LET us be frank about this. We all resort to lying from time to time. Sometimes it is just a fib or a harmless joke and at other times the degree of lying may be varied. So, lying is found to be inherent to the human nature, and often embedded as a part of communication.

Seen early in the human life, toddlers and babies often resort to false crying to attract attention. Children as young as two resort to lying to protect themselves from imminent punishment. Needless to say, youngsters and adults resort to lying for a million reasons.

And what is a lie? “A lie is a piece of information or fact which is withheld from the receiver with or without the intention to harm them.”

There are mixed responses to this as sometimes blatant lies seem to be socially acceptable. Yet at other times, lying is condemned or shunned with severe punishment.

At the base, the liar intends to keep the truth from the receiver/victim because the liar is afraid of the truth being revealed or due to the loss of ‘image’ following it; at other times it is the intention to take advantage of the gullible nature of the receiver. Manipulation, selfishness, personal gains and harming the receiver emotionally or physically are some of the reasons to lie.

Though encountered as part of psychological diagnosis, lying had not been studied in much depth until a few decades ago. But now, neuroscientists want to map the regions in the brain that get activated when a person resorts to this form of deception. They want to study how the brain centres respond to lying under different conditions, and if this manifests into a change in the neural networks within the brain.

Lie detection experiments and studies find use not only in understanding the mind of the liar but also find an important place in the investigation of crimes for the judicial system.

Interpreting Lies

With the help of neuroscience techniques, images of the different regions of the brain are mapped during the process of experimentation. An imaging method called the fMRI-functional Magnetic Resonance Imaging
Scientists have been trying hard to understand how the brain works when we lie. By analysing the changes that take place in the brain when we deceive, scientists hope to learn not only about the process of lying but also how to detect it.

is used to map the brain’s network in live action, as it processes memories, actions, behaviours, emotions, etc. fMRI is just over a decade old but has taken huge strides in the clinical studies of neuroscience. It is also opening windows in the fields of security, judicial systems and many more.

Significant studies have been conducted using fMRI for analysing the cognitive differences between truth and lies, and mapping the neural networks behind this type of deception. The decoding of lies is clearer as they are able to visualise the regions in the brain that are activated or get affected when a person resorts to lying.

Role of Brain Centres

The limbic system of our brain is a group of complex network of structures, comprising chiefly the hypothalamus, amygdala, hippocampus and the cingulate gyrus, on either side of the thalamus just under the cerebrum. It is with the help of this limbic system we are able to experience emotions,

WHAT TYPE OF A LIE IS IT?

Lies of commission: This involves fabrication of a fact and often contradictory information is given out. In other words, falsifying information with intent to make the listener do or not do something the liar intends. Such lies are told to divert the receiver from the truth of information by making them to believe that what is presented to them is the only truth. This involves manipulating the receiver’s mind by the liar. However, all lies of commissions are not intended under crimes or intent to cause harm. The harmless lies we tell children to instil a good thought or behaviour are lies of commission. Advertising spins and propaganda are also lies of commission.

Lies of omission: When the original information is withheld or truth is hidden, lies of omission occur. Most often denial is resorted to. This allows the liar to escape broaching the truth, evade it and justify their actions. Giving false information in propaganda, a car salesman giving partly true details in a sale (all the while omitting to inform the glitches) fall under this type. It is found that passive-aggressive people tend to resort to these types of lies as they have escape routes to avoid discussing the original truth.

Brain regions that participate in social processing and emotions
(Source: Wikimedia Commons)
CHANGING COLOUR OF LIES

Based on social acceptance and consequences, lies are of three categories:

White lies: These are socially acceptable lies. Here, the lie is beneficial to the receiver and not the liar. Usually these are tactful statements to bridge gaps, improve inter-personal relationships or boost someone’s self-esteem and confidence. White lies are resorted to encourage good behaviour too. However, one must be cautious of these lies too, for if overdone, these too can be deceitful and soon get exposed leaving questions and distrust in the mind of the receiver.

Grey lies: When the intention of the lies gradually takes a selfish turn, lies turn from white to grey. Here the benefit of the lie is of the liar. However, the consequence of the lie may not be too significant and usually is just borne with. The result is an inconvenience and irritation to the receiver. Lies of absenteeism, intentional excuses, etc. are grey lies. They may or may not be socially acceptable. Most advertisement spin offs come under this category.

Black lies: when the lies escalate with a malicious motive, they turn dark into black lies. They are intended to protect the liar’s interest only. Black lies are kept alive by more lies and lead to deceit and malevolence. Lies of criminal intention, destroying documentary evidences to protect self, lying to lure the victim and causing harm, are examples of black lies.

The function of the limbic system influences the endocrine glands and the Autonomic Nervous System (ANS). In addition, the limbic system is closely connected to the prefrontal cortex region. Many psychological disorders are associated with poor functioning of these regions.

The hypothalamus acts as a regulator or thermostat for responses like hunger, thirst, pleasure, anger and aggression. Its function is to quickly restore balance and bring the response to a set point. It also regulates blood pressure, pulse and arousal to emotions.

The amygdalae (two in number) are almond-shaped mass of neurons just below the hippocampus and are chiefly associated with the response and sensitiveness to emotions. The amygdala is the region that gets activated in times of danger, stress, panic and prompts a fight or flight mode. It is also the seat for self-control and emotional regulation. When this region is damaged, it is observed that the subject is deprived of emotions.

Neuroscientists Speak

A pioneer in the field of neuroimaging was Dr. Daniel D. Langleben, a psychiatrist from the University of Pennsylvania. From his experiments in brain mapping, he hypothesised that in order to tell a lie, the brain had to first stop itself from telling the truth and then formulate the lie. As our brain works at phenomenal speeds, this gap in transition can clearly be marked.

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Another scientist from the UK, Dr. Sean Spence reported that the areas of the prefrontal cortex region lit up in an fMRI when his subjects lied.

In a recent study, researchers at the University College of London conducted an experiment to map the activity and gave a scientific explanation on the effect of prolonged lies on the brain centres. Their experiments also made an important observation of how ‘small lies lead to bigger lies’.

The researchers scanned the brains of 80 volunteers while they took part in tasks where they could lie for personal gain. When the volunteers first lied, it produced strong responses from the amygdala. The findings indicated that amygdala responds strongly to acts of immoral and wrong nature. But with subsequent lies, the amygdala’s response declined even though the magnitude of the lies escalated, making it easier to lie. They also found that “larger drops in amygdala activity predicted bigger lies in future”. This reasoned to a continuous firing of the neurons resulting in a change in the behavioural set point of this region.

Papers published in the Journal of Cognitive Neuroscience indicate distinct responses in the prefrontal cortex and amygdala regions. Hence it was concluded that, with prolonged lying, it is observed that the liar becomes insensitive. In severe cases, the regions of amygdala do not respond at all. This is the extreme case of psychological disorders, which often leads to crimes.

Scientists Lars Krokoszinski and Daniela Hosser from Technical University of Braunschweig, Braunschweig, Germany undertook an experiment to investigate emotion
regulation processes in an interpersonal lying experiment published in the Journal of Criminal Psychology (6:276-88, 2016). Their study emphasized that the social interaction between a deceiver and the deceived opponent is a determining factor for deception that involves emotions. Hence, besides a great amount of cognitive control, a successful lie also requires the regulation of emotions, especially when deceiving somebody face-to-face. Their studies revealed that there was a decrease of alpha activity in left dorsolateral prefrontal cortex which predicted a higher frequency of deceptive responses as well as less guilt about deceiving the interrogator.

All these studies go to indicate that the selfish motive of lying has an effect on the limbic region of the neural systems and prolonging lying can even proceed to damage and desensitize it.

**Pathological Lying**

When a person resorts to lying without a purpose, is habituated to telling lies despite telling the truth appearing to be easier, cannot help from telling lies, then it leads to compulsive lying. Called pathological lying, psychologists and psychiatrists often describe this condition as Mythomania or *Pseudologia fantastica*.

They believe that individuals prone to pathological lying have low self-esteem, wantonly or otherwise seek attention and popularity. Often they resort to lying to cover up a failure. It is also speculated that pathological lying is a reaction to childhood trauma or neglect. When parents fail to establish realistic limits or provide timely guidance, the child overcomes the confusion and stress by beginning to weave a web of lies. Experts also believe that habitual lying is a symptom of an underlying personality disorder like Borderline Personality Disorder (BPD) or anti-social behaviour.

Research indicates pathological lying is the result of neurological imbalance, particularly in the frontal lobe. A study published in the British Journal of Psychiatry reported that pathological liars have an increased amount of white matter in the brain predisposing them to the condition. The Journal of Neuropsychiatry and Clinical Neurosciences reported that the brain scans of pathological liars suffered from right hemithalamic dysfunction.

Further strengthening this theory was a study conducted by the University of California on habitual liars, revealing startling information. In this study, the scientists observed the brain matter in depth. Their results showed that habitual liars had 25% more white matter in the brain. Also their grey
ANIMALS LIE TOO!

- In animals, lying is often seen as a response to survival. For example, false messages sent by some animals to give the predator an impression that danger lurks could be construed as lying.
- Some birds feign immobility to divert the attention of predators from their eggs.
- But strong lying is noticed in our ancestors – the apes! With a hierarchy in the group, often other males are found to not warn the alpha male about potential danger in an effort to covet the position. Or sometimes they give false warnings to drive them away.
- It is also seen that the lower order males do not divulge the food resources available so that they have access to the entire source, making them stronger and moving up on the ladder. Yet at other times, it is to draw the attention and attract a potential mate, in preference to the higher order males.

Scientific methods of lie detection like polygraph, narco-analysis and brain mapping are used in investigation of a crime. These tests are together known as Deception Detection Tests (DDT)

Effect on General Health

It is easily observed that when one fabricates a lie, one experiences a sense of tension and discomfort. Sometimes palpitations and sweating are also felt. Validating this Dr. Arthur Markman, Executive Editor of the journal *Cognitive Science* explains that the moment we tell a lie, cortisol is produced in the brain. If the lie is escalated it can lead to an adrenaline rush too. So, soon we experience faster heartbeat, increased blood pressure, perspiration and a fogginess – result of difficulty in remembering what we know and what we say. With continued lying this stress escalates leading to physiological symptoms like back pain, headaches and fertility issues.

Is the Downslide of Health Reversible?

To study this, Dr. Anita Kelly, Professor of Psychology at the University of Notre Dame, Indiana, conducted an experiment on 110 adults. Dividing the participants into two groups she urged half of them not to lie while the other half were not given any instructions, all the while keeping track of their lies. At the end of the test, all had to take a lie detector test along with monitoring their physiological responses.

She states her results as: “We established very clearly that purposefully trying not to lie caused people to tell fewer lies. When they told
more lies, their health went down. And when they told the truth, it improved."

The bigger the lie, the worse it is for your health. If you think that small, innocent lies don’t cause damage, you are wrong. The study also discovered that ‘telling three less lies per week resulted in four less mental health issues and physical complaints reduced by three times’.

Observer or Recipient?
Despite all this, we seem to be living in an age of false truths, deception and selfishness. It appears that lying is socially acceptable. So does truth matter? It definitely does. Lying is unethical and immoral. Whatever may be the social trends, deep down people want to know the truth and deserve to do so too. Accepting the truth and facing it will not only overcome false fears but will also help reduce stress, anxiety and the guilt associated with telling lies.

Now, how one can avoid being a victim of lies? Statistics show that maximum lies are told to and within the close network of family and friends. Lying is a carefully mastered and practised skill; so it is vital that one be vigilant at all times and not fall prey to false information. In this context, an interesting study conducted to perceive the responses to lying as a participant and as an observer demands attention.

The study included two groups – group 1 as participants and receivers of the lie, and group 2 as an observer to the deception. The study published in the journal *NeuroImage*, found that when one is a participant as a victim of the deception, the amygdala and fusiform gyrus immediately recorded activity. However, when one was an observer to the deception, superior temporal sulcus and anterior cingulate cortex were activated – regions that perceive others’ emotional direction. This study revealed that when one is involved in the deceit, it is perceived as a potential threat along with the corresponding emotions and hence the inflamed amygdala.

A liar is successful if you believe in his lie. So it is essential to develop this social competence to become less vulnerable; scrutinising the information we receive is a way of protecting our interest.

Detection of Lies in Crime
Apart from this, in the realms of justice and crime, lie detection is a tricky and exhaustive procedure. Criminals are often skilled at telling lies and it becomes difficult to find the truth.

Hence, apart from scrutinising, judicial systems depend on additional
supportive methods like the use of lie detectors, truth serums, and recently brain mapping techniques to detect lies.

**Lie detector:** Also known as a polygraph, this is an instrument that helps investigators to deduce if a person is lying or not. Despite the name, this instrument is helpful in recording the physiological changes in a person who is lying and does not detect lies by itself. Sensors are placed at various points on the person to record parameters like blood pressure, breathing rate, heart rate, sweating palms, etc. Under interrogation, these responses are graphed and observed for variation or peaks. Despite the use of the polygraph, it is the interrogator’s discretion which often leads to detection.

Though the polygraph is touted to be exact, it is not foolproof as the physiological responses of general fear, underlying mental disorders, etc. overlap and can give false readings. It is found that with training one can come clean from polygraph tests.

**Narco-analysis:** Another method for lie detection is the use of chemical compounds to wheedle out information from a subject under interrogation and is called narco-analysis or truth serum test. These are a range of psychoactive drugs (common name Thiopental or sodium amytal), given intravenously during interrogation. Under the effect of these drugs, the subject goes into a semi-conscious state. When posed questions under this condition, the person is unable to use his imagination and hence unable to fabricate lies; his answers are analysed along with recording the physiological changes.

**Brain mapping:** However, both the above methods are fast losing credence with fMRI gaining ground as a better and accurate mapping method. Judicial systems are depending on neuroimaging in present times. As mentioned earlier, studies by Dr. Langleben, a pioneer in this field, indicate the specific time lapse in the brain between refusing the truth and fabricating the lie, and the regions that get activated in the process. This forms a stable foundation to detect lies in criminal investigation.

According to the *Indian Journal of Medical Research*, the scientific methods of lie detection like polygraph, narco-analysis and brain mapping are recognised methods used for investigation of a crime. These tests are together known as Deception Detection Tests – DDT – and are widely used by investigating agencies to solve crimes. They claim that these methods are preferred to ‘third degree methods’.

However the results of the tests are not acceptable as evidence in trials, and are to be used only as steps to aid the investigation of the crime. In a landmark judgement, the apex court ordered that DDT cannot be performed on an accused without his/her consent.

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