



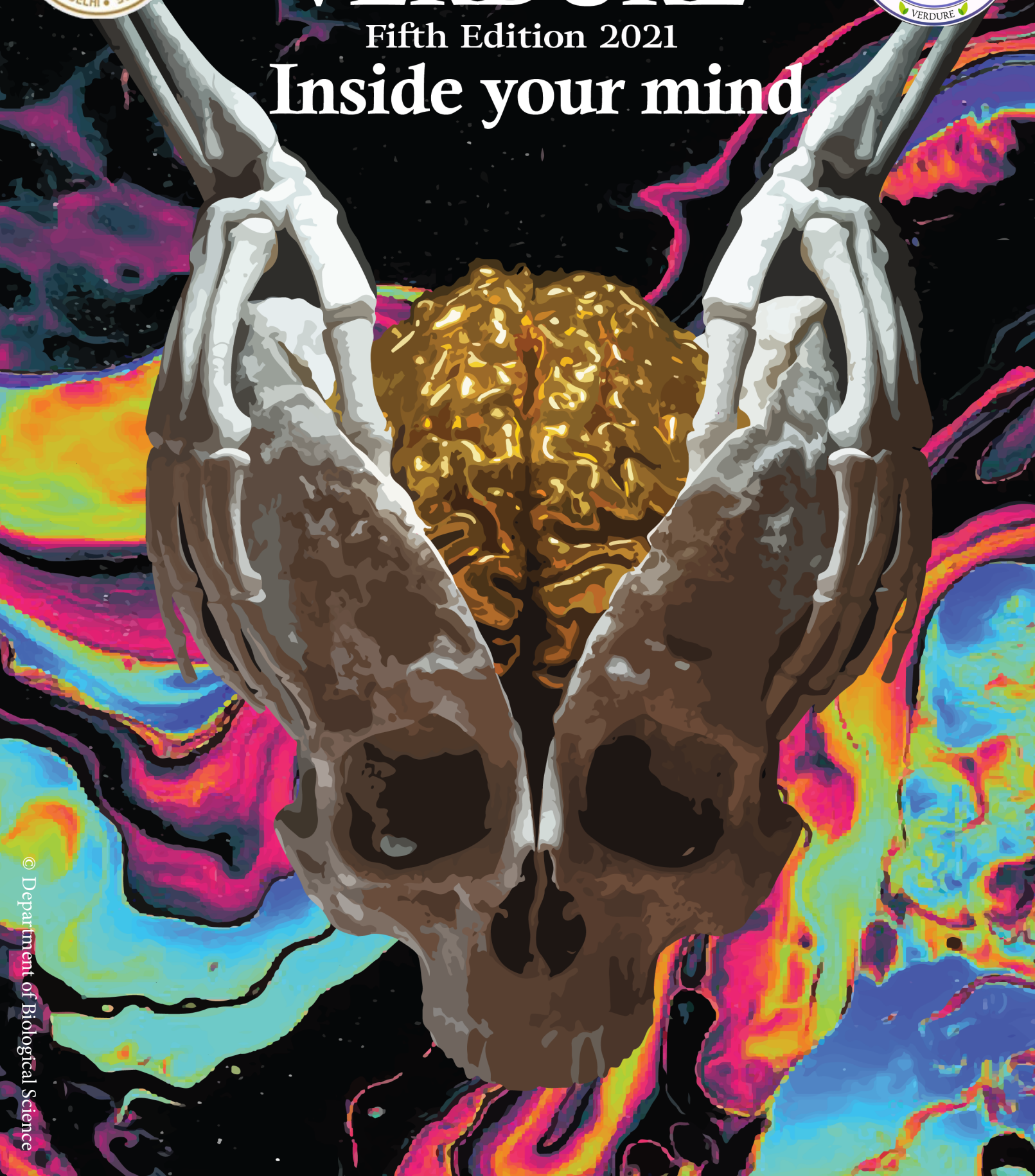
Department of Biological Science
Sri Venkateswara College



VERDURE

Fifth Edition 2021

Inside your mind



ABOUT THE DEPARTMENT

A brainchild of Prof. Kambadur Muralidhar, the undergraduate course in Biological science has come a long way since its commencement in 2005. Sri Venkateswara College, University of Delhi is the only institution offering this multidisciplinary course at an undergraduate level which gives it a unique identity. The course structure provides an interdisciplinary approach to topics being an amalgamation of all basic science streams. In its short history, the course has seen much development with its alumni delving into diverse areas of scientific research around the world.

The establishment of the Biological Science society, Chrysalis, in 2017, and its subsequent progress was made possible due to the support of our former Principals Dr. A.S. Reddy and Dr. P. Hemalatha Reddy, and the hard work and perseverance of our teachers and students. Verdure, the annual magazine of the department, is a platform to exhibit the academic depth and creative talent of our students. Being in its 5th edition, the magazine showcases as to what the course culminates in our students and a testament to the diligence of the team engaged in the development of the magazine.

Finally, we would like to extend our gratefulness and a deep sense of appreciation to all the patrons of the magazine and our sincere thanks to the faculty members of the department for their participation and dedication in making this year's publication a success.

by Abhimanyu Madhusudanan, Paruldev Huidrom, TBS

ABOUT THE FRONT COVER

Cover design - Aakriti Singh, TBS

The cover reflects the theme of Verdure 2021- "Inside your mind". The skeleton hands are opening a skull to reveal a gold brain, representing the treasure of knowledge still left to be unravelled about the brain and the self. Psychedelic art, a form of art inspired by the visions experienced during a psychedelic trip, fills the background. Psychedelics are becoming an important part of mental health studies, and are actively being researched for applications in treating treatment-resistant depression and PTSD.

by Aparna Pillai, TBS

FROM THE PRINCIPAL'S DESK



Prof. C. Sheela Reddy
Principal

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From the Principal's Desk

'Verdure,' the Annual Magazine of 'Chrysalis,' the society of Biological Science is five years old. The magazine gives an opportunity for creative expression to students. It provides a platform to share and express on topics of importance and explore its different dimensions innovatively.

It gives me immense pleasure to know that the students are bringing out the 5th edition of the magazine. The Biological Science Department truly represents the spirit of amalgamation in Sri Venkateswara College. This interdisciplinary course is structured in a manner that the students get exposure to the various facets of science. The students through this edition seamlessly traverse from the neuroscience dimension of the human mind to the very sensitive and relevant topic of mental health.

I take this opportunity to congratulate the students and faculty involved in bringing it out the magazine. I wish the students good luck in their future endeavors.

C. Sheela Reddy
Principal

From the Co-ordinator

***“Science
may set limits
to knowledge, but
should not set limits
to imagination”***

-Bertrand Russell



Dr. ANITA VERMA

The pursuit of knowledge is noble, it kindles a fire in the minds of the learners. More so, in the field of Biological Sciences which is a balanced amalgamation of knowledge from different backgrounds into one. As a coordinator of the Department of Biological Science, I take immense pleasure in introducing to you the fifth edition of our annual magazine 'Verdure'. This year the theme of the magazine is 'Inside your mind'. The magazine explores the different facets of the human mind, right from cognition to mental health. This year has been an exceptional time, where students have been taught virtually through online platforms. But no situation can stop our dear Biological Science students from achieving their set goals. Despite all odds, the team has come up with a marvel. I congratulate the faculty members and students who have been involved in conceptualization and bringing together of the magazine. The fifth edition of Verdure is the result of your dedication and hard work.

My Best Wishes,
Dr. Anita Verma
Co-ordinator

Department of Biological Science

From the Conveners



Dr. ADITI KOTHARI CHHAJER



Dr. PERUMAL JAYARAJ



Dr. MEETA BHARDWAJ

**“The good life is inspired by love and guided by knowledge.”
- Bertrand Russell**

It gives us immense pleasure and pride to bring forth the fifth edition of our annual magazine 'Verdure'. The word 'Verdure' means 'the fresh green color of lush vegetation', and this year's edition is in the true sense of the word a treat to our senses. When we decided on the theme of the magazine 'Inside your Mind', it was all inside our minds and the challenge was to bring it in physical form, which can communicate with every reader's mind. The Magazine team led by Aparna has done a stupendous job with the theme. While the pandemic made certain tasks more challenging, the team took up the challenge in its own stride crafting out a perfect blend of articles, facts, interviews and artwork that together make this magazine a visual treat and an intellectual delight. We hope the readers immerse themselves in this magazine and enjoy reading the magazine as much as we enjoyed creating it.

Happy reading!!
Dr. Aditi Kothari Chhajer
Dr. Perumal Jayaraj
Dr. Meeta Bhardwaj



From the EDITOR-IN-CHIEF



APARNA PILLAI

Francis Crick once said, "There is no study more vital to man than the study of his own brain. Our entire view of the universe depends on it." Neuroscience is the key to know the self, to understand how we think, how we learn and how we behave. From explaining an everyday occurrence like sleep, to treating dire neurological conditions, and to enhancing human health and performance by investigating the limits of human brain, the possibilities are endless and ever-growing. In addition, it is important to understand the brain so that we can treat the mind. Millions worldwide are suffering from various mental health issues. Depression is known to be the number one cause of disability across the board. Suicide rates are at all-time highs with no positive end in sight. Drug abuse destroys individuals and communities. Stigma surrounding these issues is prevalent, which further forms a bigger barrier for affected individuals seeking help and treatment. Keeping all this and more in mind, we are proud to present the 5th edition of our annual magazine,

Verdure - "Inside your mind". In this edition, we are exploring the secrets of your working mind, the 'how's and 'why's of our brain, in a manner that welcomingly eases you in this exciting world of neurobiology. You will also find many beautifully expressed poems and artworks, aiming to create the much-needed awareness about mental health issues. I express my humble gratitude to our esteemed Principal, Prof. C. Sheela Reddy for her immense support and guidance. I express my gratitude to Dr. Anita Verma, Coordinator, Biological Science and the amazing Verdure teachers' committee, for being our consistent direction and motivation through the entire process of creation and release of this magazine. Even though this was an unstoppable (and frankly, emotional) roller coaster, this was also a huge learning experience. The task of bringing out this edition would not have been possible without the sincere support of my able team (huge thanks to them!), who spent countless hours breathing life into every word, every design and every page. Come, step into your mind.

- Aparna Pillai



From the CREATIVE HEADS



AAKRITI SINGH



ANSHU KUMARI

After months and months of brainstorming and racking up a ton of screen time, the magazine has finally come to life and we couldn't be happier about it. When we first started working on this project, we were skeptical as to how we are going to make the magazine online but thanks to the wonderful teachers, our team and infinite Google meets, here we are. It wouldn't have been possible without them. We have devoted a lot of time to showcase what's the best in us and we feel like this magazine has a part of the very best/creative version of each one of us. And we want to thank our team members for making this magazine a reality and hope that everyone enjoys it.

- Anshu Kumari
Aakriti Singh



SRASHTI SAHAY

FROM THE PRESIDENT

“

Always
remember it's
the effort that
makes a
difference not
strength or
intelligence

”

From the first day in college to becoming the President of our department Biological Science, time flew away in the blink of an eye. To put my feelings into words feels like an ineffable task. It has been a great journey filled with beautiful memories. A special thanks to all the teachers for guiding us through the years.

Taking this opportunity I would like to congratulate team Verdure. Kudos to them for their diligent efforts in bringing out such a marvel even during these tough times. I can't appreciate them enough.

The extraordinary creativity and talent that surrounds me has been a source of motivation.

Enjoy the magazine!

- SRASHTI SAHAY

President
Chrysalis
Department of Biological Sciences

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Meet the team

LOGO OF VERDURE



Logo design- Shrishtika Konwar, SBS

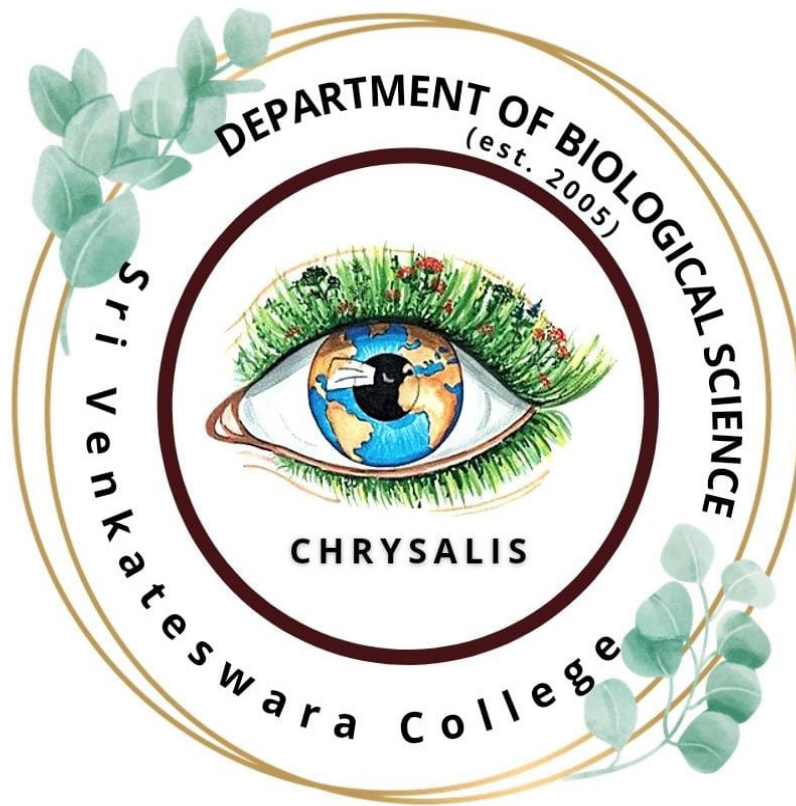
Biological Science- a coalescence of the fields of biology with botany and zoology serving as its quintessential core, a relation that laid the groundwork for our logo which highlights the fields with an avian and botanical touch.

The logo has been carefully yet artistically created to delineate a lotus in order to symbolize what it stands for- knowledge and enlightenment. These are the values that we wish to impart to our readers through Verdure.

Water represents the fluid nature of our course and the adaptability it provides us in this competitive world, just like Charles Darwin once said, "It's not the strongest or smartest that survive, it's the most adaptable."

The primary colour scheme of green and blue provides the vigour and freshness befitting of the title VERDURE. The leaves on both sides of the wording VERDURE, represent the lush green vegetation as is the literal meaning of the term.

LOGO OF CHRYSALIS



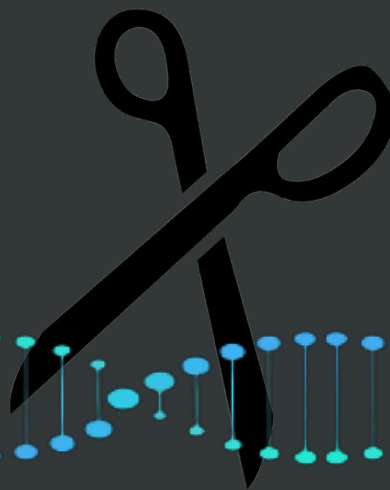
Logo design- Srashti Sahay, TBS

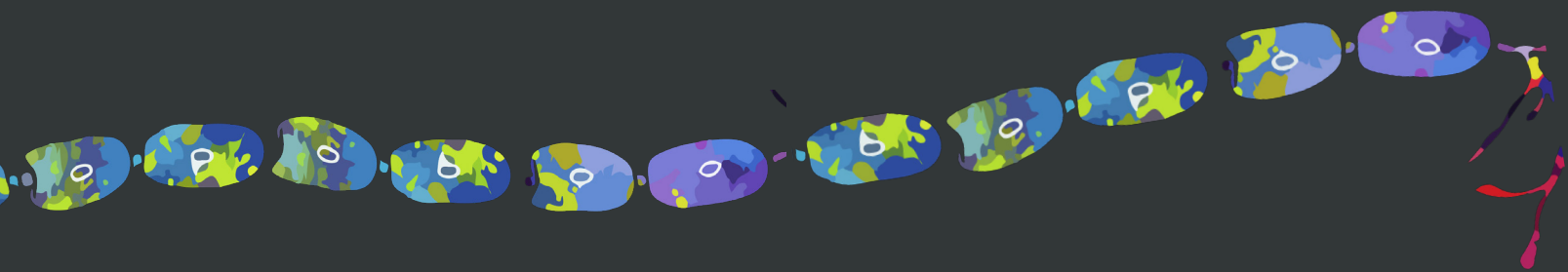
The course of biological science has been carefully crafted to blend all aspects of biology to provide an all-inclusive study of the living world. The society logo has been designed to showcase the same principles. The eye signifies how the course gifts its students a new perspective to view the world, to appreciate beauty and complexity alike. The earth being reflected in the iris is a mirror to the multi-disciplinary nature of the course. The two golden rings surrounding the logo reflect the literal meaning of "Chrysalis" – *a quiescent insect pupa*, particularly of a butterfly, and its hard outer covering. Like a chrysalis, the department has been transforming its students, helping them spread their wings to reach new heights.



Miguel A. L. Nicolelis

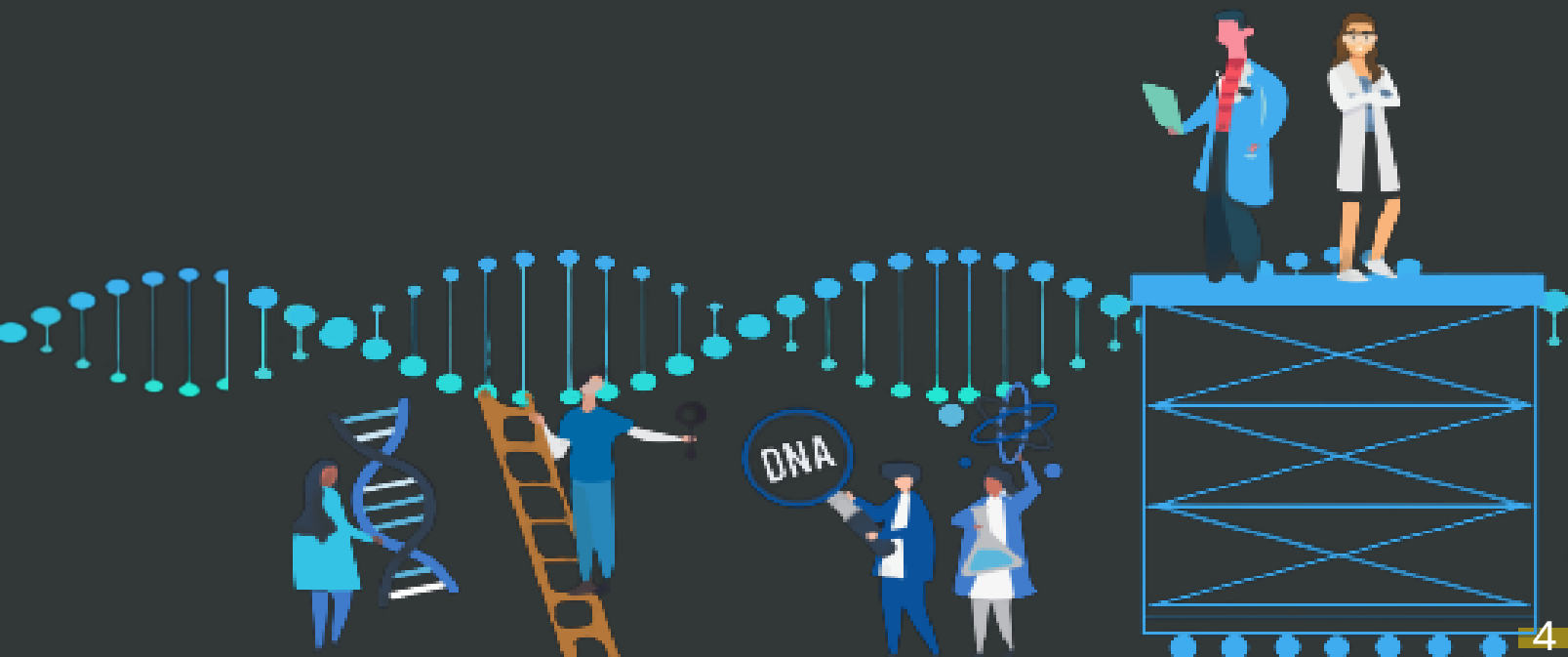
M.D., Ph.D.
Duke School of Medicine
Professor in Neuroscience
Founder of Duke's Center for
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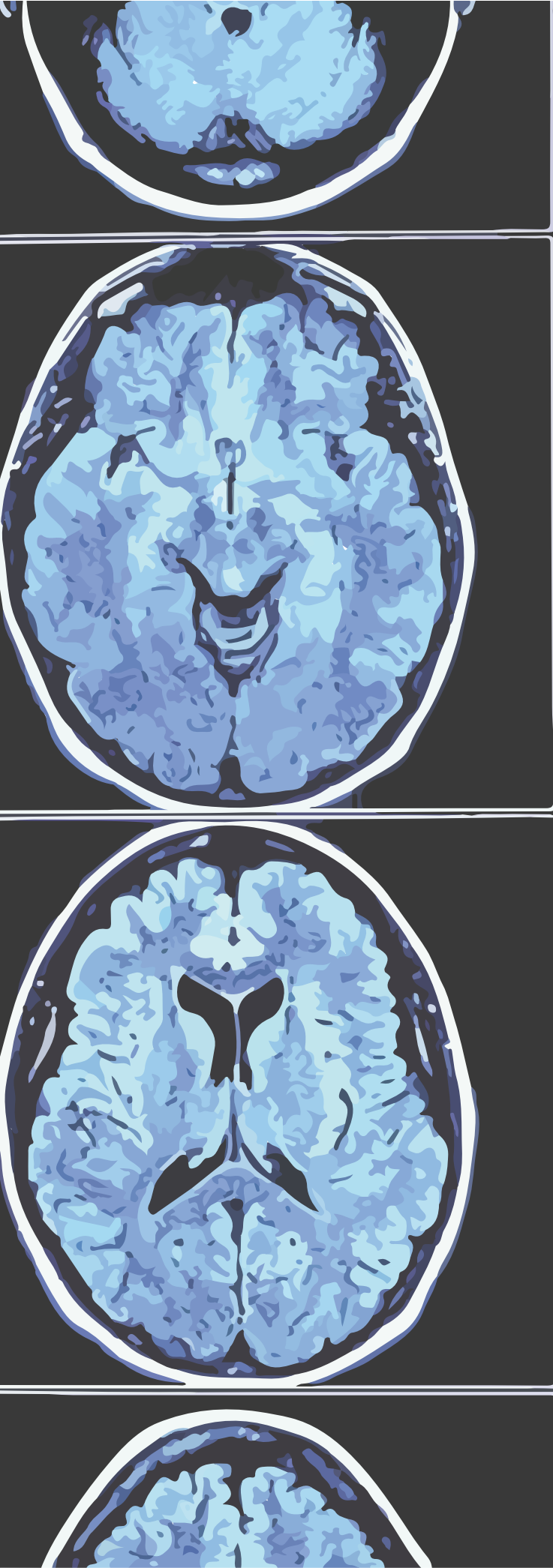
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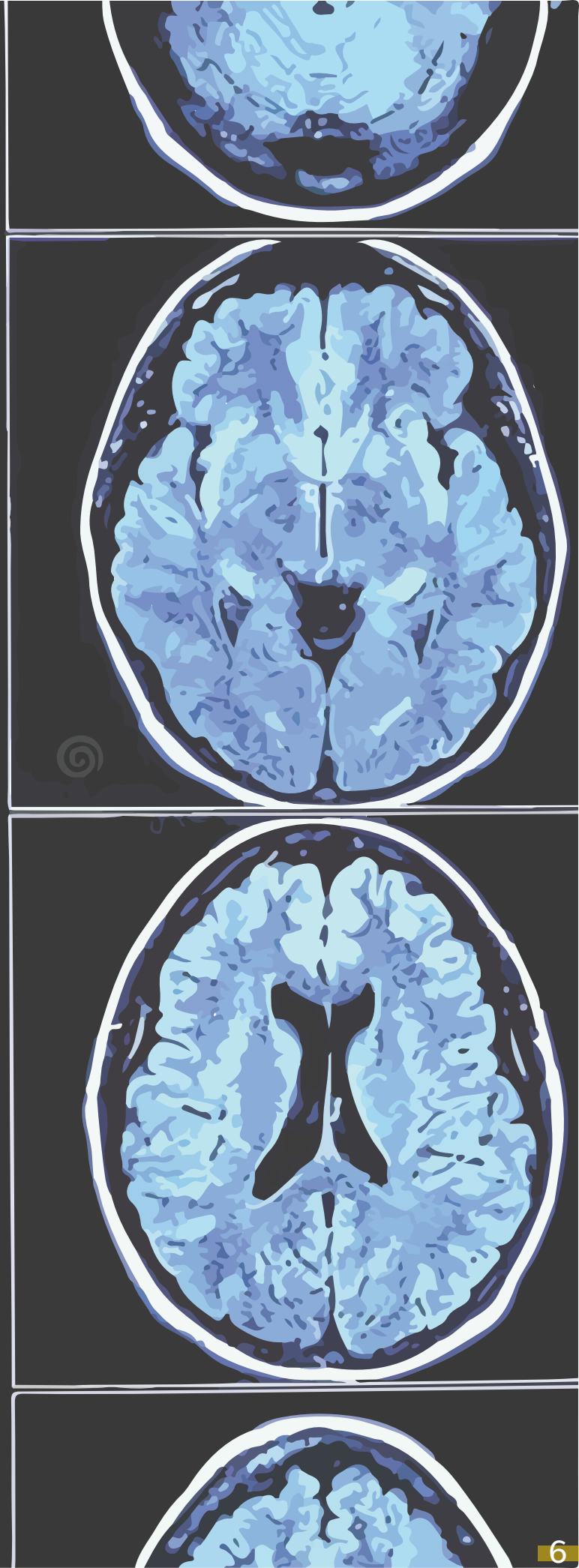


21 NEUROSCIENCE

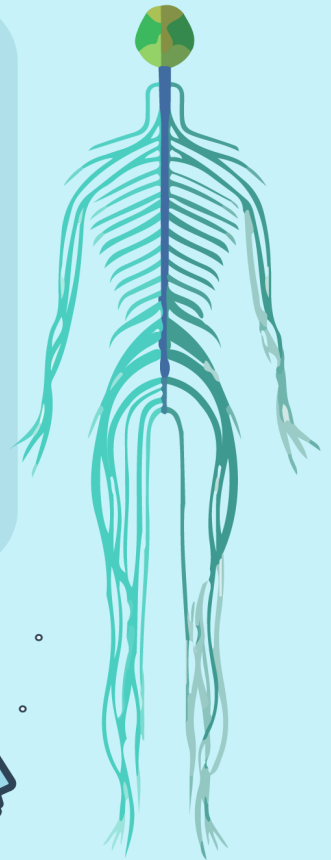
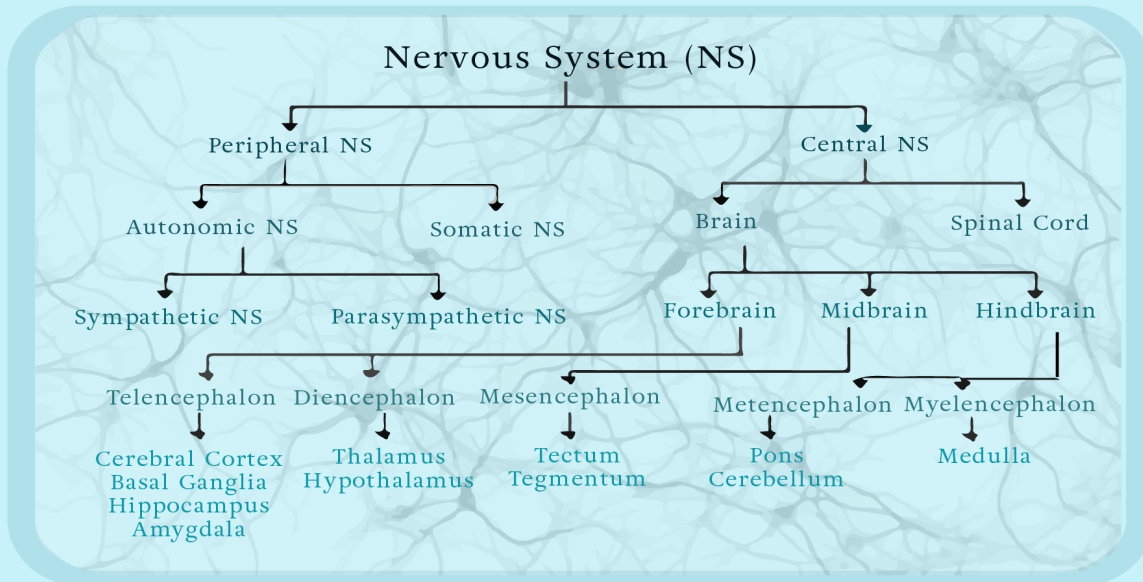
We are our brain. Without it, we are nothing. Our identity, actions, perception and literally everything else that defines us and the world around us, is governed by our brain. Neuroscience is the multidisciplinary field of study which aims to answer the questions about our brain by researching on the nervous system. Over the last 50 years, the field has seen many discoveries which has greatly increased our understanding of brain's function and pathologies. This section throws some light on what neuroscience is all about, exploring it's multidisciplinary nature along with its applications in the modern world.



This MRI scan looks at blood flow in your brain to see which areas become active when you do certain tasks.



GET YOUR BASICS RIGHT



FOREBRAIN

Olfactory lobes, cerebral hemisphere & diencephalon. 3 deep and wide fissures divide each cerebral hemisphere into 4 lobes:

01 Anterior frontal lobe



02 Middle parietal lobe

03 Posterior occipital lobe



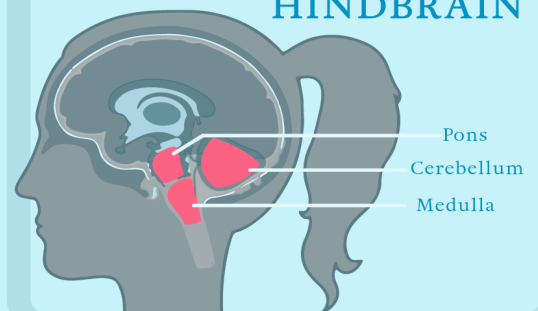
04 Lateral temporal lobe



MIDBRAIN

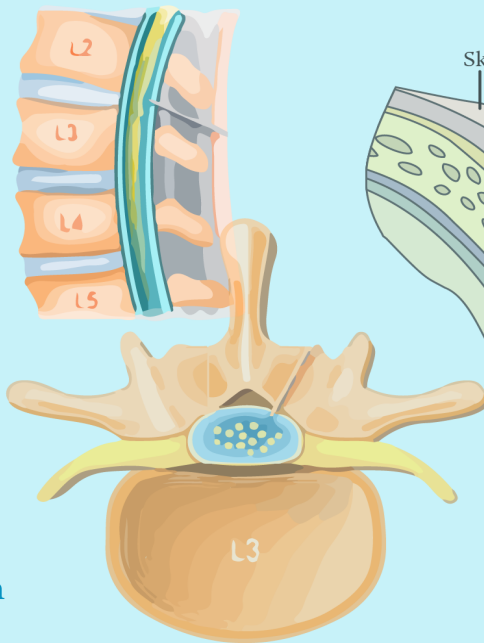


HINDBRAIN

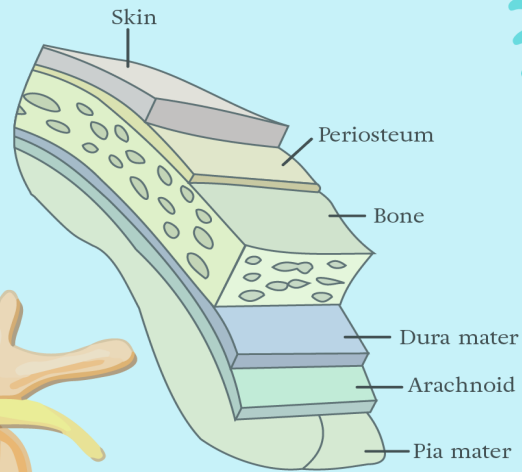


PARTS OF THE NERVOUS SYSTEM

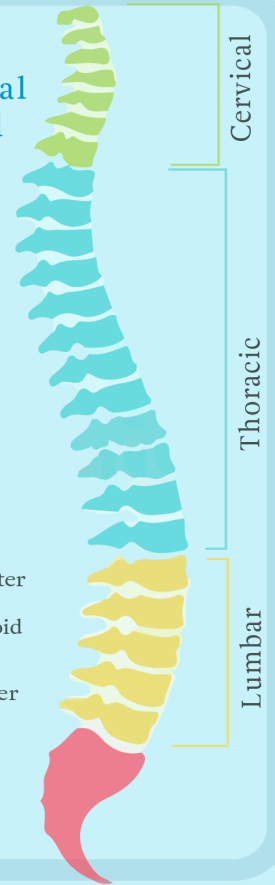
02 Cerebral Fluid



04 Spinal Cord

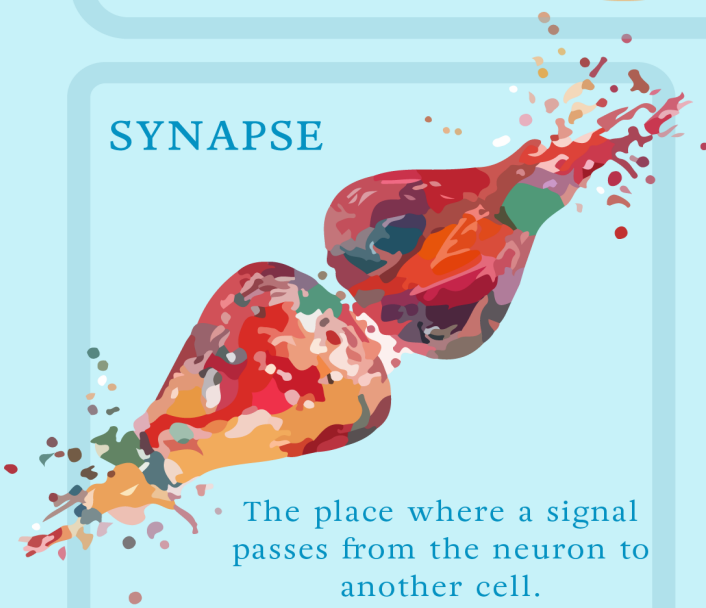


03 Meninges



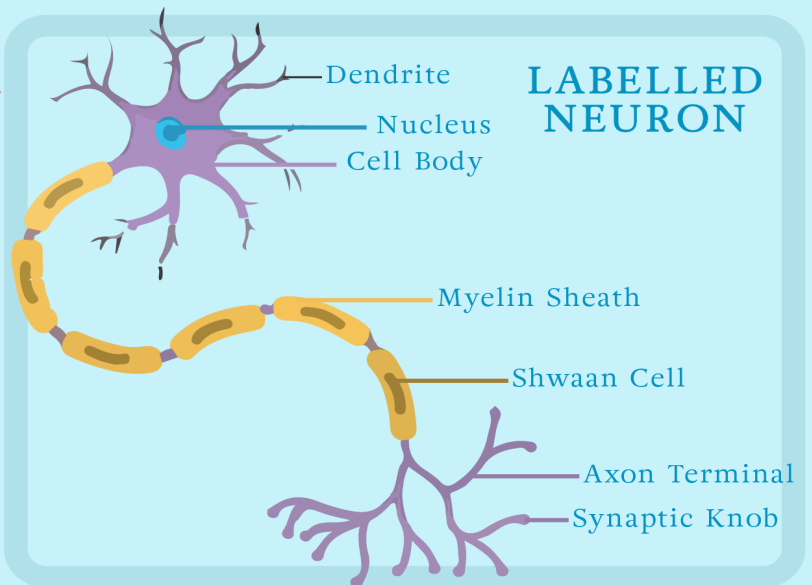
01 Brain Stem

SYNAPSE



The place where a signal passes from the neuron to another cell.

LABELLED NEURON



NEUROTRANSMITTERS

SERATONIN

MOOD
MOOD



DOPAMINE

PLEASURE



GABA

CALMING



ACETYLCHOLINE

LEARNING



GLUTAMINE

MEMORY





DELVE INTO YOUR BRAIN: THE MYSTERIES IN NEUROANATOMY AND NEUROSCIENCE

NANDINI SHARMA (FBS)

“The brain is a tissue. It is a complicated, intricately woven tissue, like nothing else we know of in the universe, but it is composed of cells, as any tissue is. They are, to be sure, highly specialized cells, but they function according to the laws that govern any other cells. Their electrical and chemical signals can be detected, recorded and interpreted and their chemicals can be identified; the connections that constitute the brain's woven feltwork can be mapped. In short, the brain can be studied, just as the kidney can.”

- David H. Hubel

It is quite empowering and humorous at the same time, to realize that our brain, the citadel of consciousness, the ultimate seat for decision making and the colonel of the army that our body is, can only be understood and decoded by the very same organ, i.e., the brain! The very fact that we literally use our brains to study somebody else's 'brain', is proof itself of how important it is, as a part of our anatomy and how crucial it is for us to understand it. That's why researchers have always considered neuroscience as 'The Holy Grail' of biological sciences (no offense to genetics!). Even then the most esteemed researchers in this field have struggled over the years to unravel the nexus of tissues that the brain is. Why do you think that is? Well one might say that it's because there is a shortage of them in today's world (couldn't disagree on that one!), but on a serious note it is because of the complexity of this 1.5 kg lump of tissues sitting in the cranium of the human body. It is this complexity of the brain, call it neocortex or whatever, but this intricacy in its structure and function has caused the evolution of humans to be the most glorious and efficient.

The mysteries involving the brain might seem ever increasing because with every new discovery, there comes the question of its function and its origin, but as disheartening as it seems that is not the case because with every discovery, we learn and update ourselves to combat new problems better. But still, there are some very peculiar mysteries regarding our brain. And we can't solve them unless we understand the dynamics of the brain.

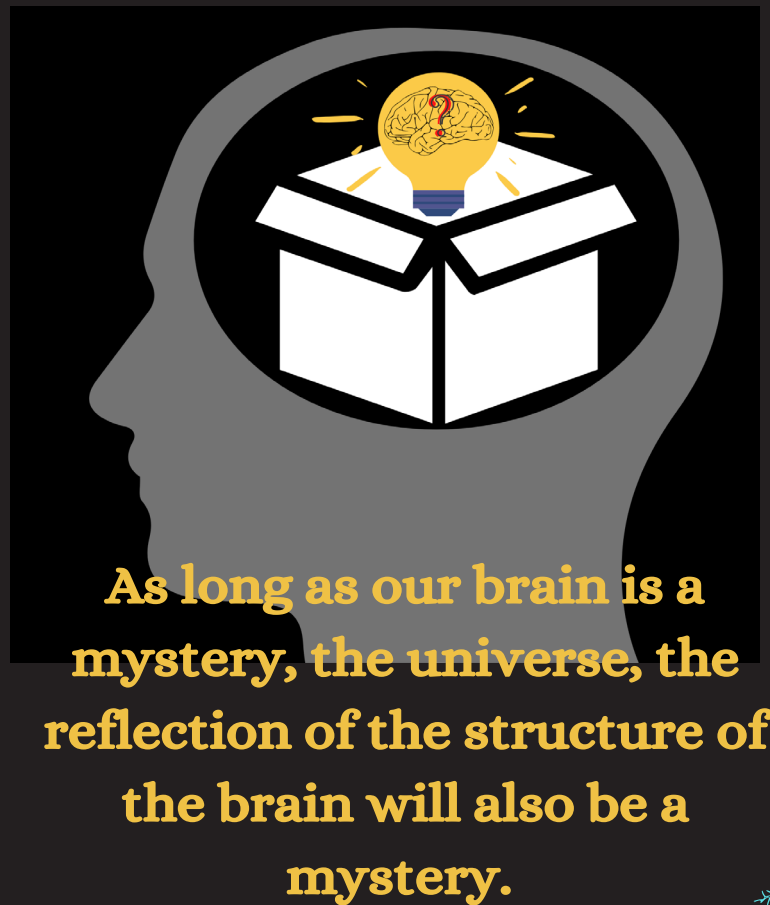
So, here are some major mystical aspects of our brain that we ought to understand-

1) THE ROSEHIP NEURON:- In 2018, a team of scientists declared the existence of a new cell type, called the “rosehip neuron” since the cells are shaped like the fruit of rose bushes. The discovery of these new cells was first noticed a few years before 2018 when two different teams of scientists, one from University of Szeged in Hungary and the other from Allen Institute for Brain Science in Seattle found that they both had identified what looked like a new cell type in the brain, and collaborated to conduct a study on the said neuron. The brains used were donated to science by men in mid-fifties and different techniques were applied to investigate the neurons, where the Hungarian team studied its anatomy and mechanism of electrical impulses and the Seattle team worked on identifying its genetics. Trygve Bakken, a molecular neuroscientist at Allen Institute and the lead author of the paper, disclosed that the neuron appeared to be quite “bushy” as the dendrites are compact, giving it a Rosehip like appearance. The paper concluded that this type of neuron exists only in humans, but not in rodents that are frequently used as model species in neuroscience. Therefore, the existence of the Rosehip neuron may explain why so many treatments for brain disorders seem to work in mouse models, but fail when applied to humans. “Our brains are not just enlarged mouse brains,” Bakken said in the release. “People have commented on this for many years, but this study gets at the issue from several angles.” This statement clearly indicates that humanity is very difficult to capture in an animal model! Present in the neocortex of the human brain, this newest neuron's function is still quite unknown. What the researchers have observed so far is the inhibitory role in impulse transmission but at the same time, its connections with the pyramidal neurons, which by the way are excitatory in nature, muddles up the matter. Scientists seem to believe that rosehip neurons have the potential to manipulate the circuit in a targeted way, but how it influences behavior is still a question they need to answer. The discovery of rosehip neurons has opened numerous pathways for treatment of brain disorders as they seem to be critical in curing such diseases. Let's see where this rosehip takes us!

2) ENDORESTIFORM NUCLEUS:- Again in 2018, a new region in the brain was discovered by Dr. George Paxinos and his team in Australia which was named the Endorestiform Nucleus or the 'Restiform Body'. While studying and mapping the human brain, Dr. Paxinos(1990) first noticed what seemed to be a previously unidentified region, within the inferior cerebellar peduncle, that may have been responsible for the integration of sensory and motor information. But he did not raise his suspicions until almost three decades after doing thorough research and confirming that this nucleus is not found in other primates like the rhesus monkey and could be the reason for us being more developed, apart from larger brain size. So far Dr. Paxinos claims that its function can only be guessed as it sits in the freeway of the brain and spinal cord, a.k.a. Brain stem and anticipates that it is involved in fine motor control of posture, balance, running, walking etc. That's why humans have the dexterity to play instruments and perform intricate surgeries whereas our closest ancestors, chimpanzees cannot. The discovery of the Endorestiform Nucleus – now one of nearly 700 nuclei in the human brain – further demonstrates the dedication and determination of the research community to provide clinicians with new information that could provide groundbreaking achievement in treatment, prevention and cure. Something you first see today may lead to an “aha!” moment in a month, a year...or even thirty years!

3) POSTERIOR CINGULATE CORTEX:- This part of the brain is one of the least understood areas and is also termed as the “Dark Energy” because it is known to consume the maximum amount of calories among all parts of the brain, at least all the parts that we know about. The Posterior cingulate Cortex or PCC for short, is indicated to work very hard, given its calorie consumption but no one really knows what exactly its function is, as it is very difficult to study in a test subject. For example, test subjects (humans) put in a brain scanner were asked to perform some pre-designed tasks to study the brain activity, but it was found that the PCC shuts itself “off” i.e. its neurons stop firing while the subject performs the task. And most amazingly between the lag of two tasks, it again switches “on”! It should also be noted that this part of the brain rarely gets affected by diseases and disorders so its effect after being compromised is also not known. However, some scientists associate it with emotional and behavioral control, attention, planning and retrospection while the others say that it might be linked with daydreaming/ mind wandering. Some schizophrenic patients have shown abnormal PCCs but all these are just theories and no one exactly knows what this elusive cortex of brain is actually responsible for!

Now, this list of what we “don't know” about our brain can be extended to a long length, but what we “do know” is that we once were no better than apes, and that too for a considerable amount of time. It was only in the last 100,000 years that we made the jump from being the lowest in the food chain to being the highest in the entire ecosystem, just by using our “brains”. Although many people have concluded that our brains are the root cause of all evil as this is where all the ideas of mass destruction, genocide, oppression etc. originate. But I find this to be a much narrowed perspective of observing an amazingly large canvas that our brains have painted so far. Yes, ideas do generate in the brain but it cannot make us do things against our will. The idea to blame an organ for bad decisions and evil personalities is downright unacceptable and takes away the credit that our brains deserve. That is why, I find neuroscience and neuroanatomy to be an ode to this supreme organ of our body, a form of respect and validation that we give, by decoding it and understanding its workings and processes. Our brain holds all the keys to unlocking the mysterious aspects about our existence, because after all, as David H. Hubel said, it is just a lump of tissue that can be studied and analyzed, the same way other organs are done and it is our responsibility to do so. Everyday new discoveries about our brain come into highlight, be it the static dark noise that goes in our brains or how our brains can learn to double their function if one half is missing! Thus the quest for the final answer is never-ending, and we all are a part of it. What we need to do is realize how we can contribute towards it.



Mindfulness

~ a supra-cognitive state of consciousness ~

By Shubhangi Antil, SBS

The concept of mindfulness always seemed foreign to me. I connected mindfulness to the divine treasure of eternal peace and harmony, restricted only to the yogis practicing "till-the-end-of-time" meditation on the summits of the Great Himalayas. But not until recently, I understood the true essence behind the words; enlightenment, meditation and mindfulness. A few weeks back I was caught up, yet again, into the chaos of anxiety. I lost control over my mind, which went haywire and kept on creating negative illusions of my past and future; my sense of the present moment was completely lost. I desperately wanted to find inner peace and harmony. In that sense of desperation, I decided to finally venture into the realms of mindfulness. I picked up "The Power of Now: A guide to spiritual enlightenment", by Eckhart Tolle and began reading it to uncover the "magic mantra" which would unleash me from the shackles of my anxiety. But to my utter astonishment, there was no such magic mantra! Instead, the author explained that the key to free ourselves from the chains of our "unconscious mind", which was apparently creating the merciless-scary illusions about my identity, was deep within ourselves! Wait, what? Within ourselves? What does that mean?

Let's find out.

According to a recent research conducted to evaluate the effects of guided mindfulness meditation on anxiety and stress in a pre-healthcare college student population - "Five to twelve minutes of daily mindfulness meditation is associated with decreased stress and anxiety, and increased mindfulness with greater changes observed following more minutes of meditation."

So what is mindfulness meditation?

In ancient Hinduism, dhyāna was the practice of stilling the chatter of the mind and focusing the energy into the present moment. In ancient Buddhism, Sati meant "moment to moment awareness of present events". In the 20th century, it's called mindfulness.

Jon Kabat-Zinn, a cognitive scientist and a former PhD scholar in molecular biology at MIT founded the Mindfulness-Based Stress Reduction (MBSR) Clinic at the University of Massachusetts Medical Center. He reframed the ancient Buddhist teachings on the practice of mindfulness by removing any references to Buddhism and instead framing the teachings scientifically. When asked to define Mindfulness in an interview, Kabat-Zinn defined the term in the most practical way possible.



© Sanidhya Jagdish, SBS

He said - the state of mindfulness is achieved when a person purposely pays attention to the present moment, without any judgements; to understand oneself and gain wisdom.

Mindfulness emphasises on feeling and observing your innermost thoughts and emotions through regulated breathing in a blissful environment. The negative thoughts and emotions, which are left buried inside the unconscious mind are a major culprit to the depression epidemic.

When you consciously explore your deepest emotions and thoughts and spend quality time to learn about yourself, you consciously confront your fears and desires.

The negative emotions due to the illusions of past and future the mind projects unconsciously, then becomes conscious as well. The moment you're acknowledging them consciously, you don't suffer. How will that be?

Well, will anyone like to make themselves suffer with pain if they are consciously aware of it? When you are consciously aware of the underlying emotional pain the past-future illusions are causing you, you are in the present moment. By being present, the path to eradicating the emotional pain and acquiring inner peace is possible, but only through your individual efforts. So regular self reflection of your thoughts and emotions, be it positive or negative; but most importantly negative ones which are most often left neglected and accumulate to cause emotional distress or anxiety, is essential to acquire inner peace.

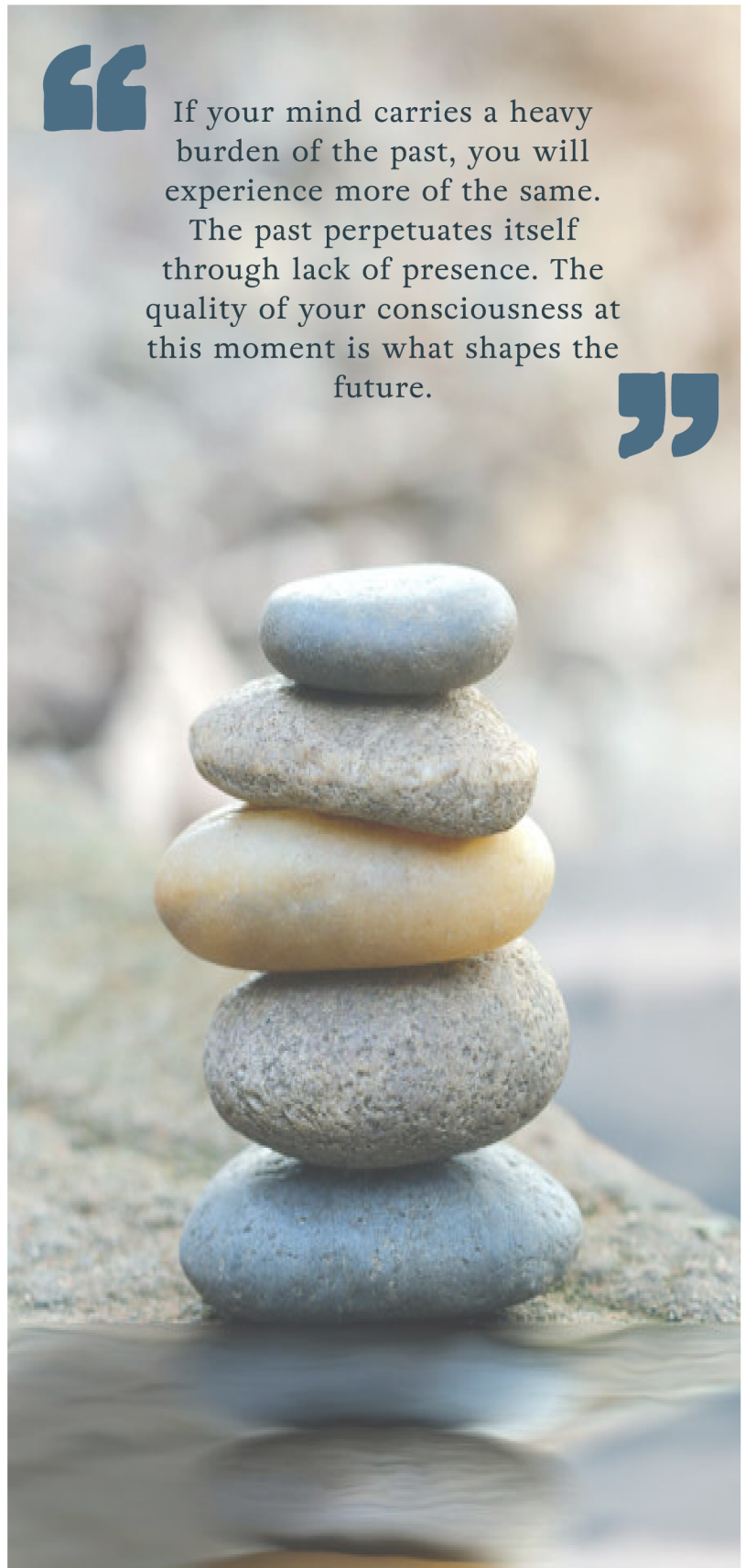
Here's one of the lines from the book, *The Power of Now*, which I find most enlightening.

“

If your mind carries a heavy burden of the past, you will experience more of the same.

The past perpetuates itself through lack of presence. The quality of your consciousness at this moment is what shapes the future.

”



The Reality of Virtual Reality

© Getty Images

.....
by Sanidhya Jagdish, SBS

Technological advancements in the 21st century and their applications in medical sciences have brought about a lot of changes in the way patients are treated for their respective health issues. Among such technologies, virtual reality is reaching new limits in recent years. Quite popular in the entertainment and gaming industry, virtual reality is now finding its applications in medical sciences as well.

VR is a computerized programme, creating simulations of three dimensional environments in which interaction is possible. The relationship between medical science and virtual reality is an

upcoming concept and has grabbed quite a lot of deserving attention. It has allowed clinical researchers and medical practitioners to bring one's imagination to reality. Such technologies provide a large scope for researchers to inculcate them into clinical therapies for various disorders. With advancements in scientific technology, the treatment methodology in medical science should advance as well.

Dr. Mayank Mehta, a neuroscientist at the University of California, had recently conducted a study in 2019 on “the effects of VR technology on the brain of rats”, which suggested that 60% of neurons in the hippocampus would shut down due to the effect of VR simulation. Similarity in

human brains as well. Hippocampus, a complex structure of the brain, is primarily responsible for learning and memory. This study suggests that memory can be tampered with, with the help of VR technology. It shows how VR technology can be useful for medical sciences; especially for rehabilitation medicine such as strokes, Parkinson's disease, and Alzheimer's disease; for behavioral medicine to treat phobias, post-traumatic stress disorder, and autism.

Looking through the medical lens, VR has also made its reach into the detection of early stages of Alzheimer's disease. Alzheimer's disease has now become a more common term and is mostly associated with dementia, which is a major cause of Alzheimer's. It is usually associated with old age and develops very suddenly over time. Although there is no cure developed yet to treat Alzheimer's, there are many therapies and medications which help to suppress symptoms. Virtual Reality has also been proved to be useful in checking for potential future threats of Alzheimers in the younger population.

In 2015, German Alzheimer's care scientists designed a study where they set up a maze with the help of virtual reality and people aged between 18 - 30 were asked to navigate their way through the virtual maze. With this experiment, scientists were able to study the participants' brain cells while they were taking decisions to move through the maze. By observing their MRI scans, the scientists were able to determine which of the participants were at a higher risk of developing Alzheimer's, later on in their life. This is a crucial development in the applications of medical technology as an early detection of potentiality to develop Alzheimer's could be of immense help in finding an appropriate cure or providing accurate medication. This could progress to find a more effective treatment.

Talking about brain related disorders, depression is "trending" in recent times. Depression is a psychological phenomenon where a patient's morale comes down and they start to feel helpless. Along with that, patients have also been seen to develop disturbed sleep cycles, irregular appetite, sudden changes in weight, lack of energy, feelings of worthlessness, and recurrent thoughts of death or suicide. Depression is also thought of as a state of being when the person is fully surrounded by negativity. Such a disturbed mindset needs to

be treated with the help of medication, such as tranquilizers, which is the current methodology of treatment. VR technology can be used to provide an artificial environment promoting a sense of joy and happiness and accelerating recovery.

Michelle Craske, a psychiatrist at the University of California, has discussed how virtual reality can help to reduce the symptoms of depression and how it has the ability to make patients feel a sense of happiness and positivity again. VR calms the brain cells, soothing the mind for some time, which has been found useful in helping patients recover from depression or even anxiety. Furthermore, from a study on VR exercise effect on treatment of depression, it was found that around 80% of the participants felt a sense of positivity after the VR exercise. The results of this experiment itself shows how effective this therapy is and how, with a bit more research, could be used to properly treat patients suffering from depression in hospitals and clinics.

Last but not the least; VR has also proved to be effective in helping patients to completely recover from traumatic brain injuries. Traumatic brain injuries (TBI) are caused due to sudden external force applied on the brain, such as those due to car accidents, crashes, etc. TBI has many detrimental effects on the brain, such as neuroinflammatory response, accumulation of abnormal proteins, and neurodegeneration. VR technology, having such a wide scope, can be very well incorporated into treatments of brain related diseases as it creates a simultaneous effect in the brain which directly controls and coordinates with other parts of our body.

With this brilliant idea and forthcoming innovations, it is not far that VR would give new hopes to patients suffering from brain injuries and traumas. In the coming decades, VR therapy might as well become as common as a flu shot and hopefully recovery of brain related diseases and disorders will also show some exponential increase. Virtual Reality as a technology, is bound by no limits and can be used in medical sciences with having less complications. With advance and in depth work on inculcating such technologies in clinical research, science might just win the race against nature and alleviate the negative impacts of brain related disorders.

THE MOST IMPORTANT EV

by Anshu Kumari, TBS



1906
Charles Sherrington
Integrative Action of the Nervous System



1929
Hans Berger
invents electroencephalography



400 BCE
Hippocrates believes brain to be the seat of intelligence



1906
Alois Alzheimer
pathology of the neurodegenerative disease

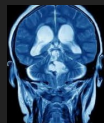


1940
Alan Hodgkin, Andrew Huxley, and Bernard Katz explain electrical activity of neurons

1998
P.S. Erikson and others neurogenesis in adult Brain



1990
Dr. Seiji Ogawa and colleagues develop functional magnetic resonance imaging.



1994
Dr. Vilayanur Ramachandran proves the plasticity of the adult human brain

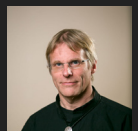


1982
Dr. David Hubel gives structure and function of mammalian visual cortex

2000
Carlsson, Greengard and Kandel discovers concerning signal transduction in nervous system



2004
Linda B. Buck and Richard Axel discoveries about odorant receptors and the organization of the olfactory system.



2004
Dr. Christof Koch study on Neuronal Correlates of Consciousness (NCC)



2004
Prof. Giulio Tononi gives his integrated information theory (IIT) of consciousness



2019
Dr. Zvonimir Vrselja demonstrates a mammalian brain have capacity to restore its microcirculation, cellular and molecular activity after post-mortem



2016
Prof. Henry Markram creates digital stimulation of neocortex.



2020
Elon Musk's Neuralink developed ultra-thin probes, that will be inserted in the brain and perform operations



2017
Dr. Susumu Tonegawa discovers that memories are formed in the hippocampus and in the cortex simultaneously



2015
Dr. Karim Benchenane demonstrates memory manipulation during sleep

EVENTS IN NEUROBIOLOGY

1947

Kacy Cole develops the "voltage clamp" technique



1930 - 1950

chemical nature of synaptic transmission



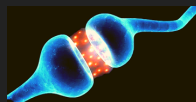
1952:

Alan Hodgkin and Andrew Huxley gives first mathematical model of a spiking neuron



1949:

Donald Hebb gives Hebb rule.



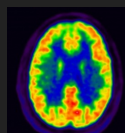
1952

Paul Maclean discovers the "limbic system"



1978

Dr. Gerald Edelman gives theory of neuronal group selection or "Neural Darwinism"



1962

Dr. Roger Sperry and Prof. Michael Gazzaniga- two hemispheres of the human brain are specialized in different functions



1953

John Eccles gives the Neurophysiological Basis of Mind



1973

Prof. Edward Hoffman and Prof. Michael Phelps creates PET scans to map brain function



1957

Vernon Mountcastle discovers the modular organization of the brain



2008

Prof. Yoichi Miyawaki's team visualizes human perception from brain activity patterns



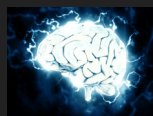
2012

Prof. Mark Mayford stores a mouse's memory of a familiar place on a microchip, "hybrid memory".



2013

James Rothman, Randy Schekman, and Thomas Sudhof discovers about the machinery regulating vesicle traffic



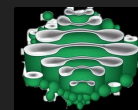
2009

The Human Connectome Project launched by NIH



2013

Human Brain Project and Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative announced



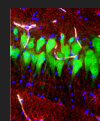
2014

Dr. Yoshiki Sasai developed methods to form neurons from embryonic stem cells



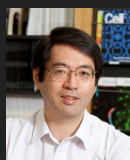
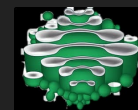
2014

Sergiu Pasca creates 3D neural cultures, human cortical spheroids using human pluripotent stem cells (hiPS)



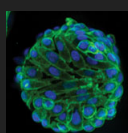
2013

Dr. Madeline Lancaster and Dr. Juergen Knoblich create cerebral organoids



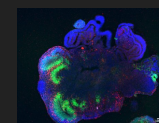
2014

John O'Keefe, Edward Moser and May-Britt Moser discovers cells that constitute positioning system in brain



2013

Kwanghun Chung and Karl Deisseroth develop CLARITY to render brains transparent.



Is "THE MIND" And "THE BRAIN"

© Aakriti Singh, TBS

The debate on whether the mind and the brain are separate entities has been going on since the dawn of brain sciences and even now scientists have not been able to collectively agree upon a single explanation. The most accepted theory in the world of neuroscience, at present, is that the mind is a stream of consciousness that stems from the brain. Whereas, psychologists hypothesize that mind and brain are two separate entities. Psychologically, the brain is an organ and is physical in nature, whereas the mind is neither of them.

Before delving deep into this, let's take a look at what exactly the mind and the brain are.

The brain is an organ made up of neurons, controlling all functions of our body. It is a part of the central nervous system along with the spinal cord. The mind, on the other hand, is abstract and is interchangeably used with terms like conscience or consciousness. It is a set of mental faculties, synonymous with cognitive and non-cognitive aspects such as perception, memory, attention, thinking, intelligence, imagination, judgement, intuition and emotion.

Neuroscientists refuse to believe that the mind is a separate entity. They believe the mind stems from the processes taking place in the brain. Their focus is mainly on understanding the functionalities of the brain and its role in our

A Single Entity?

By Sanah Kumar, FBS

body -
ly functions. They
also study the biological basis of learning, memory, behaviour, etc.

Psychologists on the other hand mainly focus on studying the mind and how it influences one's behavior, emotions, personality etc.

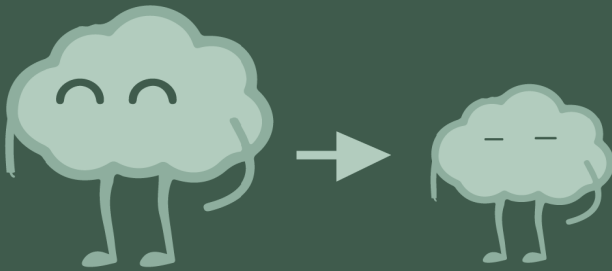
Sigmund Freud's theory about the structure of mind is widely accepted. He hypothesized that there are three levels of awareness: the conscious, the subconscious and the unconscious. The conscious level consists of all that we are aware of. The subconscious consists of all that can be recalled and brought into the conscious mind. The unconscious is a reservoir of unexpressed or repressed feelings, emotions, thoughts and memories. According to Freud, any anomalies in one's behavior or any kind of psychological distress stems from problems at the unconscious level of the mind.

Intellectuals from both fields of study have different points of view. The bottom line is that both the explanations of the respective fields are of great value.



BRAIN FACTS

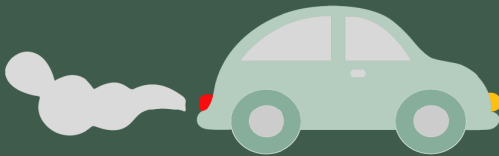
by Sanidhya Jagdish, SBS



The human brain gets smaller as we get older. This usually happens sometime after middle age.



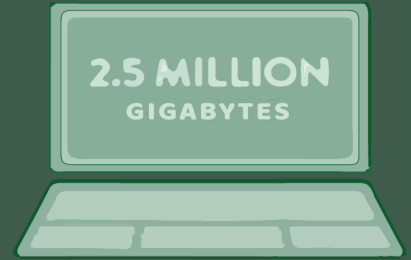
Short term memory can only store 7 pieces of information for 20 seconds.



Neurons move information at different speeds. The fastest speed for information to pass between neurons is about 250 mph.



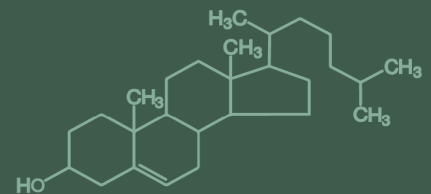
Dreams are believed to be a combination of imagination, psychological factors, and neurological factors. They prove that your brain is working even when you are sleeping.



Your brain as a computer could hold 2.5 million gigabites



The average human attention span is shorter than that of goldfish. It is 12 minutes shorter than it was 10 years ago.



Cholesterol is key to learning and memory. However, high cholesterol has different effects depending on your age and other factors.



Unconsciousness will occur after 8-10 seconds after loss of blood supply to the brain.



NEUROETHOLOGY

By Ayushi Sharma, SBS

A night-flying moth senses the echolocation from a nearby bat through special nerve systems and immediately reacts; warning their group that an enemy is nearby. The automatic reaction of its body depends on the strength of the bat's signal. If the signal is weak, then it flies in the opposite direction and if it is nearby, then it starts exotic flight patterns (maybe to be a difficult target). Much such behaviours in animals, that are adaptations or just some survival skills, have a very specific neural control. Studying these interactions has given the scientists the understanding of intricacies of such controls. This study is mainly what Neuroethology is about.

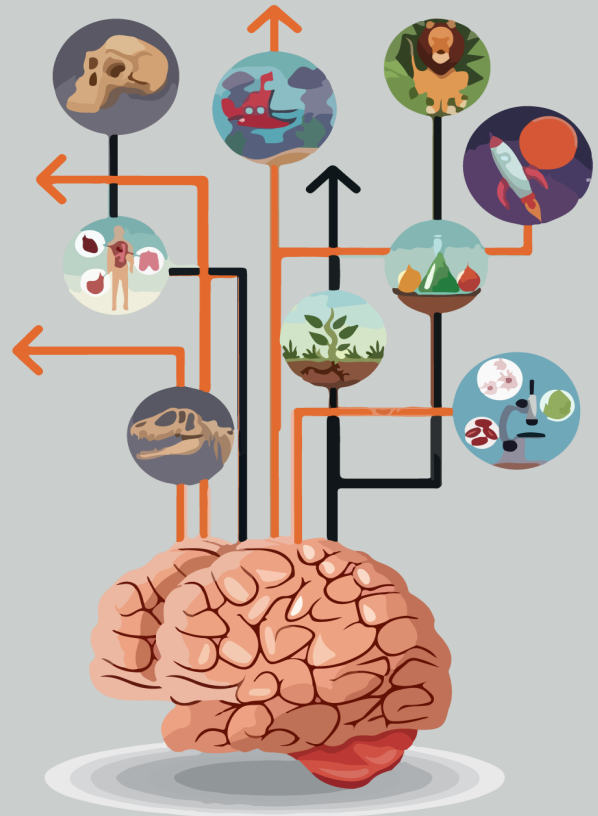
Neuroethology is the approach of science that studies the neural basis of the 'natural', 'innate' or 'instinctive' behaviour of animals; basically the relation between the neural control and the behavioural actions or approaches of animals in their natural state.

It studies the neural changes and actions that result in specific adaptations in a particular animal. The basic characteristic goal of neuroethology is to understand the specialization and diversity of neural controls, from both mechanical and evolutionary point of view. The following is a classic experiment to get introduced on how studies of neuroethology are done.

The experiment was performed to study the neural controls of prey catching behaviour in a toad.

Understanding the behaviour:

In the experimental set-up, a cardboard resembling the prey was moved around the toad to understand and record its reactions. When a thin rectangular strip placed horizontally was moved around the toad placed on a central platform, toad would see it as prey. If the strip is placed vertically and then moved around toad in the same direction, the toad doesn't see it as prey. So to understand more clearly the worm and anti-worm configurations from toad's view, various orientations of strip, directions of movement, etc. were tested.



The following theory was inferred. When the direction of movement is parallel to the longer axis of the worm's/strip's body, it would elicit the 'prey-catching' response from the toad. For example, a horizontally placed strip moved in a horizontal direction or a vertical strip moved vertically. On the other hand, if direction of movement is perpendicular to the body, an 'escape' reaction is elicited. The toad sees it as anti-worm or predator conformation.



Fig 1: No response on vertical strip

Similar were the results in diagonal orientation and movement. These responses come from the species' ability of pattern discrimination for prey recognition.



Fig 2: Prey-Catching response on horizontal strip

Neurophysiological basis:

The ganglions in the retina of the toad contact two neurons- one of optic tectum of midbrain or other to the pretectum thalamus of diencephalon. A microelectrode is used to record the neural impulses that are made audible and visualised on an oscilloscope. The results of the optic tectum neurons were the same as expected, high

impulses were generated in worm configurations. But the opposite was found in pretectum thalamic neurons, they showed high impulses in anti-worm configurations.

The following hypothesis was generated to explain how each of these neurons function in 'prey-catching' or 'escape' responses. Optic tectum neuron, T5(1) responds to parallel movement of worm and pretectum neuron, TH3, responds to 1) A rectangular worm configuration: strong activation of T5(1) and weak activation of TH3, T5(1) activates T5(2) and elicits prey-catching response.

2) A rectangular anti-worm configuration: activates TH3 strongly and T5(1) weakly, TH3 further excites another TH4 neuron and also inhibits T5(2), but strength isn't enough for escape, so no response from toad is elicited.

3) A large square configuration: Both T5(1) and TH3 activated strongly, and T5(2) excited by T5(1) but inhibited by TH3, TH4 strongly excited by both and escape response elicited.

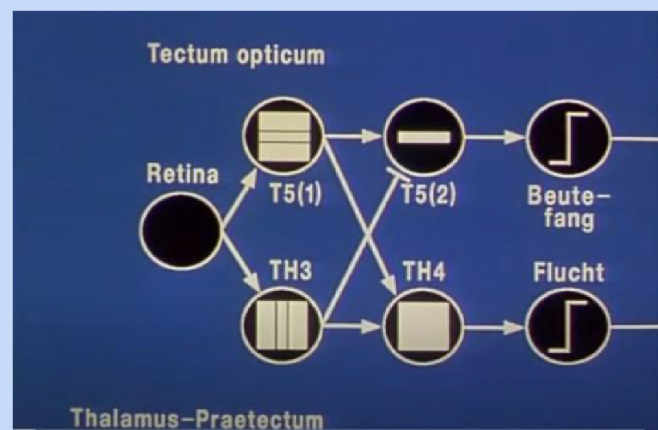
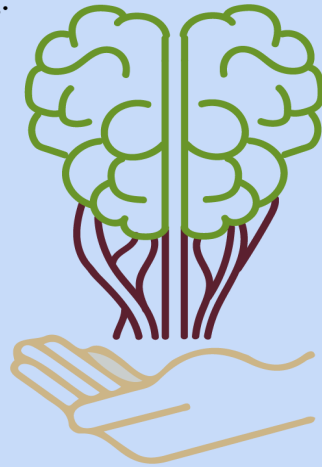


Fig 3: Interconnections of neurons for both the responses

The final part of the experiment studied the effect of brain lesions, learning and other such things on neural responses and behaviour. A large moving object like hand would release an escape response, but if the toad is fed worms by the hand regularly, the hand would then start

releasing prey - catching responses. It is explained by the presence of another neuronal connection which inhibits TH3 when prey-predator configurations both occur together. If a lesion is done in the above network so the inhibition of T5(2) is stopped, every moving thing would elicit prey-catching.

Understanding these extremely complex neural interconnections provided a well-accepted explanation of the various responses and behaviours in the toad. Similar to this, many



© Sanidhya Jagdish, SBS

experiments in neuroethology give way to intricate understanding of behaviours. The following two are some more classic experiments done in the history of neuroethology.

Acoustic communication in crickets - The neural basis:

As in many other insects, acoustic signals are used by males to attract females or send signals to other males. The female elicits its phonotactic response by flying towards the sound until she reaches the male (positive phonotaxis). The experiment of tuning to the tympanum of female cricket (sound of frequency same as produced by natural males) and an optimal response of certain auditory interneurons best reflects this behaviour preference to certain sounds. The activated neurons function as recognition neurons in females.

Jamming avoidance response of weakly electric fish, genus *Eigenmannia*:

This experiment deals with the side of neuroethology that considers behavioural responses arising from sensory information

along with motor programs. Jamming response in these fish consists of shifting the frequency of fish's electrical discharge away from neighbouring fish, to avoid 'jamming'. This model system has been used to understand the complete neuronal basis- the sensory receptors, effector organs, neural reactions- everything. This experiment also gave an important discovery during its course of investigations. The physical parameters of the stimulus triggering the jamming response are analyzed separately at lower levels (parallel processing). At higher levels, all these parameters converge together to result in the 'jamming response'.

Such studies can help in advancements of many techniques and model systems of behaviours. It can be used to make models for artificial intelligence and their behavioural responses. Neuroethology is also the great tool for understanding the evolutionary and phylogenetic relationships, natural selection, etc. It provides the basis of all behaviour.

This basis can prove to be that great tool which can help us modify, transform, include or use neural interactions to solve problems in many fields of science. As it involves an extremely vast array of fields, its future growth depends on how well it includes the advancement and technologies of those fields to find answers to its own question.

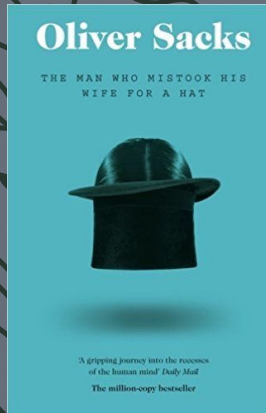


© Sanidhya Jagdish, SBS

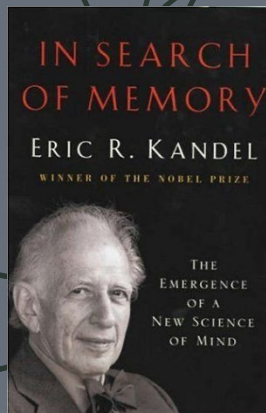
BOOK RECOMMENDATIONS

Must Read!

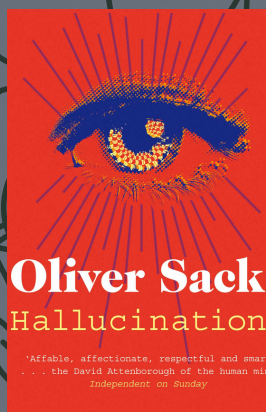
by Aparna Pillai, TBS



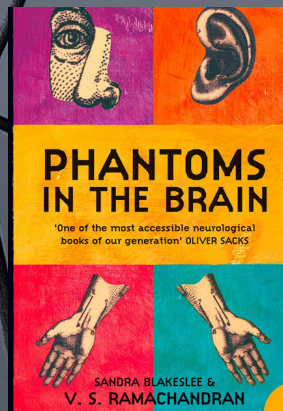
Regarded as one of the best compilations of neurological case studies, this book has 4 parts wherein each section contains the case studies pertaining to a particular category of neurological afflictions. Even though the writer sometimes goes into lengthy medical jargon, the narratives are enriched with quotes, theories and experiences of other doctors as well. The patients are represented as interesting human beings, worthy of your respect. This is a perfect starting point for anyone interested in learning about abnormal neurobiology.



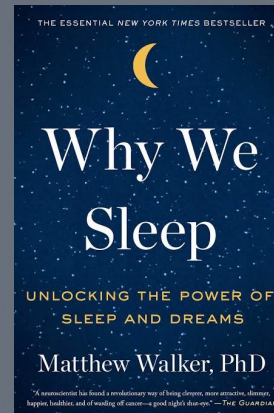
Nobel Prize Winner Eric Kandel's book offers enchanting glimpses of his life story, the history of brain science and psychology, and a description of the experiments which are moving our understanding of the brain forward at a fantastic pace. This book is for anyone who desires to want to answer big questions by starting to look at smaller things.



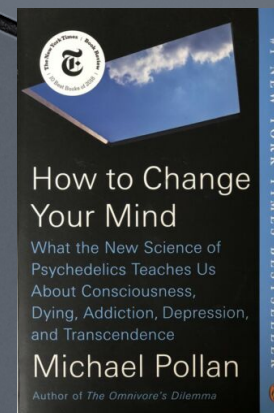
Oliver Sacks' books are always easy to understand and yet, compelling enough to give you something to think for weeks. Dr. Sacks gives an analysis of the neurology of hallucinations – visual, auditory, olfactory and tactile – sharing his years of clinical experience, and many of his own experiences with hallucinatory states (most interesting part of the book in my opinion). This book is sure to keep you hooked from the first page itself.



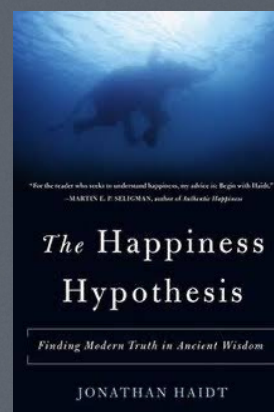
Like Oliver Sacks, Dr. Ramachandran writes about neurological problems, the symptoms expressed as behavior and anecdotes concerned with people suffering from them. Unlike Oliver Sacks, Dr. Ramachandran focuses more on the science part of his experience. That said, this book will blow your mind with its jaw dropping accounts, and then carefully fit it back by explaining what that means for our understanding of the large-scale structure of the brain. His insights are matched by the stunning simplicity of his experiments that used low-tech tools like mirrors, cotton swabs and glasses of water. This particular work of his focuses on some of the strangest, most fascinating and philosophically rich territory of cognitive neuroscience.



Neuroscientist and sleep expert Matthew Walker gives revolutionary insights about sleep, and examines how it affects each aspect of our physical and mental well-being. The book explains how even an hour short of your daily sleep hours can be disastrous (damage to your immune system, negative effects on memory, creativity and increased risk of ADHD and Alzheimer's). Dr. Walker goes as far as to say that lack of sleep is a carcinogen. This book is genuinely terrifying.



The book starts with the colorful history of Psychedelics, moves to recount Dr. Pollan's own experiences taking these drugs and lastly, looks at current research into the ways these molecules actually affect the brain. The writer shows how seriously beneficial these compounds are (they are not addictive, do not cause any tissue harm, have been shown to treat addictions and therapy resistant depression) and how seriously research scientists take them. The book is easy to read with a compelling, thoughtful and mindful narrative.



Don't confuse yourself with the name; it's not another self-help book (mostly). But Dr. Haidt chiefly covers what is responsible for making us happy. Dr. Haidt touches on philosophy, psychology, economics, evolution and cognitive science documenting centuries of works and views. This book provides a systematic take on cognition and the evolutionary logic (the best parts) behind it. If you like this, also read 'The Righteous Mind' by the same author.

THE ART OF SUBTLE MANIPULATION: CHESS

SACHIN SHARMA, SBS

It's the year 1994. Event: World Blitz Semi-final. The room is densely packed. All cameras focused on the center. The two players -Vishwanathan Anand and Ilya Smirin- began the match. 10 seconds into the game and there's a long pause. One of the greatest chess players -Vishwanathan Anand- hasn't played a move in the last 100 seconds. For a game that is judged for the right moves in a limited time, the pause surely is the scale tipper. Three minutes later, the unlikely player-Vishwanathan Anand- walks out of the room as a winner.

It's the year 2020. Event: Worldwide lockdown. The rooms are always packed. No one has left their house in months. One of the most famous streaming channels-

Netflix has released a miniseries "Queen's Gambit". Seemingly illogical moves and incomprehensible strategies has created a genius, Elizabeth Harmon, an invincible chess master and the interest of common people in chess has been revived.

The game looks so simple. All you have to do is to defend your king and you have an army!! How hard could it really be?? - I thought when I became one with the masses and gave in to the trend of the year, playing chess. And so began my journey of watching endless youtube videos of chess tournaments, endlessly reading strategy books and am still not a grandmaster. What a shame!

"What is it? What do I lack? Is chess playing skill, a god-gifted talent?" -thoughts filled my head. I began frantically looking for an answer. Rigorous research and hair scratching helped me to pinpoint four major neurological differences in a chess player and a normal person.

RECOGNITION

You see, the area of the brain associated with recognizing a face or a specific pattern, present in the cortex of inferior temporal lobe of brain, the Fusiform Face Area (FFA) shows activity when a chess player studies a chess board. Although a person who doesn't play chess shows activity in FFA on a regular basis to recognize and differentiate among many faces he/she comes across with, this region was found to be more developed in chess players because analyzing a chess board or game and developing a strategy requires many patterns which includes the opening game, the middle game and the end game, each with thousands of unique patterns. In fact, we can say that chess is a game built upon pattern recognition. It ultimately results in development of FFA in a chess player, enhancing their critical thinking and puzzle solving capabilities. 'Practice makes a man better' has never hit so hard.

PERCEPTION AND PLANNING

Chess requires a unique perception of the opponent's style to counter or 'trap' the opponent leading to a win. For this a chess player has to plan and choose a certain style to move the pieces and to set a series of different coordination among different pieces to checkmate the opponent. Prefrontal cortex of our brain is responsible for planning, perception and self- control. This part of the brain develops last, usually in our adult years, which is why the prefrontal cortex of the kids who start playing chess at an early age, gets stimulated by the effect of this game and develops much better than those who do not play chess. This helps them to develop planning, reasoning and perception skills much earlier.

Yeah, totally so not your fault. How could you have stopped watching Tom and Jerry all day long to play chess instead!!?!!

MEMORY AND CONCENTRATION

Implementing your strategy and your style of play with its full effect requires your utmost concentration, otherwise it becomes very difficult to calculate and predict future moves. This is achieved by stimulating the dopamine neurons in the frontal lobe which are released while concentrating. Memory is another important factor for a chess player. It was estimated by some researchers that Grandmasters and International chess masters memorize around 100,000 to 300,000 chess-piece information from the previously played games and around 1000 to 5000 famous matches and plays to study the game more effectively. It was found that the hippocampus region of such players are much more developed than the normal population.

I so wish that I had known this earlier. I bet this piece of information would have completely changed my outlook on Mathematics (I am looking at you, multiplication tables). Playing chess could have saved me from countless punishments in my childhood!! Who knew?????

CREATIVITY

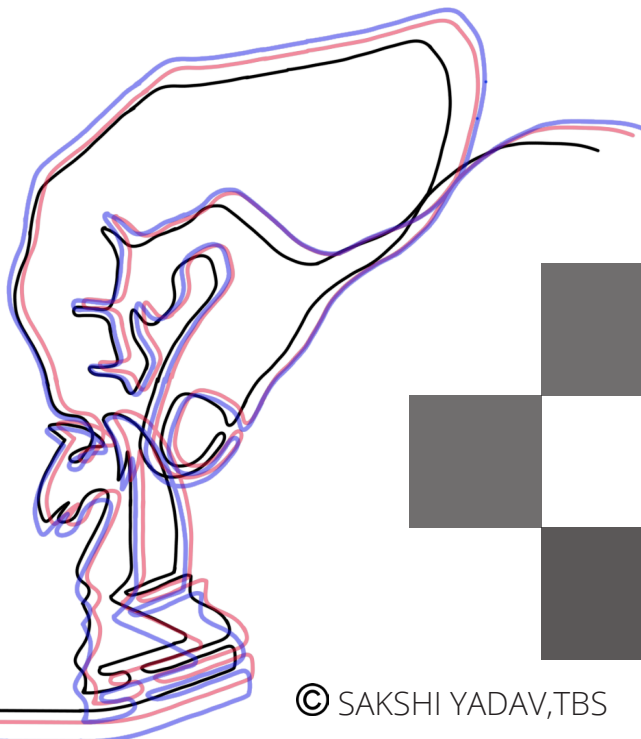
At any instance in a chess match, there are thousands of possible combinations

and moves to play at a single time. A chess player has to find the best one among them in a short period of time. At times, no logical strategy seems to work, that's where creativity comes into play and takes the lead in the game. Chess involves both, the left and right parts of the brain for analyzing and playing much effectively. Left side is used for analysis and choosing the next best move, while the right part is associated with pattern recognition and solving. An excellent coordination between these two parts is required to bring out the best possible solution position in a chess game.

What started out as a mere surface skimming of following the latest trend turned into a full-fledged nosedive of appreciation for the chess players. Who knew my never-again-going-to-be-fulfilled-desire of becoming a child prodigy could have been a reality only if I had cut short my unnecessary, attention-seeking screams in my childhood and played chess?

So next time when someone laughs at your chess playing skill, you know what region of your brain is to be blamed. And in my defense, I firmly stand by the statement that it's not my fault that I am not a grandmaster yet. It's just that the others had a head start (quite literally).

**" THERE ARE TIMES
WHEN A WELL PLACED
PAWN IS MORE
POWERFUL THAN A
QUEEN "**



मस्तिष्क कुंडली

सुना है

बचपन में हमारे दिमाग में रूखी सूखी घास भरी थी,
और आज वह जगह सेरीब्रम, सेरिबेलम और ब्रेन स्टेम ने ले ली ।
सुना है, अमिग्डेला रेस्पॉसिबल होता है डर के लिए ,
तो इंतज़ाम करवाइये जनाब बंदूक यहां सेमेस्टर के बाद तुरंत सेमेस्टर लग जाते है।
सुना था हमने यकीनन प्यार होता है दिल से,
लेकिन मस्तिष्क सिस्टम ने बताया की हम मौजूद है टेम्पोरल लोब में।

अतिशय जैन, FBS

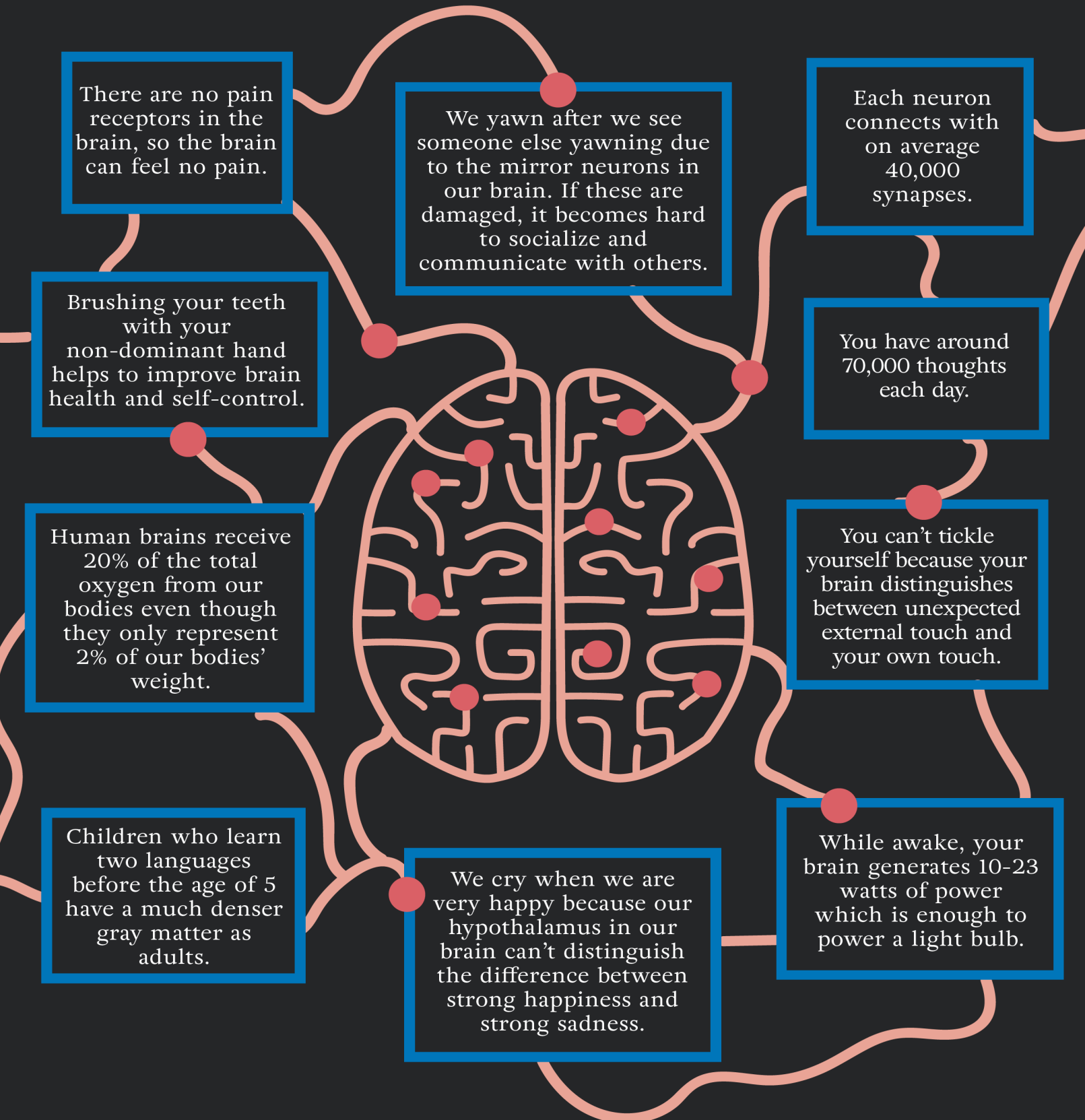
याददाश के लिए अक्काउन्तेबल होता है ग्लूटामेट ,
पर सामने क्या आया ,
जितना था ही नहीं उतना रिलीज़ हो गया यह याद करते करते।
सोचता था मेरे थॉट्स रेस्पॉसिबल होंगे मेरी इस कविता के लिए ,
लेकिन पता चला वहां पर भी रेस्पॉसिबल फ्रंटल लोब है ।
धन्यवाद कहता हूं दिल से ,
लेकिन याद रखना रेस्पॉसिबल कम्बख्त डोपामिन ही होगा आपके प्यार के लिए ।



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BRAIN FACTS

By Sanidhya Jagdish, SBS



INSTITUTES AND UNIVERSITIES OFFERING NEUROSCIENCES



M.Sc./PhD
programmes in India

1. JIWAJI UNIVERSITY



Course : M.Sc. programme
Eligibility - Graduation with 50% marks with one or two of the following subjects: Biology/ Biotechnology/ Biochemistry/ Neurobiology/Neuroscience/ Zoology along with Chemistry.
Mode of Selection : On the basis of the Index based on the merit in qualifying examinations.

2. NIMHANS, Bangalore

A premiere place for study of neurosciences and mental health in India. One of the top institute with research in Neurosurgery, Neuropathology, Neuroanaesthesia, NIIR, Neurology
Entrance through Nimhans Open entrance test OET



3. NATIONAL BRAIN RESEARCH CENTRE

Course: M.Sc. (Neuroscience)
Eligibility: Bachelor's degree or equivalent in any branch of Science from a recognized Institute / University.
Mode of selection: Minimum eligibility criteria for admission to the M.Sc. programme to appear for JGEEBILS.



4. UNIVERSITY OF MADRAS



Course: M.Sc. Neuroscience (2 years) offered under self supportive mode.
Please refer to the University Admission Notification annually for further details.

5. CENTRE FOR NEUROSCIENCE, IISC BANGALORE



The best university in India for scientific studies and research.
Course: You can opt for PhD programmes in cutting edge neuroscience research
Eligibility: Masters degree in any branch of Science .

1. UNITED STATES OF AMERICA

University of California, San Diego & UC San Francisco

Usually considered the best for neuroscience research in us. They provide a variety of scholarships including research fellowships, subject to eligibility and acceptance.



Harvard university

It is consistently being one of the world's most premier universities.

Scholarships available



MIT

Entrance through GRE scores and/or acceptance through relevant department professors based on research proposal, SoP and other academic records.

Johns Hopkins university
One of the best universities in the world for health sciences research. Scholarships available.



2. UK AND EUROPE

University College London

Entrance through professor acceptance and/or strong undergrad scores in any of the fields mentioned on their university websites.
Scholarships available .



Oxford University

Entrance through professor acceptance and/or strong undergrad scores in any of the fields mentioned on their university websites.
Scholarships available .



**M.Sc./PhD
programmes abroad**

Max Planck Society

It is for those searching for extensive research exposure in neuroscience.



Karolinska Institute

Entrance requirements:
Bachelor's degree (equivalent to a Swedish kandidatexamen) from an internationally recognised university.

3. JAPAN



Osaka University and
Tokyo University

Entrance through professor acceptance of respective departments.
Scholarships available: MEXT

THE FAME OF COCA COLA

INSIGHTS ON NEUROMARKETING STRATEGIES

SHUBHANGI ANTIL, SBS

About 400 billion dollars per year are spent by companies in advertising their campaigns. For a long time the marketers have used their conventional methods to understand consumer behaviour, and for the most parts, faced many failures. Taking feedback, surveys, and interviews of the consumer were not fairly reliable mainly due to two reasons. One, the consumer behaviour has proven to have many subconscious components hence people can't explain their decisions which they took subconsciously, and two, factors such as certain intensives, peer pressure or lack of time influenced the feedbacks of the consumers.

Millions are spent on a product which may only end up landing onto a handful households. It is not at all reasonable to invest such a hefty amount towards something which can lead you to such a loss. With the downfall of convention methods of advertising and the rise in competition amongst brands, a new marketing strategy needed to be adopted in the 21st century.

In 2004, Read Montague, a professor of neuroscience at Baylor College of Medicine, published the very first scholarly piece on neuromarketing research. His team wanted to understand that despite being similar in the

chemical compositions, why was Coca Cola drink more cherished than Pepsi? The protocol for the experiment was simple. The researchers asked the participants to drink either Pepsi or Coca Cola, but the catch was that there were two case experiments. In the first one, they revealed to the participants the brand of the drink before they were asked to choose, named as the brand-cued experiment. In the second case, they anonymously gave away the drinks without revealing the brand, named as the anonymous experiment. The brains of each candidate in both the cases were scanned in an fMRI machine.

The scientists reported that two separate systems were involved in generating preferences for their drink of choice. For the anonymous task, a consistent neural response in the ventromedial prefrontal cortex (VMPFC) was seen which corresponds to the participant's behavioral preferences for the drinks. In the brand-cued experiment, brand awareness for one of the drinks had a phenomenal influence on expressed behavioral preferences and on the measured brain responses. The conclusion hence was that during the brand cued experiment people chose Coca-Cola, whereas in the anonymous one, they mostly preferred Pepsi over Coca-Cola.



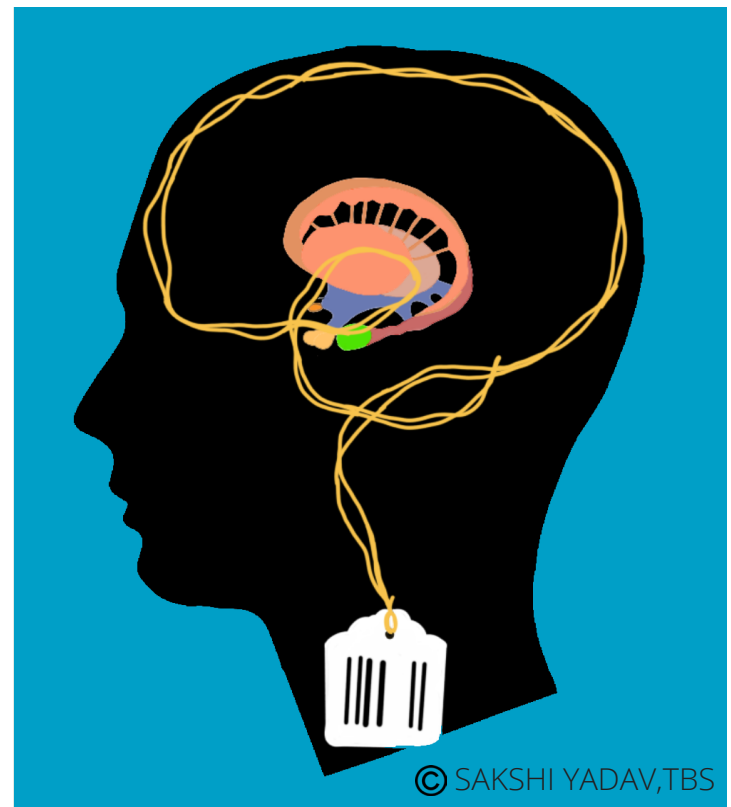
© SAKSHI YADAV, TBS

If neuroscience is considered to be the infant in the world of sciences, neuromarketing is the fetus. But just like it's bigger sibling, neuromarketing is developing at a rapid speed. Coming back to the Coca Cola and Pepsi study, we wonder why Coca was chosen over Pepsi in the brand cued experiment? Let's take one of the commercials of Coca Cola to understand this. The Coca-Cola polar bear commercial in 2012, pictured a polar bear on the run to save his bottle of coca cola drink from breaking down as the bottle slid off from his hands, making it look like the bear's life depended on the drink. There were no dialogues, texts or any announcer speaking in the background.

Just heightened adventurous music, a couple of hurdles to overcome to grab the bottle back and "boom" the polar bear, after much hard work, saves up his bottle of Coca Cola drink. Similar to this Coca Cola commercial, Thumbs Up and Mountain Dew commercials also showcase similar survival instinctive behaviour. Coca Cola's neuromarketing expert, in this commercial, applied one of the principles of neuroscience known as, Adversity. Adversity focuses on the reptilian part of our brain, which according to MacLean's triune brain model, is one of the three parts of our brain- the new brain, the middle brain and the reptilian brain. The reptilian part is the basal ganglia and is responsible for our instincts and survival. The main focus of the reptilian part is to avoid pain and hence is the decision-making area. Although it's very difficult to activate this part of our brain, it can be achieved by either tapping into audiences' pain points, appealing them to their innate selfishness or by demonstrating importance through contrast. Everyone is afraid of losing out on something or the other since we have an instinctual fear of loss. This opportunity to appeal the audience to their products, by tapping into their reptilian part of the brain is fairly grabbed by the companies who adopt neuromarketing strategies. Companies such as Carlsberg Beer, Delta, Coca-Cola, Google, ESPN, McDonalds, Procter and Gamble, and Yahoo are presently using neuroscientific methods to improve their product reach.

Another principle in neuroscience called Familiarity, focuses on the workings of a middle portion of our brain, known as the limbic system or the emotional brain. The limbic system responds to the heartstrings and prefers quality graphics. Through this, the marketers can gain access into the customer's limbic system by creating emotional and heart string graphics. The word Familiarity originated from the

Latin word Familia which refers to "family." Again, taking the Coca Cola company as the model; their polar bear baby and daddy commercial adopted the principle of familiarity. The commercial pictured a little baby polar bear smiling and squealing as he slid across the ice and shared a bottle of Coke with daddy polar bear. This commercial activates the Fusiform Face Area (FFA), which is the part of our brain that triggers face recognition. The FFA corresponds to our limbic emotional brain by forming social bonds. Activating the FFA in the audiences by showing family bonding, the commercial emotionally connected to the audiences. People are bombarded daily by an average of 10,000 sales messages, making marketing tougher than ever. More and more companies are now dropping the conventional methods of marketing and outreach, and adopting neuromarketing strategies to stand out from the mesh and increase the outreach of their products and company.



 **NEUROMARKETING
GIVES INSIGHT
INTO CONSUMER
BEHAVIOUR HELPING
COMPANIES IMPROVE
THEIR
MARKETING EFFORTS** 



Blinding Affairs

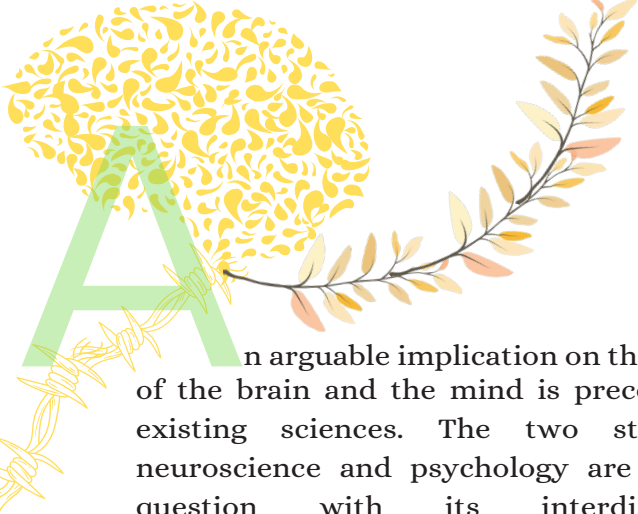
Muskaan Gupta

[illegible]

© Neha Guliya, SBS

A decorative illustration of a thin, dark branch with small, oval-shaped leaves in shades of yellow, orange, and light brown, extending diagonally from the top left to the bottom right.

31



An arguable implication on the matters of the brain and the mind is preceding our existing sciences. The two studies of neuroscience and psychology are much in question with its interdisciplinary approaches. Neuroscience studies the chemical and biological processes within the brain, whereas psychology studies the mind and the behaviour. One would wonder how it's related. The thoughts constantly running through your mind, are they just some networking of neurons? Or the emotions and behaviour you showcase, the chemical responses produced by the brain? Or perhaps, the brain has a predetermined personality set out for you as you grow? It is so intriguing and perplexing to understand one without sounding chauvinistic.

The two disciplines share a working relationship where the functions of one act as the emergent properties of the other. For example, it is believed that the emergent properties of psychological constructs such as cognition or memory come from the complicated interactions of the constituent elements of the brain. Cognitive neuroscience uses simulations, imaging and tools to understand neural functions in pain perceptions and how differences in brain structure can affect behaviour, personality and cognitive functioning. Interesting parameters of psychology are set out for neuroscientific explanations examining the subjective perspectives to generate artificial intelligence in humans and animals. Psychologists, Ochsner and Lieberman (2001) introduced the three levels of analysis: a motivational, a cognitive and a neural level, that concerns the brain mechanisms instantiating cognitive-level processes.

An inter level synchronous investigation was proposed by Jong (2002), a physiological psychologist that suggested both top-down and bottom-up influences on theories to promote an accurate approach of understanding required to answer the specific level of assessment. However, some philosophers of science are flustering over the complex relations between the two disciplines, where the analysis of lower-level neural mechanisms could explain or reduce the high-level mental functions one day, giving rise to a reductionist approach. This approach puts the mental notions in jeopardy and believes that consciousness plays no role relative to the brain.

Oversimplification views on the human experience and emotion limit the holistic and representative depth of motivation and perception. For neural impulses to understand a particular thought, it would require increasing convolutions and manipulations by abstract concepts. The interwoven mind-brain distinction causes a splurge in the basic human potential to understand, think, interpret and analyze simple yet complicated frameworks that make us more conscious beings by hinging on surface level explanations. Non-reductionists believe that the paradigms and the multitude literature of psychology is unsuitable for an organic level of science. One aspect to consider that challenges the reductive view is the position of embodiment integrating the brain, body and mind. The cognitive neuroscience approach also uses neuroscientific methods formulated at the psychological level to run tentative analyses.

As reverse inferences raises questions about reductionism, involving attempts to localize psychological functions, will the researchers be able to sustain the autonomy of Psychology? The answers lie solely on the levels of complexity set out to study by the future prospects.



Our Hardworking Brain seeks the paycheck of Happiness



By Shradha Jain, FBS

Inside the bony cavity, there's sitting a walnut. Working all day long and night as well. Let's rejuvenate it, give it some rest and make it happier.

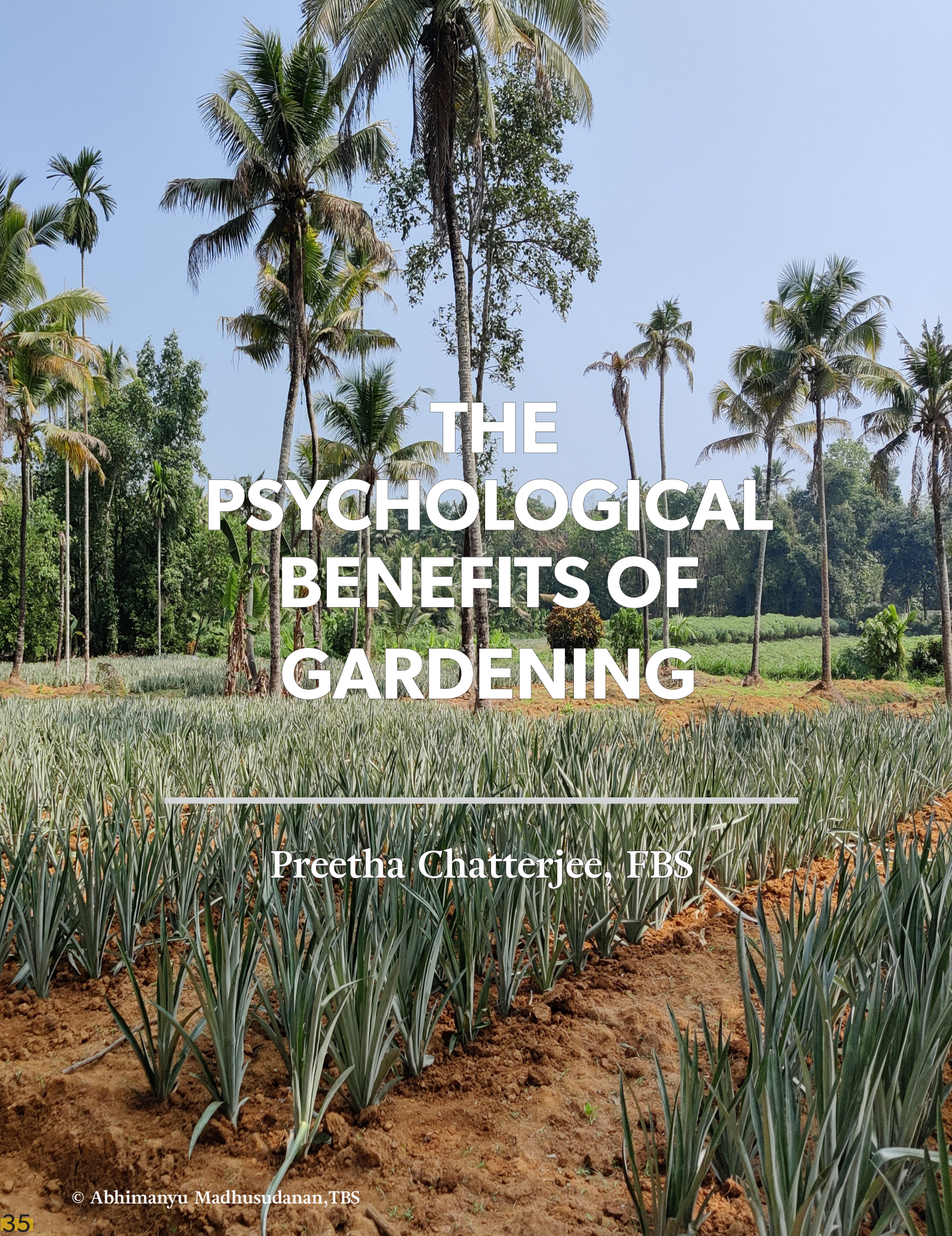
Brain is one of the most sensitive organs of our body. It works throughout the day when we are talking, walking, playing and even when we are sleeping at night. While we are asleep, the brain clears itself from 'all day long toxic dust' that gets accumulated on it. I must say that it is one of the most hardworking organs of the body. Throughout our lifespan, this 'fatty walnut' transports information to our body at an incredible speed of 268 miles per hour. Across ages human brains have evolved unbelievably. We have thoughts, emotions, feelings, we can analyse and calculate, we can do anything we want.

But in the blind run of using the maximum potential of our brain, we have forgotten to give it some rest to feel calm and happy. Today, one of the most developed brains of the world, the human brain, has also become the most depressed one.

According to a survey by World Health Organisation, more than 264 million people in the world are suffering from depression which, at its worst, leads to suicide. More than 800,000 people die due to suicide every year. Most of the people suffer from anxiety, loneliness, sleep problems and a lot more.

People seem to have no time for sleep and calm as they are busy running behind the chase to achieve 'name, fame and money'. Medicines to cure depression, anxiety and other mental disorders are not a permanent solution. So, just stop for some time, give a break to your brain, just meditate and fill yourself up with happiness and laughter. Researchers have proven that meditation optimises the functioning of our brain. Meditation reduces the activity of our brain by making it rest, so it can wander without a goal. Meditation creates a void where the brain becomes inactive, allowing you to understand yourself, your origin, and also helps you to connect to God. Just a bit of mindfulness, closing our eyes and calmly acknowledging what we have, accepting our feelings, thoughts and sensations and witnessing what is going on around us will rejuvenate the brain by soothing it. We should also engage ourselves in activities that we like and that make us laugh. Hanging out in nature, doing a bit of exercise, enjoying the sunshine and doing whatever you like can make a phenomenal change.

These activities activate and release hormones like endorphins, dopamine, serotonin, etc, which spreads the vibes of happiness around our brain. It also increases the efficacy of our brain. After all, living a happy and healthy life is much more important than living a luxurious life with no happiness. So let's lead the way towards a happier brain and a happier life.



THE PSYCHOLOGICAL BENEFITS OF GARDENING

Preetha Chatterjee, FBS

‘A GARDEN IS A TRUE FRIEND YOU CAN VISIT ANYTIME’

—Okakura Kakuzo

Looking out of a window at your green garden feels good, doesn't it? A slow walk in a place filled with trees automatically lightens mood, right? Apart from providing oxygen and sequestering carbon dioxide, plants also have many psychological benefits. Let's look into this aspect.

Interaction with nature is a very important part of our life but it often gets ignored. Dwelling around plants improves our mood and makes us feel lighter. In a survey conducted at four San Francisco Bay area hospitals, 79% patients said they felt more relaxed and calm, 19% of them felt positive while 25% felt refreshed after a session of gardening. Flowers also evoke positive emotions. During these activities, the brain secretes SEROTONIN and DOPAMINE which makes us feel good. Working with soil also makes us happy. A bacterium called *Mycobacterium vaccae* is found in soil and triggers SEROTONIN production in humans. The odour of magnolia trees causes our cortisol levels to drop, encouraging a sense of happiness and stress relief. The American Journal of

Public Health reported that dwelling in green impacts ADHD (Attention Deficit Hyperactivity Disorder) in children and increases their attention span. Also, gardening in many ways boosts our self esteem

and cures depression.

Interacting with nature can reduce anger, improve mood and general psychological well-being.

Interacting around nature puts the mind more in touch with the community and human perceptions of emotional, psychological, and social senses.

Our bonds with plants are so important that when these bonds are severed, we suffer, knowingly or unknowingly. We have the ability to mend these bonds and help ourselves grow... so why not? Plants help us in innumerable ways



but we are always blind to them as they are not something that we feel in our busy day-to-day lives.

But people living in greenery can surely, at some point, feel the positive difference. Also what can be better than growing your food on your own?

INSIGHTS ON NEUROPLASTICITY

Ambika Singh, SBS

THE ABILITY OF THE BRAIN TO UNDERGO
CHANGE



© ShristikaKonwar, SBS

In the past decade, ground-breaking research has revolutionized our understanding of the human brain and is continuing to do so. You might not expect it, but the brain is always changing--it is constantly adapting. This is called Neuroplasticity. Basically it's the term used to describe a sequence of processes that take place in your brain in response to incoming stimuli, in other words, your emotions, behaviours, experiences, and thoughts that physically change the way your brain functions (Demarin et al., 2014). We have all known that the brain is a complex structure and guides all the functions in the body but what only few of us know is that the brain is not static and is undergoing constant changes since the day we were born. It is always adapting to all different kinds of situations that we come across in our lives (Sagi et al., 2012). In short we can say that the brain is constantly learning. After you finish reading this article, I guarantee that your brain will be different!

Now the question arises: how does neuroplasticity help in learning? A classic study which was conducted by Nobel recipient Eric R. Kandel was the first attempt at identifying "neuronal changes that underlie learning and memory". Instead of humans, the subject in the study used was sea slugs. Why? Because, despite their small size, they have incredibly large and simple neural circuits, which eventually makes it much easier to observe physical changes in their cells (Balakrishnan, 2001). Kandel and his team discovered that, after using classical conditioning training, he was able to induce changes in the sea slug's gill- withdrawal reflex and change the structure of its cells!

In other words, they discovered that with the help of training, the sea slug's neurons and synapses changed, and with that, came a new, learned behaviour.

So what can we learn from this experiment? By training our brains in the right manner, we can impart changes in our brain and eventually our lifestyle. Training makes the connections between between neurons grow and get stronger (Dayan & Cohen, 2011). There is an old saying that "neurons that fire together wire together." You can think of it as the neuroscientific way of saying practice makes a man perfect. **The more you think of a specific thought or act in a certain way, the more that becomes entrenched in your brain** (Insights | p e r s p e c t i v e S, 2015). And the opposite is also true. The thoughts and actions that are less frequent

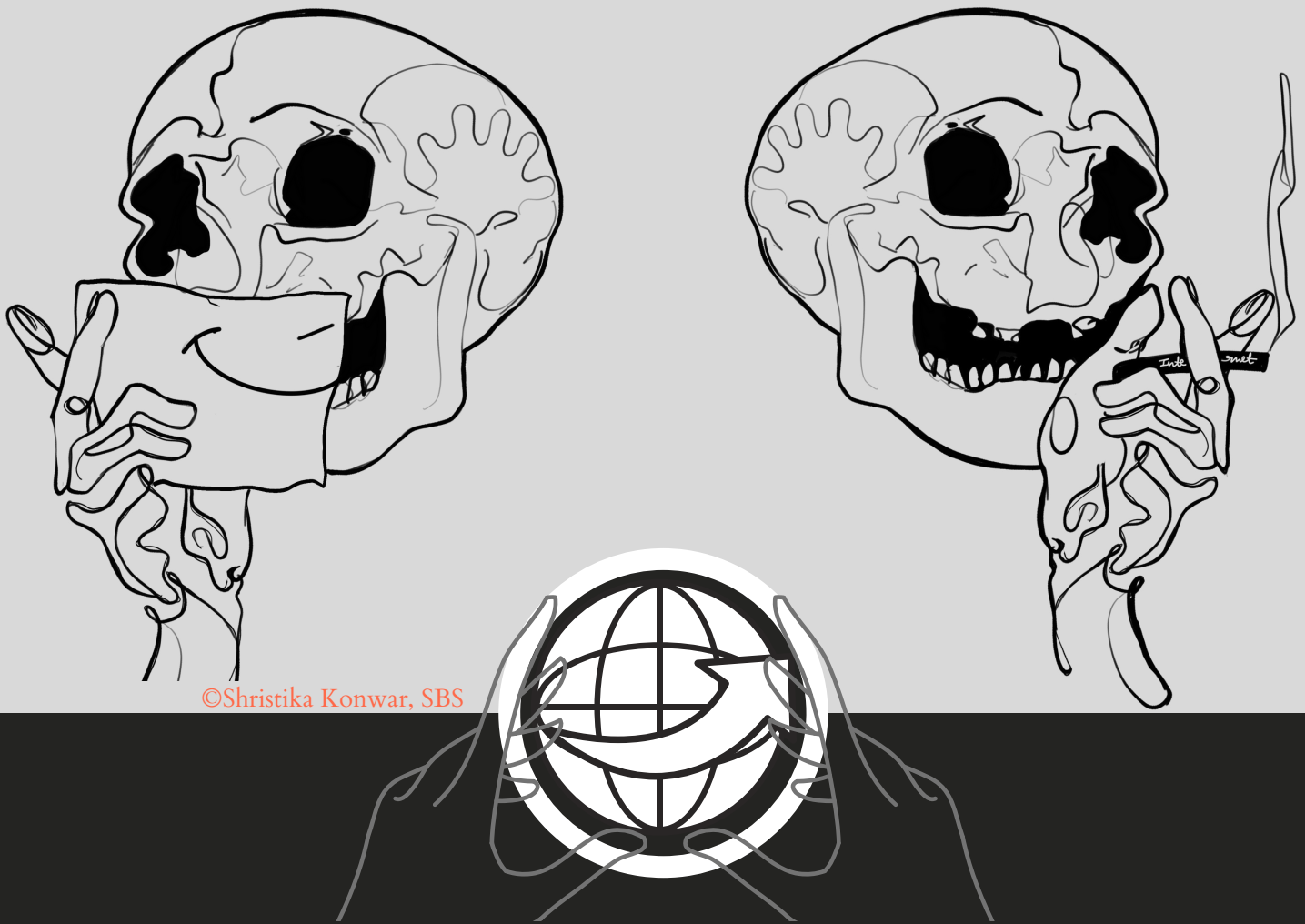
become weaker connections. So ask yourself: *What kind of behaviours do I want to reinforce? What do I want to do in my lifetime?*

Now it has been suggested by researchers that learning new things like languages, making art or even working on a musical instrument, our brain creates new synapses which helps in expanding our intellect(Vance & Crowe, 2006). Synapse is the gap between two neuron cells and it is this synapse that carries electrochemical information between neurons. In other words, we can say that synapses are the key to neuroplasticity in learning(Oltea Joja, 2013).

Neuroplasticity has been found to be static in adulthood, however the research has suggested that by learning new skills or acquiring new knowledge, neuroplasticity continues to evolve. It is found that while learning a new language, the brain's grey matter grows and also forms new synapses and forces neuroplasticity(Fuchs & Flügge, 2014). Also, it has been found out that the left inferior parietal cortex of a person learning a new language is greater than that of an average person who isn't learning one. It was also found that people who practice more on a particular skill such as learning music have bigger hippocampus and greater grey matter in their brains as compared to those who practice less(Valkanova et al., 2014).Many neuroscientists and neuropsychologists are nowadays researching this new field of Neuroplasticity to gain more insight on the topic. Below is a remarkable quote from a neuropsychologist.

"We are in the early stages of a Brain Plasticity Revolution. That revolution begins with a clearer understanding that the brain's machinery is being continually rewired and functionally revised , substantially under your control, throughout the course of your natural life. You have a remarkable built-in ability to strengthen and grow the person that you are, at any age." Norman Doidge, M.D. (The Brain That Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science)

Conclusion : Our brain is capable of definitive change and growth. Our brains become what our brains do, and so therefore we have a greater impact on what our brains become.We can mould our brains in whatever way we want just by following certain habits. In short, I think Neuroplasticity is a kind of a superpower which we can use to our advantage to achieve greater things in life.



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NEGATIVE EFFECTS OF INTERNET ON OUR BRAIN'S MEMORISING CAPACITY

Abhirami Sunil, SBS

Okay Google, what song is this? Okay Google, how to lose weight in a week? Hey Google, can $2+2$ be 5? These are some of the most searched questions in Google. Take a moment and look at these. Do you recall searching for anything similar on Google? How many times have you used Google in the last 24 hours? Now, think about the questions you searched on Google, could any of those questions be answered if you just tried to use your memory?

How the growth of Google is affecting us?

Google searches have increased from 9800 searches in 1998 to 4.7 trillion searches at present. Every day, Google performs more than 3.5 billion searches and a person with an active internet is prone to use Google at least more than thrice a day. From 'will it rain today' to 'how to spell ____', we have made ourselves subconsciously depended on Google. The thrill of instant information has got us in its clutches.

Every time when we learn a new fact, we withdraw ourselves from memorising it because we subconsciously know that we can always rely on Google again. We believe that all of the facts and information are on our fingertips, thanks to Google. Our brain is slowly learning to disregard the information found online and thus, the more we depend on Google, the less likely we retain what we read.

Pre-internet days

Back in pre-internet times, the only options to finding some answers were to either ask someone or to dig up some books. People used to spend hours in the libraries before they found the exact information. This exercise simultaneously made them explore a lot more information for future references. During those times, communicating remotely wasn't easy at all as there weren't any voice or text messaging facilities. There weren't any ways to save caller numbers, people had to either memorize the numbers or write them down on a notepad. Going to new places? Then you have to ask strangers for routes and directions. You have to ask the locals about where to visit and about the specialties of that area.

But now thanks to the technology around us, we don't have to sit hours digging for some information. All you have to do is type in what you are looking for and voila, you have all the information. Finding new places is now a cakewalk with GPS. Nowadays we don't need to memorize things like dates, phone numbers, locations, routes and not even the spellings.

How the internet age is changing our brain?

I, without a doubt, agree with the fact that the internet has eased our lives to a very good extent, but as we say 'everything that has pros comes with cons', so does this reliance on the internet.

The system under which we were to remember the types of information like date/day/phone numbers etc. have been put to rest, due to the advanced and frequent use of technology. Each time we search up simple things like these we are losing our ability to transfer the facts from our working memory to our long term memory. Our brain uses long term memories for critical thinking and reasoning. These memories are very much needed in our day-to-day life to interact with the world around us. Your long term memory reasons the way you think and is an essential component that defines you as a person. Many research have been carried out to study this topic and in

the research conducted by two students at AIMS institute of management studies on how internet searches and Google change our mind states that the way our brain saves data has been changed significantly because of our subconscious knowledge that tells us that 'its ok if we forget, we can always look up online'.

Human brains have been impacted by this whole rise of internet use and some of the most common impact on human's brain is seen on creativity. If we look into the context of creativity, the increasing rate of plagiarism is related to our dependence on the internet. From pre-made templates to scholarly and research work everything is just a click away. Not only has this drastically reduced creative thinking and one's power of imagination but it's also turning young minds into robots that only feed on what is already provided.

The way we have started to rely on the search engine then on our ability to think, research, discuss, think or ponder is alarming. This is affecting our brain by reducing a human's natural ability to ponder, create and reason. Some of the most important gifts that only humans have is being damaged. The inactive lifestyle is directly and indirectly making the memory, intelligence, IQ and other mind ability suffer. We mainly get used to absorbing limited text hastily from our screens and therefore, the ability of mind to read and ponder over detailed texts and longer reads gets compromised. Knowledge gained through this practice of surface absorption of a few lines on Twitter or Facebook doesn't stay for long and is not that effective. The text is short, thoughts expressed are precise, hence read, swallowed and run further. So these things are contributing to alter stimulation and constant distraction is changing the way we think – and not for good.

How the Social Media is affecting our brain?

The report suggests that young minds now-a-days are seeking validations from strangers online. They are constantly judged by peers in this fake race of social media that puts young people under pressure to feel accepted and to fit in the world of trends. This act creates a negative environment on one's intelligence and wit. It is becoming easier to upload forged images online and get appreciated, but what it really costs is the true natural self. One of the most negative outcomes of internet use is that it prevents a reality to set in, that subsequently, damages one's mental wellbeing. We are so addicted to the virtual world of social media, that we never realize that the overuse is leading to decline of our mental as well as our physical well being. So, to conclude let's just say that I'm nowhere in a position to tell you to not use the internet, but yes we can indeed try using our memories more.

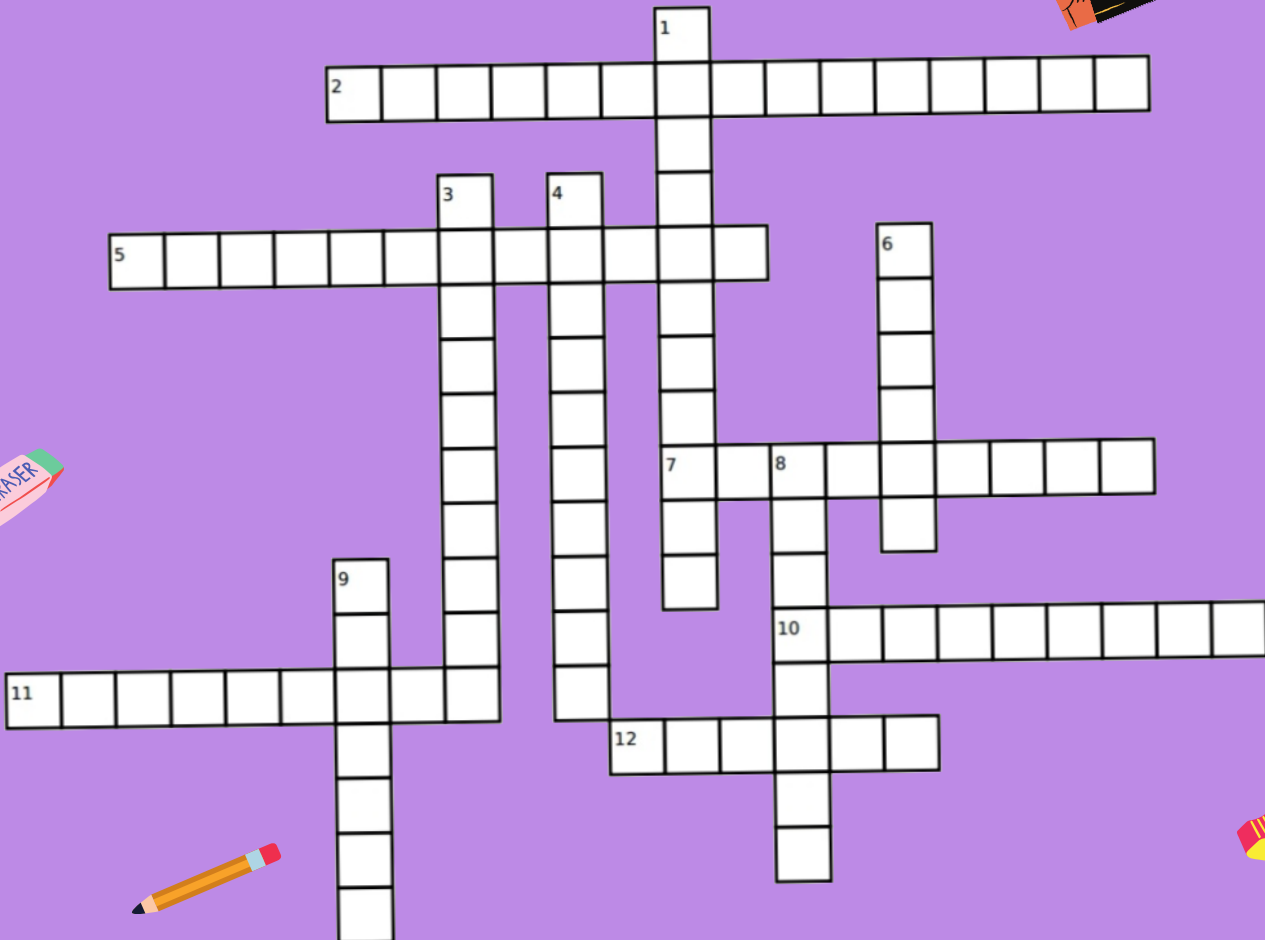
THE NEXT TIME YOU OPEN UP GOOGLE FOR AN ANSWER, JUST WAIT A SECOND AND THINK ABOUT THE QUESTION, YOU WILL BE ASTONISHED TO SEE THE POWER OF YOUR BRAIN

CROSSWORD

by Paruldev Huidrom,
TBS

puzzle

Solve the crossward by writing suitable synonyms:



DOWN

1. multiplicity
3. yoga
4. sense
6. remember your anniversary
8. the post master
9. bridge

ACROSS

2. capabilities
5. growth
7. refreshment drink
10. oblivion
11. slumber
12. introvert

1. pleuripotent, 2. neuroplasticity, 3. meditation, 4. perspective, 5. neurogenesis, 6. memory, 7. endorphin, 8. dopamine, 9. synapse, 10. alzheimer, 11. serotonin, 12. autism

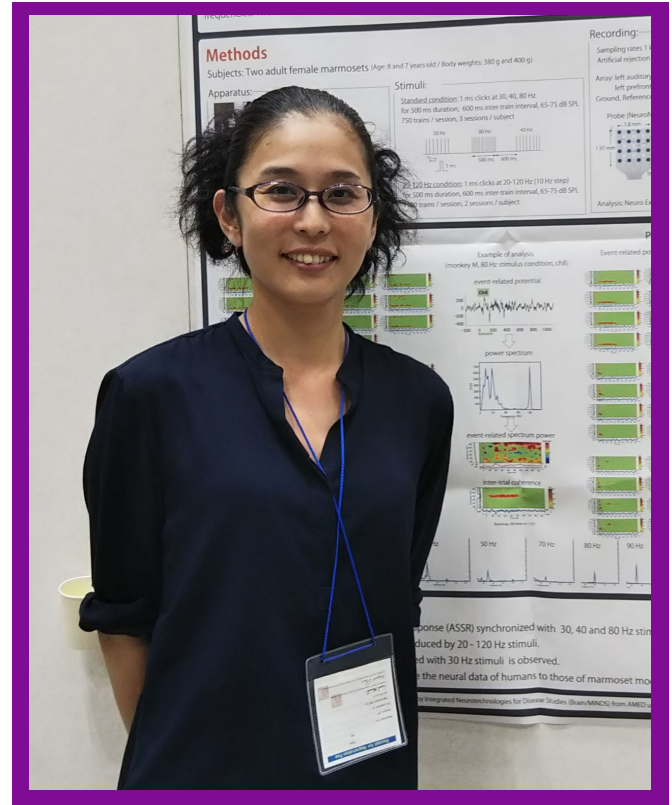
ANSWERS:

EXPLORE

Insightful Interviews



SNEAK- PEEK into



Dr. Naho Konoike
Kyoto University, Japan

life of a

NEUROSCIENTIST



What's better than taking insights on neuroscience from a neuroscientist itself? Keeping that in mind, Team Verdure conducted an interview with Dr. Naho Konoike, who is currently a project specific assistant professor at Primate Research Institute, Department of Neuroscience, Kyoto University, Japan. Dr. Konoike's research primarily focuses on studying neurophysiology and neurodegenerative diseases using non-human primate models.



How would you describe your academic journey?

I was moved by the work of a medical doctor in a documentary film when I was a high school student, and for the first time, I wanted to become a medical doctor. With this desire in my heart, I studied in a medical school. After graduating from the university, I obtained a medical license and worked at a metropolitan hospital as a physician. During my medical training, I was fascinated by the human brain, when I saw neurologists diagnosing various neurological symptoms of patients and finding out the cause of the symptoms, just like a detective. That was why I wanted to learn more about the "brain". Thus, after working there for three years, I entered the master's program at Kyoto University and knocked on the door of neuroscience research. It is extremely unusual for a doctor to apply for a master's degree in a graduate school of science in Japan. Most of all doctors who want to obtain their Ph.D. go to a graduate school of medicine. However, I entered the Primate Research Institute of Kyoto University because I wanted to study the brain using primates as a model for pursuing the brain.



What motivates you to keep your research standards high along the way?

When I was a master's student in my second year, I attended the annual meeting of the Society for Neuroscience in Washington, D.C. to present the first results of my research. I had trained macaque monkeys to perform a finger-tapping task and showed monkeys' behavioral data in the poster session. After I finished my presentation, I found a poster that had the same idea as ours, but also, the group showed more behavioral data and they had already recorded neural activity! I discussed this with the presenter and it was clear that the research of the group was more sophisticated and ahead of ours, even though we started the project at about the same time. I was shocked but decided to use this experience as an opportunity to do my research more professionally.



Could you describe your past and current research? What possible real-world applications it beholds?

During my master's course, I had started research with non-human primates on the theme of how the "rhythm" of movement is controlled. This research design was originally based on the idea of my supervisor, and I worked on this project with him. Rhythm is one of the most important components of music and language. Not only that, but each movement must be performed at the right time, i.e., "rhythm" is essential for smooth movement. We found that macaque monkeys can perform repetitive tapping if the intervals are sub-second, probably depending on the automatic timing system. However, the conscious timing system for supra-second intervals is not well developed in monkeys, unlike humans. (Konoike et al., 2012). We developed this research and revealed the neural substrates underlying rhythm perception and production in humans by fMRI experiments (Konoike et al., 2012, 2015). After I got my Ph.D., I had engaged in a research project to investigate the neural substrate underlying emotion. We focused on two brain areas; the anterior cingulate cortex (ACC) and amygdala, which are thought to be involved in emotional regulation. I recorded the activity of the ACC neurons from awake monkeys during which the monkeys are explored by emotional stimuli. We found that a part of ACC in addition to the amygdala processes emotional information, especially negative life-and-death information such as conspecifics' faces and snakes (Kuraoka, Konoike, and Nakamura, 2015; Konoike et al., 2020).

The ACC and amygdala are regions critical for emotional control implicated in the pathogenesis of the psychiatric disease. Patients with depression show abnormalities in volume and activity in the ACC and amygdala. Furthermore, depressive patients display a negative bias in the perception of emotional stimuli such as facial expressions. We investigated the ACC responses based on these findings suggesting that the ACC functions in the processing of facial information, and that malfunction leads to the negative bias of the emotion of others in depressive patients.

Recently, we have developed psychiatry disease models using small primates native to South America, common marmosets. We believe that the establishment of appropriate primate models will lead to dramatic advances in the understanding of the pathogenesis, diagnosis, and treatment of human psychiatric disorders.



What kind of research opportunities does Japan offer? How is Japan as a study destination for Indian students?

Our institute has an international collaboration facility and many international students from all over the world have been enrolled. We also have students from India. Please visit our CICASP website <http://www.cicasp.pri.kyoto-u.ac.jp/#>

In Japan, it is relatively tolerant for animal research using non-human primates than in Europe and the United States. English is spoken in the laboratory, but on the other hand, many Japanese can only speak Japanese. You will need to learn some Japanese in your daily life.



Marmoset family



As a neuroscientist, what is your vision for the next 30 years, in terms of research advancements and clinical applications in this field?

The number of patients suffering from neuropsychiatric disorders such as depression and dementia is increasing all over the world, and it is becoming a major problem that

threatens our lives. On the other hand, there are still many unknowns about the causes and pathogenesis of these diseases. Animal models are a powerful tool to explore the pathogenesis of these diseases. However, rodent models are still the mainstream of research, and breakthroughs in creating appropriate non-human primate models have yet to occur. Psychiatric disorders, in particular, have many symptoms unique to humans, making it difficult to make an appropriate diagnosis in animal models. As a neuroscientist, I hope to create appropriate primate models, especially for schizophrenia and depression, in the next 30 years to promote early diagnosis and treatment of diseases, elucidation of pathogenesis, and the development of novel therapies.



MRI ROOM - To acquire MRI data with stereotaxic co-ordinate.



Continuity is the

(継続は)



data of the marmoset brain



Marmoset babies



What is your message for undergraduate students who have interest in making a career in the field of neurobiology?

When I started my life as a researcher, there were no female researchers around to learn as role models. Many female researchers of the same generation abandon their research jobs after getting married and having children. On the other hand, famous female researchers in Japan are superwomen who achieve brilliant success at their jobs, have perfect private lives, which made me wonder when they slept. But I felt that it was wrong to have an environment where only such superwomen could become researchers. Now, I am a researcher while raising two children. I sleep well. I want to continue this work because I love to research. Many years have passed since then, and various kinds of support have increased, such as grants for researchers returning from maternity leave, and childcare during conferences can now be paid from research funds. I hope that the world will become a place where not only female researchers, but also male researchers who participate in child-rearing, researchers who want to balance their research with elderly care, and researchers who work with illnesses can engage in research.

It is also very important to "keep going. There are times when it is hard. It's okay to take a break for a while. But please start again. In the long run, not many people can keep doing one thing for a long time. I have taken many breaks, but each time I came back to my research. I think the fact that I did not quit has led me to my current career. In Japanese, there is a saying, "continuity is the father of success (継続は力なり)". With these words in mind, I am continuing my experiments today.

father of success

は力なり) 〰

EXPLORING THE FIELD OF CON

Consciousness studies being one of the most exciting realms of the neuroscientific world is rapidly developing in recent years. To discuss the concept of consciousness, brain function, and the future of neuroscience research, Team Verdure held an engaging discussion session with **Mr. Rahul Venugopal**, a PhD Scholar at Centre for Consciousness Studies, NIMHANS, Bangalore. Mr Venugopal's work focuses on understanding working memory in humans and developing methods to improve the same.

QUESTION: As there are multiple definitions and interpretations of the term Consciousness, how will you define consciousness?

ANSWER : It's a million dollar question indeed. In the field of neurosciences, the word consciousness is commonly used in varied forms yet there is no agreed upon, proper, definition. So taking that anticipatory bail, I will tell you how I will define the concept. Consciousness is that subjective feeling which is very private and individual specific. It is very difficult to put into a particular set of words, as it is very subject specific experience. Like, for example you all might have seen the ambiguous image of a rabbit-duck in which some people see a duck and some people see a rabbit. How is that possible? Their perception is very subjective, and it lies at the core of consciousness.

QUESTION: Can we quantitatively define Consciousness?

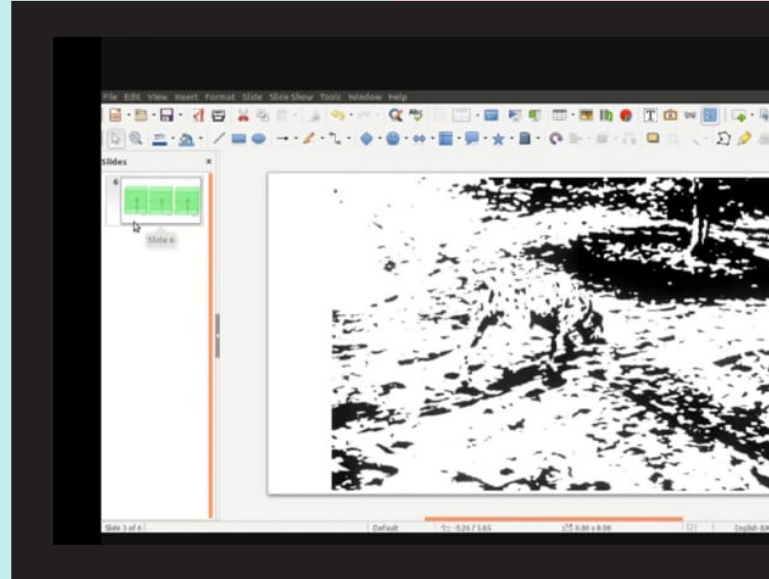
ANSWER: A lot of labs around the world, including my lab, are attempting this problem. It all started with Giulio Tononi, Professor at University of Wisconsin-Madison School of Medicine. He was interested in coming up with a consciousness meter to quantify consciousness. The meter worked on a principle in which you acquire any electrophysiological data from the sensors placed on a person's head. Then you measure the data by passing it on to a bunch of mathematical algorithms. At the end of the algorithms there will be an end value which will quantify the consciousness of that person. Tononi's work is well respected in the community and there are some parts of it already in place. Dr. Steven Laureys of the University of Liège, Belgium, worked on the same concept. His group developed a conscientiousness meter in which a person who's mathematical value in meters is large is able to recover faster from the state of unconsciousness, such as a comma, before a person who has lesser value.

QUESTION: If we are able to simulate the whole of the brain in the future, how much of a new horizon would open up for neuroscience?

ANSWER: In human genome sequencing, what scientists thought was that if we could understand the human gene, it would unravel the zenith of our understanding. But what happened was the discovery of junk codes/DNA left us without an answer.. Even if we figure out the entire synapse, there would be unknown puzzles. I believe that it is a never ending process. One answer leads to another question.

QUESTION: Can you tell us a bit about your field of research and it's prospects?

ANSWER: My PhD goal is to understand working memory and how we can enhance it. I'm primarily interested in understanding mechanisms of working memory and understanding the brain from a consciousness angle. I'm also interested in training future scientists.



QUESTION: How important is the concept of consciousness and how it affects our brain functions, like, cognition and memory?

ANSWER: There are certain levels of consciousness. Level 1 is the condition of coma, where the subject is alive, the functions like respiration and beating of heart are intact, but there is no sensory response at all. Almost zero level of consciousness. Next is locked-in syndrome or being in a vegetative state. The input of sensory information in this case is received but the patient can't respond to the sensory stimulus.

The major challenge faced by the health faculties is to decide whether the patient diagnosed with coma or locked-in syndrome will ever come back to consciousness or not, and in such cases, consciousness research is very impactful. It can be used to determine at what point the patient can be withdrawn from the life support system provided by the hospitals.

With improved medical technology, a person can now reach up to the age of 90 or 100 as opposed to the times when only max 80-85 was possible. The problem is that with the increase in reliance on external support such as heart or lung replacement, cardiac support for your bodily functions, we will reach a point where due to the replacement of the bulk organs of our body we enter the realms of ethics. Studying consciousness will play a key role there through neuroethics. If you're going to reach the age of 200 years, what all changes will happen to you. You can upload your memory into a computer and become immortal. Core of consciousness research lies in such futuristic inventions and development of neuroethics.

ANSWER: The field of my study is on a simple concept "working memory" (better explained as the way your brain processes your OTP). We are trying to improve our working memory capability. Can you alter the cognition levels of the brain using electric signals? Electro convulsive therapy and pharmacological routes are the answers.

Brain communicates through neural oscillations. When we administer certain external frequencies through electrical signals we can push the neural oscillations to a resonant frequency. This way, we are trying to find an effective oscillation frequency that enhances the brain working memory and derives neural patterns through machine learning.

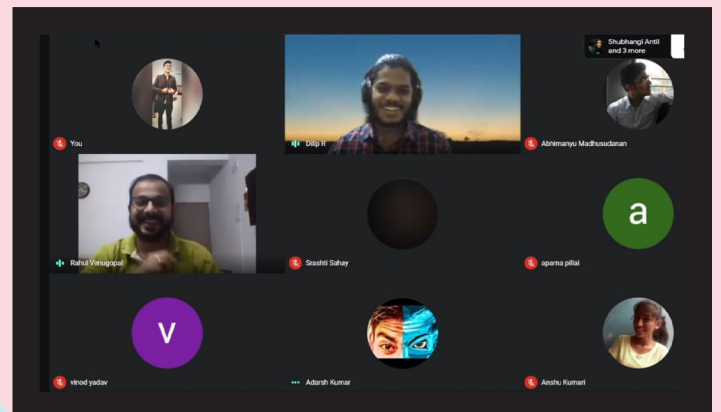
ANSWER: Curiosity is generally considered as a higher cognitive aspect. Non primates such as rats and mice are also curious. Yes, curiosity is a part of consciousness but a very minimal part of consciousness research.

Answer : It is a well researched area. So firstly I want to differentiate between sensation and perception. So sensation is more real, to speak, so that is the information that is coming through your senses. It can be auditory information, visual information, touch, smell, taste etc. So that is more real and which your receptors actually perceive at different frequency levels. Perception is the actual consciousness part of sensation. It is what you are actually feeling when you are sensing something. Whenever we talk about perception, there is a bottom-up processing. The brain tries to figure out what the sensation is, and it is always based on your memory and your visual previous experiences. There's a top down aspect to the visual perception also. Magicians cheat your visual perception, you know that it is an illusion but even so your brain can be tricked by the tricks of the magician. So that's where the whole point of perception, deception and consciousness comes into the picture.

QUESTION: What are the challenges of pursuing neuroscience in India?

ANSWER: Neuroscience is highly interdisciplinary. It involves collaboration of multiple subjects. India lacks interdisciplinary training programs. Neuroscientists need to be trained in multiple domains but there is minimum collaboration among the different institutes in India.

India also lacks job opportunities in the field of neuroscience. We do not lack anything in terms of skills and knowledge and I feel like we are slowly catching up. There has been an emergence of new training labs here and there also. Challenges will always be there and it is just a matter of time for India to come up the ladder.





UNDERSTANDING HUMAN BEHAVIOUR THROUGH SCIENCE AND THE LAW

The law has been defined as the “Science and the Art of Justice”. To understand better the relationship between scientific research and law, the Verdure team interviewed **Sanchit Singh**, a third year BBA- LLB student of VIPS, GGSIPU, Delhi, to gain some insights into the importance of human brain sciences and sciences in general, in the field of law. In this interview he tells us about the relations between law and sciences, how they both co-exist and how scientific methods are effectively being incorporated with the legal proceedings.

1 **As a student of law school, where would you place Science in the embodiment of the laws while framing the Constitution of our country?**

The Preamble of our Constitution candidly lays down the ideals of justice as the basic structure, forming the basis for adjudication in the Indian Courts of Law. Even though legal scholars like to define law-making, interpretation of legal rules and principles as a social practice that inherently does not know Science, the evolution of Sciences has had a substantial influence in shaping legal practices, evidently seen in the application of the Evidence Law and its procedural and substantive role in the proceedings of courts. This school of thought does not necessarily divest from acknowledging the significant partnership that the Law has had with the evolution of Sciences, depicting the importance that Science has had in achieving the ideals of our founding fathers during the formation of our Constitution.

2 **Could you tell us more about scientific methods incorporated with legal proceedings ?**

Such collaborations have led to three popular tests that aid investigations – polygraph test, narco-analysis and brain-mapping. Criminal jurisprudence has adjusted to incorporate scientific methods with doctrinal principles of the law that Science alone cannot help the court draw its conclusions, for example under Section 27 of the Indian Evidence Act 1872 direct evidence from an involuntary polygraph test is

inadmissible in a court of law, with the proviso being that such a test be substantiated with other relevant evidence. Similar is the case for the other two tests. Even if Science is able to develop an accurate method of conducting such kinds of tests, as already being deliberated upon by legal scholars, Article 20(3) and 21 of the Indian Constitution that deals with rights against self-incrimination and right to life and personal liberty respectively, would prevent the courts of law from adopting such methods keeping citizens’ fundamental rights in consideration. As stated in the Section 27 of IEA example, voluntary undertaking of any of the methods is essential without which the methods are useless in court proceedings.

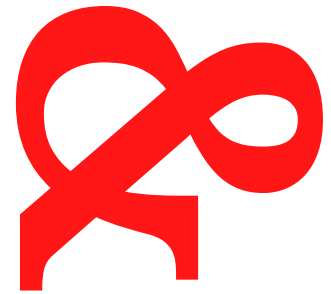
3 **And what developments have we seen so far in regards to legitimacy of these methods from the general public as well as the legal fraternity?**

While legal scholars remain divided on the issue, it can be accepted that there is a lot of research that needs to be done in normative and pathological populations. Research should be focused in light of the constitutional guarantees and the Supreme Court judgement in Smt. Selvi & Ors. V. State of Karnataka 2004 that provided that involuntary deception detection tests (DDTs) have no place in the judicial process. This indeed has significant challenges and hurdles but the unfortunate reality is that voluntary acceptance of the previously mentioned methods is rare for suspects who are undergoing trial. With this, a growing distrust has been observed



©Neha

by the legal fraternity over forensic scientists over matters of inaccuracy of the methods that disrupts proceedings, causes delays and sometimes even further complicates the case, diminishing faith in the proposed methods in the evidence collection and presentation process.



4 Could you give us some more insights on the varying views on legal prosecutions subordinated by human brain studies?

The science of the human brain has also played an important role in understanding capital punishment and the psyche of convicts of heinous crimes. Within an Indian context, capital punishment is justified by claiming that the crimes committed are so heinous that a convict cannot be corrected through reform with the intention of re-introduction into society. The debate on this issue can be seen with two perspectives based on time period. Initial deliberations by our Supreme Court include the mode in which capital punishment is presently given and efforts to explore alternative more humane approaches; and further the deliberation over the elimination of the practice entirely. Comparative studies have concluded on many occasions that capital punishment does not necessarily deter homicide cases, however at the same time these comparative studies deal with demographically different societies. While Scandinavian countries like Finland believe that convicts can be re-introduced in society, there are many countries that are yet to become state parties to the ICCPR Optional Protocol II dealing with death penalty. Scientific research is what has helped answer complex and sensitive questions of the law in the past and it is this science that will help guide our judiciary towards maintaining our commitment of protecting human rights enshrined in both domestic and international conventions.



Guliya,SBS

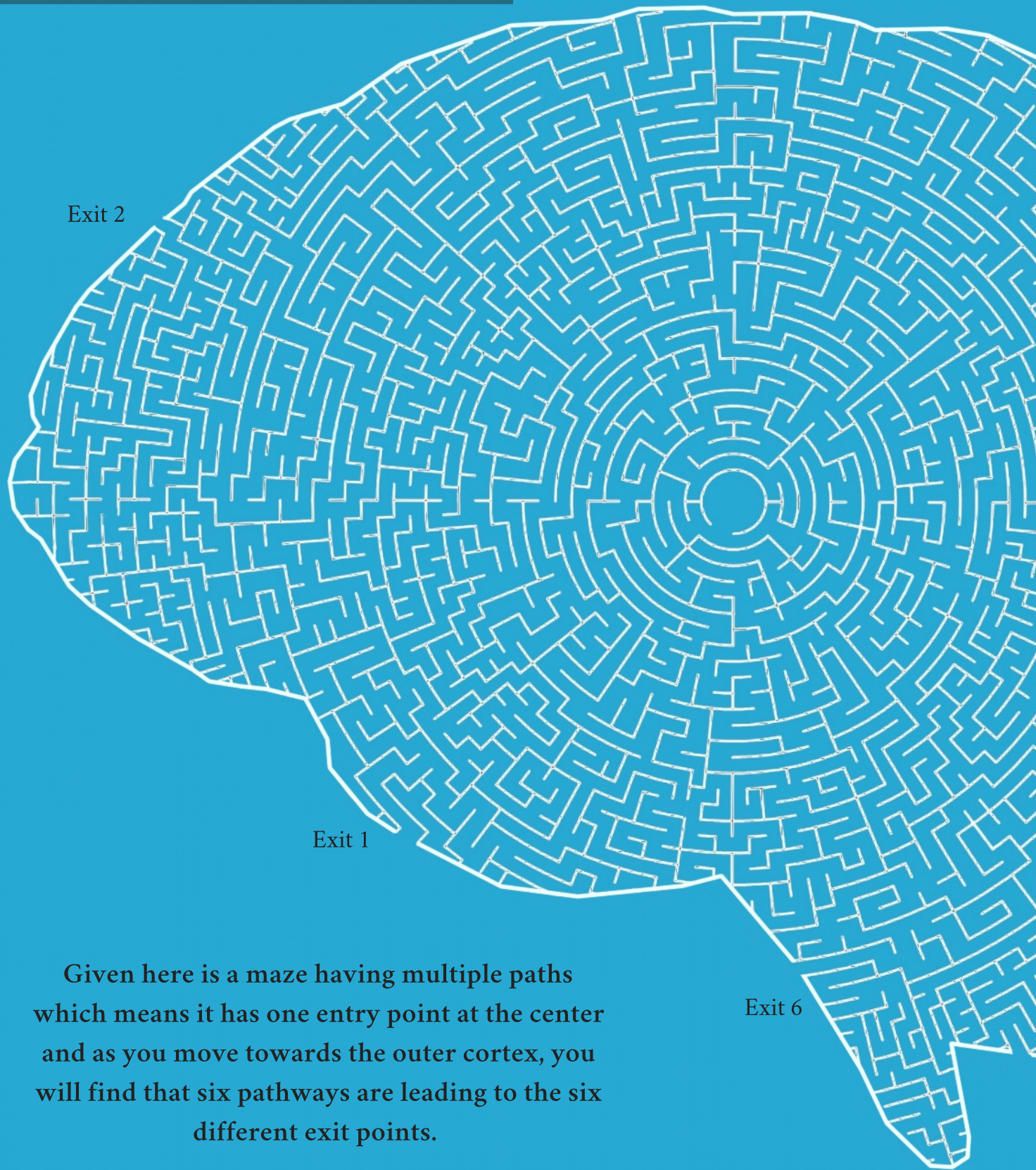
5 Any final concluding notes?

For an effective participative and collaborative democracy to function, trust in science and fact is crucial as the current American President Joe Biden has reminded his citizens time and again. With the great strides achieved in cooperative efforts between science and technology, there is faith that science will be able to support Indian courts in ensuring speedy justice for victims through the development of tests and methods based on reason and logic. And finally I quote Robin Feldman,

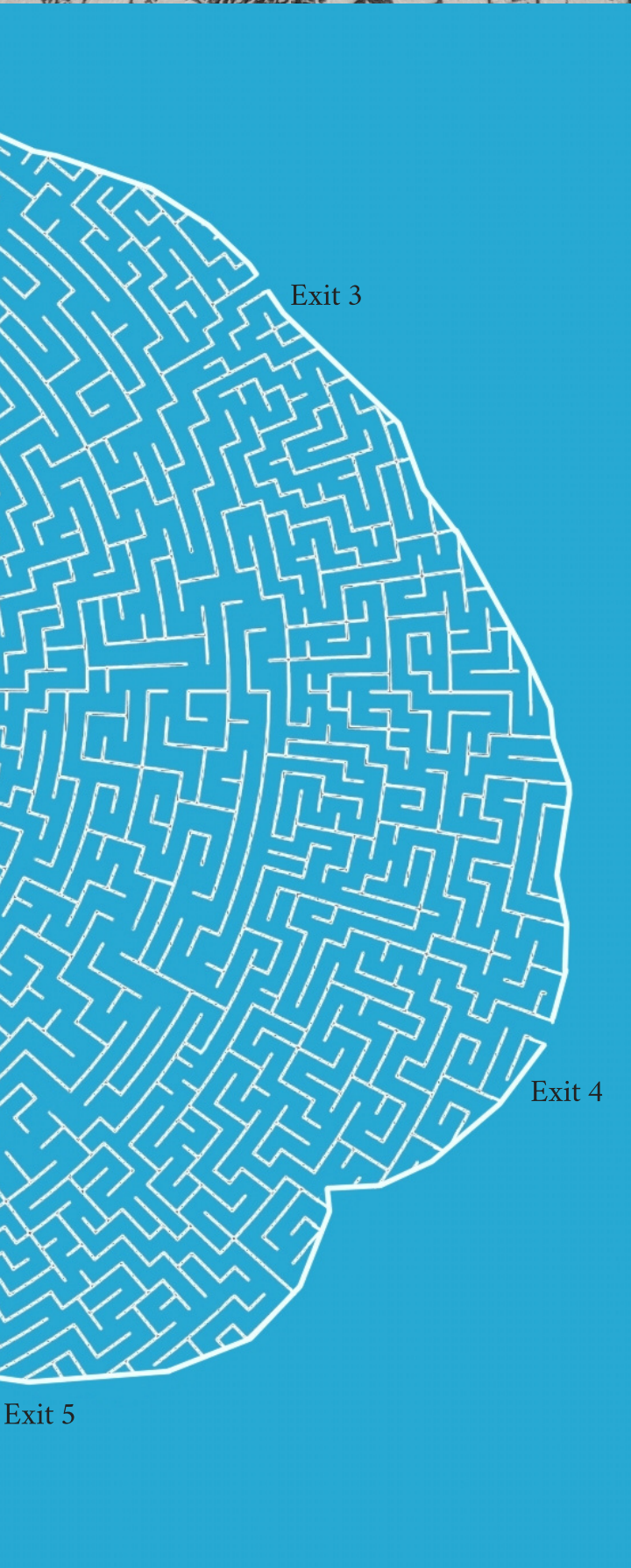
“...law’s attraction to science reaches almost back to the time when science separated itself out from other types of thought. What unites all of these attempts to reach for science is the view that science, in whatever form it takes, can solve the problems of law. Science stands on a pedestal as the —other that will help law find itself”-



BRAIN MAZE



Given here is a maze having multiple paths which means it has one entry point at the center and as you move towards the outer cortex, you will find that six pathways are leading to the six different exit points.



Exit 1 - TEMPORAL LOBE
memory and hearing

Exit 2 - FRONTAL LOBE
problem solving, judgment and motor
function

Exit 3 - PARIETAL LOBE
sensation, handwriting and body
position

Exit 4 - OCCIPITAL LOBE
visual processing system

Exit 5 - CEREBELLUM
coordination and balance

Exit 6 - BRAIN STEM
regulation of breathing, consciousness
and body temperature

How is your mental health ?

According to WHO, it was estimated that mental illness makes up 15% of the total disease conditions around the world and further refers to India as one of the largest populations affected from mental disorders . In fact, our society is crippled by the wounds from the varying personas of mental illness. And the repercussions can be quite detrimental. So, there arises a need for dismantling the social stigma against mental disorders and evaluate the importance of mental well-being. This section opens up the readers to realities of mental health from real life stories to poems and articles subordinated by research articles and makes a noble effort to throw some light on the subject.

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Mom & Dad Industries
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Bedroom ,
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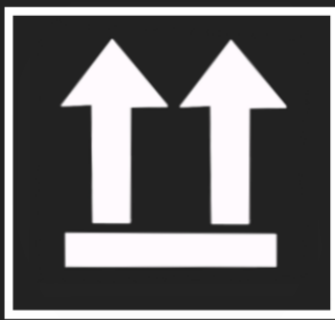
TO :
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WARNING



This product is not
a substitute for
medical help . Seek
Professional help

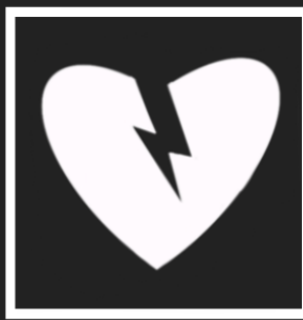
HANDLING INFORMATION



This Way up



Handle with care



Fragile



Biohazard

Human Being®

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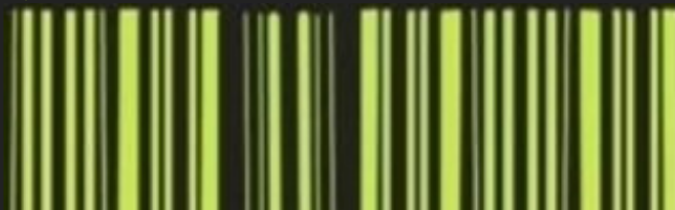
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Hydrogen(10%), Nitrogen(3%),
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Sulphur (0.25%) , Sodium
(0.15%), Magnesium (0.05%),
Selenium(0.70%), Molybdenum
(0.70%), Flourine(0.70%),
Chlorine (0.70%), Iodine (0.70%)
, Manganese Cobalt (0.70%) ,
Iron (0.70%) , Lithium (trace),
Strontium (trace), Lead (trace),
Vanadium (trace), Arsenic
(trace), Bromine (trace)

**100%
ORGANIC**

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may vary
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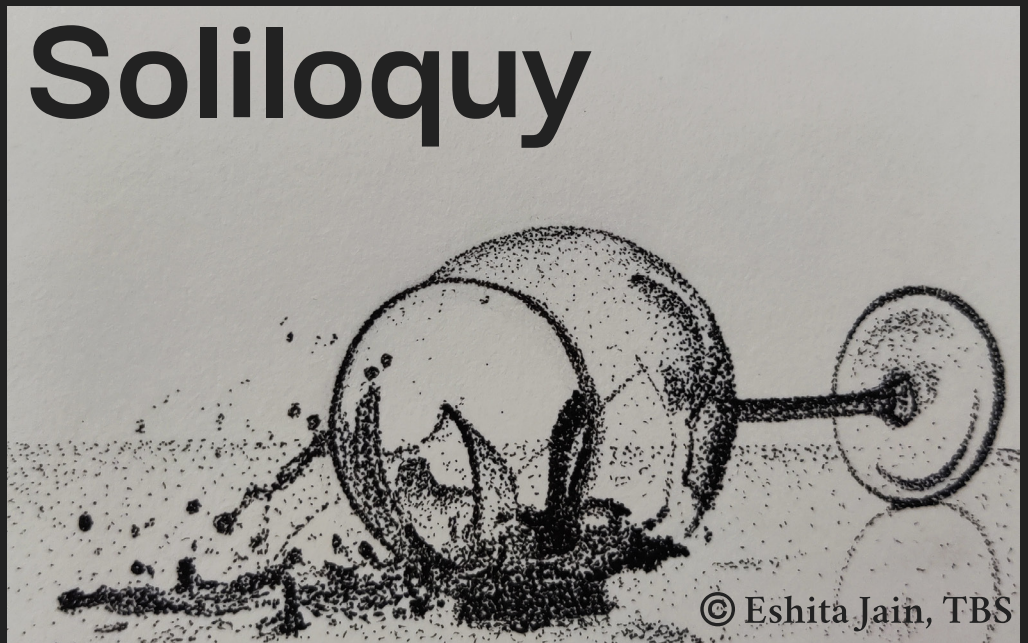
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**100% Biodegradable
Please recycle**

My Dark Abyss: A Soliloquy

By Nandini Sharma, FBS



Why do I always
have to conform myself and my priorities every time?
To perform
according to their meaningless meanderings into satisfying big egos;
to transform
my whims & wishes,
my interests and my dreams, into something “appropriate”;
to reform
my ideas, my mindset,
my experiences to fit their dingy chauvinistic narratives;
to deform
my learnings, my values
& my morals just so I could become acceptable to their “crowd”;
to inform
myself constantly that my soul was never mine,
but theirs to control.

MY, oh my, Why?

Why should I have to believe
that my identity is limited to,
only my gender, race & nationality?

To leave,

and pass up opportunities,
so they can live "carefree";

to weave

the threads of my soul into
a fabric through which I can't breathe;

to receive

hatred, judgement in return of,
voicing my opinions and ideas;

to achieve

laurels that light up their pride and darken my mind;

to retrieve

every single thought that they find "somehow" offensive,
in their diabolical minds.

MY, oh my, Why?

Why can't I just break ties,

from everybody and run away?

Just wake from this never-ending nightmare and fly away;

just take back my soul, heart and mind,

that they stole on the way;

just make myself realize, my potential

and never let my determination sway;

just unmake this insipid ghost of a person,

that I've turned into

just forsake those demons that,

snatched away everything in their wild pursuit.

MY, oh my, Why?

But, I won't.

I won't let them discard thousands like me,

who search for purpose and stand up for truth;

disregard the sacrifices of people;

before now & after,

for the purpose of a new change,

bombard the foundations of things,

that I believe in.

You ask why?

But you know why,

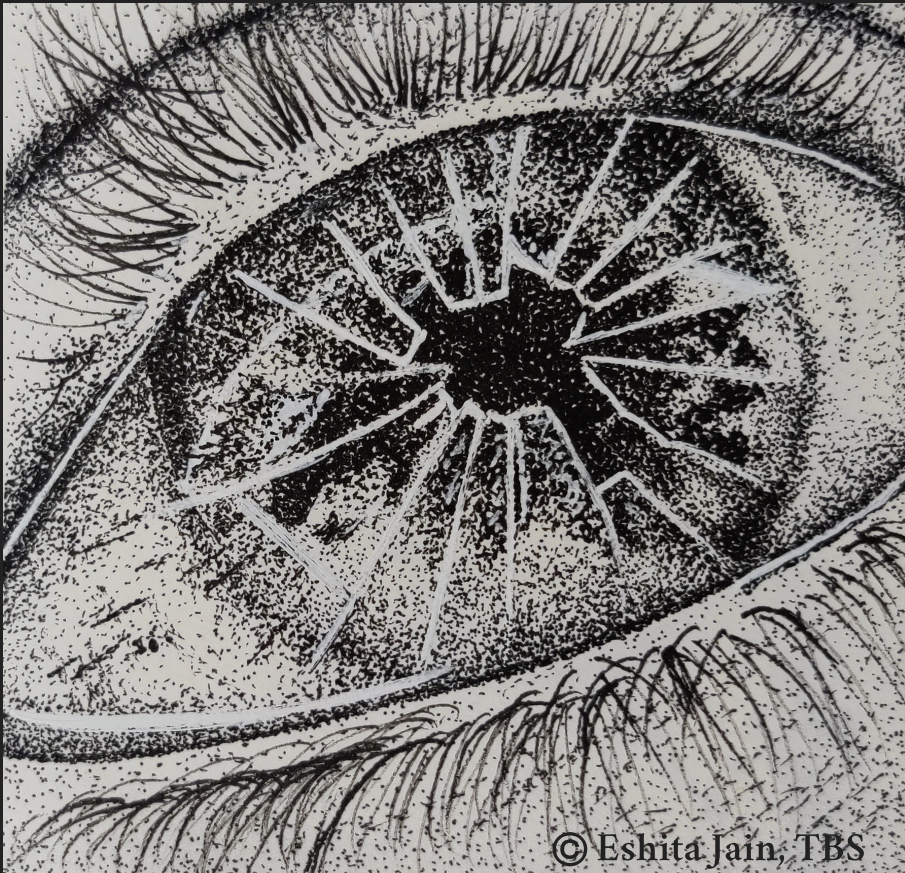
I try to create a world where

there is no lie,

where every child can fly,

wherever they want,

however they want.



© Eshita Jain, TBS

DECOPIING

Sadness touches lives at times, be it a loss of a loved one or down on one's luck at the workplace. Depression, in contrast, has enormous depth and usually persists for a long time. WHO defines depression as "a mental disorder that presents loss of interest, pleasure, feeling of guilt, low self-esteem and poor concentration."

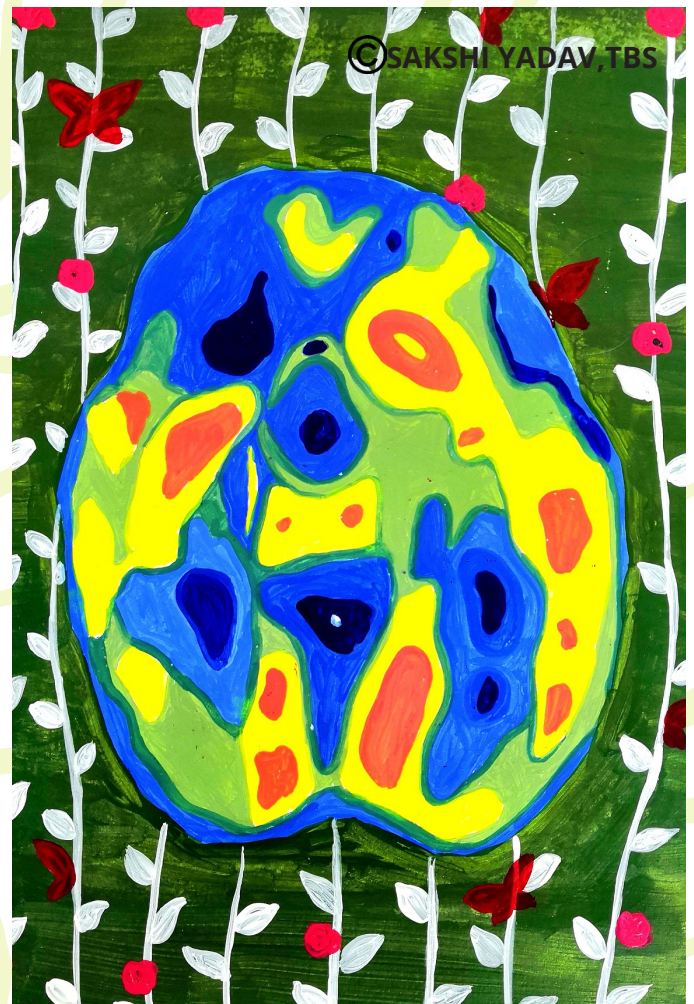
However, to diagnose the symptoms of depression is not easy, for we could see contrasting responses to similar conditions - one might be feeling low on a foggy dusky winter day due to low light or short-day conditions (as seen in seasonal depression) while someone else may be absolutely fine and feeling nothing as such. It becomes even more difficult to diagnose depression simply because "mind reading" still remains a fiction. The only way researchers or psychiatrists rely to know about someone's mental health is when people themselves open up their feelings; and even then, it's not as simple as it looks for two very obvious reasons: -

Firstly, the existing social stigma against therapy;

And secondly, lack of awareness of their own mental health. In fact, most people misunderstanding depression is way more common than one realizes.

Though very little is known or understood about depression till date, we can all agree to a common conclusion that there generally occurs some trigger that can lead someone to depression like suffering a loss in one's life (a breakup or a loss of loved ones). Continued prolonged medications generally observed in people unable to recover from a life threatening event, can cause a condition called Post -Traumatic Stress Disorder (PTSD). Generally, PTSD is very common among individuals who served in the military with a significant amount of time on the battlefield.

Not only these, recent studies have found depression can be hereditary . In fact, suicidal tendencies in a person whose family had a history of such anomalies can be high as indicated by an experiment conducted by Lieb et al (2005), who carried out a prospective study to examine the risk of suicidal attempts in the offspring of a depressed mother who had attempted or contemplated suicide. They found higher risk for suicidal ideation or attempt to such individuals as compared to an offspring whose mother had never attempted suicide.



NORMAL BRAIN

DEPRESSION

VINOD YADAV, TBS

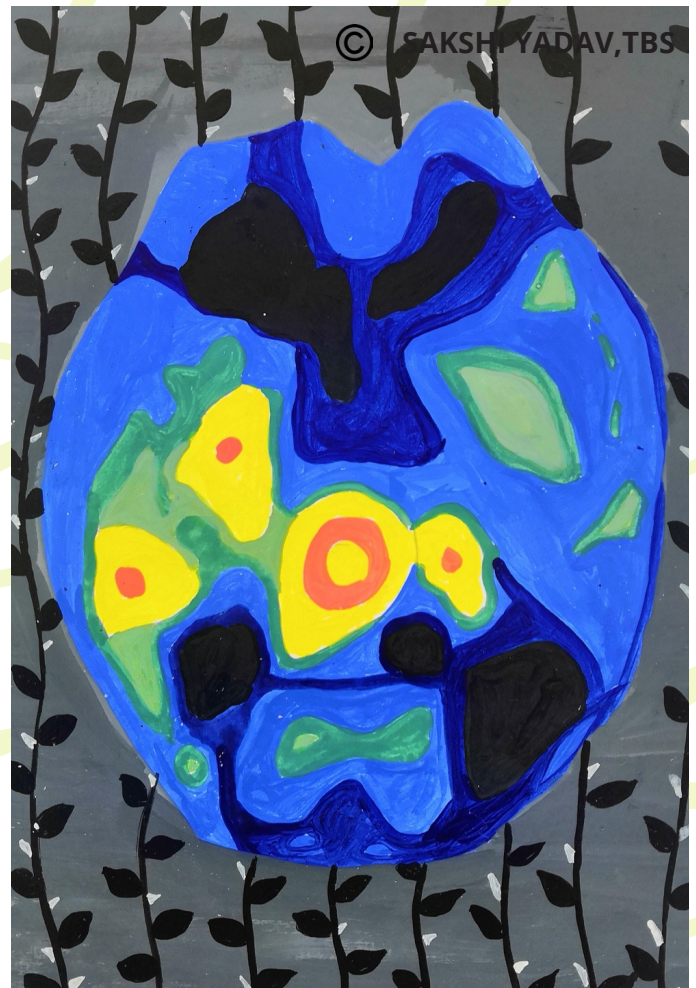
There can be different degrees of depression broadly classified as:

- Major depression or full-blown depression, which is long lasting.
- Persistent depression disorder / minor depression or also called dysthymia: - Low mood occurring for at-least two years persistently and continuously .
- Bipolar depression: - Display cycles of mood swings, from depressive low to maniac high.
- Postpartum depression :-Irritability and mood swings seen in women after childbirth.
- Psychotic depression: - Causes perception, hallucination and the person loses touch with reality.

All that might be a description of depression as a medical condition but a biologist or more particularly a biochemist, would translate depression as a condition of the body where it experiences a low level of neurotransmitters (molecules that bear the responsibility to coordinate the signals in the nervous system) in the body.

For example, the dopamine and norepinephrine in the brain, a low level of production of these neurotransmitters or a problem in their receptors will, for sure, hinder proper coordination of the nervous system; a hormonal imbalance might also be responsible for the same, which is a major cause of mood swings in women associated with puberty, menarche, pregnancy or menopause.

Antidepressants are generally beneficial for the patients suffering from depression and might work miracles in some cases, however results might not be that solid with everyone, also some people might develop allergic reactions to antidepressant medications. In that aspect of treatment of depression, psychotherapy, cognitive behavioral therapy, etc. have proved to be very effective. However, there is no sure shot treatment method for depression .Exercise, meditation, healthy living and good diet, can be beneficial to increase the body's ability to resist falling into depression.



DEPRESSED BRAIN

Mirror Mirror On My Wall..

by Sanidhya Jagdish, SBS

Mirror mirror on my wall,
How many likes have I in all?
“Around six hundred”, it said.
That is what I recall; but is that all?

What has life become these days,
Full of apps and filled with haze
I gave myself a glare,
and resolved a life without fanfare

Wanting to change my life,
I stabbed the internet off with a knife.

At breakfast I ate some fruits too,
then I recalled that Apple was one too

Life was getting to be boring sans my phone.
There must be something to do in this silent zone,

I used to swipe through my Instagram feed,
And try those creepy filters as I pleased.
What lovely emojis were they,
The heart, the sun, so many faces to say

Not keeping track of time,





I've spent hours on Amazon Prime.
I really miss those days with lots of pings.
Now even the doorbell doesn't sound its ring.
People I used to call my friends,
were merely an illusion in a sense.

The struggle was hard,
But I triumphed at last.
And the stressful day finally passed.
Happy to have achieved my goal,
I marched on to the internet's shore

"Got to tweet this", I exclaimed
Oh! There I go again.

This was a cycle of silent death,
to be fought with a lot of strength.

I decided to find true peace from within
and enjoy the sunset with a grin.

And asked the mirror once again ...

How's my painting overall?,
Mirror Mirror on my wall ...



It's hard to breathe
at night,
for hours I sit, in my favorite corner
not a paper flaps, yet
it's so noisy (inside my head)

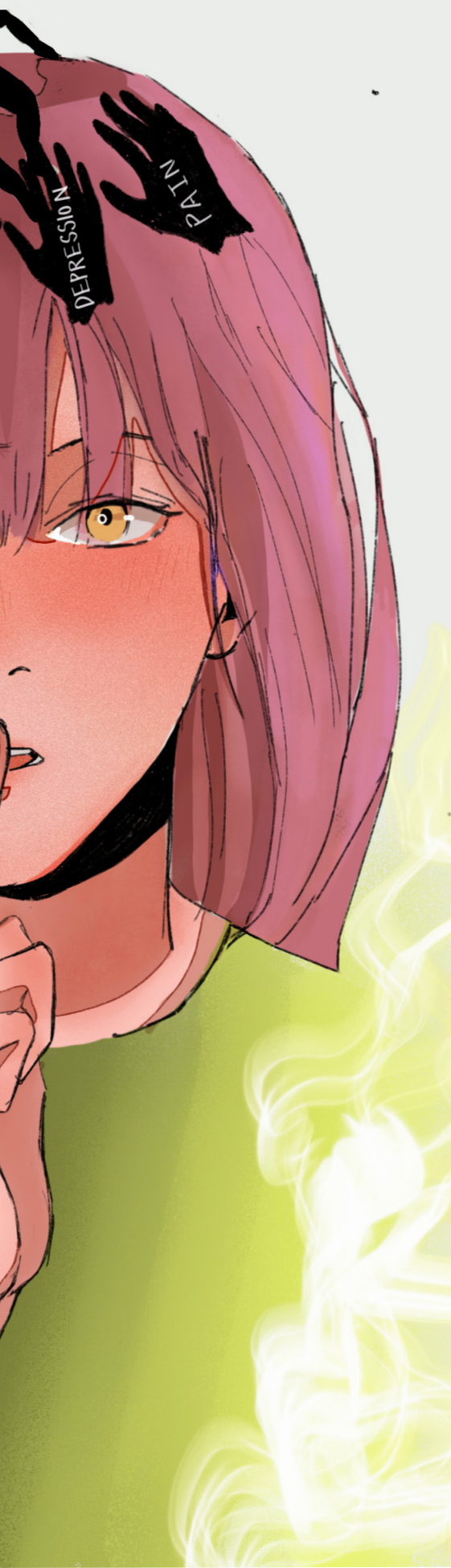
It's hard to be okay,
pretend,
to wear the same smile
and lie about being fine
but inside, in the box by my bedside
are the pieces of me hidden, from your eyes.

It's hard to trust anyone,
to help me climb,
through the mountains
I'm afraid, afraid of the dark half of them,
who might push me into the abyss.

It's hard to move forward,
strings holding me,
piercing my heart like an icy dart
It's less painful now, more out of habit
Normal, it hadn't felt normal for ages, I'm
trapped in a loop.

It's hard to remember, small things
"Did I eat already?" Yes they say. "I am
sorry I forgot."
I apologized, not for the first time.
Am I lazy? Maybe (No)
Because every day, I wake up to do it
all over again.





It's

Hard

by Anshu Kumari, TBS

REPEAT AFTER ME : "MENTAL HEALTH IS POTENT"

by Jaanvi, SBS

MENTAL HEALTH - The most trending yet misunderstood issue in the nation. Yes, we exist in an environment where the mere talking of mental health issues relates to the chords to retardations and mental disabilities.

Since the pandemic occurred across the world, each one of us, at least once, has gone through the trail of emotions, be it strength, concerns, boredom, fear of losing loved ones and many more.

This roller coaster of emotions has affected our mental health at catastrophic cost.

The need of the hour is to NOT TO NEGLECT this aspect of health. It is absolutely normal to feel down, to need someone to talk to, to want someone who can just buck you up and drop you to life back again !!

For example, if we take the example of Agoraphobia- a disorder where a person might feel uncomfortable, suffers anxiety, is frightened interacting with people and visiting places, and feeling trapped, helpless or embarrassed. People with ag-

oraphobia often have a hard time feeling safe in any public place, especially where crowds gather. You may feel that you need a companion, such as a relative or friend, to go with you to public places. The fear can be so overwhelming that you may feel unable to leave your home.

**Mental Health Is Not A
Destination, But A Process. It's
About How You Drive, Not Where
Are You Going**

Imagine the state of mind of such a person. They are frightened to know people, to interact with them or to just be around them. How would such people gear up their lives – both personal and professional?

Instead of taking mental health for granted, we should reach out to the people in need.

Ways we can help

- Reach out if some one needs to talk to you
- Ask out if you notice behavioural changes in your loved ones
- Stop relating the mental health issues to mental disabilities
- Be vocal if you are suffering from one.

Because the world needs more positivity and understanding. The pandemic has taught us the value of little things we took for granted and, we should definitely know the worth of our lives and the lives of our loved ones.





My lockdown mind

SHUBHANGI ANTIL, SBS

A collection of short poems composed during Covid-19 pandemic lockdown. The poems represent the consecutive phases my mental health went through during the lockdown period.

EVERYDAY IS THE SAME

It's a loop,
everyday is the same,
these white walls, the same
these posters on them, the same
these faces around me, the same
the voices I hear, the same

It's a loop,
everyday is the same,
but,
the dates on the calendar, change
the colour of the sky, change
the thoughts in my mind, change
the beliefs I once cherished, change

Yes, it's a loop,
but an illusion,
governed by isolation
things aren't the same,
even if they seem same,
the reality is change.

INSOMNIA AND ANXIETY

Lied down but can't sleep.

this pulsating head,
circling through me

this ravishing pain,
seeping through me

Oh please, let me be.

this utter darkness,
mocking me

this unrest mind,
searches for peace

I can't breathe,
I'm trapped inside of me

Oh please, let me be.

HOLDING ON

Darkness encloses, no sign of light
stomach churns, what a state of plight

Holding onto,
those sweet memories of past
those happy days that didn't last

Holding onto,
the faith once so strong
the hope, I hope is not wrong

Holding onto,
the good old days to come again
dark storm to end, peace to hail again

COUNTLESS STARS

Gazing up the night sky
I let out a deep sigh

Did I ascend and win the fight?
Or is the dream still out of sight?

Is the path I'm on, still right?
all I feel is my flickering might

Gazing up the night sky
I look up to the stars and cry

The twinkle blinds my eye,
suddenly a thought passes by

The countless stars sing to me,
"Endless opportunities await thee"

SANITIZE YOUR BRAIN

-Avantika Basliyal, FBS

The year 2020 was all about masks and sanitizers. We sanitized almost everything, from our hands, roads, household stuff - almost everything.

But in our hectic lives we forgot about the pathogens upsetting our brain namely - Depression, stress, anxiety, and negativity.

These affect the storage house HIPPOCAMPUS and the chemical messengers NEUROTRANSMITTERS.

Altering the mood and emotional balance, causing sleep disturbance, inflammation and even brain cell death.

That's too much, right?

But wait I got your back. There is a sanitizer for these germs - Art

Yes! Art in any form - coloring, sketching, doodling, photography, painting, etc. does the same for you as sanitizers to germs.

I think all of you remember the simple joy of coloring as a kid. It was fun, right? This is the magic of art. Whenever you engage in any form of art you shut down the world for sometime and forget about the tension

of job, family, exam and your pending assignment on MS Teams. Not only this, it also increases fine motor skill, hand eye coordination, analysis and critical thinking skills.

Studies show that creating art stimulates the release of "feel-good" hormone DOPAMINE which is helpful for battling anxiety and makes you feel optimistic.

Mental health professionals and experts say that art also helps in boosting self esteem and provides a safe outlet to relieve your emotions.

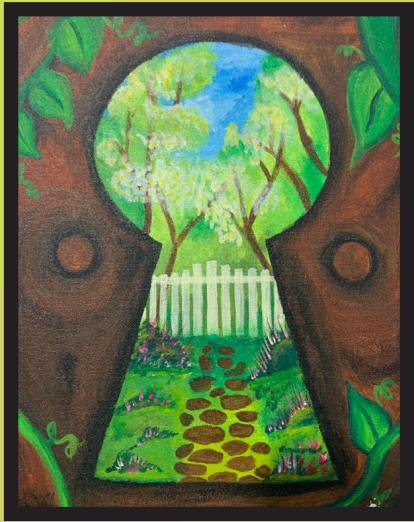
Even a recent study found that 45 minutes of creative activity significantly lessen the stress on body and mind. (Study published in Art therapy: Journal of American Art Therapy Association)

I know a lot of people do not have time but I think I have given ample reasons to start any art form. Spending 10 minutes isn't too much for your brain's health.

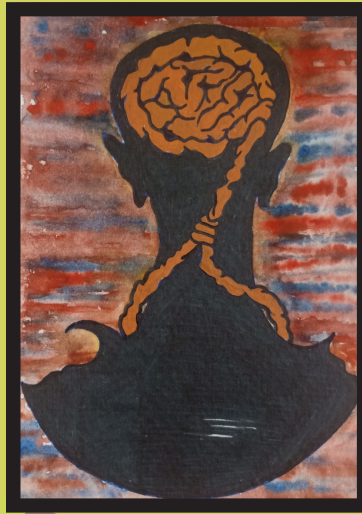
So, what are you waiting for....Go start exploring your creativity today.

©Sonali Kumari, SBS

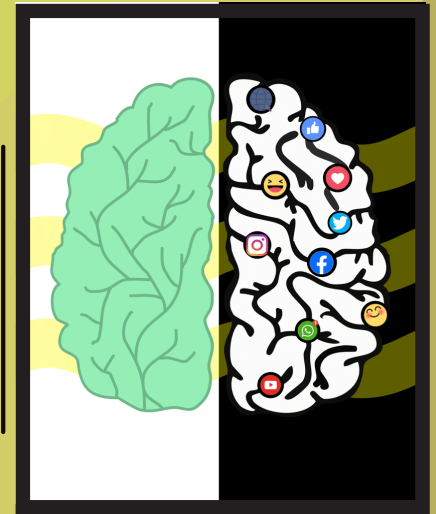
Healing Through Art



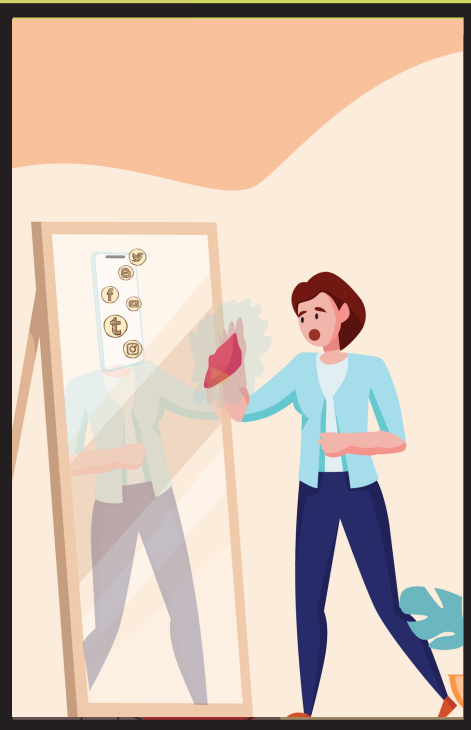
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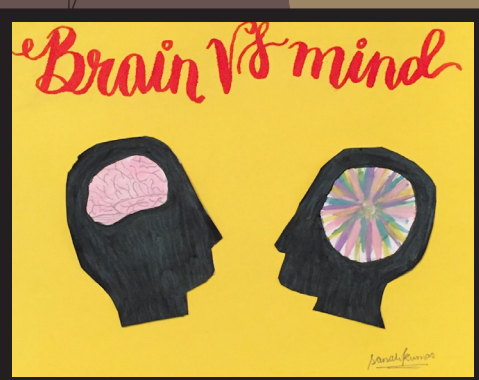
© Sanidhya Jagdish, SBS



© Sanidhya Jagdish, SBS



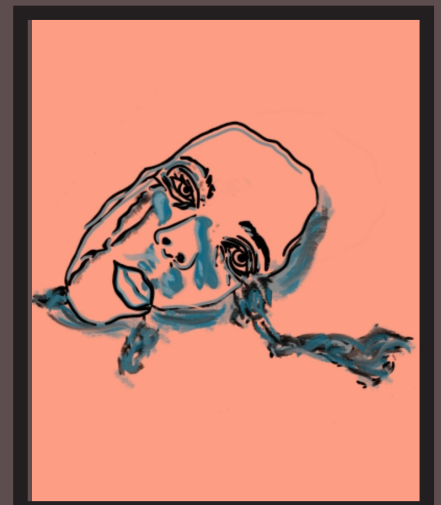
© Shristika Konwar, SBS



©Sanah Kumar, FBS



©Sakshi Yadav, TBS



©Sakshi Yadav, TBS

HABROMANIA

Be practical, they say;

for the heart chooses,
vice over the virtues

but who defines the vices,
the one who has lost all virtues?

If humans can be replaceable,
then why not their brains?

It's okay to be a "habromaniac",
if that's what they call it

And anyway;

who makes decisions.
from the heart or the brain,

it's the gut which owns ,
the veto power,
so don't forget to feed it

by Diva Singh, SBS

MY EXPERIENCE WITH MY DEPRESSED FRIEND

By Bivishitha Naisamudhin, FBS

It was a very fine day. We students were returning from our school to the hostel in the school bus. While in the bus, I was talking to a close friend of mine. For some reason she had not been in a good mood lately and it was no longer inconspicuous. I thought I would try to cheer her up. Despite my constant trials, I failed to even get her attention. I grabbed her hand and to my shock she literally screamed and pulled her hand away. That's when I saw the mark. Huge line on the inside of her wrist

mother to come over to the hostel and started consoling her. Considering that I did not know the problem, counselling her was quite difficult. Suddenly she started telling me some of her problems, which, surprisingly, I found were very small issues but to her they were erupting volcanoes! An hour later, her parents came and took her to see a doctor. She occasionally came to school, missed many exams and continued with her treatment. During the lockdown, I kept con-



where I could see the blood clots. I just kept staring at her and then tore my gaze away to look out of the window. She became tense at that and started calling for me. Initially I ignored her but then I asked her, "Why, just why?". She didn't utter a word. Since she was not sharing anything I thought I would call her mother and had her picked up from the hostel. Once we reached the hostel, we were lucky enough to find that the phone room was unlocked and free. I quickly grabbed a phone, dialed her mother's number and narrated everything. Her mother got tense and asked me to hand over the phone. Beside me, she was crying her head off and didn't want to talk. I had to ask her

ntact with her because I knew, as a friend I should stand with her and support her. I realised anyone could have been caught in this mess.

If today was her, tomorrow it might be me. Helping her to cope up with the trauma taught me to look at life in a different perspective. It also gave me a way of finding happiness in small things. I feel blessed and thankful to God in many ways. Today after a year of treatment, she is doing great! This shows that with continuous help, support and hope, a depressed person can come out of their cocoon and find their wings to fly in this colourful world.

Please come back my son

by Bivishitha Naisamudhin, FBS

Dear Son ,

Hope you are doing well so far there!
Today , while cleaning your empty room
I found your letters for me .

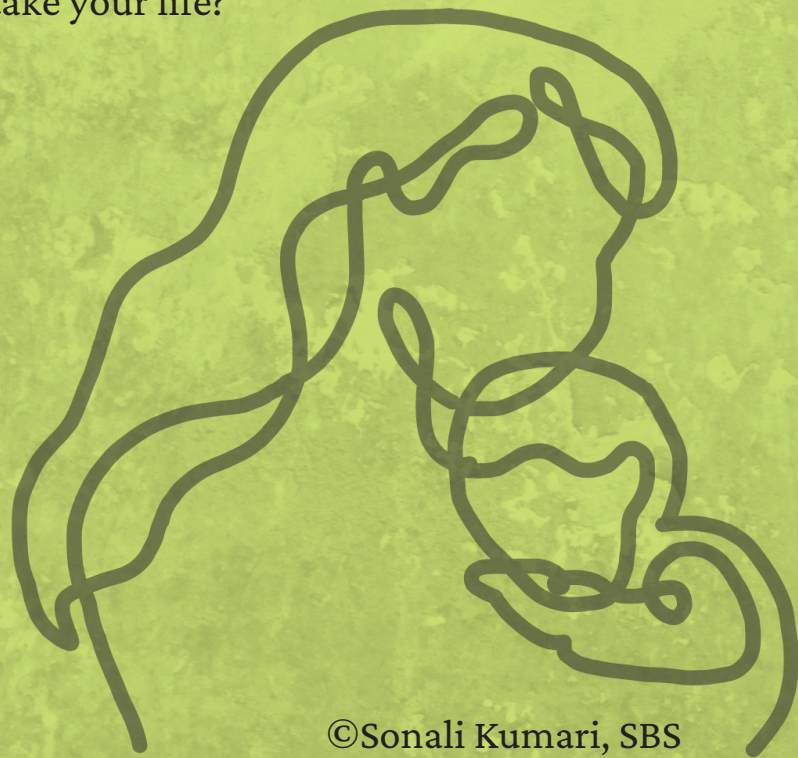
I'm still in shock and state of trauma.
I could never tolerate your departure.
Now, knowing that it's because of me, kills me inside.
How can you do this to me ?

Mothers scold their children for good!
Your mamma want you to be raised having good values
Mamma and pappa loved you more than anyone else
Why did you do this to me ?

Did mamma's scolding tempt you to take your life?
I am sorry, I apologise
I take back my words.
Mamma and papa love you so much.

I beg you,
Please, please do come back my son.

- With lots of love
Your Mamma



© Eshita Jain, TBS



Let's Be The One

By Ayushi Sharma, SBS

Let's be the one;
whom we all needed,
When the world seemed too crowded,
but we felt completely stranded
in an island of our thoughts
and struggled to find the shore;

When we couldn't find the light,
and even shadows left our side,

when darkness swallowed all our hopes,
and we fell deeper into the abyss
of prisons that our minds created.

Let's be the one;
we all needed,
someone who lends their hand,
and someone who could've helped us stand.

Someone to listen to our silence,
and cries alike,
without any judgement or hate.

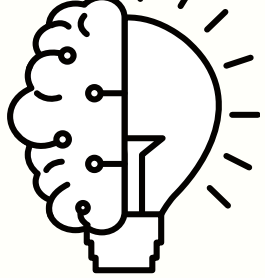
Let's be the one;
we all needed,
and do what we expected from that someone,
to believe in us, untangle the knots
when we just could not.

When our minds pulled us down,
And we couldn't see the way.

Let's be the one;
we all needed

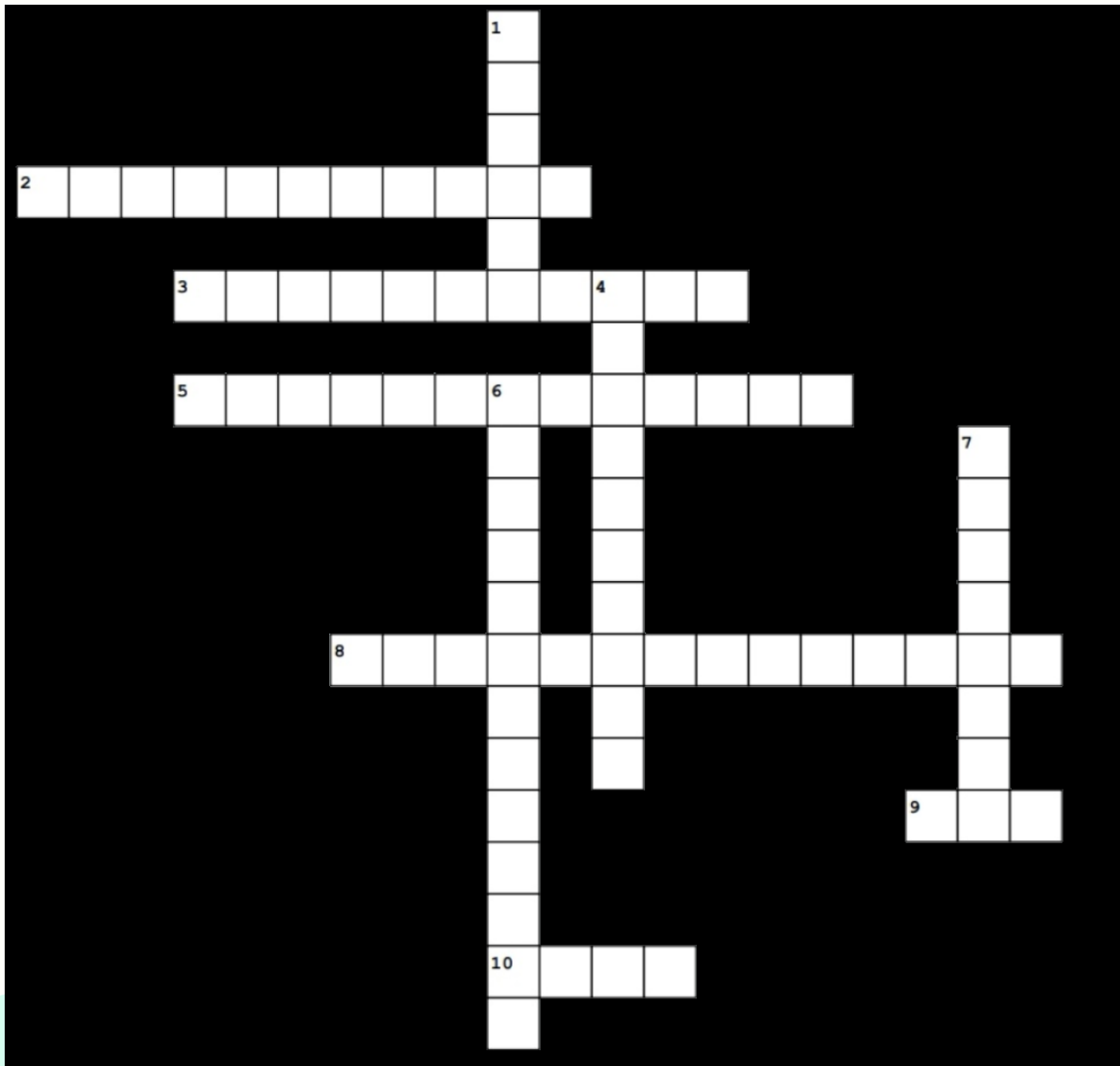
in those strenuous times,
To be the light, that guided us back
to a world with some hope,

where we don't need to find the shore.
Someone who could bring out that inner light
which we always had inside.



CROSSWORD PUZZLE

Let's see how much you know about mental health by Paruldev Huidrom TBS



ACROSS

2. fear of public places
3. stealing is my habit
5. I see what you can't see
8. first antipsychotic drug
9. mental health awareness month
10. dirt is tasty

DOWN

1. I don't do well with people
4. I can't but sleep
6. I see a shrink
7. to become oblivious

ANSWERS:

1. autism, 2. agoraphobia, 3. kleptomania, 4. narcolepsy, 5. schizophrenia, 6. psychotherapy, 7. dementia, 8. chlorpromazine, 9. May, 10. pizza

ARE YOU OKAY?



**If you or someone you know is struggling, you are not alone.
There are many support services that are here to help.**

1. Jeevan Aastha Helpline:
1800 233 3330

2. AASRA Helpline:
09820466726

3. COOJ Mental Health Foundation:
0832-2252525

4. One Life Foundation:
7893078930

5. SUMAITRI Helpline:
011-23389090

6. FORTIS STRESS HELPLINE:
+91-8376804102

7. VANDREVALA FOUNDATION:
18602662345

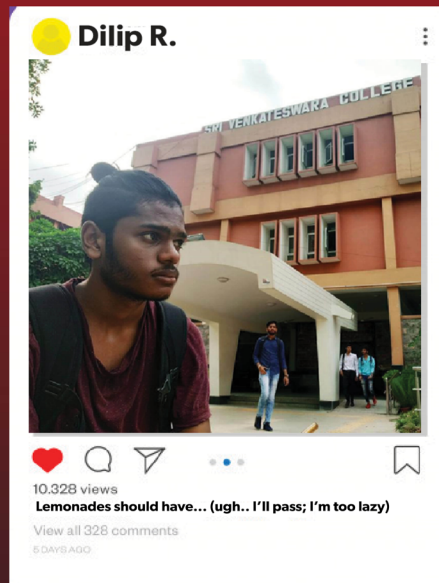
8. KIRAN MENTAL HEALTH:
18005990019

03

THE DEPARTMENT



CLASS OF e-v-t



2021

Paruldev Huidrom

10,328 views

Change is the only constant, embrace it.

View all 328 comments

5 DAYS AGO

Nikita Garg

10,328 views

Dear future self, always remember who got you where you are today.

View all 328 comments

5 DAYS AGO

Riya Sharma

10,328 views

Blooming through the blurs and blues.

View all 328 comments

5 DAYS AGO

Neeraj Singh

10,328 views

If life were predictable, it would cease life, and be without flavor.

View all 328 comments

5 DAYS AGO

Ankit Soni

10,328 views

The strong feed upon the weak, it's such an obliquely simple rule

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5 DAYS AGO

Harsh Nagar

10,328 views

It is my style to take my opponent and myself onto unknown grounds. A game of chess is not an examination of knowledge.

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5 DAYS AGO

Vinod Yadav

10,328 views

Show must go on.. Keep laughing, it's the easiest way to get six packs

View all 328 comments

5 DAYS AGO

Shubhangi Sharma

10,328 views

If you want to achieve your goals, you have to choose between pain of discipline and pain of regret.

View all 328 comments

5 DAYS AGO

Sonam Rawal

10,328 views

Making memories of lifetime with people i can never forget all my life

View all 328 comments

5 DAYS AGO

78

Eshita Jain



10,328 views
I say more dumb things before 9 am than most people say all day.
 View all 328 comments
 5 DAYS AGO

Yashmita Choudhary



10,328 views
Too much change is not a good thing, ask the climate.
 View all 328 comments
 5 DAYS AGO

Aakriti Singh



10,328 views
I'm not gonna cry about it, I did that in the car on the way home.
 View all 328 comments
 5 DAYS AGO

Sohini Saha



10,328 views
You live only once? False! You live everyday, you die only once.
 View all 328 comments
 5 DAYS AGO

Sakshi Yadav



10,328 views
Graduated in the era of MS Teams and a million different class whatsapp groups.
 View all 328 comments
 5 DAYS AGO

Anshu Kumari



10,328 views
There is no good or bad. Its all relative.
 View all 328 comments
 5 DAYS AGO

Srashti Sahay



10,328 views
To memories, dreams, drama, love, fights and through pandemic. Damn we made it! #unmanaged_mischief
 View all 328 comments
 5 DAYS AGO

Vishal Singh



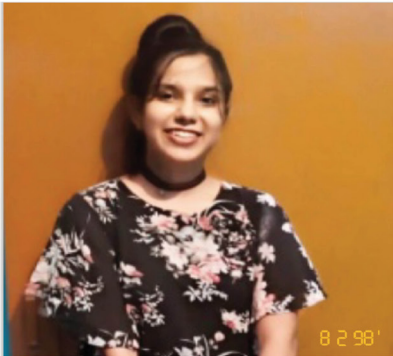
10,328 views
Your time is limited, so don't waste it living someone else's life
 View all 328 comments
 5 DAYS AGO

Suman Saini



10,328 views
Do you remember the times we had? Let's bring them back.
 View all 328 comments
 5 DAYS AGO

Aastha Dorata



10,328 views
Things seen are temporal, things unseen are eternal
 View all 328 comments
 5 DAYS AGO

Abhimanyu



10,328 views
Couldn't fit my surname here. It's Madhusudan btw.
 View all 328 comments
 5 DAYS AGO

Anchal Kaler



10,328 views
Don't prove yourself to anyone, you're human not a theorem.
 View all 328 comments
 5 DAYS AGO

Aparna Pillai



10,328 views
Learning and Evolving.
 View all 328 comments
 5 DAYS AGO

Adarsh Kumar



10,328 views
A billion thoughts, a million quotes, can't find one to describe my emotes.
 View all 328 comments
 5 DAYS AGO

Michael Nhial



10,328 views
Each day provides its own gifts.
 View all 328 comments
 5 DAYS AGO

Sagar Chauhan



10,328 views
Don't hate anyone, cause you only live once.
 View all 328 comments
 5 DAYS AGO

Subhiksha S



10,328 views
Things that last won't come easy.
 View all 328 comments
 5 DAYS AGO

Sameeksha Pandiya



10,328 views
I don't even have a pla-
 View all 328 comments
 5 DAYS AGO



Nandini Sharma
FBS

Research- Chapter and 2 reviews under Dr. Sanjay Kumar and Dr. Shikha Gulati.

Parul
FBS

Research for international journal on the specific topic with the help of Dr. Sanjay Batra and Dr. Shikha Gulati

Preetha Chaterjee
FBS

Research-Bismuth ferrite nanohybrids for degradation of environmental pollutants. underDr.Sanjay&Dr.Sikhagulati

Sanah Kumar
FBS

Research - Nanotechnology in modern textiles under the guidance of Dr. Shikha Gulati.

2020

Shradha Jain, FBS

Bismuth Ferrite Nanohybrid For Degradation Of Environmental Pollutant. Toxicological Risks And Environmental Risks Of Consumer Nanoproducts.

Atishay Kumar
Jain, FBS

Research - Starch Bio-nanocomposites as food packaging material, under Dr. Sanjay Batra & Dr. Shikha Gulati

Vidhi Wadhawan
FBS

Wrinkle-Resistant Fabrics: Nanotechnology in Modern Textiles Under guidance of Dr. Shikha Gulati

Abhirami Sunil
SBS

SRI VIPRA-Role of medicinal plants in combating pathogens with special reference to COVID -19.

Ambika Singh
SBS

SRI VIPRA- Study of regulatory mechanisms in glioma stem cells,an integrated Omics approach.

Anantpreet Kaur
Sood, SBS

SRI VIPRA- Botany under Dr. Pamil Tayal

Atharv Kapoor
SBS

SRI-VIPRA under Nimisha Sinha.

Diva Singh, SBS

Cluster Manager at Writefully Yours, under Mr. Karan Chugh. Digital marketing intern at Prejunction H.R. Intern at Acelot Innovations Pvt. Ltd. 5. COO at UnMa

**I N T
E R N
S H I P S**

Sachin Sharma
SBS

SRI-VIPRA- Role of Medicinal Plants in combating diseases (with special emphasis on COVID-19) under Dr Pamil Tayal .

Jayanti Chhillar
SBS

SRI-VIPRA-project under Dr. Pamil Tayal on potential uses of medicinal plants to combat against COVID-19.

Cheshte Varshney
SBS

SRI VIPRA- Study of regulatory mechanisms in glioma stem cells,an integrated Omics approach.

Neha Guliya
SBS

Chalcone Scaffolds as Anticancer Drugs: A Review on Molecular Insight in Action of Mechanisms and Anticancer Properties

Dravie Bansal
SBS

SRI-VIPRA- Hereditary Diseases- Genetic and Environmental Aspects under Dr Kameshwar Sharma.

Ayushi Sharma
SBS

SRI-VIPRA - An online survey based research article on topic Diet, lifestyle and obesity under Dr. Kameshwar Sir.

Shubhangi Antil
SBS

Position - Science Communicator atSciRiobroadcastingknowledge Work description- Creating comic series

Vaidehi Sharma
SBS

SRI-VIPRA-Carbon Sequestration under Dr. Abhishek Chandra

Vishnu Narayanan
Verma SBS

SRI-VIPRA- Aspects of Scientific Writing - a survey based approach under Dr. Kameshwar Sharma

Anshu Kumari
TBS

SRI VIPRA- Study of regulatory mechanisms in glioma stem cells. Grip your life- worked on factors responsible for mood changes.

Aparna Pillai
TBS

SRI-VIPRA- Study of knowledge and popularity of alternate strategies for boosting immunity during COVID19 times.

Eshita Jain TBS

SRI-VIPRA- Applications of Bio-informatics in Cardiovascular Disorders for Novel Therapeutics Design under the supervision of Dr. Latha Narayanan

Aastha
TBS

SRI VIPRA-Deriving a metabolic index to evaluate the metabolic status of an individual under Dr. Nandita narayanasamy

Aakriti Singh
TBS

SRI VIPRA- Study of regulatory mechanisms in glioma stem cells,an integrated Omics approach.

Sagar Chauhan
TBS

SRI-VIPRA - Carbon Sequestration under Dr.Abhishek Chandra

Sohini Saha
TBS

SRI VIPRA- Study of regulatory mechanisms in glioma stem cells,an integrated Omics approach under Dr.

Sonam Rawal
TBS

SRI VIPRA-Analysis of raw sequencing data of cancer specific genes associated with eyelid tumors and their gene networking

Yashmita
Choudhary, TBS

SRI VIPRA - Signaling networks of mycobacterium tuberculosis under the supervision of Dr. Vandana Malhotra





2021

Aparna Kumari

FBS

Feedopedia member and
Equal opportunity cell volunteer

Avantika

FBS

Equal opportunity
cell (EOC)

Nandini Sharma

FBS

Nrityangana- The Indian
Dance Society and NSS-
SVC

Prishita Sharma

FBS

Crescendo
WMS

Radhika

FBS

Verve dance
crew

Atishay Kumar

Jain, FBS

Equal opportunity
cell (EOC)

Shradha Jain

FBS

Eco club SVC

Vidhi Wadhawan

FBS

Crescendo - Western
Music Society

Abhirami Sunil

SBS

National Service
Scheme(NSS)

Anantpreet Kaur

Sood, SBS

Nrityangna-The Indian
Dance Society and
NSS-SVC

Ambika Singh

SBS

Boolean- Technological
society

Atharv Kapoor

SBS

TED x SVC

**S O C
I E T
I E S**

Diva Singh SBS

Anubhuti - The Hindi Dramatics
Society , Ascend - The Entre-
preneurship Cell of SVC, Equal
Opportunity Cell , Volunteer
at Enactus, Ex-member of
Conquistador - The Qui soc

Dravie Bansal

SBS

Verbum - English Dramatics
Society

Jayanti Chhillar

SBS

Nrityangana-The Indian Dance
Society and NSS-SVC

Neha Guliya

SBS

Vimarsh, Hindi
debating society

Rabsang Lhamo

SBS

Verve western dance crew
2019-2020

Sachin Sharma

SBS

National Service
Scheme (NSS)

Shubhangi Antil

SBS

Equal opportunity
cell

Vaidehi Sharma

SBS

Vimarsh (hindi debating
society), Conquistador

Vishnu Narayanan

Verma, SBS

Effulgence - The photogra-
phy society

Anshu Kumari

TBS

Eco Clubo SVC

Srashti Sahay

TBS

National Service Scheme
Women development cell
Spirit of youth Foundation

Eshita Jain

TBS

Leonci Art
Society

Paruldev Huidrom

TBS

North East Society
Joint Secretary)

Aakriti Singh

TBS

Leonci Art
Society

Riya Sharma

TBS

Anubhuti, the dramatics
society

Sohini Saha

TBS

Leonci Art
Society

Subiksha.S

TBS

Fine Arts
Association

Harsh Kumar

Nagar, TBS

Archangels
Exordium



© Aakriti Singh, TBS



South
Sudan

MY EXPERIENCES AS A FOREIGN STUDENT IN INDIA

Michael Nhial, TBS



Growing up in East Africa, in the world's youngest country, South Sudan, furthering my education in a quality and prestigious university like the University of Delhi has been my dream since childhood. After finishing my high school, this dream came into reality when I was awarded a merit based scholarship to study in India by the Indian Council for Cultural Relations (ICCR), received and awarded to me by His Excellency the Indian Ambassador to South Sudan, Mr. S.D. Moorthy. On my arrival to Indira Gandhi International Airport, I came out of the plane with much desire to see how the environment of the country of which I have been seeing its beauty on TV screens looks like. My first impression about India started the very first time I stepped out of the airport; I met an honest Indian that gave me a ride to the hotel. As a foreigner I thought he was going to charge me highly because in some other countries, foreign nationals easily get cheated especially on their first days of arrival but that wasn't the case for me. I took admission to one of the best hostels of Delhi University, International Students' House, where I have met and interacted with students from over 30 different countries and some native Indian students. I have lived with them for 3 years and I have learnt cultures of many countries and tasted different cuisines of various regions. This experience gave me a good amount of cultural exposure and it helped me to increase my global awareness and exposure. My beautiful experience at Sri Venkateswara College was introduced when I met Randip Singh, the former president of the Sri Ven-

kateswara College Students Union, who dedicated much of his time in following up my admission process and walked me around the whole college and also taught me some Hindi short phrases. Second experience was how my classmates welcomed me in the class. I was so humbled to have met such amazing classmates who made me feel at home. They have played a vital role in my life as colleagues. When I go back to my country, I will always remember India because of them. I recommend the international students who will come to India for studies to make sure they travel to various cities and towns of India. You will be much impressed by many things as you travel to new places, it will give you beautiful memories and educate you about what the media portrayed negatively as Martin Luther King said

“Education must enable one to sift and weigh evidence, to discern the true from the false, the real from the unreal, and the facts from the fiction.”

My trip to Manali, Himachal Pradesh was one of the most exciting moments of my life as I travelled on the slopy Himalayas Mountains, I had a great moment seeing beautiful sceneries, playing games in the snow, skiing and parachuting. What I do like about India are magnificent architecture, food from different regions, its culture and tradition, and festivals like Diwali,



Holi among others. I am now also a fan of Bollywood films. But what I like most about India is the people. Of course there are good and bad people everywhere but for Indians, once you become their friends, they are your true friends. They treat you like one of their own. Generally my stay in India has enhanced me in many different aspects of life, starting from the people I met, travelling to various states across India, visiting historical sites and more importantly the education system that I have got here, it has given a knowledge of understanding of the world around me in a better picture as Nelson Mandela said

ter of a peasant can become a doctor, that the son of a mine worker can become the head of the mine, that a child of a farm worker can become the president of a great nation. It is what we make out of what we have, not what we are given, that separates one person from another.”

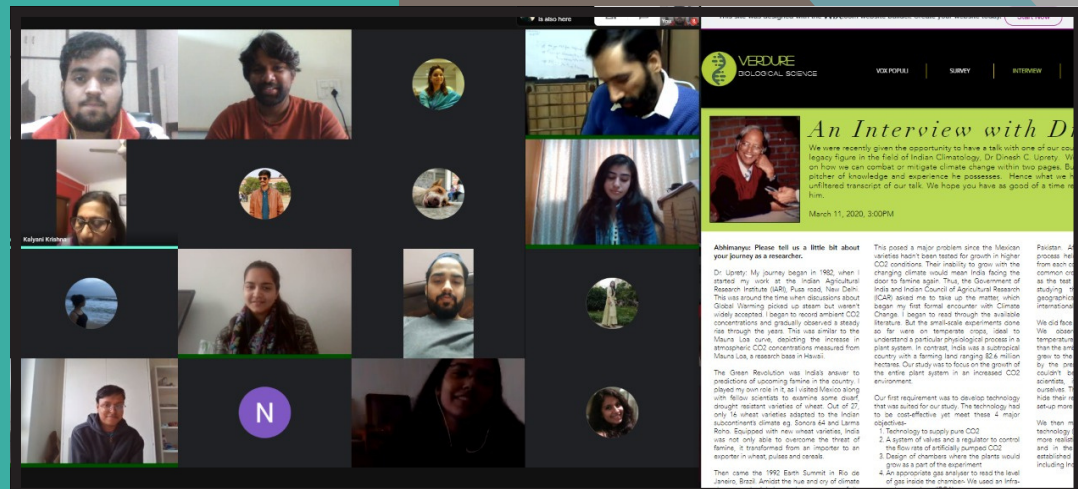
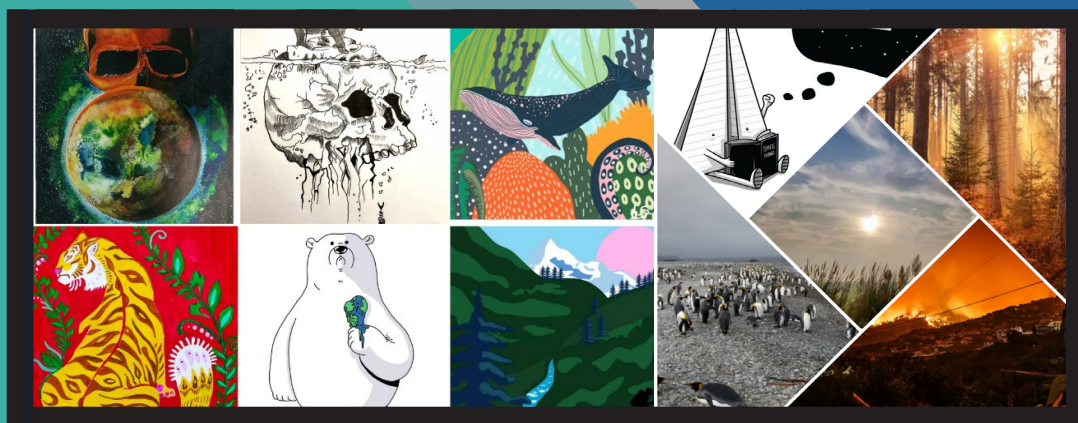
“Education is the great engine of personal development. It is through education that the daugh-





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Where

OUR SENIORS ARE...



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Jiwaji University (JU), India

HALL OF FAME

2020-2021



NAME	NAME OF COMPETITION	NAME OF ORGANISING INSTITUTION	PRIZE/POSITION
Jaarvi*, Neha*, Shubhangi*, Srashti**, Aastha**, Subiksha**	Tug of war, Group	Sri Venkateswara College	First and Cash Prize
Riya Sharma**	'Bol dil se' a monologue event, Individual	Vivekananda Institute of Professional Studies, Online	Third
Shubhangi*, Vishnu Narayanan*, Devika*	Treasure Hunt, Group	Sri Venkateswara College	Second and Cash Prize
Abhimanyu Madhusudan**	1. Quick Pick - Photography competition, Individual 2. Brain Fury - Zoology Quiz, Individual	1. Kirori Mal College 2. Sri Venkateswara College, Online	First First
Diva Singh*	Group Stage and Street Play Competitions	1. Maitreyi College 2. Swami Shraddhanan 3. St. Stephen's College College 4. ARSD 5. Satyawati College	Second Second Third Second First
Neha*, Jaarvi*	Dumb Charades, Group	Sri Venkateswara College	First
Cheshte*, Neha*, Sonali Kumari*, Athrav*	Mindspar 3.0, Group	Sri Venkateswara College; Online	Selected in Top 12
Jayanti Chhillar*	Annual folk dance competitions, Group	1. Swami shraddhanand 2. Ram Lal anand 3. Deshbandhu 4. Janki Devi memorial 5. ISOMES 6. Janki Devi memorial, Online 7. JMC, Online 8. SRCC, Online	First Second Second Third Third Third Third Third
Shristika Konwar*	Western group dance competitions (Stage and Street)	1. IIT, DELHI 2. JMC 3. LSR 4. IGDTUW 5. IIT, DELHI 6. AIIMS 7. PGDAV 8. Hansraj 9. Gargi 10. SPM	First First First First First Second Second Second Third Third

*SBS, **TBS

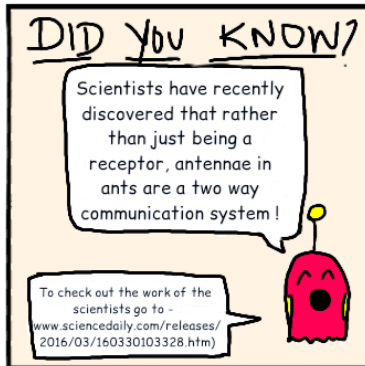
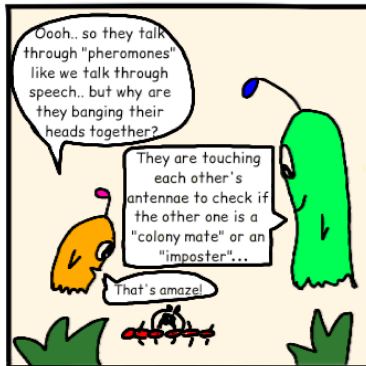
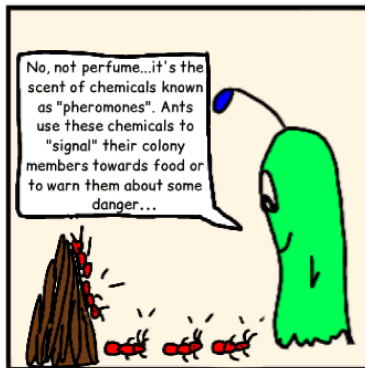
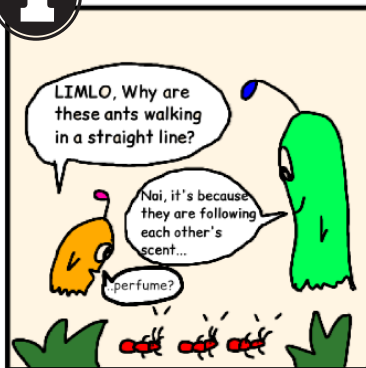


Photograph by Abhimanyu Madhusudan, TBS

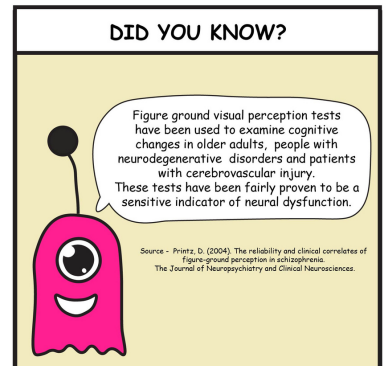
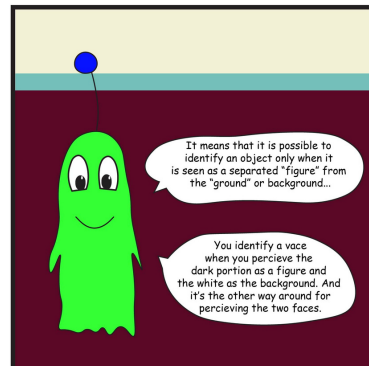
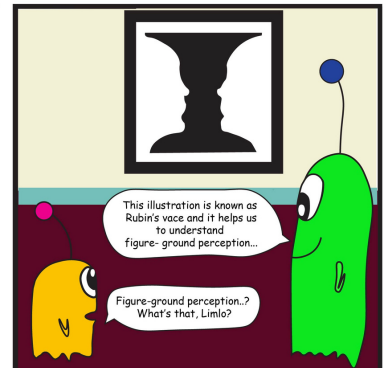
THE TALES OF LIMLO & NOI

by Shubhangi Antil, SBS

1

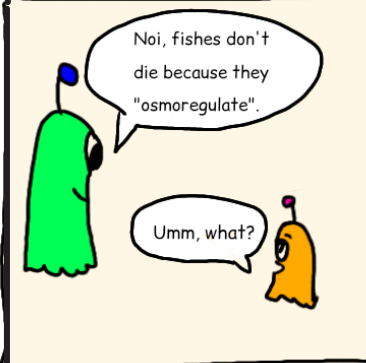
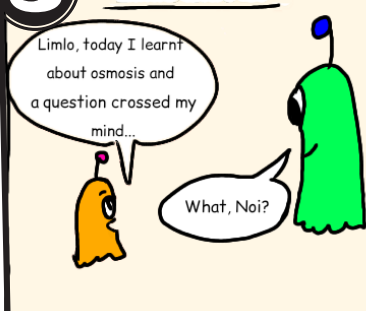


2



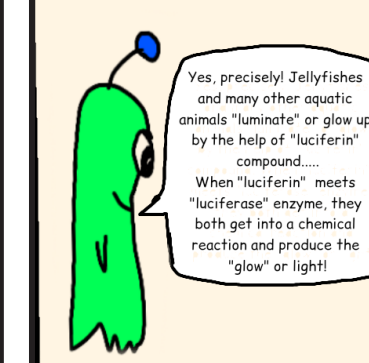
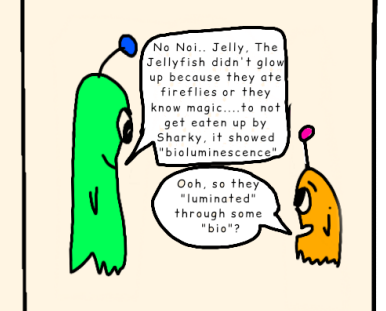
3

Limlo and Noi



4

LIMLO AND NOI



The Brains Behind INSIDE YOUR MIND



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ONLINE MEETING 101



P.S. This magazine is brought to you by countless Google Meet calls.

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ABOUT THE BACKCOVER

Cover design - Aakriti Singh, TBS

A human being is the amalgamation of all the experiences and knowledge gained during the course of his lifetime. The small snippets of such experiences shape the mind, the brain and the self. As the years go by, the mind continues to evolve and become more complex. This is the very idea that the cover represents.

by Anshu Kumari, TBS

