

# Nervous System Glossary

MAKING COMPLEX  
NEUROLOGICAL CONCEPTS  
ACCESSIBLE

HEALTHY MIND PSYCHOLOGY UK

# Welcome

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I'm Dr Amber Johnston!

In addition to being the founder and director of Healthy Mind Psychology, I am an accomplished Clinical Psychologist, Neuropsychologist and Pain Psychologist with trauma specialty.



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I am passionate about enhancing widely accepted knowledge to better understand components of psychology not often talked about and to break the stigma around individuals who seek guidance to support their mental well-being.

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Welcome to your Nervous System Glossary, a guide to help you understand the fascinating network that controls virtually every aspect of your functioning. This resource is designed to make complex neurological concepts accessible and practical for your everyday life.

*Amber*

# Fundamental Structures

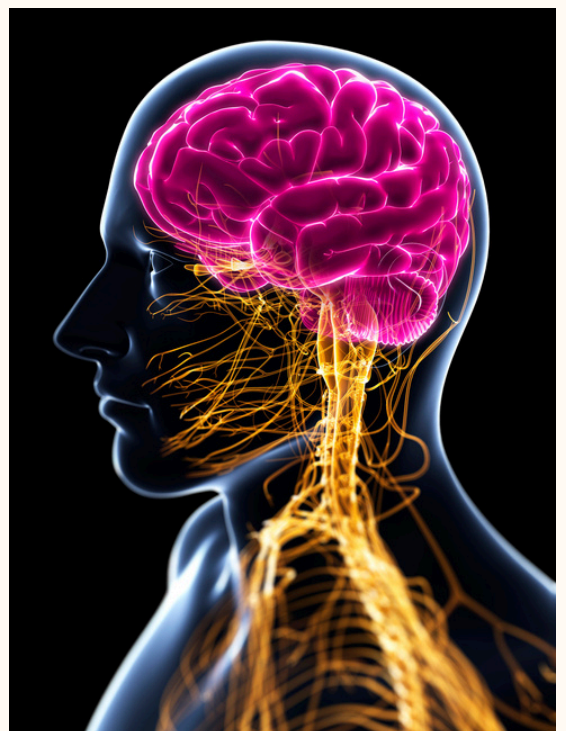
## Glial Cells

Support cells that maintain homeostasis, form myelin, provide structural support, and protect neurons. Types include:

- **Astrocytes:** Regulate blood flow and nutrient supply to neurons
- **Oligodendrocytes:** Form myelin in the CNS
- **Schwann cells:** Form myelin in the PNS
- **Microglia:** Immune defence cells in the brain

## Synapse

The junction between neurons where information is transmitted, typically via chemical neurotransmitters that cross the synaptic cleft between cells.



# ANS

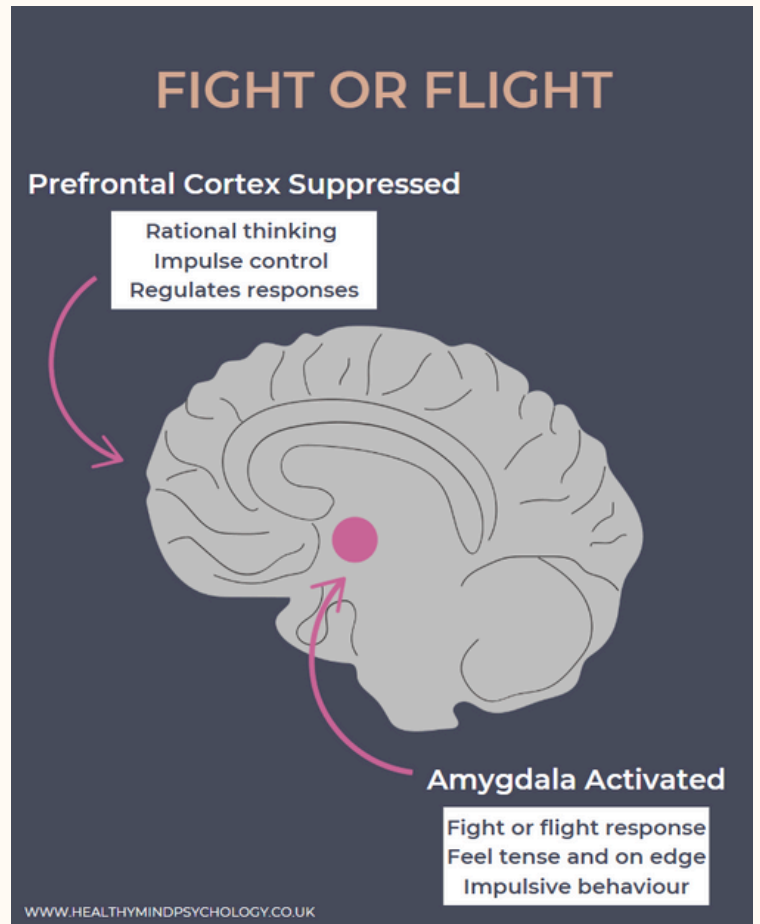
## Autonomic Nervous System (ANS)

The part of your nervous system that controls involuntary bodily functions like breathing, heart rate, digestion, and pupil dilation.

## Sympathetic Nervous System

The "fight-or-flight" branch of your ANS. When activated:

- Heart rate and blood pressure increase
- Pupils dilate
- Digestion slows
- Muscles receive increased blood flow
- Stress hormones release
- Breathing rate increases





# ANS

## Parasympathetic Nervous System

The "rest and digest" branch of your ANS. When activated:

- Heart rate and blood pressure decrease
- Digestion increases
- Muscles relax
- Pupil constriction occurs
- The body focuses on conservation and restoration

## Vagus Nerve

The primary nerve of the parasympathetic nervous system, influencing heart rate, digestion, respiratory rate, and emotional regulation. Vagal tone refers to the activity of this nerve and is associated with resilience to stress.

## Enteric Nervous System

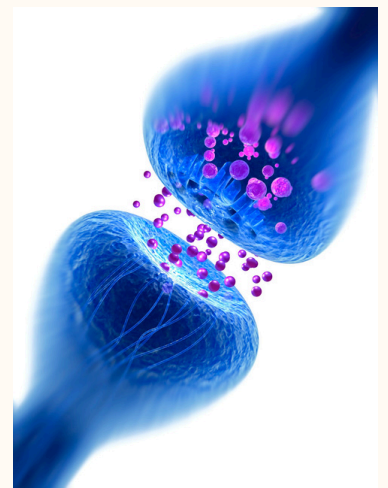
Often called the "second brain," this complex network of neurons in the gut can operate independently of the CNS and significantly influences digestive function, mood, and immune response.

# Neurotransmitters

## Neurotransmitters

Chemical messengers that transmit signals across synapses:

- **Glutamate:** The most abundant excitatory neurotransmitter, critical for learning and memory
- **GABA (Gamma-aminobutyric acid):** The primary inhibitory neurotransmitter that reduces neural activity and promotes calm
- **Dopamine:** Involved in reward, motivation, motor control, and executive function
- **Serotonin:** Regulates mood, appetite, and sleep; influences social behaviour
- **Norepinephrine:** Increases alertness and readiness for action
- **Acetylcholine:** Involved in muscle activation, attention, and memory formation
- **Endorphins:** Natural pain relievers that also produce feelings of wellbeing



# Neuromodulators

## Neuromodulators

Substances that adjust the strength or efficiency of synaptic transmission:

- **Oxytocin:** The "bonding hormone" related to trust, attachment, and social connection
- **Cortisol:** Primary stress hormone that affects metabolism, immune function, and cognitive processing
- **Melatonin:** Regulates sleep-wake cycles in response to light exposure
- **Substance P:** Involved in pain perception and inflammatory responses



# Brain Regions

## Prefrontal Cortex

The brain's executive centre involved in planning, decision-making, personality expression, and moderating social behaviour. It plays a key role in inhibiting impulses and regulating emotional responses.

## Amygdala

Almond-shaped clusters involved in processing emotions, particularly fear responses and threat detection. The amygdala forms emotional memories and helps determine what requires attention.

## Hippocampus

Crucial for forming new memories, spatial navigation, and connecting emotions to memories. It's particularly vulnerable to stress and plays a role in regulating stress responses.

## Hypothalamus

Controls many bodily functions including hunger, thirst, temperature, fatigue, and circadian rhythms. It's a key link between the nervous system and endocrine system.



# Brain Regions

## Insula

Processes interoception—your awareness of internal bodily sensations—and is involved in emotional awareness, empathy, and social emotions.

## Brainstem

Controls many basic life functions including breathing, heart rate, blood pressure, and consciousness. It connects the brain to the spinal cord and the rest of the body.

## Cerebellum

Coordinates movement, posture, and balance. Newer research shows it also plays roles in attention, language, and regulating fear and pleasure responses.

## Corpus Callosum

The largest white matter structure in the brain, connecting the left and right hemispheres and allowing them to communicate.

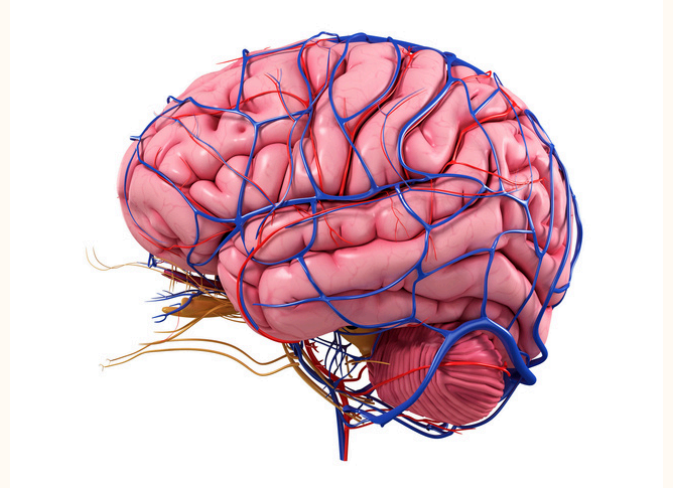
# Neural Processes

## Neuroplasticity

The brain's ability to reorganise itself by forming new neural connections throughout life.

This allows for:

- Learning new skills
- Recovery after brain injury
- Adaptation to new experiences
- Compensation for disease or damage



## Habituation

The decrease in response to a stimulus after repeated exposure. This filtering process prevents sensory overload, particularly when a stimulus is learned to be safe and normal.

## Sensitisation

Increased response to a stimulus, often occurring with threatening or novel stimuli. Can become maladaptive in conditions like chronic pain or PTSD.

# Neural Processes

## Long-Term Potentiation (LTP)

The strengthening of synapses based on recent patterns of activity, forming the cellular basis for learning and memory.

## Myelination

The formation of a fatty insulating sheath around axons, which speeds up neural transmission. This process continues into adulthood, especially for pathways used frequently.

## Neural Pruning

The elimination of weak or unused neural connections to increase efficiency, a crucial process in development and learning.

## Interoception

The sensing of internal bodily sensations (e.g., hunger, heartbeat, breathing) that forms a foundation for emotional awareness and self-regulation.

# Stress Response Systems

## HPA Axis (Hypothalamic-Pituitary-Adrenal Axis)

The central stress response system that coordinates between the brain and adrenal glands to release cortisol during stress.

## Allostasis

The process of achieving stability through physiological or behavioural change, representing the body's adaptation to stressors.

## Allostatic Load

The cumulative wear and tear on the body due to chronic stress and repeated adaptation to stressors. High allostatic load increases risk for numerous health conditions.

## Acute Stress Response

Short-term physiological and psychological reactions to immediate threats, characterised by sympathetic nervous system activation.



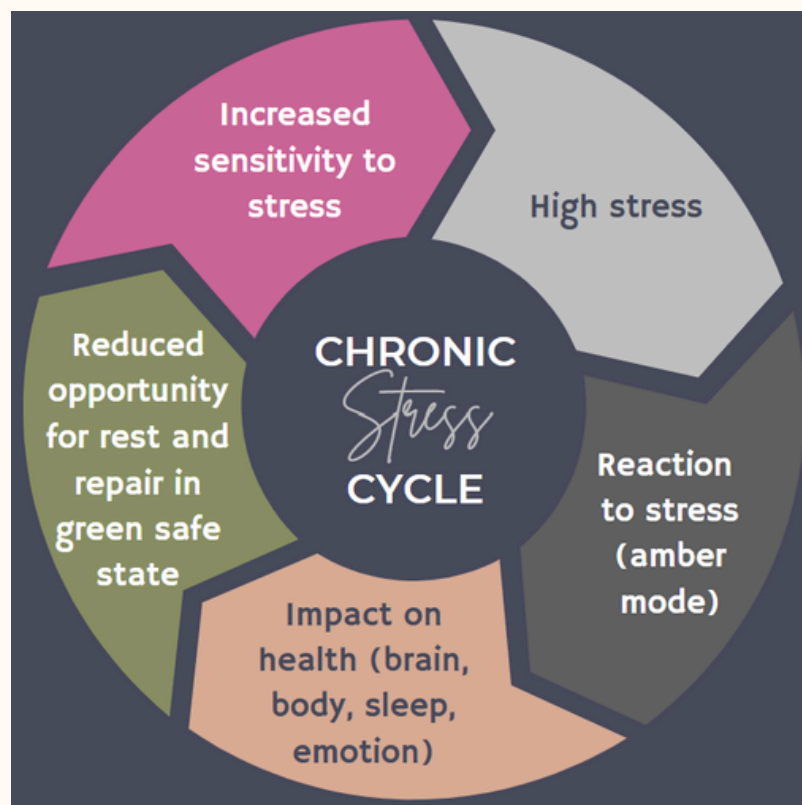
# Stress Response Systems

## Chronic Stress Response

Prolonged activation of stress response systems that can lead to dysregulation of the HPA axis and autonomic nervous system, contributing to various health problems.

## Window of Tolerance

The optimal zone of arousal where you can function effectively. Within this window, you can think clearly and manage emotions. Stress and trauma can narrow this window.



# States and Regulation

## Neuroception

The subconscious process through which your nervous system evaluates environmental risk and safety, influencing autonomic state without conscious awareness.

## Co-regulation

The interactive process where one person's regulated nervous system helps another person regulate their own system, particularly important in child development and close relationships.

## Self-regulation

The ability to manage disruptive emotions and impulses while maintaining appropriate physiological arousal for the situation.

## Dysregulation

When the nervous system becomes stuck in maladaptive patterns, resulting in emotional reactivity, difficulty concentrating, or problems with executive function.

# States and Regulation

## Hyperarousal

A state of heightened physiological activation involving increased heart rate, rapid breathing, muscle tension, and vigilance. Can manifest as anxiety, irritability, or panic.

## Hypoarousal

A state of diminished physiological activation involving reduced energy, disconnection, and sometimes emotional numbness. Can manifest as depression, fatigue, or dissociation.

## Polyvagal Theory

Developed by Dr. Stephen Porges, this theory describes how the vagus nerve influences social behavior and emotion regulation through three evolutionary nervous system states:

- Ventral vagal (safe and social)
- Sympathetic (mobilisation)
- Dorsal vagal (immobilisation)

# NS Development

## Critical Periods

Specific time windows during development when the brain is receptive to certain types of stimulation and learning.

## Experience-Dependent Plasticity

How environmental experiences shape neural connections, particularly strong during childhood.

## Attachment

The emotional bond between an infant and caregiver that shapes neural development and establishes patterns for future relationships and stress responses.

## Trauma

Experiences that overwhelm the nervous system's coping capacity, potentially leading to lasting neurobiological changes in stress response systems.

## Resilience

The capacity of the NS to withstand, adapt to, and recover from adversity, supported by genetic factors and life experiences.



# NS Health

## Neural Reserve

The brain's capacity to function effectively despite age-related changes or pathology through redundant neural networks and compensatory mechanisms.



## Cognitive Reserve

The mind's resilience to neuropathological damage, influenced by education, occupation, lifestyle, and social engagement.

## Neuroinflammation

Inflammatory responses in the nervous system that can be protective in the short term but damaging when chronic, associated with various neurological and psychiatric conditions.

# NS Health

## Neurodegeneration

The progressive loss of structure or function of neurons, as occurs in conditions like Alzheimer's and Parkinson's disease.



## Neurogenesis

The formation of new neurons, which continues in limited brain regions throughout adulthood and can be enhanced by exercise, learning, and stress reduction.

## Excitotoxicity

Damage to neurons due to excessive stimulation by neurotransmitters like glutamate, which can occur during stroke, traumatic brain injury, and some neurodegenerative diseases.

# Practices for Regulation

## Diaphragmatic Breathing

Deep breathing using the diaphragm that activates the vagus nerve and shifts the autonomic nervous system toward parasympathetic dominance.

## Progressive Muscle Relaxation

Systematically tensing and releasing muscle groups to reduce physical tension and signal safety to the nervous system.

## Meditation

Various practices involving attention regulation that can alter brain structure and function, enhance emotional regulation, and promote parasympathetic activity.



# Practices for Regulation

## Mindfulness

The practice of present-moment awareness without judgment, which has been shown to reduce stress, enhance attention, and promote neuroplasticity.

## Somatic Experiencing

A therapeutic approach focusing on bodily sensations to resolve trauma-related nervous system dysregulation and complete interrupted defensive responses.

## Vagal Toning

Practices that stimulate the vagus nerve and strengthen parasympathetic functioning, including specific breathing techniques, cold exposure, singing, humming, or gargling.

## Bilateral Stimulation

Alternating right-left patterns of movement or sensory input that may help integrate brain hemispheres and process emotional material.





# — Help and Support —

If you're struggling with chronic stress, anxiety or dysregulation, [\*\*Healthy Mind Psychology\*\*](#) can help. Our therapists understand traditional and more modern ideas behind psychology and neuropsychology. We help you fill in the gaps of how your daily life can affect your mental health and use multiple treatment modalities to help you discover how a healthy mind can lead to a healthy body. Visit our website to find out more.



The background is a solid brown color. In the center, there are several dried, pressed flowers with long, thin stems and delicate, spiky petals. In the top-left and bottom-right corners, there are white line-art illustrations of leafy branches. A thin, light-brown rectangular border frames the central area.

# Understand your nervous system

[www.healthymindpsychology.co.uk](http://www.healthymindpsychology.co.uk)