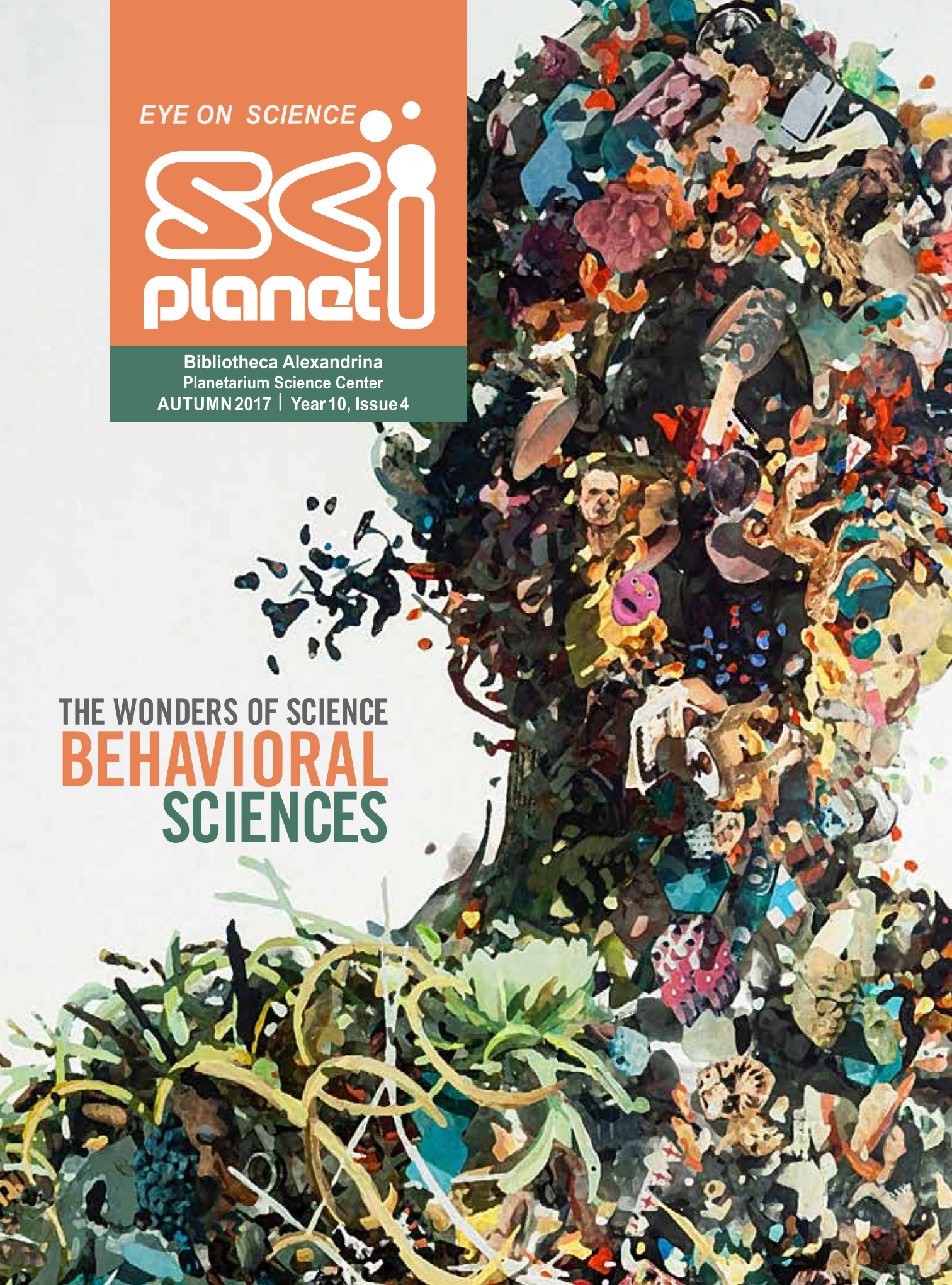


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THE WONDERS OF SCIENCE
BEHAVIORAL
SCIENCES



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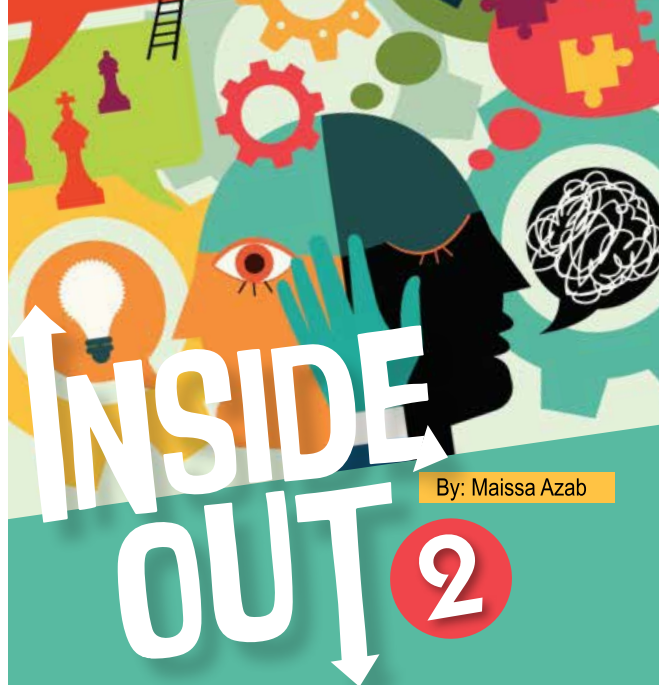
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IN THIS ISSUE...

- 4 1st Language Acquisition Explained
- 6 Botanic Talks
- 7 Insect Eating Plants
- 8 Conflict or Harmony? Viewpoints on the Nature of Society
- 9 Social and Behavior Change Communication
- 10 Mental Disorders: Acquired or Inherited?
- 11 Paranoia: The Downfall of Greatness
- 12 The Madness behind Genius
- 14 Split Between Fact and Fiction
- 15 Addiction
- 16 Memories: To keep or not to keep
- 17 Turning the Mind Inside Out
- 18 Philosophy between Science and Fiction
- 20 Animal Behavior
- 21 Life in Captivity
- 22 Animals: Are They Smart?



By: Maissa Azab

The Wonders of Science has been our overarching theme throughout 2017, *SCiplanet's* tenth year; we have already tackled three broad core sciences: Astronomy and Space, Earth, and Life Sciences. Naturally, there are many more fundamental sciences to have a closer look at in the future; however, in this concluding issue for this year, we have selected a rather enigmatic branch of science that is rarely tackled, at least by us. After having had a look at the broader sciences of our universe, our home-planet, and our own bodies, we find it is high time we probed further inside our own selves; to delve deeper inside our own minds and psyche as we explore communication and psychological sciences.

In reality, these branches of science are quite intriguing and surprising; mainly because their secrets are extremely well hidden within highly intricate and quite invisible systems that require very complicated methods to unravel and test. Yet, they are crucial to explore, because they hold the secrets of how all life forms have and will develop, as communication is the key to the survival and progress of species, while psychology's broad scope encompasses an enormous range of phenomena: learning and memory, sensation and perception, motivation and emotion, thinking and language, personality and social behavior, intelligence, child development, mental illness, among many others.

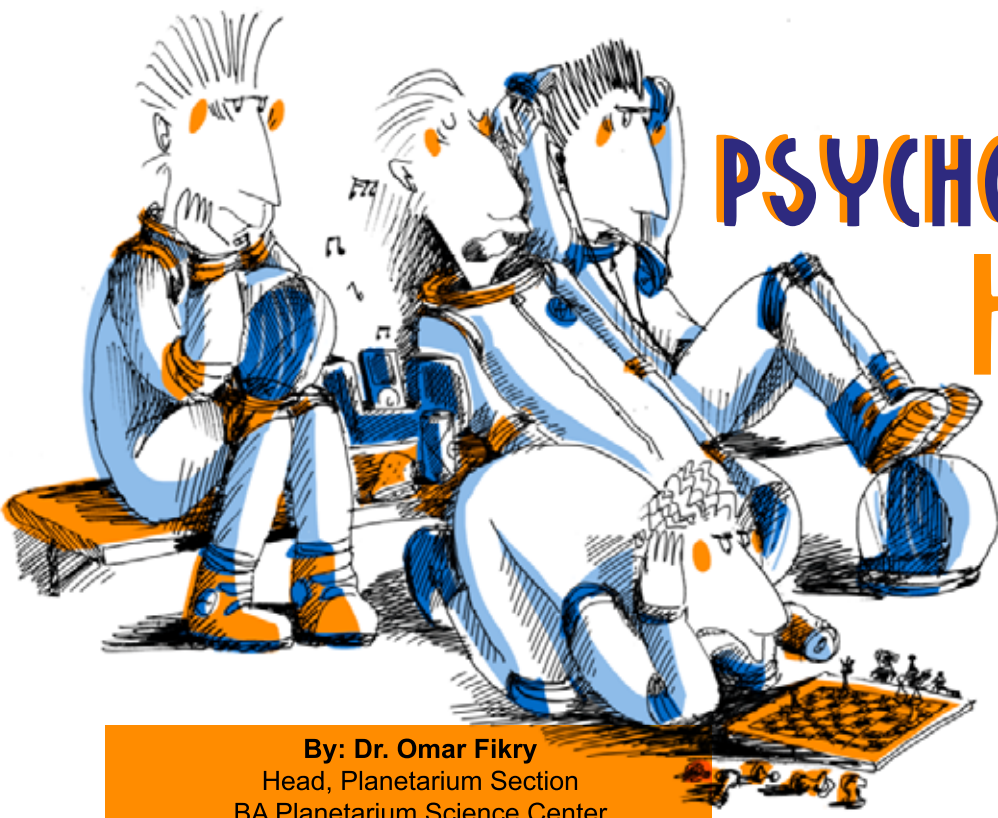
It is all truly fascinating, albeit complex; yet, this is exactly why we are here. It is indeed our role as science communicators to delve into the cryptic and disentangle the tangled; to start the conversation about such critical topics that are so vital for our wellbeing and well-doing. It is always essential to understand oneself; how we think, how we feel, how we react, how we behave, to be able to survive, thrive, and also comprehend each other. This understanding is critical for success and progress, not only in our own personal lives, but in life in general; as communities, societies, nations, and worldwide on one planet with one environment keeping us all together for better or worse.

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PSYCHOLOGICAL HEALTH

Of ASTRONAUTS



By: Dr. Omar Fikry
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Some professions require the highest degrees of self-controlling psychological and behavioral reflexes; as in the case of firefighters and surgeons, just to name a couple, for any misconduct while performing can lead to uncompensated losses. There is, however, a profession that exceeds normal expectations; astronauts, whether male or female, are selected carefully, after grueling scientific, cultural, physical, and mental tests, with psychological health testing being of utmost importance.

A team of psychiatrists observe the changes that occur to the astronauts psychological health. They face great pressures because of their work in sealed, narrow rooms 24 hours a day, away from their family and friends. This leads to feelings of loneliness and confinement simultaneously, which can unhinge any normal person. Dr. Nick Kanas, a psychology expert at the University of California and Chief Psychiatrist at San Francisco Hospital, studies the behavior of astronauts under these circumstances, and he is now studying the crews of the international space station. Crew members fill out surveys about their psychological health and daily feelings in space and inside the spaceship, after which Dr. Kanas analyzes these forms and studies the information gathered from them. Several studies revealed interesting behaviors among astronauts.

The most significant observation is that most of them control their feelings when in need of control. This is very important, because the problem with controlling psychological and nervous behavior lies in the suppression of feelings and the inability to control them for long periods of time up to six months, which may lead to self-destruction. Psychologists know that the normal person needs to relax from time to time to regain control of his/her feelings after the relief of stress. However, this is inapplicable in the case of astronauts; they live under continuous stress and there is not enough time to relax and regain their energy, so astronauts are special.

Astronauts tend to have a diminishing ability to socially communicate with their colleagues inside the spaceship. After they live with each other for a long time, it becomes difficult for them to listen to each other; as such, tension and pressure increase. One way to get rid of this pressure is blaming the leadership of the

space mission; it is their way to get rid of stress. Sometimes, people yell at their own children instead of their bosses, this is known as "transference", and it helps them get rid of anxiety and stress, but can lead to family problems and does not solve the problem.

According to Dr. Kanas, when spaceship crew members say they suffer from anxiety and stress, this indicates they do not get sufficient support from ground control during this period. When ground control is under pressure or stress, it means there is insufficient support from management, which is transferred all over again. Transference can, thus, be devastating, because the main problems remain unresolved. The problems that may occur during training for several months on a military ship, for example, would be multiplied if the trip is to Mars and will last for three years, during which the crew will be in complete isolation. If a psychological problem emerged, they will have to deal with it themselves, so the longer the astronauts are trained, the better the situation is.

Researches state that the changes in the astronaut psychological state can be predicted during the space mission. Kanas says that an astronaut exerts his/her utmost effort up to the middle of a long mission, then he/she realizes there is another half with the same duration so depression onsets. If it is like this in space, then astronauts should expect it. Moreover, the kind of support provided by mission control has to change as the mission progresses. Scientists found that the most successful leaders at the beginning of the mission are those who are committed to mission goals and achieve them. However, during the second part of the mission, the most successful leaders are those who take care of the emotional side and take care of the crew's feelings.

Kanas says that mission leaders must be trained on how to deal with the crew's emotional needs in order to support their crew throughout the mission. This is Basic Collective Psychology, which will lead to understanding these behavioral cases and benefit from their results in future space missions.



thanx!

Cool!

hello!



no

yay

NO

Wow!

1st

Language Acquisition Explained

By: Hend Fathy

I often recall this hilarious incident when my nephew Youssef was only three years old and was having the following conversation about his broken toy with my sister:
 Youssef: Mommy, *eh 7asal lel 3abeya ta3ty*. (Mom, what happened to my car?)
 Mother: *Bazet ya Tabiby*. (It got broken dear.)
 Youssef: *Meen bayyazha?* (Who broked it?)
 Taken by the intuitive innocent response, everyone in the room burst into laughter. My memory automatically summoned the topic of language acquisition that I studied in my first academic semester at college as a student of linguistics. What we have here is vivid manifestation of one of the first language acquisition processes; namely, confusing morphology rules to generate derivations. Before I go into more technical details, let us start over the right way and ask: What is language acquisition?

Acquisition versus Learning

First language acquisition is an extremely sophisticated, yet remarkably speedy subconscious process. In essence, it is very different from second language learning. Think of how hard it is to learn a second language; it might take up several years, and one will still never match the competency of native speakers. In general, mastering a language requires addressing four skills: listening, reading, writing, and speaking. What is common between the two processes, however, is that the receptive skills (listening/reading) are easier and faster to acquire/learn than the productive skills (speaking/writing).

It has been suggested that there is an innate predisposition in the human infant to acquire language. Pioneer linguist Noam Chomsky, who is the most influential figure in modern linguistics, had an interesting theory about language acquisition. He maintained that the human mind contains a Language Acquisition Device (LAD); a hypothetical module that encodes the universal principles of language into the child's brain, and hence, help it rapidly acquire language.

However, this inborn language capacity has some basic requirements to function. For example, the child must be physically capable of sending and receiving sound signals; that is, enjoys healthy auditory and articulatory systems. Also, he/she has to have a chance to interact with other language-users who would provide him/her with

language samples or input. A study conducted in the 1990s stated that a normal-hearing child who was raised by deaf parents was only able to acquire the sign language, which the triple used for communication. Although the parents gave their son ample exposure to television and radio, he failed to speak and understand spoken language.

The Process

As they acquire language, children do not simply imitate the utterance that they hear around them. Imitation as a process of language acquisition has not been widely accepted among theorists and there are several arguments against it. First of all, children who are still unable to speak are capable of learning and understanding language. I was thrilled to find how my daughter seemed to understand and react to my speech while she was still incapable of speech. Even when they overcome their speech impairment, they still cannot imitate adult speech because of their limited knowledge of grammar and syntax. Check the telegraphic speech stage below for examples.

Moreover, children's unpredictable mistakes indicate that they do not acquire a repertoire of phrases, but rather a set of rules that help them generate brand new utterances.



Cool!

Let us go back to the example cited at the very beginning; Youssef has definitely not acquired the word *bayyazha* from an adult. Instead, he made a wrong morphological derivation to make another form (*bayyaz* “بَيْيَظ”) of the colloquial Arabic verb *baz* “بَاط”. He adapted the morphological structure of other past tense verbs such as *ghayyar* “عَيَّر”.

Similarly, children acquiring English as their first language often treat irregular verbs as regular. Instead of “held” and “went”, they would come up with words like “holded” and “goed”; simply because they apply the “ed” suffix rule to form the past tense. The same applies to the “s” suffix to make the plural form of nouns; you might hear “toothes” instead of “teeth” and so on. Some children would even mix up different rules and come up with utterances like “womens” and “brokeed”.

Developing phonology is also evident; especially, when the child’s articulatory abilities are still humble. We might find children’s messy pronunciation amusing; but in fact, they are performing sophisticated subconscious phonological processes. I bet we all heard a little child pronouncing the “t” phoneme as “k”, as in “اكلع” instead of “اطلع” or “tat” instead of “cat”; my two-year old daughter pronounces “حينة” as “نمنة”. This process is known as consonant harmony, where children substitute the phonemes they find hard to articulate with easier ones that make similar sounds. Another phonological process is consonant cluster simplification, where they drop one or more consonant sound from a word as in pronouncing “عربية” as “عيبية” or “spoon” as “poon”.

Stages of Language Acquisition

The very first stage of language acquisition is phoneme perception, at which infants process the sounds they hear in the early months of their lives. In response, they start to turn their heads in the direction of sounds. Later, they develop different patterns of crying styles to express different needs; they also produce sequences of vowel-like sounds.

By four months of age, babies develop the ability to articulate velar consonants* and start producing one-syllable sounds like “ga” and “ka”, known as cooing. The third stage, babbling, takes place between six and eight months of age. Infants become able to make multi-syllable utterances combining consonants and vowels; such as “ba-ba-ba”. Very soon, they learn to articulate new consonants and produce more complex syllable combinations, such as “ma-da-ga-ba”. Although these sounds are meaningless, this “pre-language” provides the child with some experience of the social role of speech.

Between twelve and eighteen months, toddlers use single words or holophrases to make requests or express feelings. By the age of twenty months, children’s repertoire moves beyond 50 words and they start to use a variety of two-word combinations or protosentences, such as “mommy eat”. The adult interpretation of the holophrases and the protosentences depend on the context. For example, if the child

says “spoon” or “poon”, it is either naming the object or saying “I want a spoon”. Similarly, the combination “baby juice” can either mean “the baby is drinking juice” or “the baby wants juice”.

At two years of age, children can produce up to 300 words and understand five times as many. Then comes the sixth stage known as the telegraphic speech at two-and-a-half years. This stage features humble syntactic abilities as the child develops the skill of sentence building. They produce laconic utterances made up of content words (nouns, verbs, adjectives, etc.) and drop functional words (articles, prepositions, etc.). Examples include “baby play garden” or “Daddy goed bye-bye car”.

NO



Finally, by three years of age, the vocabulary grows to hundreds of words, the grammatical and syntactic abilities advance, and the pronunciation becomes closer to that of an adult. In general, normal children develop language along almost the same schedule, which is tied to the maturation of the brain; however, variations can always exist.

No doubt, the human language faculty is a great gift bestowed upon humanity; it is by far the most sophisticated communication system of all time. Language acquisition and use involve highly-advanced cognitive and biological mechanisms that have always puzzled thinkers and linguists. Despite the evident linguistic diversity over time and space, this incredible human ability to-do-language remains universal.

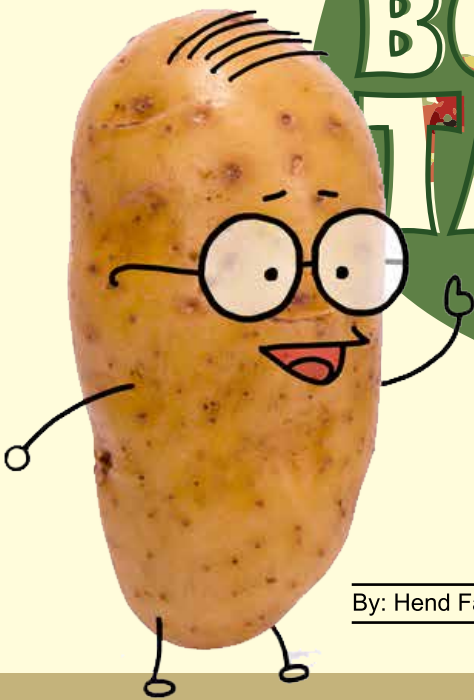
*Velar consonants are pronounced with the back part of the tongue against the back part of the roof of the mouth (palate).

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BOTANIC TALKS



By: Hend Fathy

Plantae is a seemingly silent kingdom; yet, it has billions of secrets to tell. Life on Earth literally depends on plants, which form the bases of food cycles and maintain a balanced atmosphere. However, have you ever wondered how would such a huge kingdom survive and thrive for millions of years without communication? In reality, plants have a social life that scientists have only just begun to understand.

Few decades ago, the idea of plants communication was not widely accepted in the scientific community. Unlike human beings and animals, plants do not depend on sounds or sign language. Alternatively, they use means such as airborne chemicals, soluble compounds exchanged by roots, and underground fungi networks.

Wind-Carried Warnings

When you take in the whiff of freshly mown grass, you are actually smelling a distress call. Plants can call for help and warn their neighbors against nearby dangers through emitting airborne chemicals known as Volatile Organic Compounds (VOCs). Some species can identify the pests attacking them by their saliva, and in response, emit a scent that appeals to their predators; within hours, the predators show up and drive the pests away.

When nearby plants receive these VOCs warnings, they ramp up their own defenses proactively against the hungry pests around. Several studies have demonstrated that VOCs increase the fitness of the receiver plants; they tend to lose less leaves to predators and even produce more new ones. Researchers have been working for some years now to characterize the VOCs chemically and find out how they encode different messages.

Roots Telecommunication

Plants send, receive, and pass on valuable information through their roots. In an *in-vitro* experiment, researchers grew six garden plants in row and subjected the first one to drought-like conditions. They monitored the microscopic pores on the leaves surfaces, which changes width according to the availability of water; after some minutes, the stressed plant closed its pores, and so did its nearest unstressed neighbor. Within an hour, the remaining four plants closed their pores one after the other, indicating that they, too, received the message to prepare for drought. The experiment was repeated with a control setup where root contact between neighboring plants was blocked; guess what, the pores stayed open.

"Fun-Gi" Connections

Underground botanic chitchats can take more sophisticated forms and involve more parties. Just like human beings, plants have network connections; however, theirs are based on fungi. To us, the mushroom is the most familiar part of a fungus; yet, most of the fungi bodies consist of thin threads known as the mycelium. The mycelium travels underground, connecting the roots of different plants and trees in an area together, allowing them to communicate, among other things.

The relationship between plants and fungi is one of mutual benefits. While plants provide fungi with food in the form of carbohydrates, fungi boost their immune systems, provide them with nutrients, and help them suck up water and exchange substances and information. Trees encode their messages in electrical signals that pass through their roots and spread across fungi networks. Through this strategy, they call for help when they are under attack, feed

stricken trees, and sabotage unwelcome plants by spreading toxic chemicals.

Just like our World Wide Web, the mycelium turns out to have its own version of cybercrime. Some plants like the phantom orchid do not have chlorophyll, and hence, fail to produce their own food through photosynthesis; they steal the carbon they need from nearby trees via the mycelia. Other orchid species are more wicked; while they can carry out photosynthesis, they still steal carbon from their neighbors.

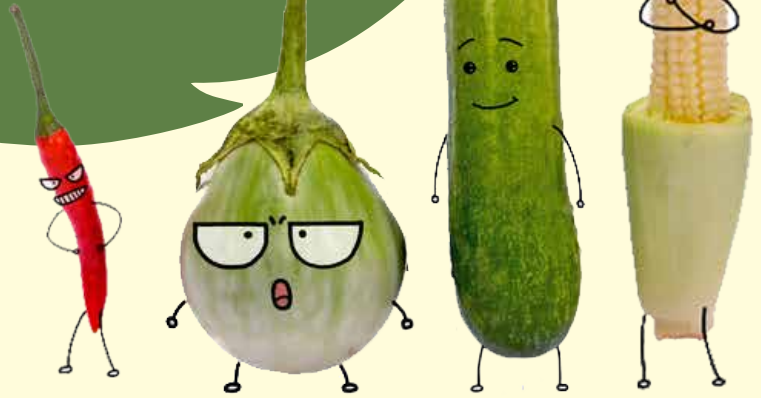
Family Ties

Plants can recognize their relatives; some studies suggest that airborne communication is more effective among genetically-matched plants. Moreover, plants adopt a strategy known as "kin selection", where they compete for resources with strangers and consider the needs of their siblings; the "kin selection" strategy shows best underground. Mother trees use the fungi networks to nurture their saplings. It was also found that plants surrounded by strangers tend to grow more roots to better compete for food, while plants surrounded by relatives grow more restrained roots and share the available resources.

I am sure you might be viewing plants from a different perspective now. Indeed, every creature has its own voice and can speak for itself. It is all about how keen we, humans, are to listen to and consider what nature has to say to us.

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Insect EATING PLANTS

By: Fatma Asiel

Plants are productive creatures without which we would not have oxygen to breathe or get rid of carbon dioxide. Moreover, without plants we would not have the energy we need to survive. Plants obtain energy from the Sun, passing it on to us upon consuming them directly or indirectly when we consume animals that feed on plants; this is the universal natural cycle of life. However, have you ever heard of plants that not only eat insects, but also small animals?!

No need to wonder; this is reality. Some plants do not obtain enough nutrition from the soil, and hence, opt for hunting insects and small animals. However, this does not make them consumer creatures, for they remain productive through photosynthesis.

Why and how do plants consume insects?

After conducting several studies on these plants, it was found that most of them grow in nitrogen-poor soils by swamps. Nitrogen is an essential element for plants; thus, they make up for it and other missing nutrients by consuming insects. Studies have also proven that predatory, or carnivorous, plants have become to be as such due to evolution. Living organisms change, spontaneously evolving to cope with the surrounding environment. In other words, predatory plants were once regular plants, but they evolved to consume insects and small animals in response to their poor environment.

If you think about it, plants in general have neither muscular nor digestive systems; how then do they hunt and digest their preys? Predatory plants set traps to hunt insects through their attractively colorful, yet very sticky, leaves. One such species looks dewy, which attracts insects that soon get trapped by these deceptively sticky drops. Other predatory plants emit distinctive smells that attract insects.

Once the insects are trapped, predatory plants use one of two techniques to catch them. They can change the water pressure in one side of the leaf, making it bend over the other side. Alternatively, one part of the leaf can be larger than the other so it bends over it. As for digestion and absorbing nutrients from the insect, most carnivorous plants secrete digestive enzymes or contain bacteria that do this task. Other plants do the hunting, but wait for other creatures to eat the prey, so that they may then feed on their wastes as prepared meals.

The Most Famous Carnivorous Plants

According to the latest statistics, there are about 600 different species of predatory plants around the world, the most famous of which are:

1. The Cape Sundew: A perennial plant that flourishes in humid places in South Africa and consumes insects.
2. The Red Dragon: One of the most famous carnivorous plants that also exists in South Africa. It consumes insects and small animals, such as frogs, using its large colorful leaves to attract prey.
3. The Venus Flytrap: This species is in the United States, specifically in the State of Carolina, which is rich with swamps. Flies, bees, and spiders are its main food.

A Harsh Challenge

Predatory plants face an extremely harsh challenge; namely, how pollen is transferred if its means of transportation becomes the food of plants? How do these plants reproduce?

Several research studies tackled this point in particular, and have proven that most predatory plants can differentiate between pollen carriers and other insects they consider prey. Pollen-carrying insects head to the plant flowers rich in pollen, which is usually far from the leaves. Other insects head to the plant leaves and are trapped then eventually eaten.

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Conflict Harmony

Viewpoints on the Nature of Society

By: Basma Fawzy

Nowadays, we live in a society that we tend to take for granted, but can you imagine our world without society? Societies did not spring out of nowhere; our modern world is shaped as such for a number of reasons. Yet, what are the criteria that make up a society? Sociology is the science that studies “the society”; it ventures to find out how human beings lived before our modern societies, and how societies began in an attempt to discover the role of society, and the need that made its existence justifiable.

In the past, human beings were hunters and gatherers; they moved from one place to another. They eventually created tools to help them perform their duties; and overtime, they developed and learned to communicate with each other. Man started to depend on agriculture; as a result, civilization and societies eventually flourished because ploughing the land and caring for the crops allowed people to finally settle and create communities.

The word “society” comes from the French word *société*, meaning “company” which, in a sense, implies the role of society. Thomas Paine, American philosopher, argues that societies existed way before governments because of the mutual interests between human beings and their dependence on each other. Aristotle once noted that “Man is by nature a social animal” and continued to argue that living in a society is part and parcel of being human. Hence, whether it is a necessity or an inclination to form groups to ward off loneliness, societies and the role they play in human existence must be studied.

Here comes the importance of sociology; it places the society and people under the microscope in order to discover social relations, people’s role in society, and how the society shapes the individual, etc. Sociology sheds light on significant factors of our reality; hence, it

allows us to explore human relationships and to see them in a new light. Since it is not always easy to explain and understand human relationships in society, sociological theories have come up to unveil the complexities in the society. Two of the major theories of sociology are: the Functional and the Conflict Theories.

The “Functional Theory” views harmony in the society, which is a whole, whose different pieces are inseparable. After all, societies share same beliefs and values; therefore, they also share a common goal, which all members of society work toward accomplishing. Accordingly, individuals become in the end devoted members, who do their best for the welfare of society because they believe that the best interests of society are their best interests as well. Emile Durkheim and Talcott Parsons are among the main figures who support the Functional Theory.

Unlike the Functional Theory, the “Conflict Theory” does not thrive on harmony. Conflict Theory is, in short, the embodiment of its name. This Theory arose from the work of Karl Marx, who was a social thinker believed to be one of the most influential figures in history. Any given society is divided into social classes, which are in perpetual conflict because they want to better their status. The social class that has full power

strives to remain in power by imposing its own rules. In other words, those who are wealthy try to maintain their wealth, while the impoverished classes try to improve their fortune; each class works for its own interests. This is why conflicts arise because the interests of the two classes in the same society clash. An example of this conflict is the appearance of labor unions, which exist only to fight for the rights of the workers in the society.

The two sociological theories contradict each other. While one theory supports the claim that the society lives in harmony and individuals work together to accomplish the same goals, the other theory believes that individuals only work for their own interests and not for the whole society. The two theories show that the social experience is a rich one, and that it requires more than one interpretation to be understood. It is only when we understand ourselves and the purpose of society that we can create a better society.

Sociology helps us create a better society by shedding light on the prevalent trends, values, and behaviors in any given society. In short, sociology focuses on the rich social experience in an attempt to understand and define the role and purpose of society. It is true the theories of sociology may differ; despite the differences, the goal of sociology remains the same: the welfare of Man in society.

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SOCIAL AND BEHAVIOR CHANGE COMMUNICATION

By: Nourane Khaled

Whether you are watching television, listening to the radio, or surfing the Internet, you are surrounded by awareness messages aiming to make you adopt a certain behavior or change the way you view a topic. Have you ever wondered what lies behind all these messages and how they influence you?

A behavior is the set of actions or reactions individuals and communities take due to internal and external stimulants. They are usually influenced by social norms, cultures, past experiences, personal perceptions, and educational and awareness level. Accordingly, a behavior that is accepted in a community is not necessarily acceptable in another; the same applies on the individual level.

Changing a community or an individual's behaviors is based on three pillars: a trigger that urges people to change, a routine that people will follow to modify their behavior, and lastly, a reward, or the positive impact that people will witness in their lives.

In the past, behavioral change was through top-down approaches such as the teacher-student type of communication. This method has proved its failure in changing behaviors and ensuring the sustainability of change, because knowledge alone is not enough.

People need an approach that involves them in the changing process, rather than order them to stop what they are doing because "science says so". Hence, Social and Behavior Change Communication emerged; it uses other approaches, acting on multiple aspects to motivate the behavioral change.

Social and Behavior Change Communication (SBCC) are interventions aiming to positively change the behaviors towards a specific topic via the power of "communication". This can be through influencing attitudes, knowledge, norms, and practices of communities, societies, or individuals, leading to better social norms, policy-making, and future.

SBCC incorporates three core elements:

- Social Change: to change social norms, gender roles, perceptions, and policies;
- Behavioral Change: through making the newly practices feasible and easily adaptable to achieve better outcomes to the population; and
- Communication: using different channels and themes that target the audience needs and preferences.

SBCC is a multi-sectoral process that involves more time, human, and sometimes financial, resources to be implemented. You must start by scoping the audience, creating the needed materials, testing them, then implementing your SBCC campaign.

You need to start by formulating an SBCC strategy after analyzing the problem, defining the barriers and motivators, then designing the effective messages and interventions for your community.

Have you ever seen an SBCC campaign? Of course, you did! All television, radio, social media, newspapers and magazines display SBCC content; they either target the whole population or are tailored for specific community groups. Famous examples are: campaigns on cancer prevention, rationalizing electricity consumption, saving water, avian and swine flu awareness, family planning, diabetes and hepatitis awareness, breastfeeding and childcare awareness, etc.

Currently, the arena is more suitable for SBCC campaigns thanks to the massive progress in social media, which provides low-cost channels for disseminating messages among different communities, classes, and age groups. Moreover, people's perceptions have totally changed after globalization. They have become more open to foreign actions and trends, which have enriched their experiences.

SBCC and Health Communication

The most common applications of SBCC campaigns are concerned with public health. Health communication activities can vary widely, depending on the objectives, audience, and communication channels. In this process, the activities vary according to the target audience and objective of the campaigns.

Health communication is a part of what we call Health Education. Originally, health education and communication procedures were usually performed through producing Information, Education, and Communication (IEC). IEC materials are the visual material used in transferring the required information and changing the behaviors.

Health communication is research-based; SBCC must be driven by epidemiological evidence and inclusive analysis for the community's perspectives and needs. From that, the importance of researching in the behavioral science field has risen. Experts analyzed the populations' knowledge, perceptions, norms, and preferences, hence, developing a new approach in behavioral change the multi-sectoral approach.

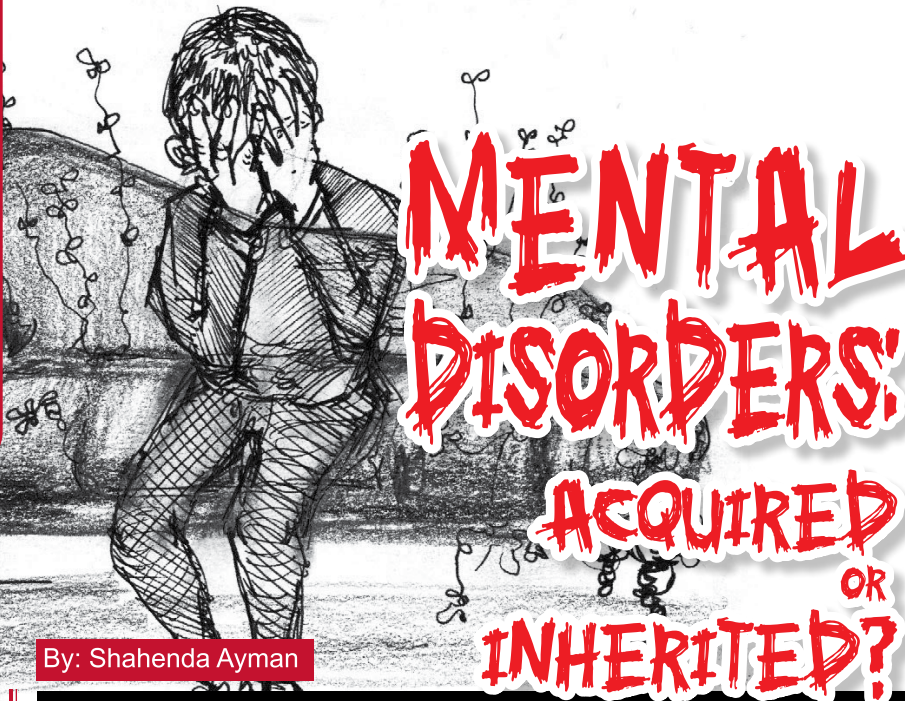
In Egypt, we have witnessed several successful public health campaigns; such as schistosomiasis treatment and prevention, family planning, and female genital mutilations. These campaigns were a success; they captured the population's attention, causing a significant behavior change with sustainable positive effects.

At the end, we can conclude that behavioral sciences have a major role in our lives and future; understanding behaviors is a key element in mobilizing communities and individuals towards positive behaviors and social norms. Further research on SBCC and its related fields are still ongoing to serve humanity and help people adapt better behaviors for a better future.

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By: Shahenda Ayman

When I read or hear about people hurting their own selves or trying to end their own lives, I wonder how a person could become that desperate.

Mental or psychiatric disorders may indeed cause a person to suffer greatly that s/he is unable to function in life. Such features may be persistent, relapsing and remitting, or occur as a single episode. Many disorders have been described, with signs and symptoms that vary widely; the most common cases classified as mental disorders are:

1) Sleep Disorders:

An interruption in sleep patterns that lead to distress and affects daytime functioning.

2) Eating Disorders:

The obsessive concerns with weight and disruptive eating patterns that negatively impact physical and mental health.

3) Anxiety Disorders:

Characterized by excessive and persistent fear, worry, and anxiety, such disorders manifest in a person's inappropriate response to a situation, if a person cannot control his/her response, or if the anxiety interferes with normal functioning.

4) Trauma- and Stress-Related Disorders:

Following the exposure to a stressful or traumatic event, people with this disorder often have lasting and frightening thoughts and memories of the event.

5) Bipolar Disorder:

It is the shift in one's mood and change in activity and energy levels; it involves persistent feelings of sadness or periods of feeling overly happy, or fluctuations between the two extremes.

6) Impulse-Control Disorders:

An inability to control emotions and behaviors, resulting in harm to oneself or others.

7) Obsessive-Compulsive Disorder (OCD):

People with OCD have constant thoughts or fears that cause them to perform certain routines; for example, a person with an unreasonable fear of germs washes his/her hands incessantly.

8) Psychotic Disorders:

They involve distorted awareness and thinking; two common symptoms of psychotic disorders are hallucinations and delusions.

9) Personality Disorders:

Extreme and inflexible personality traits that are distressing to the person and/or cause problems in work, school, or social relationships. The person's patterns of thinking and behavior significantly differ from the expectations of society.

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Do genes have a role in such disorders? Are they socially acquired or emerge because of bad experiences? For some disorders, the evidence suggests that genetics play a significant role, while others appear to be more environmentally influenced.

In 2007, researchers began investigating genetic data generated by studies in 19 countries, including 33,332 people with psychiatric illnesses and 27,888 people free of the illnesses for comparison. They studied scans of people's DNA, looking for variations along the long stretch of genetic material. In 2013, results came up with five common mental health conditions that not only share symptoms, but also share a variation in their DNA; these conditions are depression, bipolar disorder, Attention-Deficit/Hyperactivity Disorder (ADHD), schizophrenia, and autism.

During the study, researchers examined the genes of a few families in which psychiatric disorders were prevalent; they found few unusual disruptions of chromosomes that were linked to psychiatric illnesses. However, what surprised them the most was that, while one person with the aberration might get one disorder, a relative with the same mutation had a different one.

It was not clear though whether these families were an exception or they were pointing to a rule about multiple disorders arising from a single genetic glitch. Mental illness itself occurs from the interaction of multiple genes and other factors, such as stress, abuse, or a traumatic event, which can trigger an illness in a person who has an inherited susceptibility to it.

Scientists think there are other factors, such as:

- Certain brain infections;
- Defects in, or injury to, certain areas of the brain;
- Disruption of early fetal brain development;
- Trauma that happens at the time of birth, such as loss of oxygen to the brain, may develop certain conditions, such as Autism Spectrum Disorder;
- Severe psychological trauma;
- Early loss, such as loss of a parent;
- Neglect and poor ability to relate to others.

Over time, researchers will continue identifying more causes for a single personality disorder, says Theodore Millon, Dean of the Florida-based Institute for Advanced Studies in Personology and Psychopathology. Narrowing down potential causes will help psychologists more quickly isolate what might be influencing a particular patient, he says. "Once you identify the cause that seems most probable and most significant, then you can design your therapy in order to unlearn what seemed most problematic for that individual," says Millon.

The coming years promise to reveal the adversity behind mental illness in an attempt to save many lives captivated in mental disorder incarceration.

PARANOIDIA

The Downfall of Greatness

By: Fatma Asiel

We always hear the term “paranoia”, which is often linked to the word “madness”, and that is true; yet, not in the common sense of madness. Paranoia is a common disease that people, and perhaps entire communities, suffer from worldwide. It has several forms and types that differ in terms of symptoms and treatment methods.

Paranoia is a mental illness that causes patients to suffer from controlling ideas and beliefs that have a special logic invented by the patient’s mind. The behavior of a paranoid person is characterized by suspicion, mistrust, and excessive obstinacy to validate his/her beliefs and ideas. Moreover, the patient’s reactions are exaggerated toward any behavior—even normal behaviors—from other people. The patient believes that he/she is being persecuted one way or the other, by other people, believing they are conspiring to make fun of him/her, or even thinking of killing him/her.

Symptoms

Generally, it is hard to identify specific symptoms of any psychiatric illness, because some symptoms are similar; however, each disease has certain distinguishing symptoms. A paranoid personality is distinguished by:

- A constant belief that others are deceiving him/her and are plotting against him/her.
- Extreme fear to provide information about himself/herself, even to close people, fearing they would use it against him/her.
- A sense of persecution and suspicion in people surrounding him/her.
- Expecting lack of sincerity from others.

Sometimes, symptoms develop into audio-visual hallucinations.

It is not necessary for a paranoid person to suffer from all these symptoms combined; the type of paranoia is the determining characteristic of its symptom.

Types

Persecution Paranoia: The patient feels that everyone persecutes him/her for ethnic, religious, or other reasons of his invention, which he/she believes in.

Grandeur Paranoia: Celebrities suffering from problems in the formation of their personalities, and people who are already exposed to harm or harassment from others, are those who suffer most from this disease. This causes them to imagine grandeur or that they have supernatural powers.

Delusional Disorder: You may have heard of people who died from delusion. This is true; this patient imagines he/she is suffering from an illness and feels pain in a certain area or all over his/her body, or that he/she has a terminal disease. Analysis and professional opinions show that he/she is healthy; however, the condition of paranoia gets worse day after day, leading to death.

Melancholia Paranoia: The patient feels a permanent guilt complex, believing that all disasters are caused by him/her in one form or another. The patient feels that he/she is responsible for the consequences, and is haunted by a constant guilt, believing that he/she deserves punishment that can sometimes lead to suicide.

Paranoia Celebrities



As mentioned before, Grandeur Paranoia is most common among celebrities and high-ranking officials; however, tackling specific figures remains tricky. Most people around the patient, as well as the patient himself/herself, avoid talking about that problem.



Several movies presented paranoia, such as *Conspiracy Theory* and *The Caine Mutiny*; yet, *A Beautiful Mind* remains the most famous. It narrates the story of the renowned mathematician and Nobel Laureate (1994) John Nash. Despite his genius, audio and visual hallucinations surrounded him everywhere; at the end, it led to harming those around him as well as himself. Nash underwent psychological treatment in one of the clinics, but the treatment affected his scientific production; as a result, he left and tried to control the disease himself. Although psychiatrists expected him to fail, he overcame paranoia.

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THE MADNESS GENIUS BEHIND

By: Maissa Azab



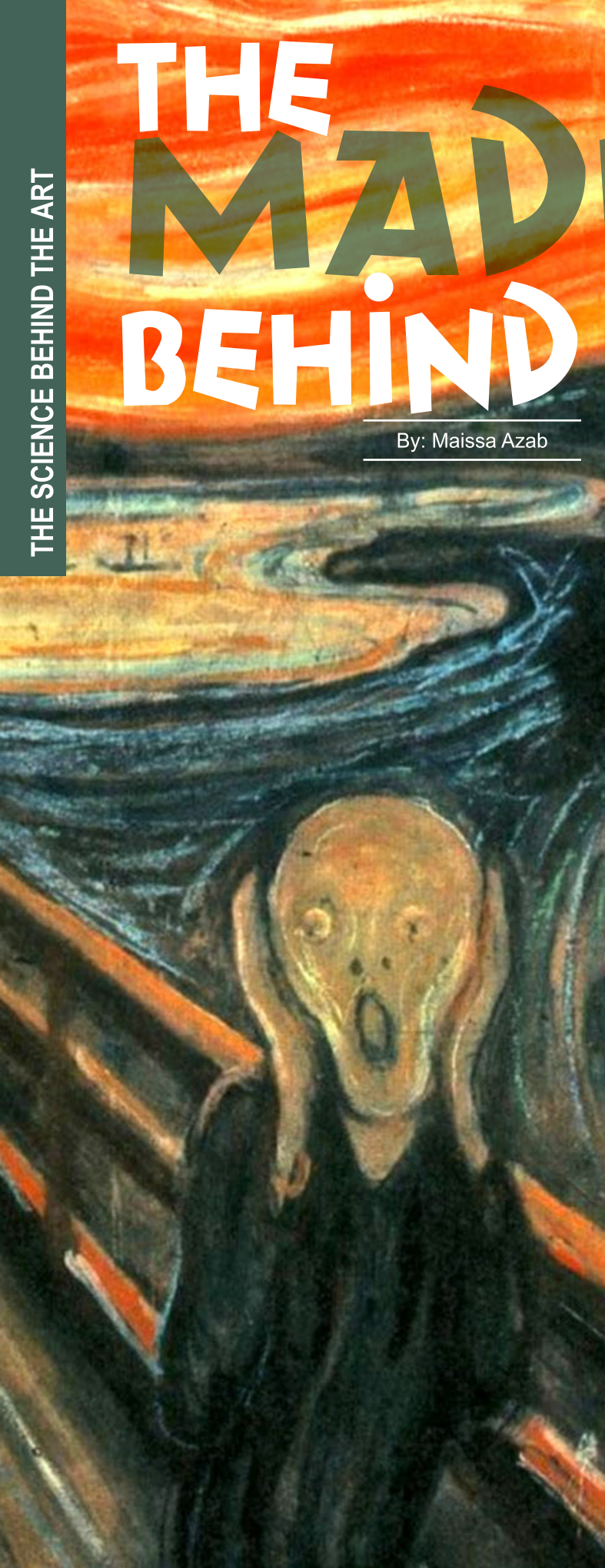
Let us admit that, more often than not, being artistic is linked to being mad—in the broader sense of the word—that is “art is madness” is actually a common saying! As a matter of fact, most geniuses, in any field, including scientific fields, are almost always associated with one type of “madness” or the other; this so-called madness sometimes take the shape of erratic behavior, it can be a psychiatric condition, or in some cases it can actually be a mental illness.

This brings us first to the differentiation between the aforementioned situations, as the difference between *mental illness* and *psychological health* is usually misunderstood. Mental illness refers to alterations in thinking, emotions, or behaviors that create distress and impaired functioning for the individual; it is often a result of biological changes in the brain. Psychological health, on the other hand, is determined by more than just the absence of mental illness.

If a person is not depressed, does not have hallucinations or delusions, they are probably not mentally ill; however, that does not mean they are necessarily psychologically healthy. Psychological health means having the ability to think, express, and behave appropriately in relation to our emotions. Knowing the difference is important.

The common trait between geniuses in all kinds of fields—whether artistic, scientific, or other—is creativity. Hence, it is actually creativity that is often associated with “madness”, and I insist on using quotation marks, because although we commonly use the term for describing any kind of behavior or demeanor that we deem abnormal, it is not truly correct to use it spontaneously in any such case.

A definitive link between mental illness and creative pursuits had been missing; about one in four people in the creative industry struggle mentally in some form, which is the same ratio as the general population. Past research had, however, tentatively confirmed a correlation; scientific surveys found that highly creative people are more likely to have mental illness in their family, indicating a genetic link. At least two recent studies have found that creative people are significantly more likely to be a sibling or child of someone who is autistic, anorexic, schizophrenic, or bipolar. They experience a milder expression of schizotypal traits, such as openness to new experiences,



a tolerance for ambiguity, and an approach to the world relatively free of preconceptions.

Scientists had previously found that divergent thinking, or the ability to “think outside the box”, involves the brain’s dopamine communication system. A research team at the Karolinska Institute in Stockholm studied 13 mentally healthy, highly creative men and women, using PET scanning to determine the abundance of a particular dopamine receptor, or sensor, in the creative individual thalamus and striatum, which are the areas that process and sort information before it reaches conscious thought. The team found that people who had lower levels of dopamine receptor activity in the thalamus also had higher scores on tests of divergent thinking—for instance, finding several solutions to a problem.

Previous research showed that people with schizophrenia also have lower dopamine receptor activity in the thalamus; the scientists suggest in their paper that this striking similarity demonstrates a “crucial” link between creativity and psychopathology. “Thinking outside the box might be facilitated by having a somewhat less intact box,” writes lead author Fredrik Ullén, a cognitive scientist at Karolinska.

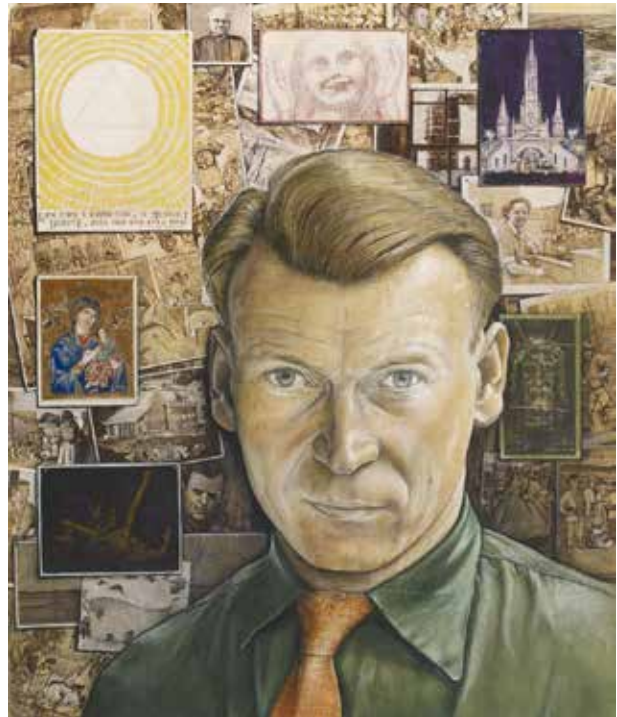
The truth is, for many creative people, the psychological and physiological manifestations of a frustrated life can lead to hospitalization, debilitating depression, mania, or flourishing of mood disorders. For those attempting to cope in a world that does not embrace alternatives too well, the consequences may seem less severe, but are clearly identifiable as emotional problems that indeed interfere with healthy functioning.

The association between madness and art in particular is as old as Western culture. Aristotle identified a tendency to melancholia in the artistic temperament; Shakespeare produced multiple variations on the theme of lunatics and poets being “of imagination all compact”; and Dryden coined the notion of a “thin partition” between wit and insanity. As a matter of fact, madness and artistic talent are often connected so strongly that it is used as a proxy for determining the quality—and selling price—of an artwork.

The tortured artist has been a recurring character in fiction and in real life; countless painters, composers, writers, and musicians have indeed suffered from depression, bipolar disorder, and schizophrenia. A 2012 study followed 1.2 million patients and their relatives and found that bipolar disorder is more common in individuals with artistic professions, including dancers, photographers, and authors; scientists were also found to have the same link. Authors were more likely to face other psychiatric diseases, such as depression, anxiety, substance abuse, and schizophrenia. Writers were also about 50% more likely to commit suicide than the population at large.

Historically, the Bethlem Hospital and Museum were home to several significant artists, perhaps most famously Richard Dadd, who in 1843 was institutionalized at the age of 26 after undergoing a psychotic fit during which he murdered his father; he remained committed until his death in 1886. Dadd was a serious painter whose work did come to take on some of the strange combinations and eerie remoteness of his condition, which was probably schizophrenia.

Perhaps the most extraordinary painting in the Museum is *The Maze* by the modern Canadian artist William Kurelek. It is a portrait of the deranged contents of the artist’s multi-compartmented skull; he painted it while suffering from acute depression, aged 26. When he got better, he gave one of his subsequent Canadian landscapes to the Hospital as a demonstration of his improvement. The correlation between extremely different mental states and the scenes depicted in these two paintings is self-evident. However, Kurelek’s technical ability as an artist is unchanged; it is a function that was quite separate from his mental dysfunction.



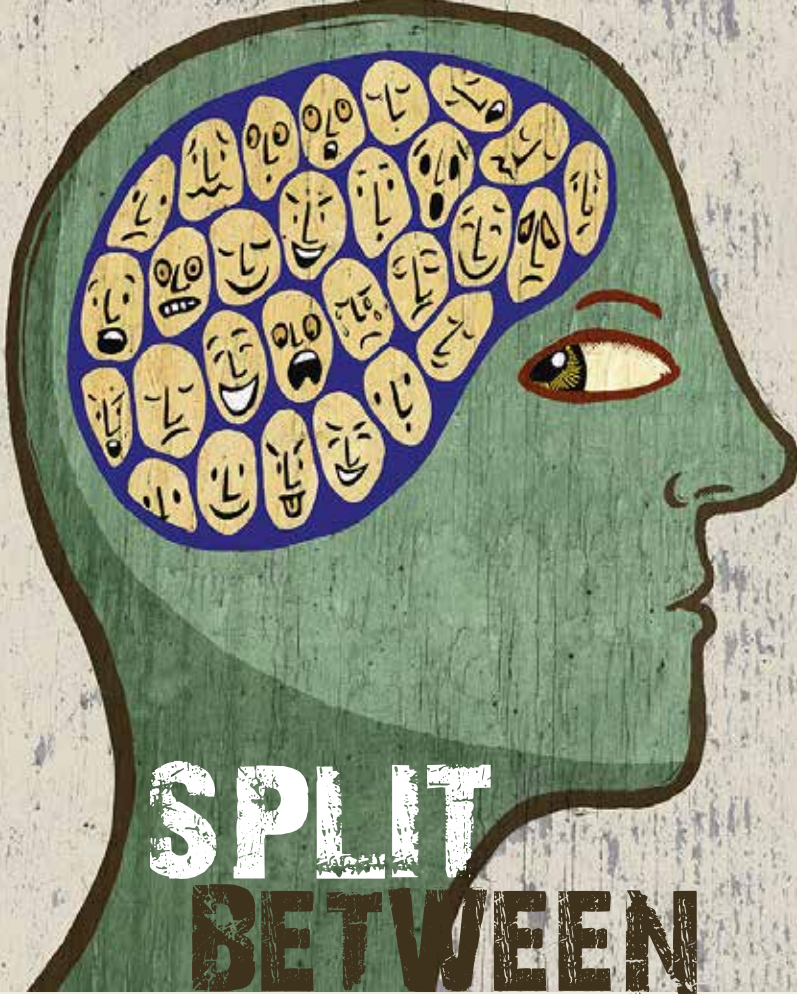
Research in the area, though sporadic, reveals distinctly higher rates of psychiatric conditions—most particularly mood disorders—among artists and writers. In her 1993 study *Touched With Fire: Manic-Depressive Illness And The Artistic Temperament*, Kay Redfield Jamison, Professor of Psychiatry at Johns Hopkins University, concluded that among distinguished artists she investigated, the rate of affective disorders was 10–30 times more prevalent than in the general population.

Nancy Andreasen, Chair of Psychiatry at the University of Iowa Carver College of Medicine, studied 30 authors from the University’s famous writers’ workshop and discerned that artists, though prone to emotional disorders, do not have high rates of schizophrenia, but their families do. The suggestion is that some features associated with schizophrenia, which have not developed into a psychosis, may confer some kind of creative originality. Hypomania—moderate levels of manic experience—can produce extraordinary periods of energy and concentration, followed by a plunge into depression. It may, in some people, confer benefits as well as deficits.

On The Other Hand

Art has led the way to seeing mental illness not as alien or contemptible, but as part of the human condition; even as a positive and useful experience. This psychiatric modernism started with the “madness” of Vincent van Gogh and led to work by patients being discovered as a new kind of art; yet, it has much deeper historical roots. The idea of going outside oneself to see things afresh is probably as old as the torch-lit visions of cave artists; it was expressed by the ancient Greek philosopher Plato when he wrote that poetic ecstasy is the only source of Divine truth.

In 1792, Francisco Goya, 46 years old, came down with a mysterious illness, causing him to suffer hearing loss, headaches, dizziness, vision issues, and weakness in one of his arms. Soon after, his physical issues turned into mental symptoms, including depression, hallucinations, delirium and weight loss. Scholars have suggested that Goya’s illnesses likely influenced his later art, which featured some rather dark material.



SPLIT BETWEEN

FACT AND FICTION

By: Basma Fawzy

Almost all of us know about Dissociative Identity Disorder through movies and stories. It is basically a mental disorder in which two or more independent and distinct personality systems develop in the same individual. From the humorous to the utterly tragic, these artworks made us wonder about the dividing line between fact and fiction.

The Curious Case of Dr. Jekyll and Mr. Hyde is a famous novella published in the 19th century that has become synonymous with Dissociative Identity Disorder. If you are not familiar with it, it is about a person who has two different personalities, featuring the two sides of human nature: the good and the evil. Other artworks, such as the movie *Me, Myself, and Irene*, have also featured characters that have two distinct personalities.

However, this is not always the case; this Disorder can indeed be characterized by two or more—for purposes of accuracy let me use the term—personality states.

A more recent movie, *Split*, puts a new spin on the Disorder, taking it to the extreme, depicting a person with 23 different personality states. While in most movies and stories, the person normally displays distinct changes in behavior, *Split* sheds light on changes in the body chemistry. Leaving fiction aside, let us find out what science has to say about this curious condition and whether the movies have depicted the truth or widened the gap between facts and misconceptions.

Dissociative Identity Disorder was previously referred to as Multiple Personality Disorder; the term has been updated to shift the focus on the changes that occur to the

personality. Unlike what movies suggest, patients who suffer from this condition do not have different personalities; they have different personality states. It is the fragmentation of one personality rather than the development of separate ones.

The Disorder is also marked by severe memory loss due to the person's inability to form a multidimensional self with different aspects of identity and memory. As a result, patients dissociate from reality and form different realities with different memories; sometimes, they are unable to recall what they have done or said in different situations. In other words, the patients experience reality through various moods and memories, and as a result do not remember what has exactly taken place.

Many misconceptions have stemmed from the exaggerated portrayal of this condition in popular culture. According to neuroscientist Simone Reinders, movies have created a negative image about it, and mistakenly depicted those suffering from it as violent. Alternatively, he explains, they feel stigmatized by these movies and try to hide their case. He adds that diagnosing somebody with Dissociative Identity Disorder is not easy; it is a process that can take several years.

So, are movies completely out of touch with reality? In *Split*, Kevin's body chemistry changes with every different personality. Research reveals that changes in body chemistry do occur; Reinders observes that her patients' blood flow to the brain changes when their personality state changes. More interestingly, some findings reveal that the need to wear glasses or change which hand to write with may arise with different personality states.

In order to sympathize with sufferers of the Dissociative Identity Disorder, people need to understand, and you only understand when you are aware of the facts. As it is an interesting condition, it lends itself well to writers' imagination; however, artworks usually spice up fact with fiction, but they should also maintain their role in educating the society. Writers and directors should be more considerate to the misconceptions they might create. The responsibility also falls on the spectators. After all, movies are made to entertain people and if we seek the truth, we have to investigate the real science behind the ideas they tackle. The depiction of this particular condition acts as a reminder that we should not consider movies as references.

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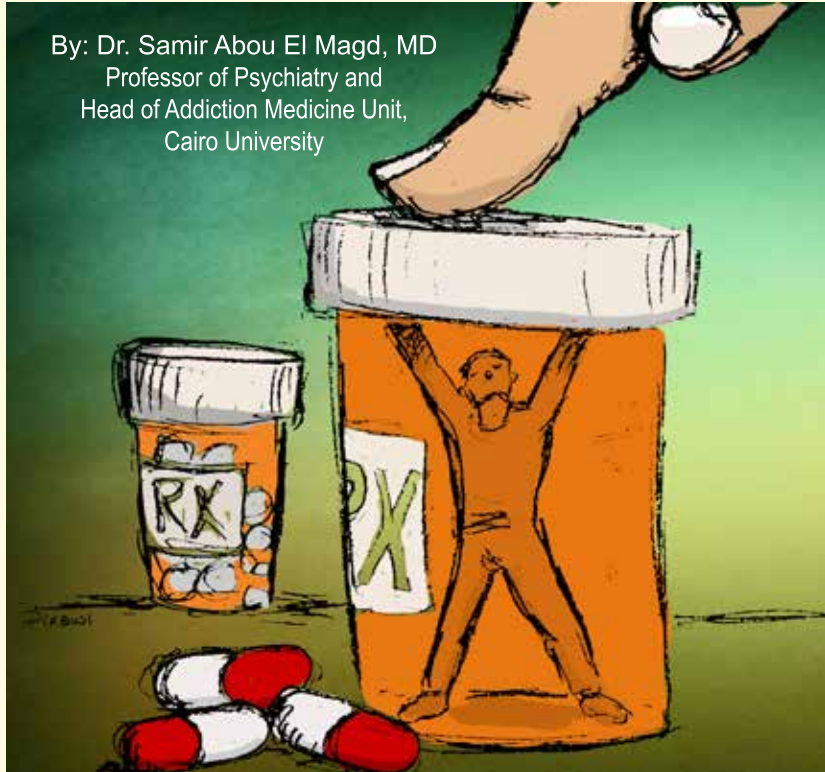




Addictive substances have been part of human existence for numerous years. For example, opium was used for medical purposes nearly 3,500 years ago, while cannabis was used as a medicinal drug and can be found in ancient Chinese herbs. Moreover, the indigenous people of the Western Hemisphere smoked tobacco and chewed coca leaves.

ADDICTION

By: Dr. Samir Abou El Magd, MD
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Addiction is a mental disorder characterized by compulsive involvement in activities with catalytic yield despite their negative consequences. The disorder is based on repeated exposure to an addictive substance, which prompts people to continue seeking it and feel that it is rewarding in its essence.

Addiction has a severe impact on individuals and society as a whole. It causes significant financial and human losses because of drugs' harmful effects, as well as related healthcare costs, and long-term complications of addiction, such as lung cancer among smokers, alcoholic liver cirrhosis, and premature aging due to brain cell damage and loss of individual productive capacity.

An inability to control substance abuse or addictive behavior, and continued use of drugs despite their negative consequences are among the basic features of addiction. Moreover, habits and patterns associated to addiction are immediate gratification (short-term reward) and delayed adverse effects (long-term costs). When a person abandons drug use, an unpleasant physical and psychological withdrawal state might result in further abuse.

According to the statistics of the National Council on Drug Control and Treatment, 10% of Egyptians use drugs—twice the world average—10% are females and 90% are males. Recently, the phenomenon of youth smoking drugs in front of their parents has also emerged. Moreover, the starting age of drug abuse has decreased to 10–11 years old.

Risk Factors

Several risk factors interfere to stimulate abuse behavior and inability to control matters related to drug-use decisions. People addicted to a certain drug neither feel the same way nor are stimulated by the same factors. Drug availability, community acceptance, peer pressure, and the effects of the drug itself are key determinants of the onset of drug-use.

Other factors, such as personal and biological characteristics, are more significant in the extent of perceiving the drug effect and the degree of changes in the patient's central nervous system due to drug repeated use. Adolescence is a risk factor of addiction; if it occurs at this age, it becomes difficult to treat and the person becomes more prone to relapse.

Causes of Addiction

1. Genetic factors are responsible for 40–60% of the risk factors of alcoholism, and there are similar ratios of other addictive substances identified in several studies.
2. Environmental factors include negative childhood experiences, ill-treatment, family dysfunctionality, and constant stress—such as physical or emotional abuse, violent scenes at home, a parent suffering from a mental or psychological illness—increase the risk of addiction.
3. Psychological factors include associated mental disorders—such as schizophrenia, depression, chronic anxiety, hyperactivity and attention deficit disorder in children and adolescents, or post-traumatic stress

disorder—increase the incidence of addiction.

4. Community factors include the impact of bad friends, the desire to experiment, and lack of control from parents.

Treatment and Rehabilitation

Addiction treatment should help the person abandon drug-use, remain drug-free, and become a productive person in the family, work, and society.

Successful treatment includes:

1. Removing toxins from the body.
2. Behavioral therapy helps patients adjust attitudes and behaviors related to drug-abuse, increase healthy life skills, and communicate with other forms of treatment, such as pharmacotherapy, including treatment in a rehabilitation home or a therapeutic community.
3. Pharmacotherapy is used for treating withdrawal symptoms and associated mental disorders treatment, and preventing relapse.
4. Diagnosis and treatment of addiction-associated mental disorders.
5. Long-term follow-up to prevent relapse; the treatment duration ranges two to six months.

By: Shahenda Ayman

MEMORIES

TO KEEP OR NOT TO KEEP

The brain is a complex system of neurons and synapses—junctions between nerve cells—which work together via proteins to form memories. There are three ways memories are stored: first in the sensory stage, then in short-term memory, and finally—for some memories—in long-term memory. The three stages of human memory act as a filter, protecting us from the information flood we are confronted with daily.

Doctors classify memories based on the amount of time the memory is stored. Short-term memory is the very short time that you keep something in your mind before dismissing it or transferring it to long-term memory. Long-term memory, on the other hand, is our brain's system for storing, managing, and retrieving information.

Short-term memory loss is the person's inability to recall recently occurred events; it may range from previous seconds to a few days. According to the Brain Aneurysm Foundation (BAF), brain aneurysm may cause short-term memory loss. Brain aneurysms are weak, bulging spots on the wall of brain arteries; they do not always rupture, but when they do, they may cause bleeding into the compartment surrounding the brain. The pool of blood clots, increases the pressure on the brain and can irritate, damage, or destroy brain cells.

Finding Nemo, the famous 2003 Pixar animated movie for children, introduced us to Dory; a fictional blue tang fish that suffers short-term memory loss. She knows who she is, but has difficulty forming or encoding new memories. She accidentally meets Marlin while he chases a boat of

scuba divers who have just captured his son, Nemo. Dory recalls seeing the boat and agrees to show Marlin the way it went; however, after swimming a few minutes, she completely forgets who he is and why he is following her. Dory suffers from anterograde amnesia, a problem learning new information; yet, she helps Marlin find Nemo.

In humans, anterograde amnesia is most associated with anterior temporal damage, particularly to a structure called the hippocampus, a brain structure located in the medial temporal lobe. Memories before the cause of amnesia are usually preserved. If you have a short-memory loss, you may do some small actions to cope with the condition:

- Keep everyday items in the same place and try to do things in the same order each time.
- Write down information you think may be important.
- Keep a diary at home, as well as at work, to remind you to do daily tasks.
- Use an alarm clock to help you remember to do something in the future, such as taking something out of the oven.
- Repeat important information you need to remember to someone or to yourself.

On the other hand, long-term memories are formed when short-term memories are consolidated in the hippocampus; once the memories are consolidated, they are available independent from the hippocampus in the neocortex, where they can be retrieved. A patient with long-term memory loss has problems recalling stored memories, not creating new memories.

Physical injuries, brain tumors and strokes, and degenerative diseases can lead to long-term memory loss.

Memory is similar to a jigsaw puzzle; to remember a past event, we piece together various remembered elements. How well we remember things depends to a great extent on how well we are attentive when material is presented. In addition, the extent to which we replay the material in our minds and relating it to what we already know affects our ability to remember.

Some people are lucky—or unlucky, depending on the memories—have photographic memory. Just like a photograph freezes a moment, people with photographic memory are able to take mental snapshots and recall them without error later. It is unclear whether this type of memory is trainable or is it related only to the events that affected us deeply.

Though some people are born with this unique brain chemistry specialized for an advanced photographic memory, almost anyone can improve their memory exponentially. Proper supplementation, diet, exercise, meditation, and perfecting your sleep are keys to maximize your brain health to create an environment for massive memory growth and cognitive enhancement. Memory training programs are essential to unlocking your brain's full potential to become the ultimate memory machine.

Memory is still a deeply complex thing that we are only beginning to understand. However, if you encounter any memory loss symptoms, do not panic; do like Dory, and “just keep swimming”.

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Turning the Mind INSIDE OUT

By: Esraa Ali



"There are emotions we have all shared: joy, fear, anger, disgust, and sadness. Ever wonder where all those emotions really live?" This is how Pixar Animation Studios and Walt Disney Pictures introduced *Inside Out* (2015) movie, which delves deeply into brain science. It takes the audience onto a journey inside the mind, exploring the ups and downs of human experience, bringing our emotions to life in a comedic-dramatic adventure.

Inside Out focuses on the emotional turmoil of a cheerful eleven-year-old girl, Riley, whose life turns upside-down by moving with her family to another city; thus, getting separated from her friends, the places, things, activities, and memories she loved. The emotions are personified in the interplay of five main characters residing in Riley's mind—Joy, Sadness, Anger, Fear, and Disgust—who manoeuvre her through everyday life.

The emotions, led by Joy since Riley's birth and throughout her childhood, try to help her overcome that life-changing event; however, Sadness comes to the forefront as the depression of the relocation increases. The emotions conflict to adjust Riley to the new life, when Joy and Sadness, unintentionally, get swept away from Riley's mind into a wider world of her emotional interior, leaving only Anger, Fear, and Disgust.

The team of the movie consulted psychologists and other experts in order to make the way Riley's mind works scientifically accurate, making sense of the emotional turmoil. "The film takes place in the mind, not the brain" says Pete Docter, the Director. "We were very specific from the get-go. We did not want blood vessels and dendrites. The mind is metaphorical. We imagined our thought processes, memories, feelings" he added.

While watching the movie, one starts to explore situations and feelings experienced before; one understands how growing up is difficult, and starts to accept the feelings of sadness. Children learn about the transition from childhood to preteen and early teen years, to feel that it is normal and to deal with their emotions towards losing their childhood. In that sense, by the end of the movie the audience witnesses the arousal of nostalgia, which is a combination of the two main emotions, Joy and Sadness; we learn that nostalgia is important to understand who we are.

Resembling such scientific details in the movie helps kids understand their emotions and how they become in control of their actions and behaviors, to help build their self-awareness about what they feel and how they could act. Nevertheless, the parents must understand this connection to learn how to handle difficult child behavior.

The movie also encourages parents to help their children build their emotion vocabulary and communications skills at the same time. Children need to identify the different types of emotions and use their own words to describe their feelings. They also need to learn how to communicate these emotions to others appropriately, to learn to manage their emotions in a productive way, and to know that negative emotions are normal as their positive ones.

Moreover, the struggle between Joy and Sadness to prevent Riley's core memories from being deleted shows how our memories are formed. The fact that short-term memories in Riley's mind are made during the day, turning into long-term memories during her sleep, was cleverly presented in the movie.

Physiology, on the other hand, was also taken as a reference in the movie as noted by Daniel Holland, the Art Director. "We were

inspired by shapes—the hypothalamus, pituitary gland, cells under a microscope. Everything was heavily caricatured, but we wanted to start from somewhere that made sense" he says.

Inside Out portrays Riley's mind terrain formed of brightly colored floating islands dedicated to her interests, an imagination land, and a train of thoughts. In her mind, Riley's experiences are also transformed into objects, and there are guards protecting her subconscious. Offering a visual tour inside the mind and emotional interior helps the audience visualize how the brain actually works. The designers brilliantly also resembled the folds of the cerebral cortex, which plays a key role in memory, by making the shelves of the long-term memory curve and bend.

The beauty of animation movies lies in being part of our lives. Complete generations have been raised on such movies, which have formed our subconscious and built our personalities. Filmmakers do not fear to surpass logic and portray truly heavy scientific content to all ages in the most attractive manner. Similarly, *Inside Out* portrays how our emotions govern our behaviors, color our past, and shape our future in a magical way, no matter whether to children or adults.

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By: Esraa Ali

Philosophy

between

Science and Fiction

An ubiquitous anecdote attributed by Erasmus¹ to Socrates² narrates that a rich man had sent his son to the latter to look over him and to judge his talents. "Well, then, my lad," said Socrates, "Speak, so that I can see you". Socrates wanted to see the student's mind reflected in his true mirror—his speech—rather than his looks. Imagine Socrates living in the third millennium, would he still ask his student the same question or would he just read his student's mind?

Socratic argumentative dialogues, through which Socrates thought and taught, have impacted several thinkers, such as Hegel³ and Marx⁴. Nevertheless, philosophy—once called the mother of all sciences—has impacted other specialized sciences, such as physics.

Philosophy supports other sciences with its principles, and methods of cognition, world-view, and exploration. Philosophy also shares with other sciences its views about mind-reading, and how people could guess and predict others' behaviors. Moreover, philosophy is linked to science fiction; "Sci-Phi" is an actual term. That link has raised several questions regarding the nature of the human mind, artificial intelligence, time travel, virtual reality, among others. Those themes were portrayed in modern science fiction, as in *Brave New World*, *The Matrix*, *The Dead Zone*, among others.

The Mind Reader

Social interaction forces every day to be mind-readers. A deep-down intuition of what other people have in their minds, which is obviously reflected in their behaviors, is always there. This ability is known as the "Theory of Mind (ToM)"; it attributes mental states—beliefs, intents, desires, knowledge, etc.—to ourselves and to others. It also helps us understand that others have perspectives different from ours.

Think of any simple social situation, for example, a mother and her crying baby. The mother knows what her baby is feeling; whether it is a cry of hunger, thirst, pain, etc. Thus, behaviors result from a set of mental states, which dominate our minds; in other words, behaviors are the window to our minds. From this, you realize that mind-reading ability is an integral part of social

intelligence; however, not all people possess such ability.

Some people have social and communication deficits; they struggle to read others' facial expressions. They fail to recognize others' viewpoints and communicative intentions; this includes people with autism, schizophrenia, as well as addicts.

The Matrix

To guess what people think or feel, we usually have to observe their behaviors or listen to their words; however, our measures could be imperfect! Several people try hard not to reveal what is on their minds; they do so unintentionally for several reasons. Think of the above example, you will notice that the mother could sometimes fail to identify the reason of crying; maybe the baby was frightened of something, but she is not able to recognize this.

Thus, scientists are currently developing mind-reading mechanisms, which apply the functional Magnetic Resonance Imaging (fMRI) technology, which measures brain activity, using brain scans by tracking changes in the blood flow. This mechanism makes it easier for neuroscientists to observe any changes in the mind safely and effectively.

This technology, amongst others, tries to prove that the brain works as a computer, using electrical impulses, which communicates beliefs and thoughts that are translated into action. Accordingly, scientists would be able to identify whether a person is hungry or thirsty based on their brain scans.

A senior lecturer in psychology at the University of Central Lancashire, Dr. Sarita Robinson describes this technology, saying: "If you go back 100 years, you could barely see inside the brain. We

were pumping the skin around the skull with air and removing the cerebral fluid and taking some really dodgy X-rays just to get an image of what was going on. Now we have MRIs, CAT scans, we can take blood flow images. In the future, we will be able to look at a brain scan and see what a person is thinking about."

Existing mind-reading technologies have revolutionized human brain studies and understanding how the mind works; yet, they are still fairly primitive. Nevertheless, do not expect to hide your thoughts for long; they will be revealed soon.

Big Brother is Watching You

Why would you need a mind-reader when you share all your thoughts on social media? While people everywhere are addicted to their smartphones and are staring intently at them all the time, Silicon Valley works hard to build "brain hacking" technology for Mobile Apps and social media.

Every time you check your phone, looking for a new like or a new follower, social media is hijacking your mind; they just make you feel a little extra awesome to recheck your phone every now and





then, while you start to develop a habit. If you think that it is scary, you should know that telepathy is becoming part of the technology too!

Facebook has announced that it is looking for a “brain-computer interface engineer”, which people perceived as the Company building a potential mind-reading social network. Mark Zuckerberg has later confirmed that Facebook is indeed working on a new mind-reading technology.

Using neuroscience and electrical engineering, such technology would enable people to talk to each other by reading minds. Optical neuro-imaging systems would allow people to type 100 words per minute; five times the speed possible on a smartphone. Maybe in the future, according to Facebook, people would be able to share their thoughts directly by removing the language barrier.

The Mentalist

In that sense, we might expect that mastering mind-reading is limited to scientists; however, some of the world’s leading experts are magicians. A magician would present you with a pile of cards and asks

you to select one, then asks you to put it back. Afterwards, s/he reveals a card s/he has previously predicted that you will choose, and you get astonished that his/her prediction is right! This magic trick relies on making the audience believe that the magician, rather the mentalist, was able to predict the card from your face or that s/he has read your mind.

In reality, that mentalist has preselected this card based on a psychological suggestion; this preselected card should trigger a particularly powerful mental association for most people. Though several magicians mix mentally-themed performance with magic illusions, a magician would focus on deceiving the eye, but a mentalist focuses on magic of the mind; it is all about deceiving people’s thoughts.

The legendary David Copperfield presented spectacular illusions with grand finales, in an act similar to that of a superhero, simply by flying over the stage. That finale left a great impression on all audience, because that is what magic is all about: manipulating attention and blindsiding the audience with paranormal acts, or just as Michael Caine says in *The Prestige* “You want to be fooled”.

On the other hand, telepathy is the process of transmitting information from one person to the other without using our five senses. However, telepathy is considered within the scientific community to be pseudoscience. Thus, be careful about differentiating between mind-reading and other paranormal activities, such as mentalism and telepathy.

Now You See Me

Always remember that the closer you look, the less you see; nevertheless, the more you learn, the more you realize how much you do not know. Possessing an ability to read others’ minds can amaze people; yet, using the latest scientific discovery or just a simple trick will make them think you have magical powers.

Next time you encounter a mind-reading situation at home, in the street, at the circus, or while using your phone; try understanding whether you are being fooled or just a new technology is being applied. It is up to you to make sure that these powers are used for good, not evil.

1. **Erasmus** (1466–1536): Dutch philosopher and social critic.
2. **Socrates** (469–399 BCE): Classical Greek philosopher credited as one of the founders of Western philosophy.
3. **George Hegel** (1770–1831): German philosopher and a key figure of German idealism.
4. **Karl Marx** (1818–1883): Prussian-born philosopher and revolutionary socialist.

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Have you ever wondered how animals interact with each other and with their surrounding environment? Many people do not know that there is a science dedicated to studying animal behavior, it is Ethology. Animal behavior includes all the processes through which animals perceive the external world and the internal state of their bodies, and react to changes. Many of these processes take place inside the nervous system and may not be noticed.



By: Mariam Elsayed

Animal Behavior

We can classify animal behavior into two types. The first type is innate, it passes from one generation to another, and includes the behavior that is needed to maintain animal life, such as ingestion, rest, sleep, and reproductive behavior. A vital behavior we observe in animals is the care-giving behavior, which is highly important for survival. The care of a mother to her offspring is the most common type and is usually described as maternal behavior.

All mammals allow their offspring to suckle; a mother dog or cat will spend almost 24 hours per day with her offspring during the first week besides nursing. However, not all mothers are alike; the female rabbit visits her offspring only once per day and allows suckling only for a few minutes. As she has many kits (baby rabbits) you will notice that some of her kits will not suckle at all; thus, becoming very weak and will not survive. Moreover, the mother rabbit may eat her own kits if she was stressed during parturition by the presence of foreigners or predators as dogs and cats. Thus, any disturbance at that time should be avoided and make sure her food contains adequate amount of calories and protein.

The second type of animal behavior is the acquired one. Animals learn gradually through their lifestyles the correct responses to certain situations. Learning is considered an adaptive change in behavior, which results from

past experiences. It takes place in the memory, and starts with the initial formation of short-term memory and then the formation of long-term memory.

We may sort the acquired behavior into different categories, this includes habituation. When animals are subjected to repeated stimuli, they may gradually start to respond as if the stimulus is harmless; in other words, the animals learn not to react. A horse will not panic any more when near traffic; it gradually becomes used to the sound and no longer afraid of it. On the other hand, if it is harmful, the response is exaggerated, this is known as sensitization. For example, a dog becomes more frightened of a car backfire, and this scare becomes associated with all cars.

Another type of behavior that can be acquired by learning is associative learning. In this type, an animal remembers its past experiences and modifies its behavior accordingly. A basic type of associative learning is the conditional reflex, which was investigated by Russian physiologist, Ivan Pavlov, at the beginning of the 20th century. Pavlov repeatedly offered food to a dog after ringing a bell; when the dog heard that ring without being offered food, the dog would still respond to the bell as if food was offered. After collecting the dog's saliva, Pavlov found that the amount of saliva produced by bell ringing increased even without the food because the dog

was more frequently exposed to the coupling of food and bell ringing. Here the dog has learned to associate the sound of the bell with food.

There is also exploratory learning, which is very important for animals because it enables them to find their way, to know their environment, and to remember its characteristics and landmarks. Animals also learn to avoid eating a food that is associated with illness, particularly gastrointestinal malaise; this type of learning is known as taste aversion or bait shyness. This form of learning can be recognized by anyone trying to rid their farms of rats. A first use of a certain poison usually kills many rats; however, after applying the same poison again, we will notice that few numbers of rats are killed. The animals that survived from the sub-lethal dose will not eat that food again.

The animal world is an amazing pure world that is full of many surprises and a large variety of behaviors that make ethology a fast-growing field to qualify us to give animals their proper need of management and to know how they think.

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Life in

By: Mariam Elsayed

Captivity



“When I used to have animals they could not get to sleep at night; I knew that was not right, so I brought in acrobats and now my circus is famous for trapeze acts. Do not keep animals in cages!”

Circus Owner, Malcolm

Wild animals in captivity are denied everything; they are unable to do what is natural and important to them. They no longer search for food and water, relying on their owners to provide them with their needs, eventually leading to physical and mental health impairment. They end up with abnormal behavior, plenty of diseases, or even death. Their abnormal behavior manifests itself in stereotypic behavior; such as neck twisting, bar-biting, vomiting and regurgitating, circling and head bobbing repeatedly without obvious reasons, all of which are known as zoochosis.

We notice the effect of captivity on elephants, which are very social animals that love to live in herds, protect each other, play, and share responsibilities. Mothers, for example, take care of all young elephants and not just their own; that makes the elephant mother one of the best mothers in the animal kingdom.

You may wonder how a huge animal as an elephant is kept in the zoo with just a small chain around its ankle. When the elephant is young, the owner chains its ankle to a large tree; as the elephant is so young and small, it keeps trying to break free, but surely it cannot because of its very small body compared to the tree. The elephant will keep trying to get away until it gives up and believes that any chain around its ankle will prevent it from running away, even after it grows up and becomes much larger than its owner.

At some circuses, baby elephants are taken from their mothers and are

punished until they become obedient; the trainer uses many violent methods and tools to train them for the circus show. One of the violent methods is digging the bullhook in the animal's sensitive flesh; another is starvation until the trick is performed. Finally, electric pods are used; they cause pain without significant injury. The animal learns that not performing these meaningless tricks will result in a painful shock. On the other hand, taking elephants from their mothers has a devastating impact on them; the mother feels depressed and disappointed watching her babies taken away while she cannot do anything to bring them back.

Despite training, male elephants (bulls) are aggressive by nature and can be extremely dangerous to humans and other animals, even if they are domesticated. This case is periodic and is termed “musth”, which is a recurring change in elephant's behavior that may extend from weeks to months due to the secretion of large amount of testosterone. In this period, the elephant cannot handle any noise or sudden movement around it; it becomes very nervous and will not react to its keeper's commands and may even attack him. That is one of the main reasons why male elephants should be kept in special stables without direct contact with the keeper.

Not only male elephants can turn aggressive, females also can too; we cannot forget the famous execution of the elephant, Topsy, which became

unmanageable and killed her trainer and two others. The story began when Topsy killed her trainer after he burnt the tip of her trunk with a lit cigar. She was electrocuted at Luna Park in New York City in front of a crowd of guests and reporters. No one can deny that she was a victim of bad treatment to become well-trained and that she suffered a lot when she was driven away from her herd and natural habitat to be held in captivity.

Captivity may also cause many diseases for both animals and owners due to hygiene risk. Similarly, wild and domesticated chicken or birds become stressed in cages and may damage their wings as they do not have the opportunity to stretch their wings and fly. Moreover, if we compare their production to free-range ones*, we notice the greater production efficiency at lower costs; many free-range farmers believe their animals are about 20% less sick than caged ones.

In brief, before captivating any animal, think more about them and their rights; you will recognize that wild animals are meant to stay in wild.

*Free-range birds are captives, but have room to fly.

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ANIMALS!

ARE THEY SMART?



Animals are cute; we all know that, but did you know that they are super smart too? Most of us have always thought of animals as simple creatures roaming the Earth for food; however, new studies have shown that they are much more than that. They are intelligent; they have good problem-solving skills and are very much aware of their surroundings.

Studies focusing on animal and bird behavior conducted tests on elephants, horses, and cormorants. Self-awareness, for example, was tested using the “Mirror Self-Recognition (MSR) test” to see if animals could recognize their reflections in the mirror. Only few species have passed the test; such as great apes, dolphins, and elephants. It is believed that animal self-recognition is linked to more complex forms of perspective taking and empathy.

Another new mirror test was devised to measure animal awareness of their bodies in relation to its physical environment. The test was adapted from one where children were asked to push a shopping cart that was attached to a mat on which they were standing. The test was modified to the Asian elephants, where a stick was attached to a rubber mat using a rope; the elephants were required to walk on the mat, pick up the stick, and pass it to an experimenter standing in front of them. The researchers wanted to determine if the elephants would recognize their bodies as obstacles, observing how and when they would remove themselves from the mat, which was at one point of the test unattached to the stick, meaning the elephant could pass the stick while standing on the mat.

“Elephants are well regarded as one of the most intelligent animals on the planet, but we still need more empirical, scientific evidence to support this belief” says Rachel Dale, a PhD student at the University of Veterinary Medicine, Vienna. “We know, for example, that they are capable of thoughtful cooperation and empathy, and are able to recognize themselves in a mirror. These abilities are highly unusual in animals and are very rare indeed in non-primates; we wanted to see if they also show body-awareness,” Dale added.

Horses, too, are not any less smart than Asian elephants. A behavioral study demonstrates that when horses are faced with an unsolvable problem, they use their visual and tactile signals to draw human attention and ask for help. This study also shows that horses alter their communicative behavior based on human knowledge of the situation.

In this study, scientists investigated social cognitive skills with humans in a problem-solving situation, where food was hidden in a place accessible only to humans. For the first experiment, food was hidden in a bucket that the horse could not reach; the researchers observed how the horse signaled the

By: Soha Elborgy

caretaker—unaware of the situation—when he arrived. The horse stayed near the caretaker, looked at, touched, and pushed him; these signals happened over longer periods of time than when the food was not hidden. This showed that, when the horses are faced with a problem they cannot solve, they send signals to humans visually and physically.

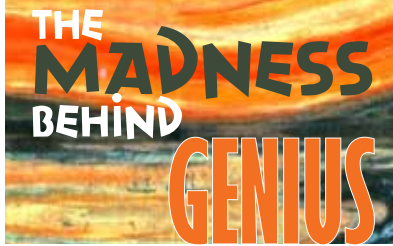
Based on the results of the first experiment, the second experiment tested whether horse behavior changes based on the caretaker knowledge of the hidden food. When the caretaker did not see the food being hidden, the horses gave more signals, demonstrating that horses have high social cognitive skills that allow them to easily change their behavior according to the human knowledge of the situation.

Moreover, behavioral studies and tests have also been conducted on marine birds and the findings were amazing. It has been known that seals, whales, and other marine animals can hear under water, but for the first time scientists show that cormorants have this ability too. It makes sense that they are able to hear under water; the environment where they hunt for food. Researchers expressed that it was very useful for cormorants to hear under water, since they depend on being able to find food even when the water is not clear, or if they live in the Arctic regions, where it is dark for long periods of time.

Aside from marine animal behavior, this discovery also sheds light on how some of the human behaviors could disturb the ocean animals searching for food. Human-made sounds ranges from spinning wind turbines and ship traffic to water scooters and drilling platforms.

As it turns out, animals are not exactly mindless creatures; in fact, they possess exceptional skills. We are curious to know what more could be hidden in their magical world!

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Goya's depiction of a sleeping man, the artist, assailed by monsters of the night is an image of reason's frailty made at the end of the Enlightenment; the great 18th century movement that sought to change the world with encyclopedias, scientific demonstrations, and the primary factories. Goya's pessimistic, yet compassionate, view is that reason only ever rules part of our minds; it must share the world with nightmares.

Vincent van Gogh likely struggled with a range of mental illness, including depression, bipolar disorder, and hallucinations. He was fascinated by a 19th century painting *The Madness of Hugo van der Goes*, where the medieval artist, who in actual life was confined to a monastery because of mental illness, broods in torment, while those around him despair of helping the afflicted man.

Van Gogh wrote that he sometimes identified with this painting; shortly after cutting off his own earlobe, he scrutinizes himself as a man similarly afflicted. In his self-portrait with bandaged ear (1889), Vincent's eyes are crystal blue, his gaze acute and penetrating; he looks at his wounded face objectively, with deep truth. He is neither "sane" nor "insane" but a fellow human being who speaks to us with courage and honesty.

Madness is the modern condition in Edvard Munch's *The Scream* (1893); it is universal, because this is how life today makes us feel as Munch says. Far from a pathology afflicting individuals, the desire to scream out in pain and isolation under the wobbly sky is a sane response to an insane world. Munch takes the artistic reevaluation of mental illness that started in the Romantic period to its logical conclusion: there is no Bedlam but the world itself.

Once Munch and Van Gogh made "madness" a positive value in modern art, a key to visionary truth, it was only a matter of time before the medical profession too started to see new connections between art and the mind. Before his death in 1933, Dr. Hans Prinzhorn assembled a collection of art by mentally ill patients, marking beginning of what is now known as "outsider art". This example has the eerie power of Goya from something to be depicted by artists, "madness" has become a source of artistic originality in itself. Josef Forster, *Untitled in the Prinzhorn Collection* (after 1916).

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VISITORS INFO

Planetarium

Available Shows

Enlightened Mind
19 min.

The Mission
24 min.

Stars Show
45 min.

Oasis in Space
25 min.

Stars of the Pharaohs
35 min.

Seven Wonders
30 min.

The Life of Trees
33 min.

**Kaluoka'hina:
The Enchanted Reef**
35 min.

To Space and Back
25 min.

**Alexandria, The Cradle of
Astronomy**
22 min.

- For the Planetarium daily schedule and fees, please consult the Center's official website: www.bibalex.org/psc
- Kindly note that, for technical reasons, the Planetarium maintains the right to cancel or change shows at any time without prior notification.

History of Science Museum

Opening Hours

Sunday–Thursday: 9:30-16:00
Saturday: 12:00-16:00

Guided Tours Schedule

Sunday–Thursday:
10:30, 11:30, 12:30, 13:30, 14:30, 15:30

- Museum entry fees are included in all Planetarium shows tickets.
- For non-audience of the Planetarium, Museum entry fees are EGP 2.-
- Museum Tours are free for ticket holders.



ALEXploratorium

Discovery Zone

Opening Hours

Sunday, Monday, Wednesday, Thursday:
9:30-16:00
Tuesday: 9:30-12:30
Saturday: 12:00-16:00

Guided Tours Schedule

Sunday, Monday, Wednesday, Thursday:
10:00, 11:00, 12:00, 13:00, 14:00, 15:00
Tuesday: 10:00, 11:00
Saturday: 12:00, 13:00, 14:00

Entry Fees

Students: EGP 5.-
Non-students: EGP 10.-

Listen and Discover

- For the list of shows available at the "Listen and Discover" and the schedule, please consult the Center's official website: www.bibalex.org/psc.
- For reservation, please contact the PSC Administrator, at least one week before the desired date.

Show fees

DVD shows:
Students: EGP 2.-
Non-students: EGP 4.-
3D shows:
Students: EGP 5.-
Non-students: EGP 10.-
12D shows:
EGP 20.-

GENTLE REMINDER

