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**LIMBIC SYSTEM AND THE FORMATION OF
EMOTIONS.
&
THE CENTERS OF PUNISHMENT AND REWARD**

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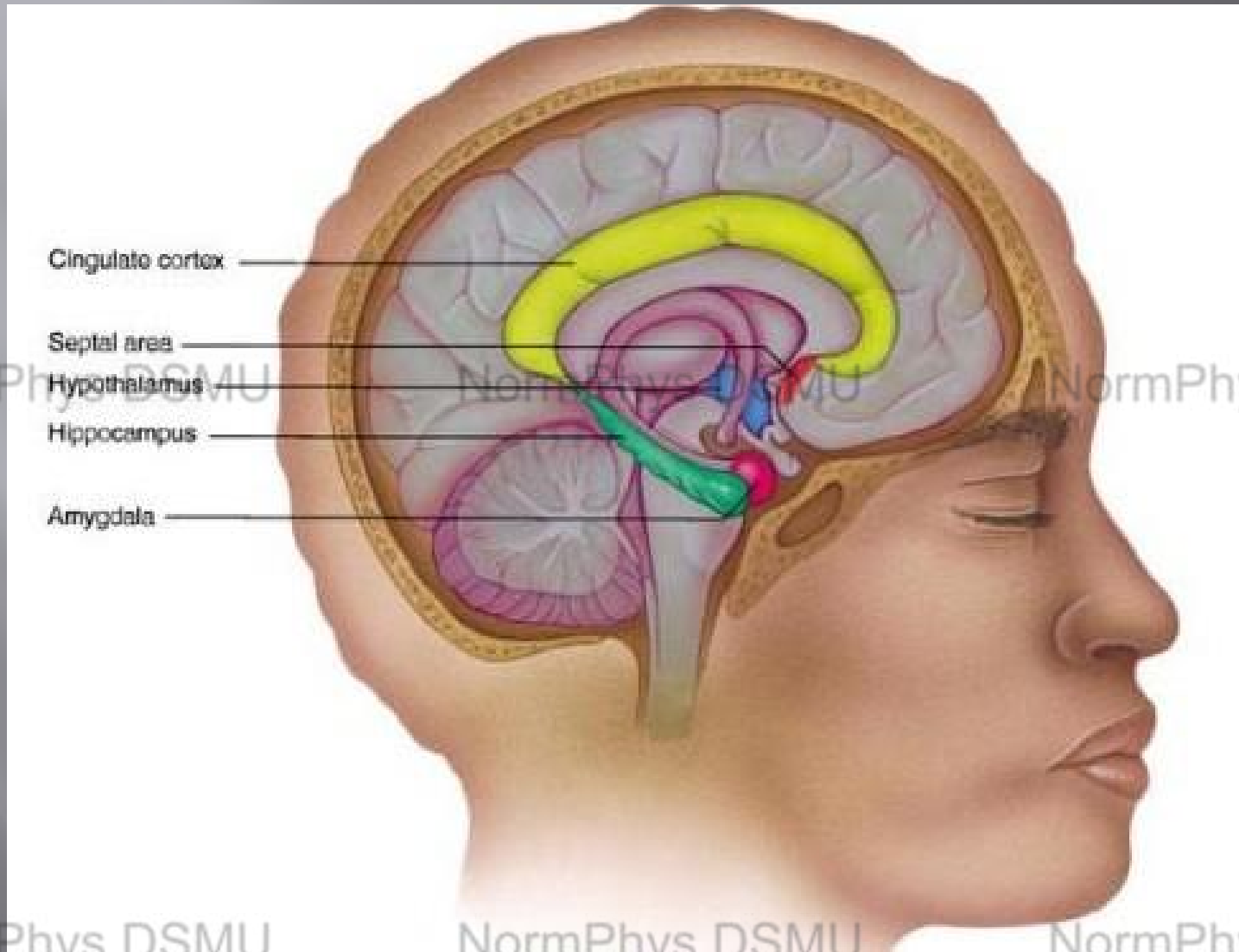
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- ***Definition:***
- ***A mental reaction such as anger, fear or happiness that is experienced subjectively as a strong feeling usually directed toward a specific object and typically accompanied by physiological and behavioural changes in the body.***
- ***It is controlled by the Limb***



Limbic System



Limbic System

- Located beneath the cerebrum on both sides of the thalamus.
- Responsible for our emotional lives but also many higher mental functions such as learning and the formation of memory.
- Primary structures include the: Amygdala, Hippocampus , Thalamus, Hypothalamus and other smaller parts.
- **The Limbic system combines higher mental function and primitive emotion into a single system often referred to as the emotional nervous system**

Important Limbic System Structures for Emotion

- 1; Amygdala (corpus amygdaloideum)
 - -Emotional center of the brain
 - -It evaluates the emotional value or valence of situations.
 - -Helps the brain recognise potential threats and helps prepare the body for fight or flight reactions by increasing the heartbeat and breathing rates.

2; Thalamus

- -It is the sensory way-station or depot for the rest of the brain.

- 3; Hypothalamus

- -Lateral parts of the hypothalamus are involved with pleasure and rage.
- -Medial parts are linked to aversion, displeasure etc.

- 4; Cingulate Gyrus

- Induces an emotional reaction to pain and helps regulate aggressive behaviour.

Components of Emotions

- **Cognitive Appraisal**= Provides an evaluation of events and objects.
- **Bodily Symptoms**= Physiological component of emotional experience.
- **Action Tendencies**= A motivational component for preparation and direction of a motor response.

Components of Emotions

- **Expression**= Facial and vocal expression almost always accompanies an emotional state to communicate a reaction and an intention of action.
- **Feelings**= Subjective experience of an emotional state once it has occurred.

Purpose of Emotions

- Emotions facilitate adaptive responses to environmental challenges.
- They can be a way to communicate what is important to us, such as values and ethics.

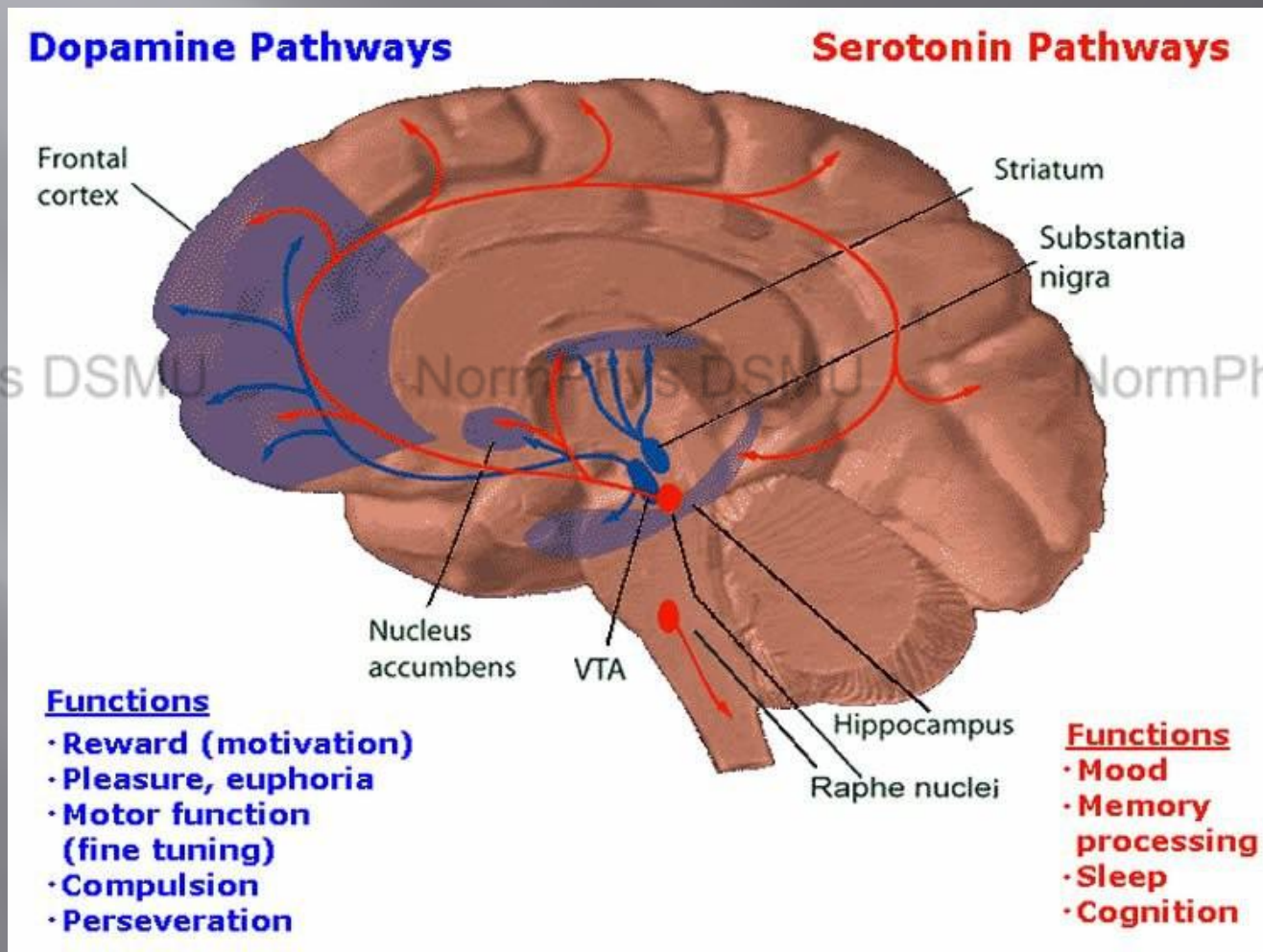
Emotions serve 1 (or more) of the following core functions.

- a) **Emotions Motivate Actions**
 - They can motivate us to respond to situations.
 - They may inform us about our circumstances and the environment we are in, helping us act appropriately
- b) **Emotions communicate valuable info to others**
 - They may tell others how we're feeling and what we need in a given situation.
- c) **Emotion-specific bodily responses**
 - Are thought to physiologically prepare to organism for specific emotion-related actions, prioritizing response mobilization .

Conclusion

- According to scientist emotions are innate, biologically driven reactions to certain challenges and opportunities formed by evolution to help humans survive.

Reward and Punishment...



Reward and Punishment Centers

The Limbic System again plays a role in the formation of the reward and punishment centers.

In this instance it is particularly concerned with the affective nature of sensory sensations, whether the sensation is pleasant or unpleasant. Also called reward and punishment.

Electrical stimulation of certain limbic areas pleases or satisfies whereas stimulation in other areas cause terror, pain, fear, defence etc.

Reward Centers

- Major reward centers have been found to be located along the course of the medial forebrain, especially in the lateral and ventromedial nuclei of the hypothalamus.
- Neurotransmitter that has the main influence of the reward center is *Dopamine*. Produced in the ventral tegmentum area(VTA) of the mid-brain.

- When the brain receives pleasurable stimuli the ventral tegmentum area (VTA) sends dopamine to the following areas:
 - 1- Amygdala
emotion
sensation was good
=Center of
=Feels that a
 - 2- Hippocampus
=Responsible for memory formation
=Remembers the good feeling for the next time

- 3-Nucleus Accumbens = Motor Function
 - =Works in repeating the motion that caused the reward.
- 4-Prefrontal Cortex
 - =Responsible for planning and focusing attention
 - =Helps focus on the source of reward/pleasurable feeling, directing some of the attention to that source.

Mesolimbic Pathway

- Nucleus accumbens, amygdala and hippocampus make up the *mesolimbic pathway* (dopaminergic pathway)
- With continued activation of reward circuit there is an increase in Dopamine levels and at the same time there is a decrease in Serotonin levels.
- Serotonin is responsible for feelings of satiety/satisfaction or contentment.

Punishment Centers

- Strongest centers of punishment are found in the:
 - - Central Gray area surrounding the Aqueduct of Sylvius in the Mesencephalon
 - - Periventricular zones of the Hypothalamus
- Lesser centers:
 - - Amygdala
 - - Hippocampus

- Stimulation of the Punishment Center can frequently inhibit the Reward and Pleasure circuit completely, demonstrating that Punishment and Fear can take priority/superiority over pleasure and reward.
- According to scientist the same dopamine that leads to reward also causes punishment if the stimulus is large enough on the Punishment Center.

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- THANK YOU FOR YOU ATTENTION...

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