how long we take to inhale and exhale) and try to maintain our attention on our breath. During the initial training, it is normal to become easily distracted. Attention is not a continuous process but fluctuates and can be shifted by distractors (e.g., sudden thoughts). **Thus, one of the main goals of mindfulness is to learn to bring the attention back to what we aim to focus on**. In turn, learning how to **bring** one's attention **back,** will help one to **stay** focused on a task.

In order to demonstrate that being attentive and mindful is not obvious and will require learning techniques, we propose an experiment about following their breath, during which they will most probably stop paying attention.

**Interactive experiment:** Propose an observation experiment, in which children try to follow their breath. Holding a hand on the stomach might be helpful for children to start and feel the breathing. After a minute, stop the experiment and ask them if they are still paying attention to their breath. They will probably notice that it's not easy.

An important and related skill, which can be gained in mindfulness practice, is learning to **be kind to ourselves.** For example, when we lose our attention and our mind wanders off, we should not be angry or disappointed with ourselves. It takes practice to master the art of mindfulness and as with every training, we will get better with time. Therefore, we could learn to welcome what we perceive, in the following way:

1 - "I perceive a distraction (e.g., a noise)"

2 -"I notice my attention is going away toward the distraction"

3 - "I accept that my mind is attracted to it and accept the presence of the distraction"

4 - "I take notice of it."

5 - "If I wish, I will try to carry my attention back to my exercise".

In conclusion, the key concepts here are to be **kind to yourself** and **non-judgmental**. By noticing a distraction, we accept it more easily and we are able to come back to the point of focus. Everyone is prone to distractions; there is no need to feel bad about it, it is part of the process of learning. With time and practice, you will get better at gently accepting distractions and coming back to the object of attention.

## PHASE 2 (3 X 10 MIN)– EXERCISES

**Optional musical beginning of the exercises**

In order to let the children calm down mentally and physically, especially in the case when they are particularly active before starting the meditation exercises, we propose to take a few minutes of silent listening to calming music. A possible musical start can be some handpan music such as: https://xkliber.bandcamp.com/album/handpan-stories (see piste 4).

**Exercise 1: Being light as the air (Learning to breathe)**

**Optional approach to begin exercise 1**

**Teacher**: Eagle (Teacher introduces a bird, so children can imagine and engage more easily)

Eagles are known to have highly accurate vision, even at far distances. They can grow very big and have impressive hunting skills. They are also very good at building nests at high locations, such as mountains and big trees. Some species of eagles can reach the speed of up to 100 km/h.

**(Optional) External resources:** To help children imagine being an eagle you can show some online video of camera footage from the back of a flying eagle. Here are some examples:

https://www.youtube.com/watch?v=G3QrhdfLCO8

https://www.youtube.com/watch?v=2EAgbW1u00M
https://www.youtube.com/watch?v=7E3XcO9DozY&t=38s

**Instruction:**

Imagine an eagle flying smoothly, using the airstream. Take a big breath going through your nose, and breathe out through your mouth. In order to achieve an optimal speed, eagles focus on the direction of the airstream and they position their wings to take advantage of the airstream. Your breathing is very similar, using optimal path to and out of your lungs. Let's try to focus on your breathing and feel the air going in and out smoothly. Don't control it, just feel it going in and out. See how smoothly it goes, like the eagle on the airstream.

1- The air first goes through the nose, feel it going smoothly there. Breathe out.

2- Next time, take a breath and when you breathe out, feel it going smoothly through your throat and then feel it also when it passes through your mouth.

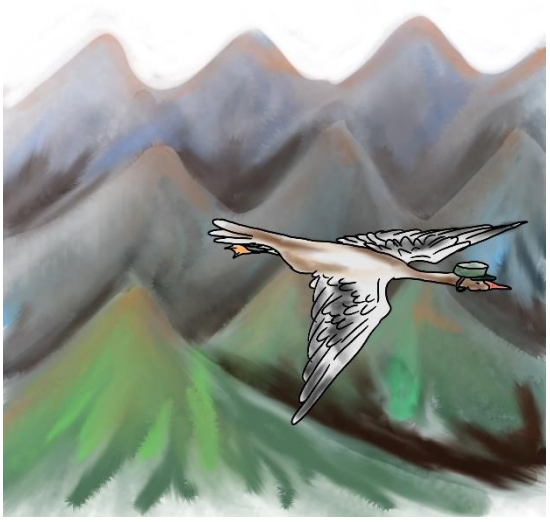
3- Now, when you breathe in, feel it going smoothly through your nose, then feel it going smoothly through your mouth when you breath out.

Now that you know how smooth the air goes in and out, like the eagle knows how to feel the airstream, we can imagine being an eagle. Start with your arms beside you and, as you breathe in bring your arms up towards the ceiling. Smoothly breathe out while bringing your arms back to your sides. You are the eagle, slowly moving your wings by following the airstream. Don't accelerate your arm movement as they need to follow the breathing very closely. For the next breath, repeat, and follow the teacher.

**Note to the teacher:** If you notice that a child has problems with breathing and the exercise starts to stress him or her, go to the child, make sure everything is ok and remind him/her about the concept of being non-judgement to ourselves. Let him/her try again but emphasize that it is ok to stop the exercise at any point. Also, another exercise may be better suited for this child later.

**Exercise 2: Count the breaths (Mindful breathing)**

**Optional approach to begin exercise 2**



**Teacher**: Goose (Teacher introduces a bird, so children can imagine and engage more easily)

Geese fly in specific V-shaped formations. They migrate during the year according to the season and fly long distances. They stay focused to keep their formation that optimises the airflow between them which helps them get less easily tired.

**External resources:** To help children imagine flying geese in the V-shape, you can show some online videos of geese's eye view. Here is an example:

https://www.youtube.com/watch?v=FSxvF6UM25c

**Instructions:**

After previous exercise, you are ready to do the breathing exercise on your own. Take a sit on the chair, both feet flat on the ground, back straight but not tense, both hands on the knees. Now, focus on your breathing without moving the arms.

This time, we will also be breathing without thinking about anything in particular. To do so, you will start with following one breath and trying to keep your full focus there until the end of the breathing circle. If you succeed at staying focussed without your mind wandering or getting distracted during one breath circle (in and out), you can try with two consecutive breath circles. Try to keep your normal breathing rhythm - there is no need to speed up or slow down your breathing speed. If you wander away, it is fine, just notice that it happened and go back to counting the breath circles (in and out is one circle). If you lose your

count, it is also fine, just start again. It is important to highlight that we are not trying to reach a particular score.

**Optional resource in exercise 2**

In the annexe - there is a video that you can also use:

If you want to use the short video provided in the annexe (video_2), use the following instruction: We are going to follow the goose that migrates towards the north. There are many hills in front of you. The airstream is passing through the mountains, climbing the top and descending down to the valleys. For each mountain, you will breathe in when going to the top and exhale while going down. Keep your own rhythm, there is no need to follow the goose's speed; - it is *not* the exercise to follow the speed of the goose with your breath. This video is only a visualisation that might be helpful to get you into the exercise. Focus on the feeling of the air going in and out.

First try this with one mountain. Then try with two mountains. Take your time and breathe in your own rhythm.

As mentioned before, your mind may get distracted and start wandering away. Just try to bring back your attention and gently come back to your breathing. Start again with one mountain.

**Exercises 3: Mindfulness walk (Body perception)**

**Optional approach to begin exercise 3**

**Teacher**: Penguins (Teacher introduces a bird, so children can imagine and engage more easily )

These animals cannot fly, they mainly walk and swim. Most of them live in Antarctica where it is very cold. To keep the warmth, they group in a circle. Penguins inside the circle stay protected from the cold and the wind,

and penguins outside the circle walk slowly around them. When the outside penguins start feeling cold, they get inside the circle and other penguins take their place.

“You know how we check if they are getting cold? While walking, the outside penguins feel their body and the ground with each step. If we can no longer feel the ground, this indicates they are too cold and need to leave the outside circle and move into the inside circle to warm up. To be able to feel your body and how it touches the environment for a long time, we train a lot. Because if we lose our focus and we start feeling cold, this can be dangerous. Maintaining focus is not always easy, it requires training.”

Today, we are going to learn how to maintain focus by trying to walk mindfully like penguins do.

**External resources:** To help children imagine being a penguin and walk mindfully, you can show them some online videos about the organized rotation against the cold weather. Here is an example:

https://www.youtube.com/watch?v=0L7O5O7U4Gs

**Instruction**

Before starting the walking exercises make sure children have enough space to walk. You can move the furniture to the side, so children can move in any direction freely or you can decide on a path in the classroom that they will follow. Children should take shoes off to ease the contact with the floor. Give the following instructions to children:

Stand up and try to relax, your legs should be a little bit spread so you don't lose your balance. Start moving your body slowly a bit back and forth to feel the weight of your body in your feet. This first part of the exercise allows you to be aware of your connection with the floor before you start walking. Don't control your breathing, just breathe normally.

Now, lift your right leg and feel your weight on the left leg. Step forward slowly with your right leg by first touching the floor with your toes, then your middle part of feet and lastly the heel, slowly. Transfer your weight to the right leg and feel your whole right feet in contact with the floor.

Then, the same with the other feet. Lift your left leg, slowly step forward. Again, touch the floor first with your toes, feel the floor, then make contact with the middle part of your feet, feel the floor, and at last, make contact with your heel.

Now, transfer your weight to the left leg.

Continue with the mindful walking.

Lift, move, touch : toes, middle, heel, slowly.

Lift, move, touch : toes, middle, heel, slowly.

Repeat these instructions several times, so children can follow it and focus on feeling the floor.

While learning the pattern, you can, after a few repetitions from your side, propose to children to repeat the instruction in their head instead of you saying it outloud. As usually, remind children that if they get distracted and lose the pattern, they can simply relax, get back to the initial position and start again. Everyone can move at his or her own pace but make sure that children don't play with other students, e.g, with someone who is walking faster. If this happens, remind them that it is an exercise for themselves and they should only interact with their body and the floor, not with other children. If they start playing, ask them to stop, close their eyes for a while, take a breath, open their eyes and start with the exercise

again. There is no need for talking, or exchanging any information between children.

The length of the exercise should not be more than 5 minutes. After the exercise, ask children how they feel, how easy it was and reassure them on the different concepts presented at the start: it is fine if they did not manage to do it, it is not particularly easy, and that there is no judgment.

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# CHAPTER 6

## *Overview and Higher Cognitive functions*

### Take Home Message

Executive functions can be classified in two categories: the lower level ones (working memory, inhibition, cognitive flexibility) and the upper level ones (like planning, which means creating action plans by cutting down tasks into small tasks or creating sequences of action). Executive functions of lower level are the base for upper level one to mature. So we will focus on the lower level ones. A strong basis enables a good maturation of the higher level one, which will improve until adult age.
Children have a big progress leeway, because these abilities are not yet mature. To propose organization strategies (cutting tasks into smaller steps, control distractors, inhibit ourselves…) will enable a successful training and maturation of these functions.
Be aware, however, to don't ask too much of children. As these abilities are not yet mature, it is absolutely normal that children show more or less difficulties in understanding and apply these techniques
For the case of neuroatypical children such as children with AS or ADHD, these exercises can be particularly challenging. You will need to accentuate the message that each brain is different and learn to its own pace, but at the end of the day, we are all able to become good if we own the good strategies and if we stay determined to surpass oneself. With this message, we aim to "erase" differences.

This chapter enables learners to revise the multiple concepts learned across the chapters of the kit, and to put them into perspective with each other.

A good learning process depends not only on using each cognitive function independently, but also together. As all cognitive functions are orchestrated by the brain, and the brain is made of connections between neurons – the key players allowing us to learn – it stands that by relating and using these functions together, we can further improve learning.

As our brain is the basis of our ability to learn and communicate, we ought to regularly consider keeping our brain 'happy and healthy' so that we can be efficient learners. Here, we apply the idea of 'transfer', where we are aware of our brain and thoughts not only in the classroom, but on a daily basis, in various situations. In particular, our diet, the food we eat, will also influence how our brain functions. Just as with bodily hygiene, our mental hygiene is very important. The last session uses a board game to put these information in perspective and remind that learning a new skill and a regular active movement such as sports can help to keep the brain happy and healthy.

SESSION 15

# BASIC EXECUTIVE FUNCTIONS

## About

| |
|---|
| **Learning goals**<br>Getting a bigger picture of how the brain works. Relating cognitive function together. Executive functions start from basic functions that have been seen in previous sessions. |
| **Why?**<br>Cognitive functions are not isolated, they work together to perform a task, or to learn something. We start to create this integration in the mental map that students have built from previous sessions. |
| **What?**<br>reminder activity<br>2 comics and related interactive activity post reading<br>practice exercice |
| **How?**<br>class discussion<br>individual or class reading |

## Description

### PHASE 1 (5 MIN) – REMINDER OF WORKING MEMORY: DISCUSSION

In order to refresh the prerequisite knowledge, the teacher asks what children remember about the working memory (session 5). Most important concepts that should be recall are that it is a short term

memory that is used to manipulate multiple information together, and that there is a maximal number of element that can be stored and manipulate (span).

Teacher introduces the new chapter : “Now we are going to see how the working memory and other function that we have studied work together in more complex function. Do you remember when we listed all the thing the brain could do ? So far, we have looked into : memory, attention, emotion. We are going to see how these functions combine or are used in building more complex functions like planning, organizing and so on.”

## PHASE 2 (10-15 MIN) – COMIC EF1: WORKING MEMORY

Individually or in class, students read the comic and use the exercise sheet to complete the paragraph with the right words. Does they remember the shopping list of the comic ?

## PHASE 3 (10-15 MIN) – COMIC EF2: INHIBITION

Individually or in class, students read the comic and do the word search exercice.

## PHASE 4 (15-25 MIN) – STOP, THINK AND DO

STOP THINK DO: Context

This method is based on the Social Problem Solving Curriculum Traffic Light by Roger Weissberg et al.

https://www.researchgate.net/publication/226704797_Social_problem-solving_skills_training_A_competence-building_intervention_with_second-_to_fourth-grade_children

This method enhances inhibition skills by proposing to follow a step-by-step program to solve a situation. Even if this pattern was originally proposed for problem solving of social situations, it can be extrapolated to all kinds of problem solving.

How to exercise self-control ? Inhibition is a function that is still maturing until late teenagehood. The "stop, think and do" method is a way to learn to exercise self-control by learning to take the time to process the situation and evaluate the possible action to take.

This method is based on breaking a process into steps and creating a routine, easier to process and executive for children at an age where inhibition skills have yet to reach full maturation.

INSTRUCTIONS:

The teacher questions :

*"Do you remember where we also saw the inhibition?" We want to create a little discussion about the chapter 10 on attention. In the attention comic, the self-control/inhibition is one of the attention systems.*

*"When we were looking at attention and how to control it, what did we learn to manage ?" We want to bring back the concept of distractors: internal (thoughts, body state ...) or external (noise ...), and that control of attention method is more related to the "selection" and "vigilance" systems.*

*"Now we are learning a method to make inhibition / self-control easier. This will be Professor Stork that will present the method."*

Display or distribute the infographic of the traffic light with Professor Strok to explain the "Stop, think, go" method. Then use the exercise sheet to try out the method.

STOP THINK DO: Method

The method is called “Stop, think, go” and can be illustrated by a traffic light. Students in front of a complex, emotional or problematic situation are invited to:

- “stop” all actions and calm down (for example using breathing technique presented in chapter 14)

- “think”

    - of how do you feel, or how difficult the problem is

    - of how do you want to react, or of what do you plan to do

    - of all possible consequences of this action and if it is what you want

    - if it is not what you want, what are alternative solutions/actions ?

- “go”, once you have chosen the solution, you can go execute it.

Outside of this class training, in daily life, this process can be guided by an adult if a student is in distress, either in social/emotional distress or having difficulty to solve a problem, and if the student does not think yet by himself of using the technique.

The “stop” process is promoting inhibition skills by creating a routine in which inhibition comes first. The “think” process is promoting higher executive skills (planning) that will be seen in the next session. You will be able to come back to conclusion of session 16 on this to make the link with their new knowledge.

Exercise sheet:

On the exercise sheet, there is a set of guided situations together with a list of possible reactions and associated consequences. First, students have to read the situation and the different reactions and choose the

reaction that would most correspond to how they would react. Then they should read the linked consequence. If the consequence is not satisfying they come back to another reaction and associated consequence, and so on until they find a consequence they are satisfied with.

You can do the first one as an example all together, afterwards they can continue either individually or in pairs.

There is a set of situations with a list of reactions and consequences that aren't linked, so the student has to figure out the most logical consequences.

There is a set of situations without guided reactions, so students can try to solve and write down their reaction by themselves.

You can stop the work every 5 minutes and correct in a full classroom setting, one or two situations. Discussion can follow on whether the situation is relatable.

## TAKE HOME MESSAGE

To be able to solve a problem or to do a task, you need multiple functions: working memory, inhibition, attention are part of the cognitive functions that are the most commonly used. We need to know them and know how they work to improve our learning and problem solving abilities, as we can use different tips and strategies to help them.

## Written record:

**The exercise sheet and the comics**

SESSION 16

# HIGHER EXECUTIVE FUNCTIONS

## About

| |
|---|
| **Learning goals**<br>Introducing higher executive function : cognitive flexibility, planning ... |
| **Why?**<br>Disentangling the complexity of the brain, as a building blocks : we started with neurons, we went to basic cognitive functions, and now moving to more complex functions. |
| **What?**<br>reminder activity: polarity game<br>2 comics and related interactive activity post reading<br>practice exercice : théâtre |
| **How?**<br>class and group activities<br>individual or class reading |

## Description

### PHASE 1 (10 MIN) – POLARITY GAME

Closed questions are presented to children.

To answer each question, children have to walk to answer at the appropriate location. For instance, one corner is the "yes" corner, while another corner is the "no" corner. When all children have selected their location/answer, a couple of children at each location are asked to explain their choices.

This activity promotes the idea of collective intelligence, showing that everyone takes part in the answer.

Questions:

- Can we use attention and memory at the same time?
    - Answer options: yes, no, it depends
    - Correct answer: Yes. Cognitive flexibility is a combination of both. See if this answer comes into the minds of children. Do they have an example for cognitive flexibility?
- Can we use emotions and memory at the same time?
    - Answer options: yes, no, it depends
    - Correct answer: yes: we saw that we have an emotional memory. Do children remember more memories with high emotional event (a big fear, a big joy)?)
- When playing theatre, and interpreting a character, what do we use: attention, memory or both?
    - Answer options: Attention, memory, both.
    - Correct answer: In general both are used, but the precise extent of each component cannot be specified. See if children can recall terms like selective attention or inhibition. Example: Memory is used to recall the script whereas attention is used to define when it's our turn, but both are also combined to create cognitive flexibility during playing the character (shifting our behavior to "the character's behavior", refers to comic about cognitive flexibility).

## PHASE 2 (10 MIN) – COMICS EF3-4: COGNITIVE FLEXIBILITY AND HIGHER EXECUTIVE FUNCTIONS

Individually or in class, students read comics.

## PHASE 3 (10 MIN) – POST READING ACTIVITY

Ask student what tasks use cognitive flexibility and higher executive functions. On a board visible by all, make a table : first column is the list of task proposed and the following columns are the cognitive functions seen so far (emotion, attention, memory, cognitive flexibility, planning …). Ask students which cognitive function are used and to justify their answer.

Conclusion : for most of the task, we use all type of cognitive functions.

## PHASE 4 (30 MIN) – THEATRE

Split the class into smaller groups to do some role-playing and improvisation. Make children's aim to stay in character for the whole time as a good practise of executive functions.

Depending on how much time you want to spend, you can do one or two plays. Children are asked to pick their character (maximum group size: five children).

**Theatre play 1: The case of the stolen jewels**

- Inspector (very cold, suspicious) trying to solve a case of the robbed jewels by asking if everyone have an alibi from 10 to 12AM the day of he robbery.
- The gardener (strong country side accent)
- The owner of the house (very old and has hearing problem)
- The visitor (very active, busy, businessman)
- The neighbour (not caring, laughing from everything)

Theatre play 2: Party in the village

Hold a little conversation around what everyone will do to prepare the party in the village

- Baker (very tired)
- Florist (very eccentric, want to have everything big)

- Mayor (embarrassed, want to keep everything small)
- Event organizer builder (annoyed, want to know how many people will attend, how many chairs, how many tables how many ... etc.),
- DJ ("the head in the clouds" (or in the music), half-listening, talks loud (as if he had hearing problems)

## TAKE HOME MESSAGE

Understanding others, their emotion or a problem to solve often involved putting ourselves in the shoes of someone else or trying to see a situation from another angle, therefore cognitive flexibility is a very important skill. As we see here again, this is based on other more basic cognitive fonction (inhibition, working memory) that we now know well and know what to do to help them.

## Written record:

**Together with the teacher, make a list of all cognitive functions studied so far, and a list of activities (horse riding, reading, drawing from observation, doing theatre etc.)**

**Which cognitive functions are used during these activities? Match the cognitive function to the activity (more than one cognitive function can be used in the activity). You will notice that you use often all of them in each activity.**

SESSION 11

# NEEDS OF THE BRAIN

## About

| |
|---|
| **Learning goals**<br>Reviewing the lessons learnt from previous sections |
| **Why?**<br>The brain is not independent of the body as it is not independent of its environment. This section gives a larger view of this relationship. |
| **What?**<br>Brain game |
| **How?**<br>Groups of four to six children |

## Description

### PHASE 1 (10 MIN) – RULES

The teacher reads and discusses the rules of the game to make sure everyone understands them. Do you recognize some of the concepts that we learned so far?

### PHASE 2 (30 TO 50 MIN)– PLAY THE GAME

Use the game "The needs of the brain"

### PHASE 3 (20 MIN OPTIONAL) – FURTHER INFORMATION

Go over the supplementary information attached to the game.

# BACKGROUND INFORMATION

# Chapter 1 : BACKGROUND INFORMATION

We invite you to find more information about theses topic in our flipboard magazine grouping articles (across multiple languages) about the neurobiology and cognitive science in education:
https://flipboard.com/@cognijunior/vulgariser-la-neurobiologie-ea5ln3c2z
https://flipboard.com/@cognijunior/le-cerveau-au-programme-rsl7q0pfz
https://flipboard.com/@cognijunior/sciences-cognitives-et-éducation-nqk7eim9z

Here are a couple of selected resources out of these lists:

- https://nautil.us/issue/27/dark-matter/the-neurons-secret-partner
- Il était une fois la vie : le cerveau : https://www.dailymotion.com/video/x7xnj5
- https://brainmadesimple.com/

# Chapter 2 : BACKGROUND INFORMATION

Memory and learning

**https://thebrain.mcgill.ca/flash/d/d_07/d_07_p/d_07_p_tra/d_07_p_tra.html**

EUSTACHE F. sous la direction de. (2014). *Mémoire et oubli.* Le pommier et Observatoire B2V des mémoires.

CROISILE B. (2009). *Tout sur la mémoire*. Odile Jacob.

STORDEUR J. (2014). *Comprendre, Apprendre, Mémoriser, Les Neurosciences au service de la pédagogie*. De Boeck Éducation.

# Chapter 3 : BACKGROUND INFORMATION

**Recognizing emotions:** The first sessions focus on recognizing and understanding emotions. Emotions are associated with certain facial expressions and physical characteristics that can be noticed by the person experiencing the emotion or by someone in the environment.

**Benefits of emotions:** Help us act quickly with minimum awareness, Prepare the body for immediate actions, Influence thoughts, Motivate behaviours, Emotional Expressions Facilitate Specific Behaviors in Perceivers, Emotional Expressions Signal the Nature of Interpersonal Relationships, Emotional Expressions Provide Incentives for Desired Social Behavior

**Downsides of emotions:** physical uncomfort (stress), mental uncomfort , Can interfere with attention, memory and executive function, Can impair decision making

Emotions can lead to impulsive actions which one might regret later (acting in the heat of the moment).

**Regulation:** Session 9 offers an introduction of a tool to regulate the cognitive (mind) component of the emotions. This could be helpful when you are bothered by negative thoughts and feelings and you would like to change those. Your thoughts about a situation influence how you will feel about it. Analyzing your thoughts about a situation and trying to take a more neutral or positive perspective might help you feel better and help your decision-making.

This form of emotion regulation is a bit similar to the familiar Stop - Think - Act strategy and also makes use of the executive functions. Executive functions mature until adult age and even for many adults the use of executive functions can be challenging. This especially true in 'the heat of the moment', as strong emotions can actually work against the executive functions.

Therefore, one should not be surprised if one does often not entirely succeed in changing the thoughts and feelings that come with strong emotions, even if one managed to do so in practice situations. It requires practice throughout life. If it did not work one day, do not be hard on yourself or give up, tomorrow is another day.

Furthermore, the aim of the regulation session is not to teach children how to stop emotions. Emotions have important functions and suppressing them in the long run could have detrimental effects.

**Ressources**

- https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2015.302630
- https://casel.org/wp-content/uploads/2016/01/meta-analysis-child-development-1.pdf
- https://www.salzburgglobal.org/fileadmin/user_upload/Documents/2010-2019/2018/Session_603/Strengthening-Social-and-Emotional-Education.pdf

*Cognitive reappraisal:*
Webb, T.L., Miles, E., Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin, 138(4),* 775-808.

Gross, J.J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology, 39, 281–291.*

Cutuli, D. (2014). Cognitive reappraisal and expressive suppression strategies role in the emotion regulation: an overview on their modulatory effects and neural correlates. *Frontiers in Systems Neuroscience, 8*, article 175.

*The Penn Resiliency Program:*
Gillham, J.E., Hamilton, J., Freres, D.R., Patton, K., & Gallop, R. (2006). Preventing depression among early adolescents in the primary care setting: a randomized controlled study of the Penn Resiliency Program. *Journal of Abnormal Child Psychology, 34*, 203–219.

Bastounis, A., Callaghan, P., Banerjee, A., Michail, M. (2016). The effectiveness of the Penn Resiliency Programme (PRP) and its adapted versions in reducing depression and anxiety

and improving explanatory style: A systematic review and meta-analysis. *Journal of Adolescence, 52*, 37-48.

*Op Volle Kracht:*
de Jonge-Heesen, K.W.J., van Ettekoven, K.M., Rasing, S.P.A., Oprins-van Liempd, F.H.J., Vermulst, A.A., Engels, R.C.M.E., Creemers, D.H.M (2016). Evaluation of a school-based depression prevention program among adolescents with elevated depressive symptoms: study protocol of a randomized controlled trial. *BMC Psychiatry, 16*, article 402.

*SPARK programme:*
Pluess, M., Boniwell, I., Hefferon, K., Tunariu, A. (2017). Preliminary evaluation of school-based resilience-promoting intervention in a high-risk population: Application of an exploratory two-cohort treatment/control design. *PLoS One, 12(5*), e0177191.

# Chapter 4 : BACKGROUND INFORMATION

Renée K. Biss, Happily distracted: mood and a benefit of attention dysregulation in older adults, Front. Psychol., 16 October 2012 |https://www.frontiersin.org/articles/10.3389/fpsyg.2012.00399/full

ATOLE est un programme de découverte et d'apprentissage de l'attention en milieu scolaire, pour apprendre l'ATtention à l'écOLE (« ATtentif à l'écOLE » © J.P. LACHAUX, INSERM). https://project.crnl.fr/atole/

**Dutch sources:**
https://www.nrc.nl/nieuws/2018/04/24/genees-jezelf-van-infobesitas-en-twitteritis-a1600695
https://www.nrc.nl/nieuws/2016/11/14/allemaal-adhd-door-de-smartphone-4854932-a1531805

**Dutch/English sources:**
http://blog.donders.ru.nl/?p=3591
http://blog.donders.ru.nl/?p=7432

# Chapter 5 : BACKGROUND INFORMATION Session 12 and 13

*The comic about stress includes some images about the underlying biology of stress. Here we propose an extended explanation in case students have questions.*

There are two main systems, which are activated when we are confronted with a stressful situation: the sympathetic-adrenal-medullary pathway (SAM) and the hypothalamus-pituitary gland-adrenal axis (HPA axis).

When facing a situation which has been deemed as stressful or dangerous by the amygdala, distress signals are sent to the hypothalamus. The amygdala (or actually amygdalae, as there are two) is an area of the brain which is involved in the assessment of sensory signals like images and sounds and its emotional interpretation(?). The hypothalamus is often described as the brain's command center. It controls vital bodily functions like breathing, heart beat and blood pressure. The hypothalamus is also in control of the two systems involved in a stress reaction.

**The Sympathetic-Adrenal-Medullary pathway (SAM) / autonomous nervous system**

In relatively sudden or acute stress situations (like suddenly seeing an angry dog jumping towards you) our body can be brought within a second into a so-called 'fight-or-flight' reaction (or a 'freeze' reaction). This (these) reaction(s) are triggered by an activation of the (sympathetic pathway of the) autonomous nervous system (ANS). It is called 'autonomous' as it usually cannot be influenced by conscious, voluntary control. The neurons of the ANS project to (innervate) all of the body's organs and thereby control their activity. In case of the fight-or-flight reaction this includes for instance an increase in heartbeat and blood pressure, a speeding up of breathing, dilation of pupils, and a sharpening of our senses. The activation of the ANS also entails the release of the hormones Adrenalin and Noradrenalin from the mark (medulla) of the adrenal glands. These hormones rapidly mobilize the supply of oxygen, glucose (sugar), and fat in the blood, which deliver energy to the whole body. At the same time, non-emergency processes like food digestion are suppressed. We are prepared for fight or flight.

**The Hypothalamus-Pituitary gland-Adrenal system**

The second system which is coordinating our stress reaction is a hormonal pathway leading from the hypothalamus to the pituitary gland and finally to the cortex of the adrenal glands where Cortisol is released.

The nearly instant reactions caused by the above described SAM pathway is possible because the SAM communicates mainly through neurons (i.e. via electrical signals). The HPA axis however is based on hormonal communication. The messengers (hormones) are released into blood and need to travel via the bloodstream to their target organ which takes some time.

The cortisol had an inhibitory effect of theses axis, signaling the end of the stress response.

Cortisol works with epinephrine (adrenaline) to create memories of short-term emotional events; this is the proposed mechanism for the storage of flash-bulb memories, and may originate as a means to remember what to avoid in the future.

However, long-term exposure to cortisol (in the case of chronic stress for exemple) damages cells in the hippocampus, which results in impaired learning. Furthermore, it has been shown that cortisol inhibits memory retrieval for already stored information.

# Session 14

Over the last two decades, mindfulness has become a hot topic in scientific research. The effects of mindfulness training on attention, emotion regulation and information processing have been investigated and various intervention programs have been developed and tested. Here are some studies, which investigated the effects of mindfulness practice in relation to:

- improving attention, executive functioning and academic outcomes: Flook et al., 2015; Schonert-reichl et al., 2015; Zenner et al., 2014; Black & Fernando, 2014
- reducing stress, anxiety: Kuyken et al., 2013; Rempel, 2012, Mendelson et al., 2010; Sibinga et al., 2013
- improving self-regulation skill and prosocial behavior: Flook et al., 2015; Schonert-reichl et al., 2015

The biological underpinnings of the mindfulness practice on these cognitive and emotional functioning is still the subject of investigation.

You can find the cited reference in the reference section.

Additional information about mindfulness meditation and mindfulness training.

To continue training your awareness and to broaden your ability to focus on e.g. different objects of attention, there are other exercises that might be fun and helpful. For example, Body scan or Mindful sensing (hearing/ viewing / tasting / smelling / touching).

BODY SCAN:

In the Body scan exercise, you try to pay attention to ("you scan") each of your body parts, moving from your head to your toes.

There are lots of recordings available online that can guide you in this exercise. You can sit, or you can lay down. As with every exercise, be good to yourself and if your mind wanders off, try to go back to the exercise gently. This exercise can be carried out in the classroom, and the length of the exercise should be adjusted appropriately for children.

MINDFUL SENSING:

In the Mindful sensing exercise, you try to pay attention to different characteristics of a selected object. An easy example of this exercise can be a version with a mindful sensing of food. The object of attention here is for example a risen. In this case you take a single raisin and try to sense it, in other words explore, using different senses. First, you can put it on your palm and explore it with your eyes, e.g. its colour (Is the risen only one color or maybe there are parts with different shades?), and its shapes (Is it folded or a smooth object?). Next, by using your touch you can explore its shape (Is it small or big? Is it round or longitudinal?). Then, you can bring it closer to your nose and smell it

(Does it smell strongly or it does not smell at all?). In the end, you can taste the risen, but try to do it mindfully, do not swallow it quickly but use your tongue to explore its taste (Is the risen sweet or sour? ). This exercise can also be carried out in the classroom, and the type of sensing object should be chosen appropriately for children.

Additionally, here are some suggestions where you can get inspired and get more information relate to well-being and mindfulness

- Overview of different activities for young learners to promote well-being. (ENG)
  ttps://centerhealthyminds.org/join-the-movement/children
- Blog about - how breathing is important (ENG and NL)
  http://blog.donders.ru.nl/?p=6701&lang=en
- [christophe andré, suivre sa respiration and podcast ] (FR)
  https://www.youtube.com/watch?v=JaCxFK1ttYE
  https://www.franceculture.fr/emissions/trois-minutes-mediter

**Other scientific studies on mindfulness practice:**

Cahn, B.R., Goodman, M.S., Peterson, C.T., Maturi, R., and Mills, P.J. (2017). Yoga, Meditation and Mind-Body Health: Increased BDNF, Cortisol Awakening Response, and Altered Inflammatory Marker Expression after a 3-Month Yoga and Meditation Retreat. Front. Hum. Neurosci. *11*.

Diamond, A., and Lee, K. (2011). Interventions shown to Aid Executive Function Development in Children 4–12 Years Old. Science *333*, 959–964.

Diamond, A., and Ling, D.S. (2016). Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not. Developmental Cognitive Neuroscience *18*, 34–48.

Kuby, A.K., McLean, N., and Allen, K. (2015). Validation of the Child and Adolescent Mindfulness Measure (CAMM) with Non-Clinical Adolescents. Mindfulness *6*, 1448–1455.

Kuyken, W., Nuthall, E., Byford, S., Crane, C., Dalgleish, T., Ford, T., Greenberg, M.T., Ukoumunne, O.C., Viner, R.M., and Williams, J.M.G. (2017). The effectiveness and cost-effectiveness of a mindfulness training programme in schools compared with normal school provision (MYRIAD): study protocol for a randomised controlled trial. Trials *18*.

Sanger, K. L., Thierry, G., & Dorjee, D. (2018). Effects of school-based mindfulness training on emotion processing and well-being in adolescents: evidence from event-related potentials. *Developmental science*, *21*(5), e12646.

# Chapter 6 : BACKGROUND INFORMATION

Lindy Petersen, Stop Think Do, Improving Social and Learning Skills for Children in Clinics and Schools, Behavioral Approaches for Children and Adolescents pp 103-111
https://link.springer.com/chapter/10.1007/978-1-4757-9406-9_9

Adele Diamond, Executive Functions, Annual Review of Psychology, Vol. 64:135-168 (Volume publication date January 2013) https://doi.org/10.1146/annurev-psych-113011-143750

Adele Diamond, Daphne S.Ling, Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not. Developmental Cognitive Neuroscience, Volume 18, April 2016, Pages 34-48
https://www.sciencedirect.com/science/article/pii/S1878929315300517

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