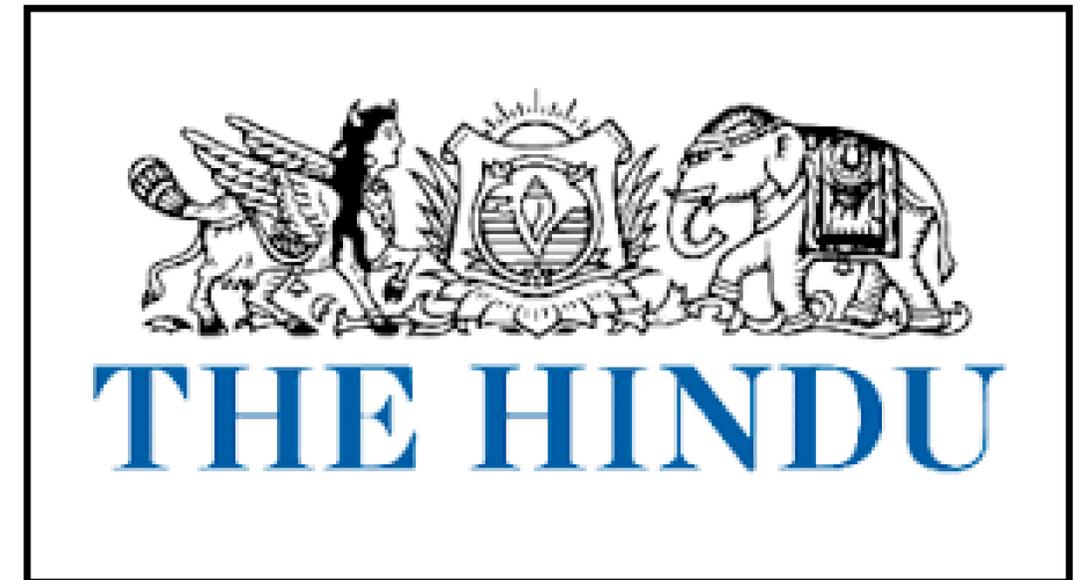




# Topics



- Why Human lack tail?
- Total solar eclipse
- Disruptive Technology in Defence
- AI Regulation
- Why earthquake in Taiwan?
- Mains



By saurabh pandey sir





# Target Mains 2024/25

Q“ Explain the factor responsible for earthquake in Taiwan.

Q" ताइवान में भूकंप के लिए उत्तरदायी कारक बताइये।

send your answer - Saurabh pandey upsc telegram channel



# Answer review



Question No. 279/2021

Abstract  
20-Min

**UPSC**

For Practice Use Only  
Not to be used for any purpose

Q: "Suicide in young people is best understood as multidetermined and the result of interaction b/w biological, psychological, familial and social cultural factors" Discuss.

Ans: Suicide is a complex human behaviour and it is futile to locate a single causative factor. The National Crime Records Bureau (NCRB) reports that 1.71 lakh people died by suicide in 2022, the highest number of suicides in the world.

Risk Factor	Percentage
mental health problem	54%
family issue	36%
academic issue	23%
violence	22%
social and lifestyle factors	20%
economic stress	9.1%
relationship factor	9%

fig shows - most commonly reported risk factors

Question No. 279/2021

**UPSC**

For Practice Use Only  
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Reason for Rise of suicide among Indian youth

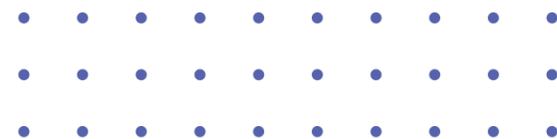
1. Mental health problems - Conditions like depression, bipolar disorder and schizophrenia significantly elevate vulnerability to suicide ideation and behaviour.
2. Family factors - Arranged and early marriages, young motherhood, low social status along with urbanisation and the breakdown of the traditional large family support system increase the suicide tendency.
3. Cyber-bullying - 80% of college students are net-addicts. One-third of young people are cyber-bullied.
4. Some other factors
  - i) domestic violence
  - ii) consumption of Alcohol as harmful substance
  - iii) strong influence of media among vulnerable young people.



# Answer review



Question No. प्रश्न संख्या	UPSC	For Practice Use Only प्रैक्टिस के लिए अपके ही
	<p><u>Steps taken</u></p> <ul style="list-style-type: none"><li>i) Training - suicide can be averted by training and sensitisation session for teachers. Teachers can easily gauge suicidal tendency among youths.</li><li>ii) Early identification of mental distress and provision of care in a youth friendly environment are essential.</li><li>iii) Adopting a healthy lifestyle improves mental health and reduces suicide in the youth.</li><li>iv) Improving the family environment by reducing domestic violence and alcohol consumption and providing economic assistance reduce so suicidal behaviour.</li></ul> <p><u>Conclusion</u></p> <p>This multifaceted of youth suicide underscores the imperative of a holistic approach. By addressing these interconnected factors, policy makers &amp; stakeholders can formulate nuanced preventive strategies and interventions to mitigate the prevalence of youth suicide and foster mental well being among vulnerable populations.</p>	



# A freak DNA change 25 million years ago is why humans lack tails

Around 25 million years ago, the chance insertion of a transposable element occurred in a gene in the zygote of an ancient creature. The probability of the insertion occurring in that exact region was around one in a million. Yet it did, causing the creature to not develop a tail, a study has found

Arun Panchapakesan

One of the most striking anatomical features of apes, which sets them apart from monkeys, is the absence of a tail. All mammals have a tail at some point during their development, but apes, including humans, chimpanzees, bonobos, gorillas, orangutans, and gibbons, lose them *in utero*, leaving behind three to five vestigial vertebrae called the coccyx, or tailbone.

Apes started to lose their tails in this way around 25 million years ago, when the ape and monkey lineages split from a common ancestor. And until recently, nobody knew why apes started to do this.

## The compact genome

Every cell of an organism contains a full copy of that organism's DNA, called the genome. The genome contains the information that the cell uses to make proteins, the workhorses of the cell. Each protein is coded by a specific section of the genome, called the gene.

Not all cells make all the proteins encoded in the genome. For instance, pancreatic cells make insulin, but skin cells don't. Skin cells make other proteins, such as keratin, that the pancreas cells don't. A cell achieves this selective protein production by first making a temporary copy of the gene, called the mRNA, that then drives protein production. So pancreas cells will first copy information in the insulin gene into insulin mRNA, and the insulin mRNA will be used to make insulin protein. Skin cells follow the same process to make keratin.

As scientists began to determine the genome sequence of organisms in the mid-1990s, they realised simple organisms like bacteria keep their genomes very compact while more complex life forms don't. In the bacterial genome, the genes are arranged in tandem: where one gene ends, another begins. As a result, genes make up 85-90% of the bacterial genome.

## 'Junk' DNA

But in complex organisms, genes are spaced far apart. In humans, for example, only 1.5% of the genome codes for proteins. At the time, scientists didn't know what the rest did and called it 'junk' DNA.

Today we know this 'junk' DNA is responsible for various functions, including controlling when to make a protein and when not to. A significant fraction of the 'junk' also contains transposable elements. These are pieces of DNA that can shift their positions within the genome.

One such element, called Alu, is unique to primates (both apes and monkeys). It is tiny, being made up of around 300 base pairs (the human genome is approximately 3 billion base pairs). But due to its ability to copy itself and 'jump' within the genome, it is present in 1.4 million different locations in the human genome. Normally, in nearly all cell types, these elements copy themselves, switch to different locations, and insert themselves into the genome again with minimal consequence to health or evolution. This is because the insertion event is unique to a given cell.

For example, if it happens in an essential gene, only that cell will die;



**Tale of tails:** Tail loss has been implicated in bipedalism: our ability to walk on two legs. But we don't know what evolutionary benefit was conferred on the ancestral tailless ape. GETTY IMAGES

others around it will function normally. The sole exception to this rule is if the insertion happens in the zygote: the fertilized cell after fusion of the sperm and egg that develops into the offspring. Then the change to the DNA will be permanent: it will be reflected in every cell of the offspring.

## The Alu accident

Twenty-five million years ago, after the ape and monkey lineages separated, a chance insertion of an Alu element occurred in an important gene in the zygote of an ancient creature. The probability of the insertion occurring in that exact region was around one in a million. Yet it still occurred, and it caused that ancient creature to not develop a tail.

And because the insertion had happened in the zygote, it was imprinted in the DNA of every cell of that creature, and its subsequent offspring – all of them. That creature was the ancestor of all modern apes.

New York University (NYU) scientists reported the discovery of this fateful insertion in a paper in *Nature* in February.

Identifying the insertion was not easy. The NYU group first searched for DNA changes in 31 genes implicated in tail formation, and compared them across apes and monkeys. As a result, they identified 85,064 mutations (single changes to the DNA sequence), 5,533 deletions, and 13,820 insertions that could be the cause. While many of them were possibly involved in tail-loss, none of them stood out because the scientists were looking for changes in the part of the DNA that made the protein.



As scientists began to determine the genome sequence of organisms, they realised simple organisms like bacteria keep their genomes compact while more complex life forms don't

It was eventually found hiding in the 'junk' DNA.

## A tailoring defect

A peculiar feature of the genome of complex animals is that a gene never exists as one continuous piece in the genome. The gene is divided into segments separated by 'junk'; it's stitched together only when the cell makes the mRNA. This strategy has multiple advantages. For example, the pieces can be rearranged differently at the time of stitching to make different proteins from the same DNA code.

The NYU group found the Alu insertion between two pieces of a gene called TBXT – a gene already known as one of many involved in tail formation in monkeys. As a result of this insertion, apes can't stitch the pieces together correctly and ultimately produce a TBXT protein with one part missing. The team realised this insertion was present in all apes and absent in all other monkeys – a strong sign that it's the cause of tail loss in apes.

The researchers proceeded to compare the size of the TBXT mRNA produced in human and mouse stem cells. They found that while the mouse mRNA was intact, a

large fraction of the human mRNA was defective – which they had predicted.

## An unfinished tail

They needed to conduct one more experiment to be absolutely sure the Alu insertion was the culprit. This one had to demonstrate that a defective TBXT protein led to tail loss.

The NYU team, led by Prof. Itai Yanai, Prof. Jef Boeke, and PhD student Bo Xia, engineered the embryos of mice to produce a defective version of TBXT – the version found in apes. As if by magic, the resulting mice were born without tails.

The team also determined that the defective TBXT protein caused other problems, including neural tube defects. They predict that there must have been compensatory changes to the genome to overcome these defects. Some of them could be the differences they themselves identified in the proteins involved in tail formation.

Despite the excellent work of the NYU team, we may never fully understand the tale of our tail. Tail loss has been implicated in bipedalism: our ability to walk on two legs. But it is difficult to speculate on exactly what evolutionary benefit was conferred on the ancestral tailless ape that led to its selection by nature. Whatever that selection pressure may have been, what is incredible is how evolution seized upon that one-in-a-million event and used it to create an ape that would go on to rule the world.

(Arun Panchapakesan is an assistant professor at the Y.R. Gaiithonde Centre for AIDS Research and Education, Chennai.)





# Why HUMAN lack tail?

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The Hindu analysis by saurabh pandey sir





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The Hindu analysis by saurabh pandey sir





People at Niagara Falls State Park, New York, ahead of a total solar eclipse across North America, on Monday. [AP](#)

## Huge crowds gather for a total eclipse of the sun over N America

Associated Press

Millions of spectators along a narrow corridor stretching from Mexico through the US to Canada eagerly awaited Monday's celestial sensation – a total eclipse of the sun – even as forecasters called for clouds.

It promised to be North America's biggest eclipse crowd ever, thanks to the densely populated path and the lure of more than four minutes of midday darkness in Texas and other choice spots. Almost everyone in North America was guaranteed at least a partial eclipse, weather permitting.

"Cloud cover is one of the trickier things to forecast," National Weather Service meteorologist Alexa Maines explained at Cleveland's Great Lakes Science Center on Sunday. "At the very least, it won't snow."

The cliff-hanging uncertainty added to the drama. Rain or shine, "it's just about sharing the experience with other people," said Chris Lomas from Gotham,

**The moon will slip in front of the sun, blocking it. The resulting twilight would be long enough for birds and other animals to fall silent, and for planets and maybe even a comet to pop out**

England, who was staying at a sold-out trailer resort outside Dallas.

For Monday's full eclipse, the moon will slip right in front of the sun, entirely blocking it. The resulting twilight, with only the sun's outer atmosphere or corona visible, would be long enough for birds and other animals to fall silent, and for planets, stars, and maybe even a comet to pop out.

The out-of-sight darkness lasts up to 4 minutes, 28 seconds. That's almost twice as long as it was during the U.S. coast-to-coast eclipse seven years ago because the moon is closer to the earth. It will be another 21 years before the U.S. sees another total solar eclipse on this scale.

Extending five hours from the first bite out of the sun to the last, Monday's eclipse begins in the Pacific and makes landfall at Mazatlan, Mexico, before moving into Texas, Oklahoma, Arkansas, and 12 other U.S. states in the Midwest, Middle Atlantic, and New England, and then Canada.

It will take just 1 hour, 40 minutes for the moon's shadow to race more than 6,500 km across the continent.

Eye protection is needed with proper eclipse glasses and filters to look at the Sun, except when it ducks completely out of sight during an eclipse.

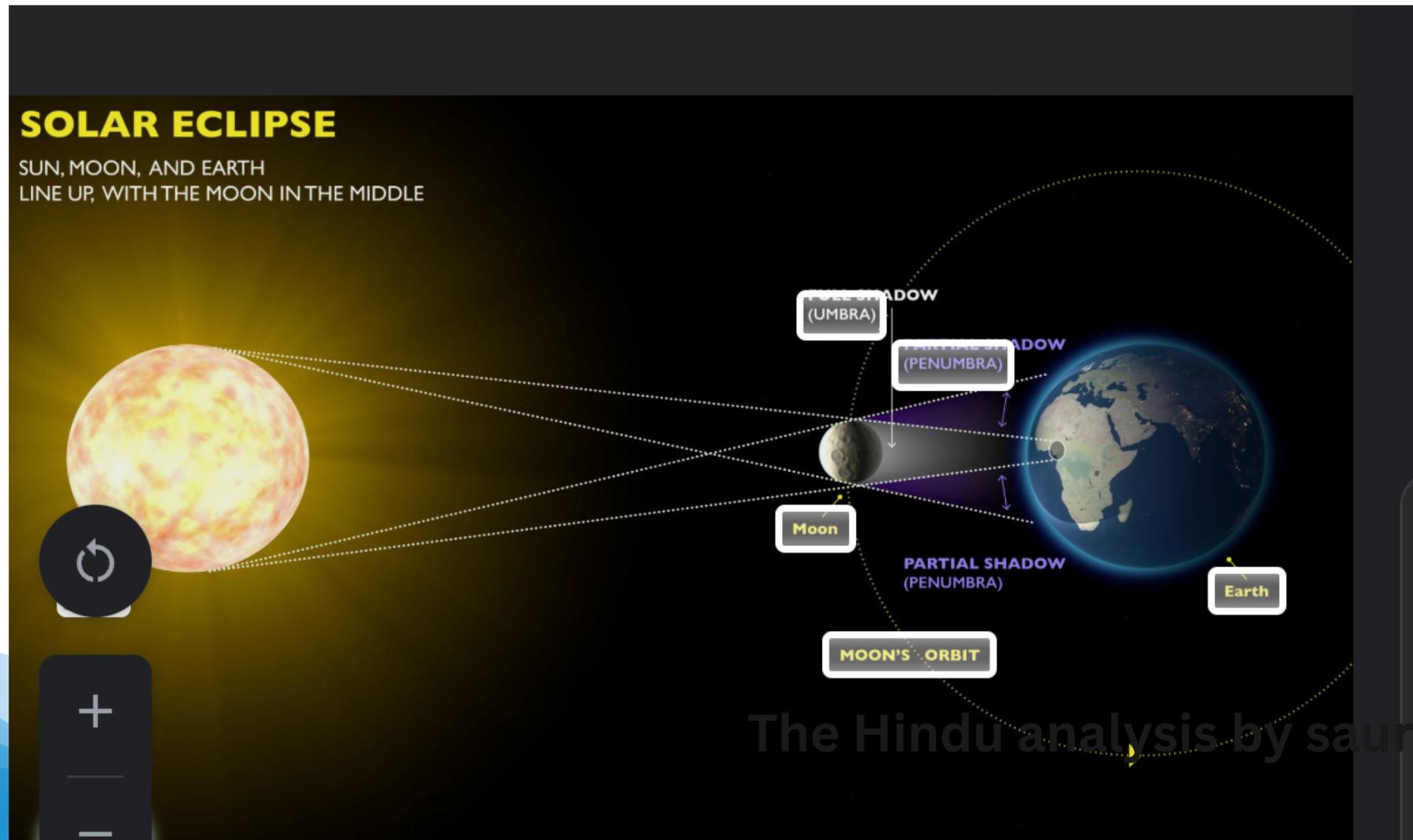
The path of totality – approximately 185 km wide – encompasses several major cities this time, including Dallas, Indianapolis, Cleveland, Buffalo, New York, and Montreal. An estimated 44 million people live within the track, with a couple hundred million more within 300 km.

Experts from NASA and scores of universities are posted along the route, poised to launch research rockets and weather balloons, and conduct experiments. The International Space Station's seven astronauts will also be on the lookout, 435 km up.



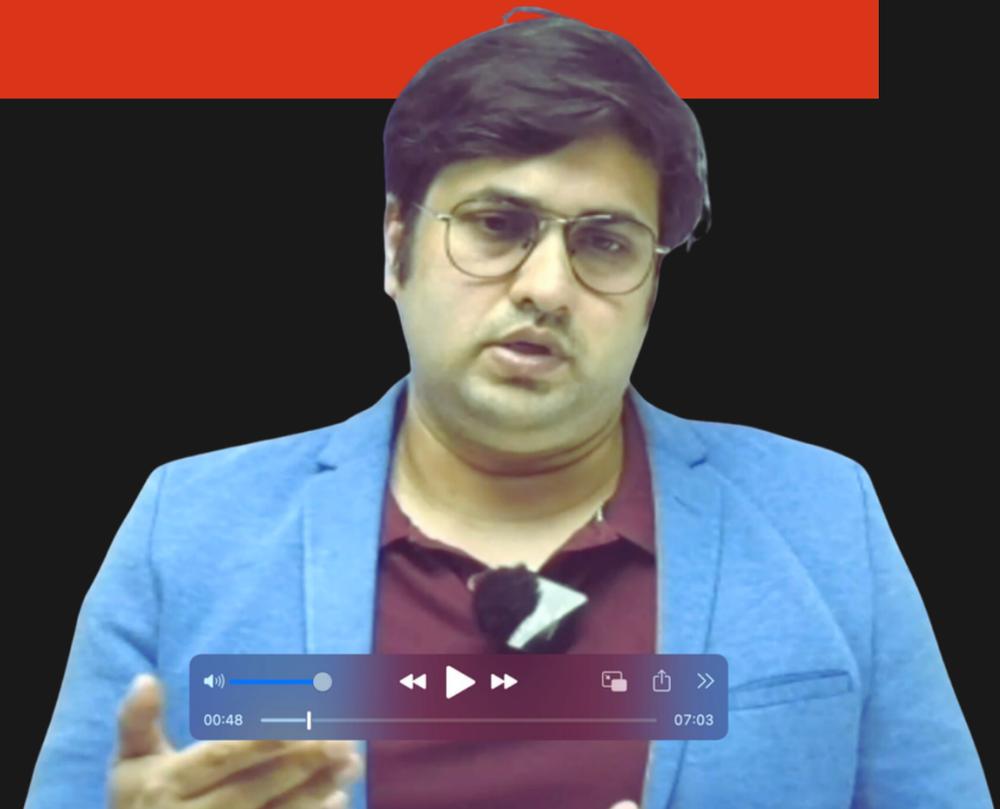
# Total solar eclipse

- A total solar eclipse happens when the Moon passes between the Sun and Earth, completely blocking the face of the Sun.
- The sky will darken as if it were dawn or dusk,



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# Marching ahead with technology absorption

The Indian Army is observing the year 2024 as the 'Year of Technology Absorption'. This theme underscores the Army's steadfast focus on embracing technology to transform itself so as to keep ahead of adversaries in the context of the evolving character of warfare. The means and end in this regard are visualised under the umbrella of Atmanirbharta.

The absorption will be mainly in terms of disruptive technology (DT) comprising artificial intelligence, autonomous weapon systems such as drones, sensors, robotics, space technology, and hypersonic weapon systems. Several nations, led by the United States and China, have remarkable accomplishments in the field of DTs. The strategic competition and engagements in the future are going to be inevitably decided by the edge a nation possesses in absorbing these technologies.

In military parlance, absorption implies the acquisition, adaptation and integration of technologies into existing structures called legacy systems. These cover various nuances that are usually not apparent to the uninitiated. In addition, a few misnomers prevail *vis-à-vis* the absorption of DTs. Certain facets are enumerated below for a nuanced understanding of the issue.

To begin with, time-tested weapon platforms and tactics are here to stay, even with the induction of DTs. It is more about discovering a practical use of the new discoveries rather than about the discovery *per se*. As said, integration as part of absorption wherein the new DTs complement existing platforms is crucial. Discarding the prevailing systems to be substituted by the new will not necessarily be the way ahead.

### Complimenting legacy systems

Although the new technologies could significantly alter the character of future wars we must still refrain from being lulled into complacency because of the mere acquisition of technology.



**Colonel Shashank Ranjan (retired)**

is an Infantry Officer having served in the Indian Army for almost 33 years. He teaches at the O.P. Jindal Global University, Sonapat, Haryana

The Indian military is moving in the right direction, but the challenge lies in sustaining technology absorption with a nuanced understanding of the requirements

The strategies that military organisations use to employ technologies will be critical in understanding their effects on the battlefield.

Analysts who see a military revolution in technology, usually argue that new technologies have made the modern battlefield more lethal. However, it is brought out that 'realised lethality', as opposed to the visualised 'potential lethality' in recent wars such as Russia- Ukraine and Armenia-Azerbaijan (Nagorno-Karabakh), is not very much different from that seen in wars of an earlier era. This corroborates the fact that technological advances will not be the sole determinative in war and are only a part of what shapes outcomes.

Also, as we have seen in the ongoing Russia-Ukraine war, the initial benefits that Ukraine could muster no longer gained traction as the war progressed. One of the reasons behind 'advantage Russia' on the battlefield now is in the Russian army employing traditional methodologies to fight the war. Aspects such as consolidating traditional defence lines and a stronger military industrial base are what matter finally. The Indian military by focusing on DTs and indigenous upgrades in defence manufacture in tandem, is certainly striking the way ahead.

### Adapting to new conditions is crucial

Technical countermeasures in wars quickly limit the performance of new technology-enabled weapons employed by an adversary. The most important adaptations are often not technological but operational and tactical, i.e., how a military fights at various levels. They involve changes in the way armies use the tools at their disposal. Over a century ago, armies developed tactics that reduced their exposure to enemy fire by exploiting dispersion, cover and concealment. Such practices hold even more importance in the current era.

In present battle conditions, weapon platforms such as tanks must adapt to become more

survivable. This will require a change in tactics and a greater integration of different types of capabilities. With a plethora of sensors on the battlefield, it has become almost impossible to hide. Tanks, for example, will have to operate widely dispersed, accompanied by electronic warfare units to detect and jam aerial platforms of the enemy. Similarly, the infantry on the battlefield, while operating dispersed will need an excellent standard of junior leadership to lead men in compartmentalised and high-tech battles.

### Planning ahead

Rather than discarding conventional platforms in favour of purely digital solutions, the technology and its attributes need to be at the centre of planning for future plans. This will be a process that starts with the acknowledgement of vulnerabilities and sensitivities and the gap between them.

An understanding of the latest technologies, their potential, and the context in which they can be utilised are essential. The absorption will have to visibly manifest itself at the unit levels, as against being controlled only at the higher levels. This democratisation in employing technology at cutting-edge levels is an imperative to usher in true transformation.

Technology absorption will also necessarily include several macro level aspects such as organisational restructuring, the management of human resources and cultivating specialists not merely at the higher levels but also decentralised at execution levels, civil military fusion, having a structure and policies to ensure data integrity, and having a procurement policy that is applicable to DTs.

The Indian military is moving in the desired direction but the challenge will be to sustain this with a nuanced understanding of the requirements as applicable. In this context, there are many lessons from recent and ongoing wars, and should not be lost sight of.



# Disruptive Technology in Defence



- **Imagine a weapon that can take down a country's entire communication satellite system, completely cutting them off the global grid, or picture hackers manipulating an enemy's radar defences from miles away, paving the way for a smooth, unobstructed air strike.**
- **Unfortunately, it's not just a fragment of imagination anymore; it has become an increasingly alarming reality:**  
**Emerging and Disruptive Technologies**



- The term 'Disruptive Technology' was coined in 1997 by Harvard Business School's professor Clayton M. Christensen in his book "The Innovator's Dilemma" to refer to completely new or enhanced technologies that bring about a radical, not incremental, shift, have the potential to change how the world operates, and disrupt the pre-existing notions of affairs.

# ARTIFICIAL INTELLIGENCE

- By enhancing the capabilities of militaries in areas of autonomous systems, decision-making, data analysis, surveillance, mitigating risks, and reducing the scope for human error, AI is rapidly transforming the defence sector.





## **Lethal Autonomous Weapon Systems (LAWS),**

- aka “Killer Robots,” which will employ sensor data to select and engage targets without human instructions, are currently being developed.
- Unmanned vehicles have already started impacting warfighting in the past decade. Unmanned Aerial Vehicles, Unmanned Surface Vehicles, Unmanned Underwater Vehicles, and Unmanned Ground Vehicles have revolutionised surveillance and reconnaissance.
-



## QUANTUM TECHNOLOGY

- Quantum cryptography can encode data in a way that is almost impossible to intercept, quantum communication can create secure lines of communication that will be unhackable, and quantum sensors can detect very weak signals and miniscule changes in magnetic and electric fields, making them very useful for monitoring radio conversations and detecting submarines and mines.

## DIRECTED ENERGY WEAPONS

- DEWs operate by using highly concentrated and coherent beams of light to neutralise their targets.

# Different approaches to AI regulation

Amid the global movement towards regulating AI systems, India's response would be crucial, with the nation currently catering to one of the largest consumer bases and labour forces for technology companies. India's path must align with its SDGs while also ensuring that economic growth is maintained

## LETTER & SPIRIT

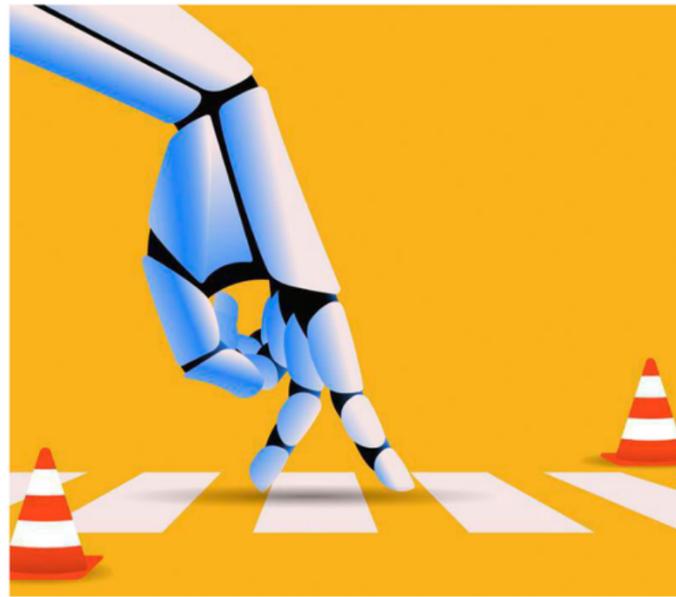
G. S. Bajpai

The Artificial Intelligence (AI) space has seen certain developments crucial to its regulation in recent years – the United Nations's Resolution on Artificial Intelligence, the AI Act by the European Parliament, laws introduced on AI in the U.K. and China and the launch of the AI mission in India. These efforts to formalise AI regulations at the global level will be critical to various sectors of governance in all other countries.

With the passing of the United Nations Resolution on Artificial Intelligence, the need and associated discourse on the regulation of AI has entered a new phase. A global acknowledgement of the risks associated with AI systems and the urgent need to promote responsible use was at the centre of the adopted resolution. It was recognised that unethical and improper use of AI systems would impede the achievement of the 2030 Sustainable Development Goals (SDGs), weakening the ongoing efforts across all three dimensions – social, environmental, and economic. Another controversial aspect mentioned in the UN resolution has been the plausible adverse impact of AI on the workforce. It would be imperative, especially for developing and least developed countries, to devise a response as the labour market in such countries is increasingly vulnerable to the use of such systems. In addition to its workforce, the impact on small and medium entrepreneurs also needs to be ascertained. Thus, being the first of its kind, the Resolution has shed light on the future implications of AI systems and the urgent need to adopt collaborative action.

### The EU's approach

The EU recently passed the AI Act, the foremost law establishing rules and regulations governing AI systems. With its risk-based approach, the Act categorises



GETTY IMAGES

systems into four categories, namely unacceptable, high, limited, and minimal risks, prescribing guidelines for each. The Act prescribes an absolute ban on applications that risk citizens' rights, including manipulation of human behaviour, emotion recognition, mass surveillance etc. While the Act allows exemptions to banned applications when it is pertinent to law enforcement, it limits the deployment by asking for prior judicial/administrative authorisation in such cases.

The landmark legislation highlights two important considerations – acknowledging the compliance burden placed on business enterprises, and start-ups, and regulating the much-deliberated Generative AI systems such as ChatGPT. These two factors warrant the immediate attention of

policymakers, given their disruptive potential and the challenges of keeping pace with such evolving systems.

### China's stand on AI

Identifying risks is evident in the approach adopted by China, which focuses on prompting AI tools and innovation with safeguards against any future harm to the nation's social and economic goals.

The country released, in phases, a regulatory framework addressing the following three issues – content moderation, which includes identification of content generated through any AI system; personal data protection, with a specific focus on the need to procure users' consent before accessing and processing their data; and algorithmic governance, with a focus on security and

ethics while developing and running algorithms over any gathered dataset.

### The U.K.'s framework

The U.K., on the other hand, has adopted a principled and context-based approach in its ongoing efforts to regulate AI systems. The approach requires mandatory consultations with regulatory bodies, expanding its technical know-how and expertise in better regulating complex technologies while bridging regulatory gaps, if any. The U.K. has thus, resorted to a decentralised and more soft law approach rather than opting to regulate AI systems through stringent legal rules. This is in striking contrast to the EU approach.

### India's position

Amid the global movement towards regulating AI systems, India's response would be crucial, with the nation currently catering to one of the largest consumer bases and labour forces for technology companies. India will be home to over 10,000 deep tech start-ups by 2030. In this direction, a ₹10,300 crore allocation was approved for the India AI mission to further its AI ecosystem through enhanced public-private partnerships and promote the start-up ecosystem. Amongst other initiatives, the allocation would be used to deploy 10,000 Graphic Processing Units, Large Multi-Models (LMMs) and other AI-based research collaboration and efficient and innovative projects.

With its economy expanding, India's response must align with its commitment towards the SDGs while also ensuring that economic growth is maintained. This would require the judicious use of AI systems to offer solutions that could further the innovation while mitigating its risks. A gradual phase-led approach appears more suitable for India's efforts towards a fair and inclusive AI system.

*The author is the Vice Chancellor, National Law University Delhi. Inputs from Priyanshi, Academic Fellow, NLU Delhi. Views are personal.*

## THE GIST

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# AI REGULATION

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**Paw patrol:** Roger the dog helps a rescuer search for victims of the Taiwan earthquake on Saturday. AFP

## Dogs searching for quake victims win hearts in Taiwan

**Agence France-Presse**  
HUALIEN

A former drug-sniffing dog who lost his job for being too friendly has emerged as the unlikely hero of the Taiwan rescue teams searching for survivors of the island's strongest earthquake in 25 years. At least 13 persons were killed and more than 1,140 injured by the magnitude-7.4 earthquake that struck the island on Wednesday.

Landslips around the epicentre Hualien still blocked tunnels and roads, making the mountainous terrain around the county difficult for rescuers to access survivors and victims. Footage released by the county fire department on Saturday showed Roger, an eight-year-old labrador, mounting a boulder that had fallen across a hiking trail near Hualien's Taroko National Park.

Another search dog, three-year-old Wilson, a Jack Russell terrier, is getting accolades as well after footage emerged in Taiwanese media of his persistent scramble through immovable boulders.

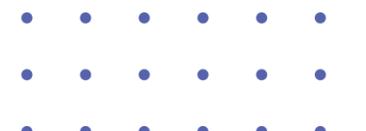
The Mayor of southern Kaohsiung said the labrador specialises in "rubble pile search and rescue" and that he is trained to search for survivors.

Handler Lee Hsin-hung said Roger located a victim "just five minutes after setting off", and praised the dog's confidence in an unfamiliar terrain.

Originally trained as a drug-sniffing dog as a pup, Roger was given his walking papers from that role because he was too friendly, which led to his switch to search-and-rescue missions.

"He's very agile," dog handler Lee Hsin-hung told presspersons.

The soon-to-retire dog has won hearts in Taiwan for his boisterous nature.



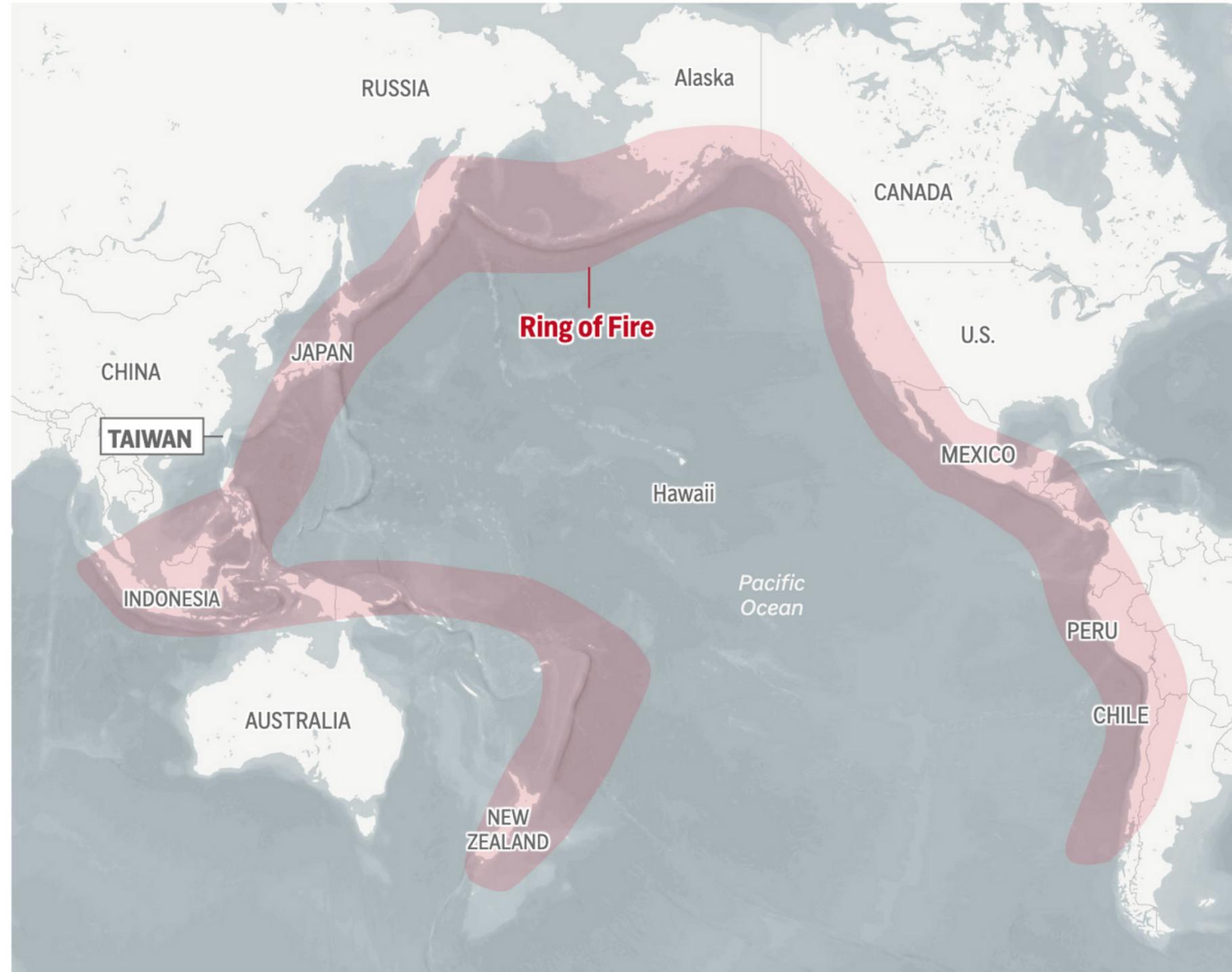


# Why Earthquake in Taiwan?

- . Taiwan lies along the Pacific “Ring of Fire,” the line of seismic faults encircling the Pacific Ocean where most of the world’s earthquakes occur.
- The area is particularly vulnerable to temblors due to the tension accumulated from the interactions of two tectonic plates, the Philippine Sea Plate and the Eurasian Plate, which may lead to sudden releases in the form of earthquakes.
- .

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- **Health risks are increased by overcrowding, poor sanitation, and restricted access to clean water.**
- **Non-communicable diseases (NCDs) account for more than 60% of all fatalities in India.**
- **WHO data indicating only 0.8 doctors per 1,000 people, which is below the advised ratio.**
- **Even though over 75% of health-care professionals work in metropolitan regions, which only account for 27% of the population, the shortage is particularly severe in rural areas.**

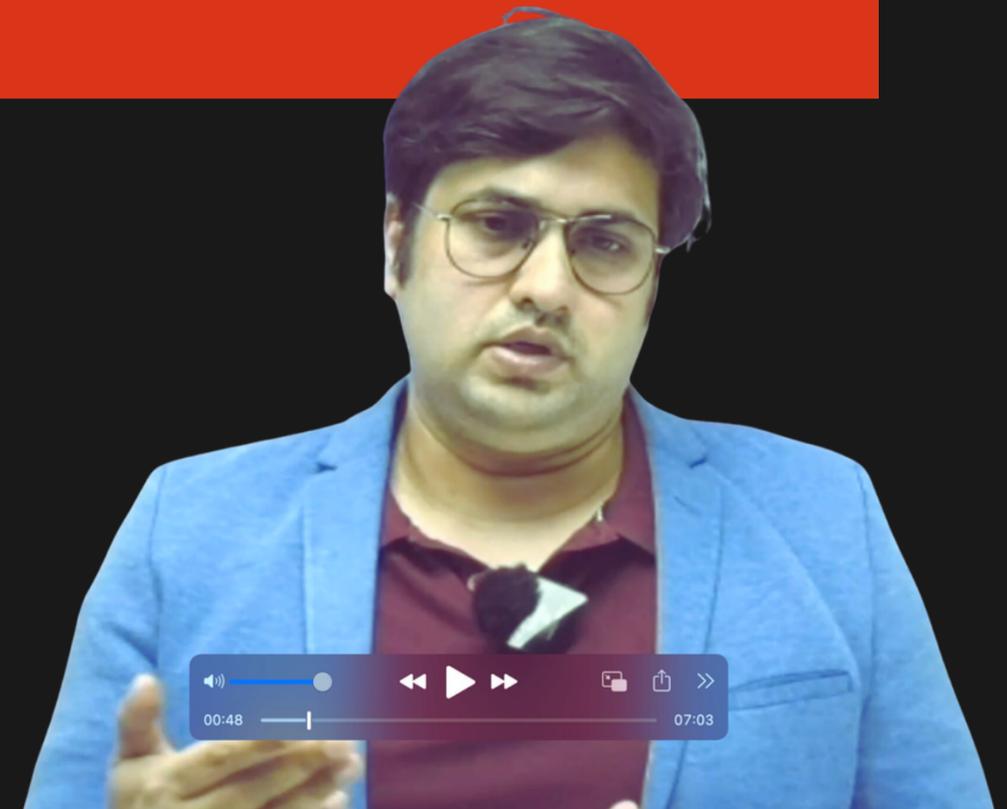


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# Target Mains 2024/25



Q" Explain the factor responsible for earthquake in Taiwan.

Q" ताइवान में भूकंप के लिए उत्तरदायी कारक बताइये।

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