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NEURO PEDAGOGY

Module 5

Emotions

Neuropedagogy

Project number: 2020-1-PL01-KA203-081740

Erasmus + Strategic Partnership for Higher Education

Emotion

Figure 1 Source: https://www.freepik.com/free-psd/diverse-people-covered-with-emoticons_2733702.htm

> *"The essential difference between emotion and reason is that emotion leads to action while reason leads to conclusions."*
>
> - Donald Calne (2010). "Within Reason: Rationality and Human Behavior", p.253, Vintage

CONTENTS

1. LEARNING OBJECTIVES

After completing this module, you will be able to:

- ❑ To understand the essence of the concept of emotion.
- ❑ To assimilate the structure and functions of the limbic system with respect to emotions.
- ❑ To acquire knowledge about the various types of emotions, their characteristic features and neurological basis.
- ❑ To analyze the levels and layers of “social”, constituting the social brain and their relations to social neural networks.
- ❑ To assess the role of different brain structures in generating and processing emotions.
- ❑ To apply the knowledge about the neuroscientific nature and functions of emotions in the classroom.
- ❑ To create and apply new strategies of learning in the classroom based on neuroscientific knowledge of emotions.

2. SELF-SCAN: QUESTIONS AND REFLECTION

- ❑ In what learning situations do students experience satisfaction?
- ❑ What types of tasks make students feel enthusiasm and pleasure?
- ❑ When / in which cases do you notice manifestations of boredom in students?
- ❑ Have you noticed negative emotions such as dissatisfaction, anger, frustration, etc. in students?
- ❑ In what situations do these emotions take place? How can they be avoided?
- ❑ What efficient methods, forms, and tools do you use to eliminate the negative emotions experienced by students sometimes?
- ❑ How can stress at exam procedures be reduced?

3. INTRODUCTION

The module of "emotions" elucidates the complex concept of emotions from various aspects and standpoints, which together contribute to the formation of notion about emotions in theoretical and practical terms, as well as about their application in education. The phenomenon of emotions is explained sequentially with the concepts of neuroscience, looking at the brain structures and systems responsible for processing and transmitting of emotions, the so-called **"emotional brain"**.

Another major concept - that of the **"social brain"** and the related to it concepts of **social behavior, prosocial behavior, social evaluation, social cognition, social functioning** are discussed from a theoretical point of view in order to clarify the various possible levels and aspects of ***“social”.*** The functioning of the social brain is explained from a neurological standpoint on the basis of four distinctive networks: **amygdala network, mentalizing network, empathy network, mirror/stimulation/action – perception network.**

The last part of the module focuses on the application of emotions in teaching and learning. This section is dedicated mainly to various practical suggestions and ideas about the application of emotions in the educational practice, based both on personal experience and scientific literature in the field.

4. WHAT ARE EMOTIONS? DEFINITION AND TERMINOLOGY ISSUES

Everyone experiences emotions every day and a lot of times a day and at first glance it seems so easy to explain them.

But … when it comes to definitions a lot of other questions appear simultaneously: **What?, Why?, How?,** … .

Fehr and Russell have wittily written in one of their articles that ***"everyone knows what an emotion is until asked to give a definition. Then it seems no one knows"*** (Fehr and Russell: 1984).

Tina Hascher observes about the complexity and connected with it multiaspectedness of defining emotions that:

"The main problems facing researchers of learning and emotions can also be attributed to the theories about emotions and the fact that there is confusion about the definition of the term "emotion". Kleinginna & Kleinginna (1981) pointed out that ***over 100 different definitions*** *of "emotion" exist. Furthermore, there are many similar terms like* ***"feeling", "mood", "affect",*** *or* ***"affective reaction"*** *(see also Davidson et al: 2003). However, it is not only the differences in approaches that make the topic so complicated,* ***it is the phenomenon itself*** *that challenges the researchers. Emotions are complex things and are strongly interwoven with cognition and motivation (Hascher: 2010)."*

Paul R. Kleinginna and Anne M. Kleinginna, have not only selected and grouped more than 100 definitions, they have also proposed a definition of their own that emphasizes the many possible aspects of emotion:

"Emotion is a complex set of interactions among subjective and objective factors, mediated by neural hormonal systems, which can:

- ❑ give rise to affective experiences such as feelings of arousal, pleasure/displeasure;
- ❑ generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labeling processes;
- ❑ activate widespread physiological adjustments to the arousing conditions;
- ❑ lead to behavior that is often, but not always, expressive, goal directed, and adaptive" (Kleinginna, Kleinginna:1981).

5. WHERE DO EMOTIONS COME FROM? THE EMOTIONAL BRAIN

5.1. The system responsible for the generation of emotions

Watch the video:

@Embedded YouTube video@

https://www.khanacademy.org/test-prep/mcat/processing-the-environment/emotion/v/emotions-limbic-system

Watch the video and get acquainted with the system responsible for the generation of emotions. Which are its main elements?

5.2. The emotional brain – emotion creation, processing and transmitting

The modern understanding of emotion creation, processing and transmitting is usually connected with James Papez' studies and findings. According to Anita Deak: "Papez (1937) has described **not one single center** for emotions (such as the thalamus or the hypothalamus) but **a neural circuit within several brain structures**. The Papez circuit consists of the *thalamus*, the *hypothalamus*, the *mamillary bodies*, the *cingular gyrus*, and the *hippocampus* (Dalgleish, 2004). He has also suggested pathways among these structures where information is transmitted during an emotional state. (…)

The limbic system has often been mentioned **as** the **central region for emotions**. (…) The limbic system consists of the Papez circuit extended with the septal areas, the nucleus accumbens, the amygdala and the orbitofrontal cortex"

(Deak, 2011: 72).

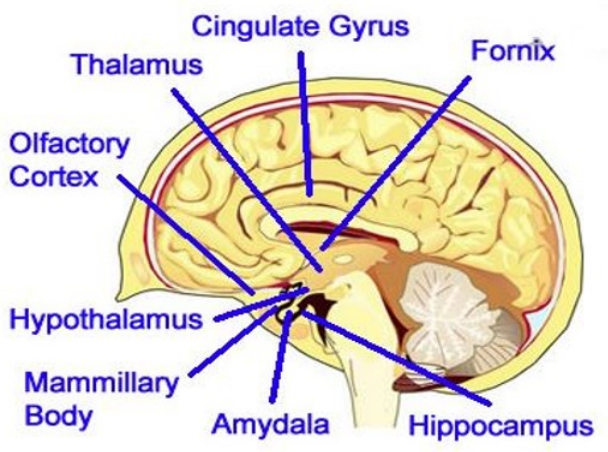

Figure 2 Source: https://readbiology.com/parts-of-limbic-system/

If you want to read more about the emotional brain:

- *Dalgleish, T. The emotional brain. Nature Reviews Neuroscience, vol. 5, no. 7, pp. 582–589, 2004. https://stanford.edu/~knutson/ans/dalgleish04.pdf*
- *Deak, A. Brain and emotion: Cognitive neuroscience of emotions. Review of Psychology, 2011, Vol. 18, No. 2, 71-80. http://mjesec.ffzg.hr/revija.psi/vol%2018%20no%202%202011/Deak%203.pdf*

The parts of the limbic system function in **an integrated way and are mutually dependent** in the process of creating and transmitting emotions.

Kathryn Elizabeth Patten notes about the **complexity of these relations**:

"Neuroscientists have rejected the idea that specific parts of the brain perform designated singular tasks and assert that brain parts are highly integrated (Murphy, Nimmo-Smith, & Laurence: 2003), and while specific parts such as the amygdalae function as the hub for certain tasks, they do not perform these tasks alone, but serve to orchestrate and coordinate neuronal activity. Damasio, Ledoux, and Goleman focus on the neural and physiological substrates of emotion as a basis for their theories and hypotheses about the role of emotion (Patten: 2008)."

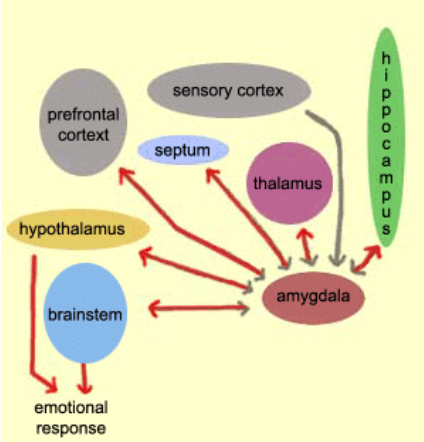

Figure 3 Source: https://yandex.ru/images/search?pos=0&img_url=https%3A%2F%2Fcolinwebber.com%2Fwp-content%2Fuploads%2FAmygdala-connections.jpg&text=AMYGDALA%20CONNECTIONS&lr=20758&rpt=simage&source=wiz

5.2.1. The emotional brain – the amygdala

What does the amygdala represent and where is it located?

The amygdala is a **collection of nuclei** found **deep within the temporal lobe.** The term "amygdala" comes from Greek and means "almond", because one of the most prominent nuclei of the amygdala has an almond-like shape. Although we often refer to it in the singular, **there are two amygdalae—one in each cerebral hemisphere**.

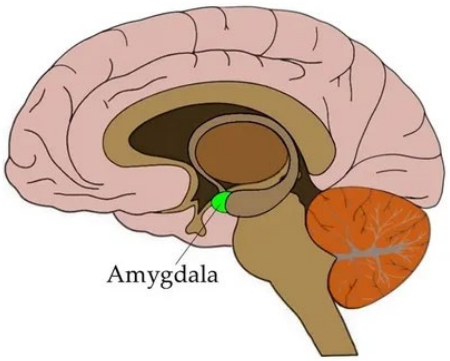

Figure 4 Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8228195/

What are the functions of amygdala?

Sometimes it is called "the aggression centre". The amygdala is related to emotion, particularly in processing of aversive information (LeDoux: 1996).

It is best known for its role in the **processing of fear** (and also anger and anxiety), **but this is an oversimplified perspective on amygdala function**.

There is evidence that amygdala is also involved in processing **pleasant information**, such as:

- related to reward-learning (Adolphs: 2010; Janak and Tye: 2015),
- episodic memory encoding (Hamann et al.: 1999; Dolcos et al.: 2004),
- pleasant scene or face perception (Sabatinelli et al.: 2011),
- mental imagery of pleasant experiences (Costa et al.: 2010).

In a broader sense, the amygdala is a key structure triggering the organisms' **survival circuit** (**fight or flight reactions**) that is organized into distinct motivational systems, the appetitive and defensive motivation system (Lang, Bradley: 2010).

5.2.2. Other brain structures responsible for the formation and processing of emotions

THALAMUS - a sensory relay center (**collects sensory inputs:** visual, auditory and somatosensory), its neurons project signals to both the amygdala and the higher cortical regions for further processing.

HYPOTHALAMUS – is **involved in emotion expression, rather than their generation**. Its role extends over many levels, regulating motor skills, emotional responses, blood pressure, etc.

HIPPOCAMPUS - **associated with learning and emotions**. It is a key part in the emotional brain network and is responsible for social cognition and emotion processing. It is also important in spatial memory, navigation, and helps turn short-term memory into long-term memory.

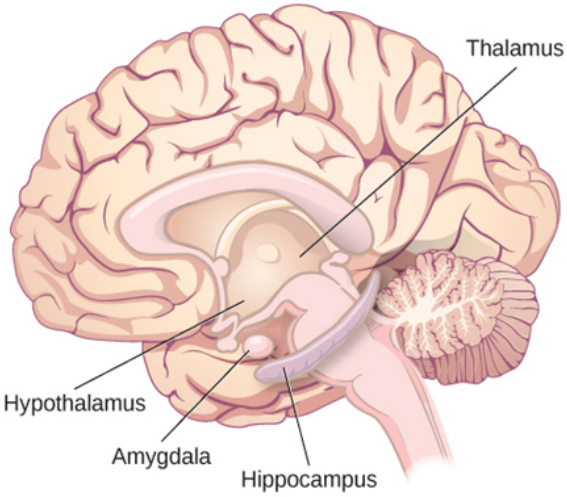

Figure 5 Source: https://courses.lumenlearning.com/waymaker-psychology/chapter/the-biology-of-emotions/

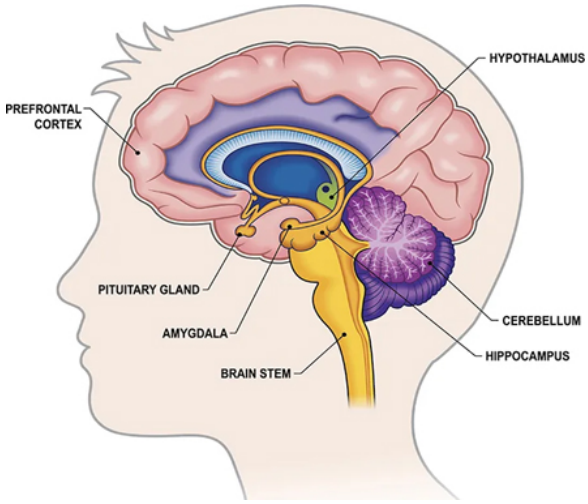

Figure 6 Source: https://www.simplypsychology.org/limbic-system.html

ORBITOFRONTAL CORTEX

One of the major theories of emotion is that emotions are states elicited by **rewards and punishers,** which are instrumental reinforcers (Rolls, 2000, 2013b, 2014, 2018a) (Fig. 6). According to this theory **the role of the OFC in emotion is to decode the reward/punishment goals for action**, by representing reward value, and by learning about stimuli with reward versus non-reward contingencies, and then to transmit the resulting representations to further brain regions (such as the cingulate cortex) which implement the learning of actions to obtain the reward outcomes, signalled by the OFC (Rolls, 2019a,b; Rolls, 2021a).

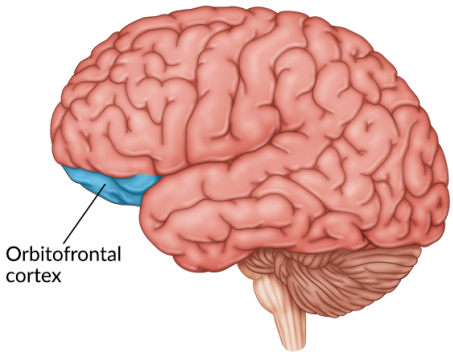

Figure 7 Source: https://www.flintrehab.com/orbitofrontal-cortex-damage/

Although the amygdala has many of the same connections as the OFC, it is an evolutionarily old brain region, and appears to be overshadowed by the OFC in humans, in that the effects of damage to the human amygdala on emotion and emotional experience are much more subtle. LeDoux and colleagues have emphasized the evidence that **the human amygdala is rather little involved in subjective emotional experience** (LeDoux, Pine, 2016; LeDoux, Brown, 2017; LeDoux et al, 2018). **That is in strong contrast to the OFC, which is involved in subjective emotional experience.**

These processes—assessing the social rank of individuals, learning from social partners, anticipating their behaviour—are critical for social life. However, the balance (of functions of amygdala and OFC) may shift towards the OFC in humans, in that it is OFC damage in humans that produces profound changes in social and emotional behavior, and subjective emotional experience, as well as in reward reversal learning (Rolls et al., 1994; Hornak et al., 1996; 2003; Berlin et al., 2004, 2005; Hornak et al., 2004; Rolls, 2019c).

QUIZ 1: DECIDE IF THE FOLLOWING STATEMENTS ARE TRUE OR FALSE

1. The concept of emotions could be approached and defined from different standpoints and aspects as emotions are an extremely complex phenomenon. – **T** /F
2. Some of the essential functions of emotions are that they can cause affective experiences and that in most cases they induce goal directed and adaptive behavior. - **T** / F
3. The parts of limbic system work separately and independently from each other in generating and transmitting emotions. – T / **F**
4. The amygdala is a main part of the limbic system which is located in the left cerebral hemisphere of the brain. – T / **F**
5. The amygdala is involved exclusively in the processing of fear. – T / **F**
6. The importance of amygdala is seen in the fact that it is a key structure for organisms' survival, demonstrated especially in the fight or flight reactions. – **T** / F
7. The hypothalamus is mainly engaged in generating emotions. – T / **F**
8. The thalamus is a sort of a relay center which gathers information from various sensory organs of the human body. – **T** / F
9. Like the amygdala, the orbitofrontal cortex (OFC) is rather little involved in subjective emotional experience. – T / **F**
10. The role of the orbitofrontal cortex (OFC) in emotion is to decode the reward/punishment goals for action. – **T** / F
11. The orbitofrontal cortex (OFC) is of primary importance for the generation of secondary emotions. – **T** / F

5.3. Neurotransmitters

Besides the circuits and structures of the emotional brain in general, and of the limbic system in particular, there is a special group of substances, known as “neurotransmitters”, that contributes greatly to the generation, processing and communicating of emotions.

@Embedded YouTube video@

https://www.youtube.com/watch?v=09eVouoCLaw

Watch the video. What is a neurotransmitter? How does it work? Which neurotransmitters were mentioned as examples and what are some of their most important functions?

What is a neurotransmitter?

“Neurotransmitter (Sembulingam et al, 2013, 787-791) is a chemical substance that acts as a mediator for the transmission of nerve impulse from one neuron to other neuron through a synapse[1]. It is produced in the cell body of the neuron and is transported through axon[2]. At the axon terminal, the neurotransmitter is stored in small packets called vesicles. Under the influence of stimulus, these vesicles open and release the neurotransmitter into synaptic cleft. It binds to the specific receptors on the surface of post synaptic cell and is responsible for the various actions produced. In short, neurotransmitters are the way nerve cells communicate with each other and with other cells in the body. Neurotransmitters are used to relay information about environment to the brain, to analyze the information and to set in motion appropriate bodily responses.(Clark, 2004, 137)” (Uppala et al. 2015, 6633)

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1. At the end of each neuron, there is a tiny gap, called a synapse.
2. An axon, also called nerve fibre, is portion of a nerve cell (neuron) that carries nerve impulses away from the cell body. A neuron typically has one axon that connects it with other neurons or with muscle or gland cells. Some axons may be quite long, reaching, for example, from the spinal cord down to a toe.

Process of neurotransmission

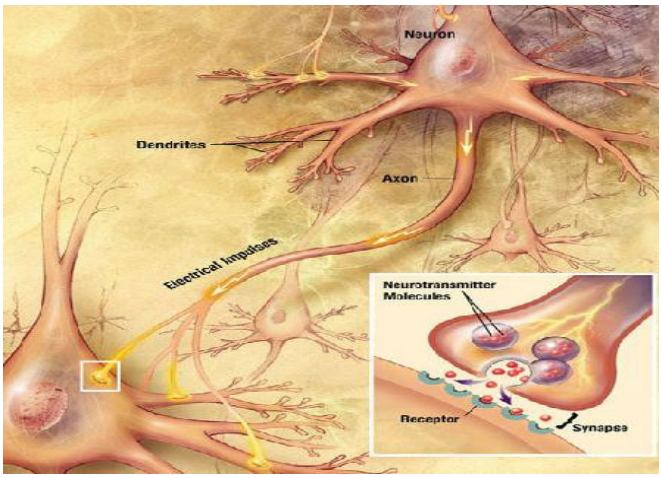

Figure 8 Source: https://www.researchgate.net/publication/319165861_Impact_of_Neurotransmitters_on_Health_through_Emotion

According to their function, neurotransmitters are classified into two types: **excitatory neurotransmitters** and **inhibitory neurotransmitters**.

Excitatory neurotransmitters are responsible for the conduction of impulse from presynaptic neuron to postsynaptic neuron. Neurotransmitter released from presynaptic axon terminal causes some change in resting membrane potential, i.e. slight depolarization by the opening of sodium channels in the postsynaptic membrane and influx of sodium ions from extra cellular fluid. This slight depolarization is called excitation. (Uppala et al.2015, 6633). Excitatory neurotransmitters are in charge of energy, alertness, motor movement, fight or flight response, and higher order thinking, all of which influence our emotions. Some common excitatory neurotransmitters are acetylcholine, noradrenaline, glutamate, aspartate, histamine and nitric oxide.

Inhibitory neurotransmitters suppress the conduction of impulse from the presynaptic neuron to postsynaptic neuron. They calm the brain and help create balance in mood. In other words, decreasing the probability of an excitatory signal being sent, these neurotransmitters act as the human body's nervous system off switch. The balance between excitation and inhabitation is very important as too much excitement can lead to insomnia, restlessness, and irritability. Inhibitory neurotransmitters contribute to the decrease of aggression, encourage calmness, and induce sleep, which in turn influence our emotions. Some common inhibitory neurotransmitters are dopamine, gamma amino butyric acid (GABA), glycine and serotonin.

In addition to the above classification, neurotransmitters can also be classified based on their chemical structure:

- ❑ Amino acids – GABA, glutamate
- ❑ Monoamines – **serotonin**, histamine
- ❑ Catecholamines (subcategory of monoamines) – **dopamine, norepinephrine,** epinephrine
- ❑ Peptides – oxytocin, endorphins

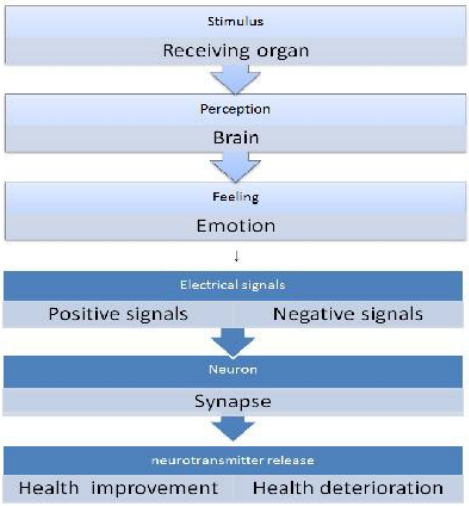

Figure 9 Source: https://www.researchgate.net/publication/319165861_Impact_of_Neurotransmitters_on_Health_through_Emotion

Scheme of neurotransmission

If you want to read more about the neurotransmitters:

- *Uppala, A. et al. (2015). Impact of Neurotransmitters on Health through Emotions. Int J Recent Sci Res. 6(10), pp. 6632- 6636.*
- *Hughes, J. et. al. (2004). Selective effects of simultaneous monoamine depletion on mood and emotional responsiveness. International Journal of Neuropsychopharmacology, 7(1), 9-17.*

SOME IMPORTANT NEUROTRANSMITTORS AND THEIR FUNCTIONS

Serotonin (5-HT), dopamine (DA), norepinephrine (also known as noradrenaline) (NE) are the three major monoamine neurotransmitters.

5.3.1. Serotonin (5-HT)

It is a hormone and neurotransmitter and is involved in regulating and modulating:

- ❑ mood,
- ❑ sleep / wake states
- ❑ appetite
- ❑ "preventing depression and promoting motivation" (McKenna & Lim, 2012).

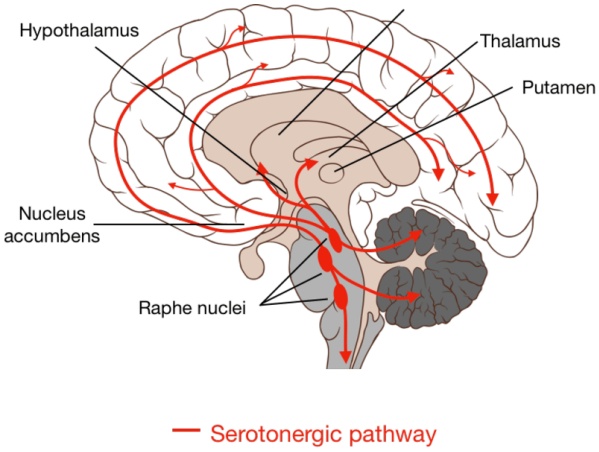

Figure 10 Source: https://www.researchgate.net/figure/Main-serotonin-pathways-in-the-brain_fig5_339755837/download

When levels of this neurotransmitter are low, an individual experiences problems with attention, becomes unorganized, and lacks concentration. Consequently, all this makes an individual to experience ***negative emotional states***.

When levels of this neurotransmitter are high, this can result in a life-threatening disorder known as Serotonin Syndrome (SS). SS produces malignant hyperthermia, over-confidence, ***aggression*** and agitation.

Serotonergic cell bodies originate generally in the midbrain and upper pons area, with neurons projecting to the cerebral cortex, basal ganglia, and the limbic system (Kaplan, Middleton, Urban, & Midgley, 2002).

5.3.2. Dopamine (DA)

It is involved in:

- ❑ the brain's **reward system,** which generates the feeling of pleasure, and acts as the brain's **"feel good"** neurotransmitter.
- ❑ motivation,
- ❑ **addictions** (Tortora & Derrickson, 2014).
- ❑ coordinating body movements (motor functions of the body)

Main dopamine pathways in the brain

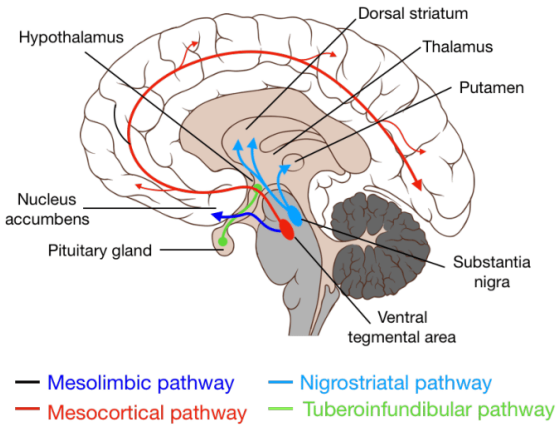

Figure 11 Source: https://www.researchgate.net/figure/Main-dopamine-pathways-in-the-brain_fig3_339755837/download

It has the capability to act as either an inhibitory or excitatory neurotransmitter, depending upon the particular site it binds to, and **can alter our emotional states**.

As dopamine levels are increased when we take part in activities that bring us satisfaction and pleasure, too high of a level can become detrimental for our health. **Disproportionate higher levels** can cause us to become **hyper-stimulated** to our surrounding environment or cause a **disrupted thought**, which are all characteristics of schizophrenia.

Dopamine's dysfunction is involved in psychiatric disorders, including drug addiction, schizophrenia, Parkinson's and Huntington's disease. (Niyonambaza et al, 2019). For instance, Parkinson's disease, which is a degenerative disease that results in tremors and motor movement impairments, is caused by the loss of dopamine-generating neurons in the brain.

Low levels of dopamine are associated with a lack of focus, cognitive problems such as **memory and learning deficits**, compulsions, **addiction**, and a loss of satisfaction in previously enjoyable activities. This can have a substantive **impact upon an individual's emotional state.**

5.3.3. Norepinephrine (NE)

Norepinephrine (NE) (also known as noradrenaline) is involved in:

- ❑ the body's **fight or flight response** – mobilizing the body and brain to take actions in situations of danger and stress(Johnson et al., 2011) (Schachter, 1957);
- ❑ creating a sense of urgency, overpowering fear;
- ❑ increasing heart rate and blood pressure (Summer & Bloor, 1984; Passetti, Dalley, O'Connel, Everett& Robbins, 2000)

It is also a hormone when released from the adrenal glands (McKenna & Lim, 2012).

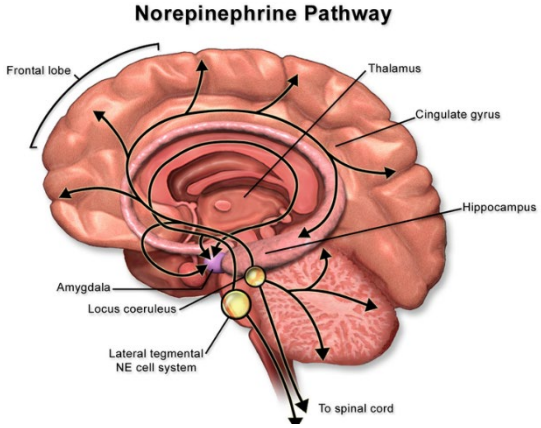

Figure 12 Source: https://commons.wikimedia.org/wiki/File:Norepinephrine_Part_1.png

Emotionally, this neurotransmitter in the brain is **related to both depression, and anxiety**. **Almost all anxiety disorders** involve **high levels of** noradrenaline.
As noradrenaline is the neurotransmitter of arousal, **low levels** are linked with poor memory, depression, below average levels of alertness, and interest.
Additionally, moderately **high levels** of noradrenaline produce uncomfortable feelings of arousal which strongly influence physical changes, intensify anxiety, impair concentration, and increases the startle reflex. This system begins from the locus coeruleus, lateral tegmental area located in the brainstem, in which through axonal pathways to the cortex, reaches the central nervous system(CNS).

QUIZ 2: CHOOSE THE CORRECT OPTION

1. What is a neurotransmitter?

A. gap between neurons B. nerve cell **C. chemical messenger**

2. Neurotransmitters are released from

A. nuclei **B. synaptic vesicles** C. cell bodies

3. Which neurotransmitter is involved in "fight or flight" response?

A. Dopamine B. Serotonin **C. Norepinephrine**

4. Which neurotransmitter supports the generation of positive emotions?

A. Dopamine B. Serotonin C. Norepinephrine

5. Which of the following functions is characteristic of Serotonin?

A. addictive behaviors B. involvement in reward system **C. sleep**

6. This neurotransmitter is part of the brain's reward system

A. Serotonin **B. Dopamine** C. Norepinephrine

7. This neurotransmitter prevents depression and stimulates motivation

A. Serotonin B. Norepinephrine **C. Dopamine**

8. Too much Dopamine is linked with

A. Schizophrenia B. Parkinson's C. Depression

9. Serotonin is responsible for

A. alertness and arousal B. learning **C. mood, sleep, hunger**

10. Low levels of Norepinephrine are linked to

A. addictions **B. poor memory and depression** C. Parkinson's

11. Low levels of Serotonin are linked to

A. **problems with attention and concentration** B. aggressive behaviors C. alertness

6. CLASSIFICATION OF EMOTIONS

@Embedded YouTube video@

https://www.youtube.com/watch?v=ecjcWzOKo5w

Watch the video. Get acquainted with some of the main groups of emotions. What is the difference between them? Which parts and structures of the brain are responsible for their generation?

6.1. Basic Emotions

Different researchers classify emotions slightly differently:

Paul Ekman's most recent research (Ekman: 2011) identifies **seven basic emotions** (anger, surprise, disgust, enjoyment, fear, sadness and contempt); (initially his classification contained six basic emotions, in this work he added one more basic emotion – disgust).

Robert Plutchik (Plutchik: 1962) proposes **eight basic emotions** (anger, anticipation, joy, trust, fear, surprise, sadness and disgust), represented in his popular wheel of emotions.

Researchers at the **Institute of Neuroscience and Psychology** at University of Glasgow identify **four categories** of emotions (happiness, sadness, fear/surprise, and disgust/anger).

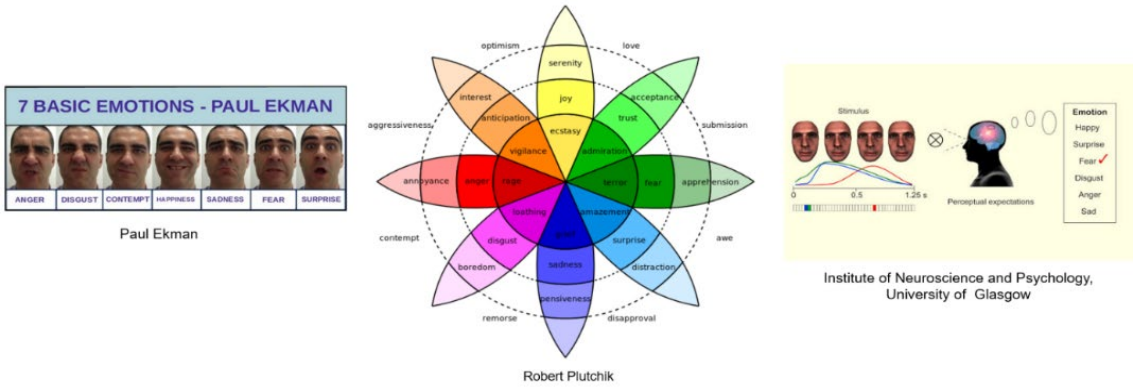

Figure 13 Source: https://www.wikiwand.com/en/Emotion

Each primary emotion has a distinct purpose and functionality and can be either adaptive (healthy) or maladaptive (unhealthy), as depicted in the table below.

Purpose of Emotions				Functionality of Emotions	
Emotion	Action Tendency	Message	Need	Adaptive vs Maladaptive	
Sadness	Slow Down Withdraw	Loss Grief Sorrow	Healing	Grieving	Hopeless Despair Desperate Clinging
Fear/Anxiety	Avoidance Get away!	Danger, Threat, Apprehension, Dread, Fright, Panic	Safety	Signals Sanger	Traumatic
Anger	Attack or Assert	Unfairness "Someone is taking advantage of me"	Protection Draw Boundaries	Empowering	Destructive
Shame	Hide Cover up	"There is something wrong with me"	Social-acceptance Approval	Belong to Group	Self-hate Contempt
Guilt	Make Amends Solve Problem	Regret Remorse "I have done something wrong to you"	Self-respect	Apologising	Blaming
Disgust/ Contempt	Aversion Revulsion	Distaste	Protection	Healthy Outrage	Self | Other abuse
Love/Joy	Care, Nurture Protect, Kindness Do More of the Same	The Recipient is Worthy Stay Close This is Good	Connection Relationship	Caring Freeing	Addictive Clinging

Figure 14 Source: https://ptspsychology.com/wp-content/uploads/2021/08/Primary-vs-Secondary-Emotions_SSalicru.pdf

6.1.1 Characteristics of primary / basic emotions

The term "primary emotions" (Damasio, 1994, 131-134) refers to emotions which are supposed to be innate. They developed during human evolution to support fast and reactive response behavior in case of immediate danger, i.e. basic behavioral response tendencies like "flight-or-fight" behaviors.

From a neuroscientific point of view, they "depend on limbic circuitry, the amigdala and anterior cingulate being the prime players" (Damasio, 1994, 133).

So, primary (or basic) emotions are our most **fundamental** and **direct initial reactions** to an event or situation (e.g. experiencing sadness following a loss, or fear when perceiving a threat).

Primary emotions - characteristics:

- ❑ crucial for survival,
- ❑ functionally adaptive,
- ❑ innate and universal,
- ❑ distinct affective states,
- ❑ hardwired in our brains (don't require learning).

Figure 15 Source: https://stock.adobe.com/search?k=emotion&asset_id=308753421

6.1.2 Basic Emotions from Neuroscientific Perspective

Fear

Fear is a powerful emotion which plays an important role in survival - fight or flight response.
Many fMRI (Functional magnetic resonance imaging) studies support the hypothesis that amygdala is the most important hub in a fear reaction (LeDoux, 1998).

Figure 16 Source: http://www.practicalheartskills.com/the-one-thing-you-must-know-to-overcome-your-greatest-fear/

Several aspects of fear processing have been attributed to the amygdala:

- ❑ fear conditioning (Davis, 1992; LeDoux, 2007),
- ❑ initiation of fear induced behaviors in response to stressors, (Weiskrantz, 1956; Blanchard and Blanchard, 1972; Prather et al., 2001; Izquierdo et al, 2005; Machado et al, 2009),
- ❑ memory creation of fear-related stimuli (Cahill et al, 1995; Hamann, 2001).

Anger

Anger can be a particularly powerful emotion, characterized by feelings of hostility, agitation, frustration, and antagonism towards others.
Like fear, anger **can play a part in your body's fight or flight response**.

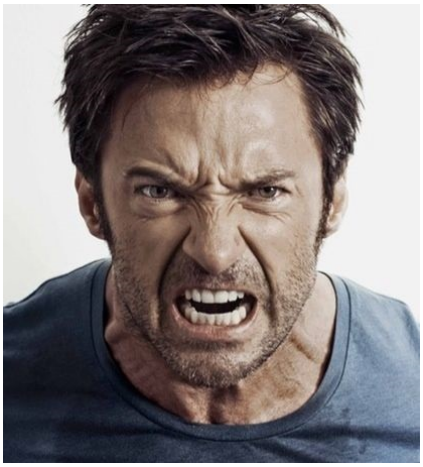

Figure 17 Source: https://hypebeast.com/2017/3/hugh-jackman-wolverine-audio-recording

Orbitofrontal cortex is the location for anger, because of its relation to prey.
Many fMRI studies suggest that **the interaction between orbitofrontal cortex and amygdala is involved in the regulation of anger** (Coccaro et al, 2007; Fulwiler et al, 2012).

Amygdala activity is related to initiation of fear, while the orbitofrontal cortex is involved in the fear extinction (Milad and Rauch, 2007; Siep et al, 2018).

Sadness

Sadness: is an emotion caused by loss and helplessness (Motoki, Sugiura, 2018),

or it is related to failure to get wanted thing (reward), or punishment to get harmful things (Gu et al, 2016).

Anterior cingulate cortex (ACC) is related to sadness (Godlewska et al., 2018; Ramirez-Mahaluf et al, 2018a,b).

ACC is also linked to sadness because of its role in suffering; many studies have suggested that **ACC is also involved in pain or suffering feeling and depression** (Taylor et al, 2018).

Figure 18 Source: https://totallyunauthorized.com/2013/01/06/les-miserables/

Happiness

The meaning of human life is associated to a large extent with the pursuit of happiness. There are two different conceptions of happiness:
hedonic happiness and eudaimonic happiness (Simeng Gu et al, 2019).

- **Hedonic happiness** is related to physical or psychological pleasure.
- **Eudaimonic happiness** is related to reaching personal goals or to expressing our potential, our abilities. (Berridge, Kringelbach, 2011).

Happy events from both kinds activate the **ventral prefrontal cortex** (including orbitofrontal cortex) (Kringelbach, 2005).

In a functional magnetic resonance imaging (fMRI) experiment, Rolls et al. (2008) found that **activations in the ventral prefrontal cortex, the cingulate cortex, and the ventral striatum** were associated with the positive hedonic state.

Figure 19 Source: https://jxxspzd.com/friends-times-joey-smartest-guy-in-the-room/

Disgust

The emotion of disgust is typically experienced as a feeling of revulsion elicited by offensive stimulations, either in physical or moral respect.

There is no consensus among neuroscientists concerning the brain region responsible for disgust processing, as well as about the nature of this emotion itself.

Some researchers defend the opinion that the insula is the location of disgust processing and that it differs from anger and fear, **while others**, on the basis of meta-analysis of imaging data, found that the anterior insula is not more active during disgust processing than when processing other emotions, such as anger (Wager et al, 2007; Oaten et al, 2018a,b).

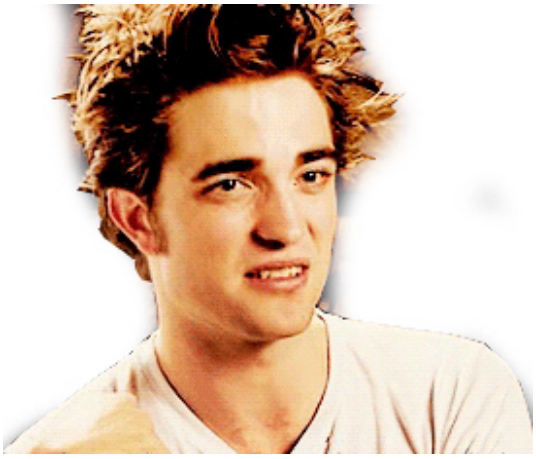

Figure 20 Source: https://bloody-disgusting.com/books/3615223/midnight-sun-new-twilight-book-releasing-summer-tells-story-edwards-perspective/

Surprise

The surprise emotion alerts the individual of any deviations from expectations, regardless of the outcome value (Litt et al, 2011; Fouragnan et al, 2018).

According to meta-analyses of fMRI studies, surprise induced brain regions **are predominantly subcortical, including the amygdala and striatum**, as well as some cortical regions, such as **the ventromedial prefrontal cortex and the cingulate cortex** (Behrens et al, 2009; Bartra et al, 2013).

Figure 21 Source: https://www.insider.com/weasleys-interesting-details-from-harry-potter-fun-facts

6.2. Secondary Emotions

In relation to secondary emotions Christian Becker-Asano and Ipke Wachsmuth state that they "arise from higher cognitive processes, based on an ability to evaluate preferences over outcomes and expectations. Accordingly, secondary emotions are acquired during ontogenesis through learning processes in the social context" (Becker-Asano, Wachsmuth, 2008).

They also explain that Damasio uses the adjective "secondary" to refer to "adult" emotions, which utilize the machinery of primary emotions by influencing the acquisition of "dispositional representations", that are necessary for the elicitation of secondary emotions. According to Becker-Asano and Wachsmuth these "acquired dispositional representations" are believed to be different from the "innate dispositional representations" underlying primary emotions. Furthermore, secondary emotions influence bodily expressions through the same mechanisms as primary emotions.

The differences between primary and secondary emotions could be summarized as follows:

- Secondary emotions are based on more complex data structures than primary ones.
- The appraisal of secondary emotions depends much more on the situational and social context than that of primary emotions. Thus, secondary emotions are **more dependent on the agent's cognitive reasoning abilities**.
- The releasers of secondary emotions **might be learned** based on the history of primary emotions in connection with memories of events, agents and objects.
- The agent's facial expressions of primary emotions may accompany secondary emotions.
- Secondary emotions also modulate the agent's simulated embodiment. (Becker-Asano, Wachsmuth, 2008)
- **They are acquired**, rather than innate, dispositional representations. (Damasio, 1994, 136)

According to Damasio, the elicitation of secondary emotions involves **a "thought process",** in which the actual stimulus is evaluated against previously acquired experiences and online generated expectations. Every secondary emotion **has first to be triggered by a cognitive process**, before it gains the potential to get aware to the agent. (Becker-Asano, Wachsmuth, 2008)

From a neuroscientific point of view, the generation of secondary emotions **depends to a great degree on the functions of prefrontal cortex**. As Damasio puts it "The prefrontal acquired dispositional representations needed for secondary emotions are a separate lot from the innate dispositional representations needed for primary emotions." (Damasio, 1994, 137)

Figure 22 Source: https://www.pexels.com/search/emotions/

6.3. Positive and Negative Emotions

Emotions are generally considered to have **two dimensions**:

Arousal - referring to the emotion's intensity;

Valence - referring to the specific emotional content, divided into positive, negative, and neutral feelings

(Kim et al, 2013; Bailen et al, 2019).

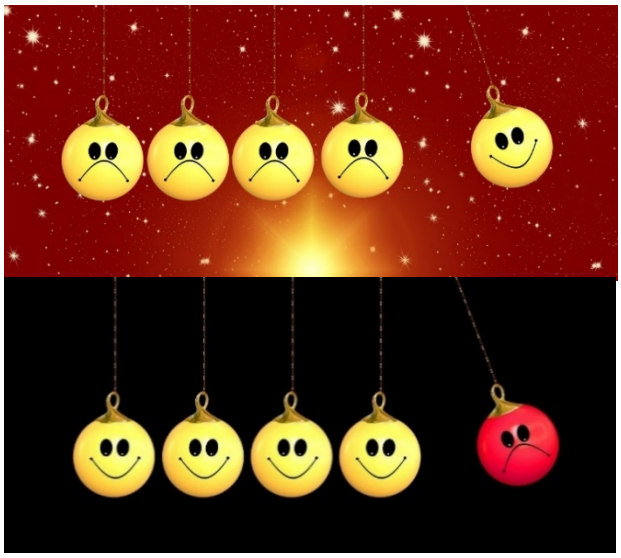

Figure 23 Source: https://pixabay.com/photos/terrorist-terror-be-happy-positive-2481808/

Positive emotions can enhance subjective well-being and promote physical and mental health.

Negative emotions, especially when persistent, affect people's physical and mental health and work status (Gupta, 2019). Different emotions arise in response to external environmental stimuli and are accompanied by changes in personal representations and psychological reactions, measured and identified by scientific methods (Wolf, 2015).

QUIZ 3: Match the parts of statements in the left column with those from the right column

1. Basic emotions	a. refers to the emotions' intensity
2. Secondary emotions	b. evolved in evolution for the purpose of survival
3. Arousal	c. depends greatly on the functions of Orbitofrontal Cortex
4. Valense	d. is connected to pleasant experiences
5. There is no consensus	e. could affect human's health
6. Basic emotions evolved	f is experienced when a goal is achieved or personal abilities are revealed
7. Secondary emotions are triggered	g. are acquired and have to be learned
8. The generation of secondary emotions	h. take part in the regulation of anger
9. The generation of primary emotions	i by cognitive processes
10. Hedonic happiness	j. about the precise number of basic emotions
11. Eudaimonic happiness	k. don't have to be specially learned
12. Negative emotions	l are involved in the "fight or flight"
13. Both amygdala and Orbitofr. Cortex	m depends greatly on the functions of amygdala
14. Both anger and fear	n. refers to the specific emotional content

ANSWERS: 1k; 2g; 3a; 4n; 5j; 6b; 7i; 8c; . 9m; 10d; 11f;12e; 13h; 14l

7. EMOTIONS AND THE SOCIAL BRAIN

@Embedded YouTube video@

https://www.youtube.com/watch?v=J0XmZW6xYSg

?

Watch the video. What is the role of the social brain for human adaptation and survival in society?

"We are an essentially social species; no component of our civilization would be possible without large-scale collective behavior. Yet much of our social behavior arises from neurobiological and psychological mechanisms shared with other mammalian species, raising questions about why we are different. Part of this difference may arise from knowledge of our own minds and those of others, a type of knowledge different from that about the shared nonsocial environment, and in degree if not in kind inaccessible and inconceivable to nonhuman animals" (Adolphs, 2009, 693–716).

shutterstock.com · 1876567684

If you want to read more about social brain and social neural networks:

Adolphs, R. (2009).The Social Brain: Neural Basis of Social Knowledge. Annu Rev Psychol.; 60: 693–716.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2588649/
Kennedy, D., Adolphs, R. The social brain in psychiatric and neurological disorders. Trends Cogn Sci. 2012 November ; 16(11): 559–572.
Kolb, B. & Whishaw, I. (2021). Fundamentals of Human Neuropsychology. Chapter 20: Emotion and the social brain. 569-70.
https://www.scribd.com/document/538348998/Fundamentals-of-Human-Neuropsychology-7th-Edition-by-Bryan-Kolb-Ian-Q-Whishaw

7.1. Levels of "SOCIAL".

Social/prosocial behavior, social cognition, social functioning, social brain, social evaluation.

The social brain hypothesis is focused on the explanation of the great size and complexity of the human brain **as a result of social interactions**, ranging from deceit to cooperation to ways of finding food and ensuring posterity (Allman 1999; Barrett & Henzi 2005; Dunbar 1998; Dunbar & Schultz 2007a,b). There are several concepts that are closely related to the concept of social brain and all of them together help to clarify the social processes from various aspects and standpoints, including the role of emotions.

One of them is that of **"social behavior"** and especially its sub-variant – **"prosocial behavior".** According to Kennedy and Adolphs **"social behavior"** is "the anchor for all these different levels of explanation" and comprises the readily observable interactions between an individual and other people. (Kennedy, Adolphs, 2012, 559–572). Respectively, **prosocial behavior** is defined as "voluntary behavior intended to benefit others" and entails a broad multidimensional domain of behaviors, such as altruistic helping, sharing, and cooperation (Eisenberg, Fabes, & Spinrad, 2006, 646; Padilla-Walker & Carlo, 2014, 3–16). It includes **interpersonal helping behavior**, but also **cooperation** that benefits one's group (Batson & Powell, 2003, 463–484; Penner, Dovidio, Piliavin, & Schroeder, 2005, 356–392). (Van Hoorn, 2016, 90-100.)

"Social cognition" - According to Kennedy and Adolphs, it refers to the various psychological processes (both conscious and non-conscious) that underlie social behavior. Kennedy and Adolphs use the term 'social cognition' relatively broadly here, including any cognitive processing (e.g., perception, reasoning, memory, attention, motivation, and decision-making) that underlies a social ability or social behavior. The processing of social stimuli and the generation of social behavior typically engage some processing that are relatively specialized for the social domain (recognizing faces, thinking about what another person is thinking, hearing somebody call one's name) and other processes that also participate, but are more general in function. (Kennedy, Adolphs, 2012, 559–572).

Another related concept is that of **"social functioning".** It is broader than social behavior as it refers to **the long-term** ability of an individual to interact with others, determined by the environment and particular situation within a community.

"Social brain" – it historically refers to those brain structures that subserve social processes (Brothers, 1990, 27–51): regions in the temporal lobe for processing faces (Tsao 2008; 411–438; Kanwisher, et al, 1997, 4302–4311; Kanwisher, Yovel, 2006, 2109–2128.), the temporoparietal junction and medial prefrontal cortex for representing other people's beliefs (Scholz et al, 2009, 4:e4869; Saxe, Powell, 2006, 692–699; Gallager, Frith, 2003, 77–83), and some newly added regions encompass structures related to social perception, social attribution, and other aspects of social cognition (Adolphs, 2009, 693–716). In principle, the relationship between the different levels of 'social' is straightforward: the social brain implements social cognition, which in turn causes social behavior, which in turn constitutes social functioning when integrated over time and context (Kennedy, Adolphs, 2012, 559–572).

Still another concept is that of **"social evaluation"** – it defines a mental process that supports the preference toward prosocial partners (positivity bias) against the avoidance of antisocial individuals (negativity bias) in a cooperative context.

Social evaluation could also be characterized as "a mental process during which an individual (1) assigns different values (positive, negative) to particular behavioral patterns (e.g., helping, hindering) that are performed in a social interaction (e.g., problem solving), (2) associates these behaviors with specific individuals (partnership values) and (3) shows different behaviors (e.g., avoidance or preference) toward others based on the overall value which has been associated with them. Social evaluation is composed of two building blocks. Negativity bias refers to an aversion of negative (social) stimuli that can manifest in the avoidance of the antisocial partner (Hamlin et al, 2010; Anderson et al, 2013a;) (Abdai, Miklosi, 2016).

7.2. Social Neural Networks

As Ralph Adolphs and Daniel Kennedy claim **"**the social brain, and its dysfunction and recovery, must be understood not in terms of specific structures, but rather in terms of their interaction in large-scale networks" and that "no social process can be attributed to a single structure alone; instead a network view of brain function is required" (Kennedy, Adolphs, 2012, 559–572/1).

To identify brain regions implicated in social behavior, Daniel Kennedy and Ralph Adolphs (2012) reviewed lesion studies of brain-injured patients and fMRI activation in healthy participants. Part A in the following figure lists individual cerebral structures implicated in social behavior, and part B demarks **four social-related brain networks** that tie these regions together:

1. Amygdala network. It includes the orbitofrontal cortex, the temporal cortex and the amygdala. The functions of this network range from triggering emotional responses to detecting socially relevant stimuli.

The important role of the **amygdala** in social network construction and maintenance has also been confirmed by Jones et al. (2020). According to the authors, the amygdala is presumed to track **visual signals** in social interactions, such as **face stimuli, gestures, and expressions** (Bickart et al, 2011, 2012). A larger amygdala provides an individual with advantages in processing non-verbal social signals (Bickart et al, 2011, 2012).

In addition, the amygdala tracks **the reward value** brought by social interaction. Individuals with **a larger volume, higher gray matter density, or higher activation level of the amygdala** tend to perceive social interaction as more interesting and of higher reward value, which in turn prompts them **to develop more social connections** (Bickart et al, 2012; Zerubavel et al, 2015; Liu et al, 2019).

The functional connectivity between the amygdala and orbitofrontal cortex (OFC) is crucial for **facial expression recognition**, **social strategy development**, **social reward processing**, **prosocial behavior**, etc. (Hampton et al, 2016; Kwak et al, 2018). Researchers generally agree that amygdala-OFC functional connectivity stably and positively predicts the differences in social network size among individuals (Hampton et al, 2016; Kwak et al, 2018).

Another non-verbal stimulus, having impact on amygdala network is **smell** - it is a type of social signal that conveys information about an individual, such as sex, disease and **emotional stat**e; therefore, individuals with high olfactory sensitivity are able to identify social signals from the body odor of others, which is conductive to social interaction (Zou et al, 2016). (Han, 2021).

2. Mentalizing network. This collection of structures related to thinking about the internal states of others includes the support temporal sulcus and anterior temporal cortex, providing a mechanism for understanding others' actions.

Mentalizing is a term sometimes used interchangeably with theory of mind (ToM), both typically refer to the cognitive processes involved in understanding the intentions, desires, or beliefs of another person. The "mentalizing network" involves brain regions that have been shown to be activated when someone thinks about another person's mental states. (Kilroy, Aziz-Zadeh, 2017)

Mentalizing enables the ability to empathize and cooperate with others, accurately interpret other people's behavior, and even deceive others when necessary (Mitchell, J., Heatherton, T., 2009: 955).
Individuals with larger OFC (orbitofrontal cortex) **volumes have higher mentalizing competence and thus more complex social relations** (Powell et al., 2012).
The PFC is the core brain region in the mentalizing network. The vmPFC (ventromedial prefrontal cortex) and OFC are involved in the emotional part of the theory of mind and are mainly responsible for understanding the emotional state of others (Abu-Akel, Shamay-Tsoory, 2011) (Han et al, 2021).

3. Empathy network. Structures involved when individuals empathize with others include the insula and cingulate cortex. The empathy network can attribute intentions to others, something we humans do automatically. Indeed, humans seem compelled to attribute intentions and other psychological motives even to nonhumans and abstract animations.

One of the important roles of the AIC (anterior insular cortex) is to process interpersonal emotional information, including sympathy, empathy and understanding the feelings of others (Pillemer et al, 2017; Spagna et al, 2018). (Han et al, 2021).

4. Mirror/stimulation/action – perception network. Activated when observing the actions of others, this network includes the mirror neuron systems of the parietal and premotor cortex (detailed in Figure B) and is also thought to be involved in developing our concept of **self.** (Kolb, Whishaw, 2007, 569-70)

The mirror neuron system is mainly responsible for supporting imitation and understanding other people's actions (Ikeda et al., 2019). Brain regions such as the inferior frontal gyrus (IFG), inferior parietal lobule (IPL), and STS are involved in the mirror neuron system.

The pSTS (posterior superior temporal sulcus) is specialized for understanding and imitating the non-verbal social signals of others, such as **body movements**, **eye gaze**, and **mouth movements** (Deen, Saxe, 2019).

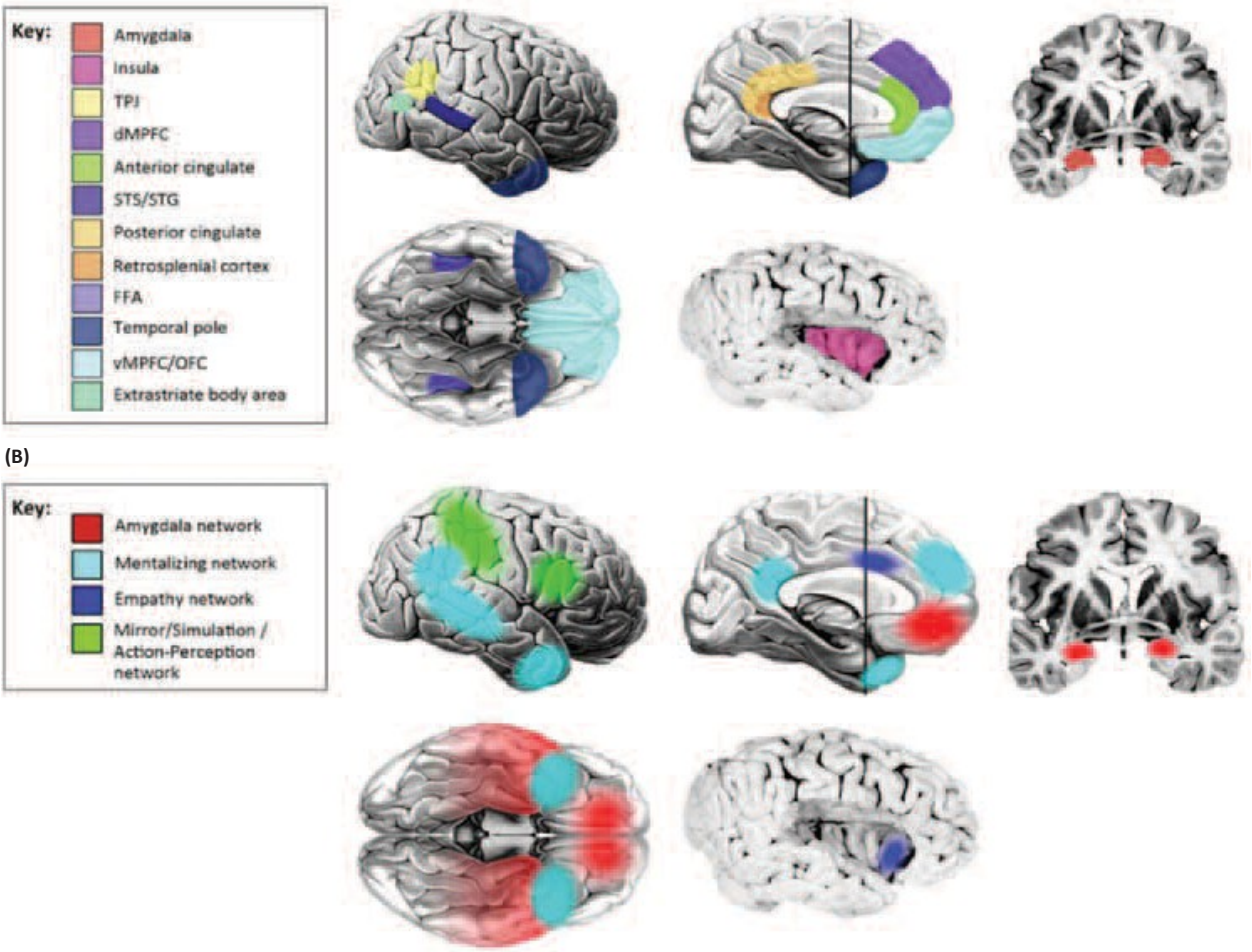

Figure 24 Source: https://www.scribd.com/document/538348998/Fundamentals-of-Human-Neuropsychology-7th-Edition

QUIZ 4: WORD BANK

Use the words or phrases from the box to complete each statement:

social cognition prosocial behavior networks
the orbitofrontal cortex social evaluation social network size cooperate
the PFC (prefrontal cortex) the insula understanding the feelings of others
imitation the pSTS (posterior superior temporal sulcus) social functioning
non-verbal social signals

1. **(prosocial behavior)** _____ includes interpersonal helping behavior and cooperation.

2. **(social cognition)** _____ includes any cognitive processing that underlies a social ability or social behavior.

3. **(social functioning)** _____ refers to the long-term, contextualized ability of an individual to interact with others.

4. **(social evaluation)** _____ represents a mental process that defines the preference towards prosocial partners against the avoidance of antisocial individuals in a cooperative content.

5. The social brain, and its dysfunction and recovery, must be understood not in terms of specific structures, but rather in terms of their interaction in large-scale **(networks)** _____.

6. The amygdala network includes **(the orbitofrontal cortex)** _____, the temporal cortex, as well as the amygdala.

7. The main functions of amygdala in the amygdala network consist in tracking **(non-verbal social signals)** _____ (e.g. visual ones, smell, etc.), as well as the reward value.

8. There is a general agreement among researchers that the relationship between the amygdala and the orbitofrontal cortex (OFC) defines the **(social network size)** _____ among people.

9. Mentalizing supports the ability to empathize and **(cooperate)** _____ with others and accurately interpret other people's behavior.

10. **the PFC (prefrontal cortex)** _____ is the core brain region in the mentalizing network.

11. The main structures that constitute the empathy network include **(the insula)** _____ and cingulate cortex.

12. One of the main functions of the AIC (anterior insular cortex) is to process interpersonal emotional information, including sympathy, empathy and **(understanding the feelings of others)** _____.

13. The mirror neuron system is mainly responsible for supporting **(imitation)** _____ and understanding other people's actions.

14. **the pSTS (posterior superior temporal sulcus)** _____ is specialized for understanding and imitating the non-verbal social signals of others, such as body movements, eye gaze, and mouth movements.

8. LEARNING AND EMOTIONS

Figure 25 Source: https://www.bbc.com/news/education-29017761

8.1. Suggestions and ideas how to implement emotions and emotional responses in the classroom – I. Fight or flight response

Some of the emotions, generated, processed and transmitted by amygdala are those of the negative spectrum, which arise as a response to some threat from the environment. The provoked reaction is defined in both neuroscience and psychology as **"fight or flight"** response.

Our task in the classroom is to assist students in their efforts not to "run away" from a hard task, but to "fight" with the problem.

Figure 26 Source: https://jupiterastrology.com/2021/12/08/%D1%82%D1%80%D0%B0%D0%BD%D0%B7%D0%B8%D1%82%D0%B5%D0%BD-%D0%BC%D0%B0%D1%80%D1%81-%D0%B2-%D0%B7%D0%BD%D0%B0%D0%BA-%D1%81%D1%82%D1%80%D0%B5%D0%BB%D0%B5%D1%86/

8.1.1. Situation 1 - at seminars

One of the possible ways to make students feel calm and confident in their academic performance, is by presenting the task in a structured way with clear instructions on what is expected and what goal should be achieved.

Figure 27 Source: https://biobaseddelta.com/news/dutch-and-brazilian-students-take-part-in-8th-biobased-battle/

It could be also recommended to demonstrate a model, an "algorithm" in order to illustrate the steps / stages for achieving the goal.

The model can be presented in an amusing and interesting way: using a video, an animation, a power point presentation, etc., which could contribute to keeping **a positive working atmosphere.**

If the task to be solved is more challenging or complex by nature, it is appropriate to offer work in pairs or groups, using cooperative method of learning.

The interdependence of the members of the group among themselves, along with the personal responsibility of each member of the group, contributes for their success and the success of their partners. (Quinlan, 2015)

Figure 28Source: https://everythingondata.com/cropped-people-2557396_1920-jpg/

8.1.2. Situation 2 - at an examination procedure

In order to create a positive emotional atmosphere, some of the traditional ways of carrying out an examination can be changed.

In some cases it could be possible the exam to be held outside the classroom / lecture hall, for instance:

- **in a library -** for students of humanities,
- **in the courtroom -** for future lawyers (the legal case assigned as an exam task can be role-played in a group of three or four),
- **in a laboratory** - for students of engineering specialties (where conditions are as close as possible to the real ones),
- **in an archive** - for historians, (personal experience).

In other cases, the traditional way of conducting an exam can be replaced by assigning an individual project and the student is given the opportunity to choose from a list of topics for the project.

Thus, he / she is given the chance to select a topic in which he / she is most interested or to which is personally biased.

Figure 29 Source: https://doenewswire.com/stories/618765797-doe-releases-environmental-justice-report-for-2020personally biased

As a result, students will be satisfied with the heuristic moment that is present in such a type of tasks and emotions experienced are expected to be of the positive spectrum. (Borja, 2020)

8.2. Suggestions and ideas how to implement emotions and emotional responses in the classroom – II.

8.2.1. Discover the Human Face of Science (Exact Sciences)

Using the inverted classroom method, students of engineering and exact sciences specialities are assigned to collect and analyze information concerning **the process of discovering** various facts, phenomena, formulas, etc. by prominent scientists.

In class, students present what they have discovered and **share both the acquired knowledge and the emotions they experience with other students**.

Through the emotions that students feel when they get acquainted with extraordinary, remarkable facts, **they empathize the process and build an emotional connection** with the discoverer in question and his / her work.

Figure 30 Source: https://unsplash.com/photos/6RTM8EsD1T8

The emphasis here is on disclosing the human face of science. Through such emotions as admiration, excitement, empathy and the like, an **emotional trace and a memory** will remain with students that could impact their attitude to both the particular subject matter and their academic performance in general. (Borja, 2020, Quinlan, 2015).

8.2.2. Discover the Human Face behind The Texts (Humanities)

As for humanities students, similar tasks, related to their particular subjects, can be offered.

Depending on their specialization, students choose an author in advance (writer, philosopher, pedagogue, etc.) and a text by him / her, according to their own preferences.

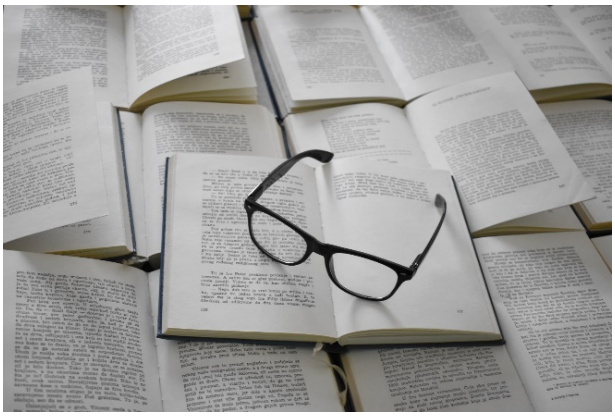

Figure 31 Source: https://florian-schupp.com/

Here again, in the process of collecting and analyzing information, students are expected to find out some not very well known facts about the author's personality or the history of the particular text creation, etc., and by doing so -to discover the human behind the text/s and build an emotional relationship with his / her works, ideas, experiencing of the world. (Quinlan, 2015)

8.3. In Discoverers or Inventors' Shoes

This sort of tasks relies mainly on the application of Project-Based Learning. In terms of emotions, it counts on the moment of **PERSONAL discovery** in order to create positive emotions, and to **raise students' confidence and self-esteem**.

Again, the functions of amygdala are taken under consideration, especially those related to emotional responses such as "fight or flight" ones.

Tasks, related to research, interpretation and writing (essays or even articles) could be assigned mainly to students, majoring in humanities.

Figure 32 Source: https://unsplash.com/@tpdubya

The moment of "discovery" here is linked to the fact that students have to do a research about authors and texts, unknown or not popular among the general public.

8.4. Suggestions and ideas how to implement emotions and emotional responses in the classroom EMOTION - MEDITATION - KNOWLEDGE

One possible strategy is to implement the so-called "sacred reading" (focusing on a paragraph of a text for meditative purposes). Through this method a connection is made with one's own personality. (Quinlan, 2015) It is mainly appropriate to be applied with humanities students majoring in such specialities as: philosophy, psychology, pedagogy, literature, music and others.

Through deep reflection on the meaning and messages of the text, this method leads to emotional states that help to take control of one's own personality and awareness. As a result, one realizes and apprehends ideas and truths that resonate in emotions having a therapeutic effect on the person.

Classroom text discussions, interpretative readings and similar practices allow students' opinions and ways of thinking to be heard, appreciated and taken under consideration.

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