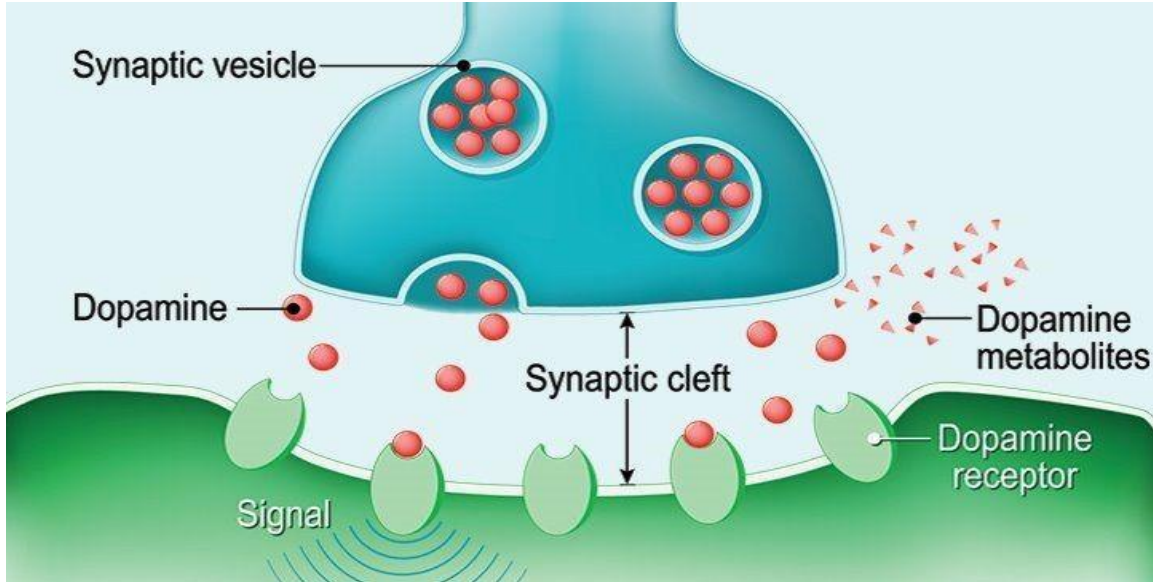


UPSC CURRENT AFFAIRS NOTES 04-12-2023

DOPAMINE



A recent study sheds light on dopamine's involvement in human behavior and decision-making processes, revealing its significance not just in positive but also in negative experiences.

Details

Methodology and Study Findings

Electrochemical Techniques and Machine Learning:

Utilization of fast-scan cyclic voltammetry, coupled with machine learning, facilitated real-time measurement of dopamine levels at rapid intervals (10 measurements per second).

Invasive Procedures and Brain Activity Monitoring:

The study involved the insertion of carbon fiber microelectrodes into the brains of participants undergoing deep-brain stimulation (DBS) surgery, offering insight into dopamine levels in the striatum.

Role in Rewarding and Punishing Experiences

Optimal Learning Signals:



Dopamine appears to encode rewarding and punishing experiences in a manner that aids optimal learning, influencing decision-making processes based on the outcomes of these experiences.

Distinct Pathways and Timeframes:

The study suggests the existence of separate brain pathways engaging the dopamine system for processing rewarding and punishing experiences, operating on slightly different timescales.

Understanding Dopamine

Dopamine is a neurotransmitter, a type of chemical messenger that transmits signals between nerve cells (neurons) in the brain.

It belongs to the catecholamine family of neurotransmitters.

Synthesis and Pathways

Synthesis: Dopamine is synthesized in nerve cells from the amino acid tyrosine through a series of enzymatic reactions involving tyrosine hydroxylase and aromatic L-amino acid decarboxylase.

Pathways: It is produced in several areas of the brain, including the substantia nigra and the ventral tegmental area (VTA), and is involved in various neural circuits.

Functions of Dopamine

Movement and Motor Control:

Dopamine plays a vital role in coordinating smooth and controlled movements. Dysfunction in dopamine-producing neurons can result in movement disorders like Parkinson's disease.

Reward and Pleasure:

It is a key component of the brain's reward system, influencing feelings of pleasure, motivation, and reinforcement.

Dopamine release in response to rewarding stimuli reinforces behaviors, motivating individuals to seek out pleasurable experiences.



Mood and Emotion Regulation:

Dopamine levels influence mood regulation and emotional responses. Imbalances in dopamine signaling are associated with conditions like depression and bipolar disorder.

Cognition and Attention:

Dopamine is involved in cognitive functions such as attention, memory, learning, and decision-making.

Dopamine Receptors and Signaling

Receptors: Dopamine exerts its effects by binding to specific dopamine receptors (D1 to D5), each with distinct functions and locations in the brain.

Signaling Pathways: Upon binding to receptors, dopamine triggers intracellular signaling cascades, influencing neuronal activity and modulating various physiological functions.

Implications in Health and Behavior

Dopaminergic Disorders:

Parkinson's Disease: Characterized by the degeneration of dopamine-producing neurons, resulting in movement impairments.

Schizophrenia: Dysregulation in dopamine signaling is linked to symptoms of schizophrenia.

Addiction and Substance Abuse:

Drugs and addictive behaviors can stimulate dopamine release in the brain's reward pathway, leading to addiction and dependence.

Mental Health Conditions:

Depression: Altered dopamine levels or signaling pathways are associated with symptoms of depression.

ADHD: Dopamine dysfunction is linked to attention-deficit/hyperactivity disorder (ADHD).

INDIA'S RELIANCE ON COAL



India's surging energy demand, driven by economic activity and rising appliance usage, is predominantly met by coal, constituting 75% of power generation, with renewables at 22%, showcasing a substantial gap from ambitious targets.

Details

India's heavy reliance on coal is primarily driven by the surge in power demand, rapid economic growth, and the challenges associated with renewable energy sources.

Growing Energy Demand

India's power demand has been rapidly increasing, outpacing the growth rate in the Asia Pacific region.

Higher economic activity, especially in industrial and commercial sectors, is a significant contributor to the increased energy demand.

Homes and agriculture also account for a substantial portion of India's power consumption.

Projections for Future Energy Demand

According to the International Energy Agency (IEA), India is expected to witness the largest energy demand growth globally over the next 30 years.



Coal Production Increase

In response to the surging demand, India has increased its coal production significantly.

Coal production spiked from 778 million tons in 2021-22 to 893 million tons in 2022-23, reflecting a 14% growth.

The government has set ambitious targets, aiming for 1.31 billion tonnes of coal production by 2024-25 and a further increase to 1.5 billion tons by 2030.

Challenges with Renewable Energy

Despite efforts to increase the share of renewable energy, only 22% of the total energy produced in India comes from renewable sources.

Renewables, including solar and wind, face challenges such as variability, necessitating significant investment in battery storage to ensure a stable power supply.

Hydropower Complexities

Hydropower, a key renewable source, faces challenges in terms of ecological damage and potential conflicts over water resources.

The construction and planning of hydropower projects in the Himalayan region have come under scrutiny.

Nuclear Power Contribution

India's plans to generate energy from nuclear power plants have not seen significant success, contributing only about 3.15% to the total electricity generated in 2021-22.

Future Plans

India aims to reach 500 GW of renewable energy capacity by 2030, a significant increase from the current capacity of about 180 GW.

The government emphasizes a phasedown rather than a phaseout of coal use, recognizing the practical constraints and the need to address the growing electricity demand.



International Maritime Organisation (IMO)



India was re-elected to the International Maritime Organisation (IMO) Council with the highest tally.

India's re-election falls under the Category of 10 states with the largest interest in international seaborne trade.

India got 157 votes out of the 167.

The other countries in the category are Australia, Brazil, Canada, France, Germany, Netherlands, Spain, Sweden, and the United Arab Emirates.

The term of the council will be for the biennium 2024-25.

Significance

India's re-election with the highest tally in the election sustained an unbroken record of India's continuous service at IMO.

The highest votes are indicative of the government's determination to strengthen India's varied contributions to international maritime operations.

Moving Ahead

To enhance representation at IMO India aims at appointing permanent representatives at IMO London under the Maritime India Vision (MIV) 2030.



To enhance and garner maritime expertise for India, it is proposed that India should nominate at least 2 qualified candidates for the Junior Professional Officer (JPO) Program at the IMO.

The Amrit Kaal Vision 2047 has also set goals to strengthen India's global maritime presence.

There are 43 initiatives identified as part of Amrit Kaal Vision 2047 Action Plan of which, the key initiatives focus on

strengthening our global maritime presence which includes a dedicated IMO cell in India,

the appointment of a permanent representative at IMO headquarters, London, implementation of BIMSTEC Master Plan,

creating a robust BIMSTEC institutional structure to ensure implementation of regional projects in a coordinated & timely manner etc.

International Maritime Organisation (IMO)

About

The International Maritime Organisation (IMO) is a specialized agency of the United Nations responsible for regulating shipping.

Establishment

The IMO was established following an agreement at a UN conference held in Geneva in 1948.

The IMO came into existence ten years later, meeting for the first time on 17 March 1958.

Headquarters

Headquartered in London, United Kingdom, IMO currently has 175 Member States and three Associate Members.

Mandate

IMO oversees the maritime sector which in turn underpins international trade, transport, and all maritime activities.

Structure



The council is the executive organ of IMO and is responsible, under the assembly, for supervising the work of the organization.

Between sessions of the assembly, the council performs the functions of the assembly, except that of making recommendations to governments on maritime safety and pollution prevention.

Functions of IMO

- The major areas of concern that the International Maritime Organisation has been able to bring under regulation have been the prevention of accidents, setting up safety standards for ships and other vessels (including design and materials) for the member states to abide by, maintaining adherence to the established treaties of safety and security, prevention of pollution and other avoidable human disasters.
- IMO also facilitates technical co-operation among member states, setting up an audition and monitoring scheme for these rules and standards and finally monitoring liabilities and compensation in case of breach of any of these regulations.
- Thus, the International Maritime Organisation plays a crucial role in modern society's progress toward a better and healthier commercial and transportation environment.

Pillars of IMO

The four pillars of IMO are the

1. International Convention for the Safety of Life at Sea (SOLAS),
2. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW),
3. International Convention for the Prevention of Pollution from Ships (MARPOL) and
4. Maritime Labour Convention (MLC).

Funding of the IMO

- An assembly of members governs the IMO.
- It is also financially administered by a member council elected from the assembly.

- It has five committees and several technical sub-committees.

Buoy

A wave rider buoy, equipped with GPS and various weather-related instruments, was recently found ashore at the Gopalpur Military Station in Ganjam district, Odisha.



About Buoy:

- A buoy is a floating object anchored at a definite location to guide or warn mariners, to mark the positions of submerged objects, or to moor vessels in lieu of anchoring.
- Buoys are often brightly coloured and have distinctive shapes or patterns, making them easily visible to ships and other watercraft.
- Buoys are commonly found in harbours and ports, along coastlines, and in rivers and lakes.



- They are maintained by various organisations, such as the Coast Guard and other navigational authorities.

Buoyage system:

For the sake of maintaining uniformity in buoyage systems worldwide, the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) divided the world into two regions: Region A and Region B.

- Region A includes Europe, Australia, New Zealand, Africa, the Gulf, and some Asian countries, whereas Region B comprises North, South, Central America, Japan, Korea, and the Philippines.
- IALA proposed a system allowing the use of lateral marks in each region, but in Region A, the colour red of the lateral system is used to mark the port side of channels and the colour green for the starboard side.
- In Region B, the colours are reversed.
- Special-purpose buoys are designed for a variety of uses; they include cable buoys, anchor buoys, or race buoys.
- A mooring buoy differs from other types in that it is not an aid to navigation but a point to which vessels may be tied up.

What are starboard side and port side?

- The port side is the ship's left side when looking forward towards the bow of the ship.
- The starboard is on the right side of the ship when facing the bow.
- The bow is the part of the ship that is generally most forward when the ship is moving. The stern is the back of the ship or its aft-most part.

Purchasing Managers' Index

India's manufacturing sector continued to perform better with S&P Global Purchasing Managers' Index (PMI) rising to 56 in November against 55.5 in October.



About the Purchasing Managers' Index:

- It is an indicator of business activity – both in the manufacturing and services sectors.
- It is a survey-based measure that asks the respondents about changes in their perception of some key business variables from the month before.
- It is calculated separately for the manufacturing and services sectors and then a composite index is constructed.



- The index helps in determining whether the market conditions, as seen by purchasing managers, is expanding, contracting or staying the same.
- There are two types of PMI — Manufacturing PMI and Services PMI.

How is the manufacturing PMI derived?

- It is derived by sending fact-based questions to a large number of companies in the concerned sector.
- The questions are related to 5 key variables. The variables with their weights in the index are — new orders (30%), output (25%), employment (20%), suppliers' delivery times (15%) and stock of items purchased (10%).

The surveys are conducted on a monthly basis.

- A PMI number greater than 50 indicates expansion in business activity.
- A number less than 50 shows contraction. The rate of expansion is also judged by the difference from the mid-point (50) and also by previous month's data.
- PMI data for India is released by S&P Global - a global major in financial information and analytics.
- Earlier PMI data in India was released by IHS Markit before its merger with S&P.
- The Manufacturing PMI measures the performance of India's manufacturing sector and is derived after a survey of approx. 500 manufacturing companies.

White Lung Syndrome

An outbreak of a respiratory illness in northern China and Ohio in the US the White Lung Syndrome as people are calling it — has sparked speculation online of a new pandemic threat after COVID-19.

About White Lung Syndrome:

It originates from **distinctive white patches** on chest X-rays in affected children.



The term includes various respiratory illnesses like acute respiratory distress syndrome, pulmonary alveolar microlithiasis, and silica-related conditions.

Causes: It is believed to be caused by a combination of bacterial, viral, and environmental factors.

Signs and symptoms

The patients have symptoms including cough, fever, runny nose, phlegm pileup in sinuses, difficulty breathing and fatigue.

Treatment

The treatment is mainly focused **on addressing the symptoms of pneumonia** and ensuring the respiratory health of the patients.

Medicines are given to alleviate symptoms like cough and fever. Overall monitoring must be done and oxygen therapy provided if necessary.