

Myths, Superstitions and Propaganda in Scientific Age

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Abstract

From prehistoric times, humans have evolved as pattern seeking and storytelling species. While the capacity to find patterns and infer meanings had obvious advantages for survival, the brain is not always successful in distinguishing meaningful and meaningless patterns. In fact, "pattern finding" and "order seeking" mechanisms form the basis for nearly all existing myths, superstitions, cultural taboos and ritual practices all over the world. The same mechanism also makes us extremely vulnerable to all kinds of deceptions and manipulative techniques that impair our critical faculties. We may imagine things that don't exist, make false judgments, accept uncritical claims, misinterpret facts and arrive at conclusions that are completely at odds with reality. The scientific age is riddled with intriguing contradictions and man-made follies. The technology-driven consumer culture and entertainment industry has fueled the growth of primitive superstitions, myths and new age beliefs. The need to promote a rational discussion on science, technology and equitable social development has never been so pressing. The first thing to guard against such trends is to be aware of the subtle persuasive techniques, marketing strategies and advertisement gimmicks that make us increasingly helpless consumers in the scientific age. Conveying the excitement of science and scientific discovery is no doubt an essential part of science education and public outreach activities. But equally important is to learn to draw the distinction between unsubstantiated claims and factual findings based on sound reasoning and evidence. Discerning magical thinking and vague ideas from the realm of possibilities that lie within limits of physical laws is therefore important to inculcate scientific temper. In this article, some major ways that can lead to sloppy thinking, misplaced apprehensions and faulty reasoning in our daily lives are discussed. The paper includes examples to illustrate how erroneous beliefs are formed and why healthy skepticism and critical inquiry is necessary to avoid common pitfalls.

Introduction

Our grand universe was born with a 'big-bang' about 13.7 billion years ago. In this marvelous expanse, earth, the only known planet to harbour life, was formed some 4.5 billion years back in the solar system. Over the last 3.7 billion years or so, life on earth has evolved from a unicellular organism to highly complex and assorted forms. In the intervening period, several million species flourished and have gone extinct. To our knowledge, in this tree of life no other species was endowed with an inquisitive brain that was sufficiently advanced to ponder over things and indulge in abstract reasoning. Hitherto, the inhabitants of earth were impervious (not by choice though) to the secrets and wonders of the Universe around. Compared to the enormous time scale, the arrival of humans on Earth is very recent. It is only about 5-8 million years back that we had split from our closest relatives, the chimpanzees, and evolved as a separate species. It wasn't until the emergence of *Homo sapiens* about 200,000 years ago that the vast Universe wrapped in grand mysteries was ready to be explored. Man's evolving brain had just begun to marvel at the impressive regularity and remarkable spectrum of events occurring in the physical world.

Watching a clear night sky, dotted with seemingly innumerable stars, journeying almost like a divinely ordained fashion, must have been the most amazing and inexplicable experience for early human beings. Right from prehistoric times, people were driven by genuine curiosity and reverence arising from the observations of periodic motion of the heavenly objects. For thousands of years, humans have understood the cycle of changes occurring in the night sky, discovered familiar patterns of stars and also struggled to make sense of rare events like lunar and solar eclipses or an unexpected

arrival of a comet. As a species, humans are predisposed to look for visual and auditory patterns and assign meanings to them. From the survival viewpoint, this instinctive ability had clear evolutionary advantages as it helped primeval beings guard against real or imagined threats that often lurked in hostile and dangerous environment.

The relentless struggle to understand the heaven and earth also laid the basis for supernatural beliefs, cultural taboos and numerous superstitions and ritual practices to please and appease the powerful and ill-tempered gods who allegedly controlled the destiny of earthly beings. It is not at all surprising that most civilizations around the world have developed their own fascinating stories resembling myths about the Universe. These primitive belief systems were eventually transformed into organized and powerful religions forcing people to dogmatic conformity and servitude.

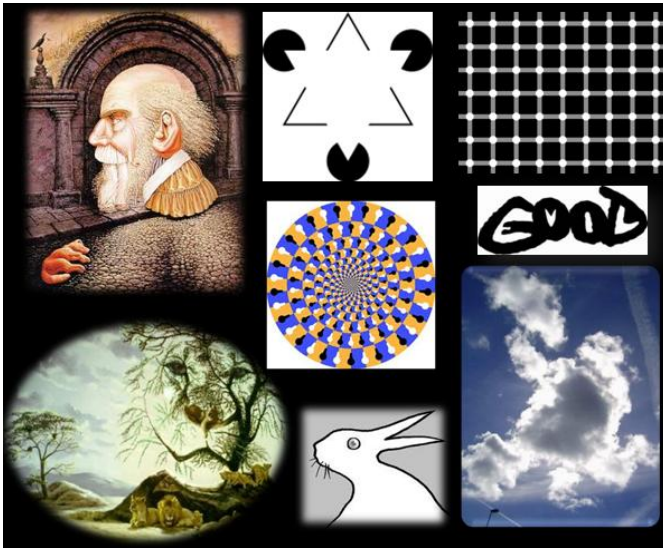


Figure 1 -- Perception shift by optical illusions

Lessons from Optical Illusions

As pointed out, we prefer an orderly, meaningful and simplistic world as opposed to the random, purposeless and chaotic arrangement of things. Keen observation with predisposition to detect pattern and make connections has also lead to several scientific discoveries. However, there is a downside to this "pattern finding" and "order seeking" mechanism. By looking at certain patterns, we can get thoroughly deceived and may conjure up things that really don't exist. How easily the mind and

brain can be misled is understood from the simple optical illusions illustrated in Fig. 1. Reexamination or some kind of mental exercise will not make these illusions disappear. The cognitive deception, however, is not confined to optical illusions alone. In general, it forms the basis for holding erroneous beliefs, making false assumptions, arriving at wrong conclusions and most importantly pushing aside good judgment and rational thoughts while interpreting facts.

Now take a closer look at Fig. 2. It gives us an idea of the complexity of the world we live in. Good or bad, what these images show is a direct outcome of our convictions, our conflicts, our aspirations and our beliefs. Scientific approach and rational thinking have largely triumphed in understanding several aspects of our physical universe. The meteoric rise of science in the last 400 years has in fact altered the very landscape of human existence. Basic research and gradual advancement in technology have thus far exceeded expectations of ordinary minds. Science has not disappointed those who knew how to harness its latent power. Despite many noteworthy achievements, modern societies are also deeply mired in all sorts of contradictions, absurdities, propagandas and irrational practices. We have created many divisive walls and dangerous ideologies based on religion, ethnicity and racial differences. The unfolding climate change, global warming and dwindling natural resources are all emerging crises for humanity. On top of that, irrational impulses of dominance and greed make the future look pretty bleak.

Technological Onslaught

The information age is not free from its perils. This may sound like an oxymoron. But there is a growing body of evidence that clearly raise serious concerns of increasing influence of technology in our daily lives. We are constantly bombarded by an enormous amount of information flowing from the Internet, television and other forms of mass media. Our brains are not tuned to process a message – dense and often conflicting stream of information. Whatever we see, read or hear could be skewed in one way or another.



Figure 2 – Triumphs and tribulations of technological age.

Sometimes it is hard to discern relevant from frivolous, good from bad and desirable from deceitful. For lack of better skills, we fail to make an independent and critical evaluation of what we see, what we read and what we hear. The problem worsens when the information is deliberately distorted to mislead the recipient in some predetermined way. The dividing line between useful and useless, genuine and fraudulent, just and wrongful, factual and fictitious, true and false, thus becomes blurred. This is where someone else can take control over our critical faculties. The lack of critical and independent thinking, for example, makes people extremely vulnerable. It compels them to seek guidance and personal cure from sources that are hardly benign and authentic.

At another level, irrational faith can become a breeding ground for collective indoctrination, forcing absolute compliance to supremacist authority of one kind or another. Uncritical acceptance of claims results in convoluted thinking and wrong reasoning. Despotism, popular cult figures, religious heads and soothsayers, for example, often take advantage of basic human psychology and the veil of ignorance. They appeal to people's deepest fears and irrational hopes before taking control of their lives.

In recent years, the celebration of religious festivals, superstitions and rituals have become regular practices in many research and educational institutes in India. The case of the Indian Space and Research Organization (ISRO) is particularly appalling. The achievements of India's space programme are commendable, but when it comes to the responsibility of developing scientific outlook and rational thinking to fight the social ills, the organization perhaps did not quite live up to the desired standard. Instead of spearheading a campaign (by virtue of its privileged position and wider resources) to eradicate superstitions and illiteracy, ISRO officials often hit the headlines for wrong reasons. You may wonder why the name PSLV-C13 was missing from the Polar Satellite Launch Vehicle (PSLV) series. This omission was purely based on widely held belief in numerology about the number 13 which is considered unlucky. Following the advice of some numerologist, ISRO had chosen to skip the problematic number and name the next space mission as PSLV-C14 after PSLV-12. Last year, the success of India's first mission to moon, *Chandrayaan-1*, was an astounding feat. As usual, before the launch, ISRO officials visited the Tirupati temple to offer special prayers for the success of the mission. Trajectories of modern space flights are not controlled by prayers, but meticulously computed from the orbital mechanics derived from Newton's law of motion and gravitation. Deity puja and godly faith cannot fix a technical fault. In fact, attributing success to

higher powers and seeking divine interventions grossly undermine the capabilities and achievements of human ingenuity. The proven success of the moon mission was solely due to the diligent efforts of individuals and nearly flawless engineering design.

The alarming manifestation of religious zeal in public sphere is a mighty blow to the Nehruvian legacy of scientific temper in India. Someone must explain why such ceremonial gesturing is necessary or even desirable when we fully understand how reactionary and communal forces exploit these myths to unleash social violence. Public display of personal beliefs and religious fervour is not just irrational and regressive, it also violates the foundational principles of our constitution. A distinction that we should not fail to make as science communicators.

Consumer Market and Entertainment Industry

The consumer market and entertainment industry too have forged an unholy alliance with technology to exploit the gullible public. The mass media and digital technology has emerged as a most powerful instrument of propaganda and persuasion. In his book, *Propaganda and Psychological Warfare*, T.H. Qualter defines propaganda as "*the deliberate attempt by some individual or group to form, control, or alter the attitudes of other groups by the use of instruments of communication, with the intention that in any given situation the reaction of those influenced will be that desired by the propagandist*".

Emotive words and false analogies are drawn to promote free market ideology by depicting the consumer as a king and the market as an empire. Subtle ideas and values are ingrained through clever visual imagery, tantalizing graphics and sound effects. Products are embedded in popular entertainment, movies and other media forms. Children are highly susceptible to propaganda and become soft targets for mind control. Findings indicate that more 90% of pre-children group want to buy things that are advertized in television commercials. They are made brand conscious right from a tender age and grow up as trained and loyal customers. '*Catch them young*' is an unconcealed motto for many brand managers. It is not terribly surprising that companies hire the best psychologists and designers to invent ways that entice kids to buy their products and foster a life time allegiance for the brand.

Advergaming is another new concept where brands are introduced to the audience through online games. In United States alone, advergaming is expected to grow to a \$68 billion industry by 2012 (*Business Standard*, 7 January, 2010). Closer home, we can take the example of the recently made science-fiction movie Ra.One. The marketing budget of the movie was well over 52 crore of which 15 crore alone was spent for online publicity (*The Tribune*, 5 Nov, 2011). Special video games and electronic gadgets were launched to lure the techno-savvy audience before the movie was released worldwide. The official online store of Ra-One sold over 40,000 merchandise items (e.g. coffee mugs, mobile pouches, video cameras, tee shirts, caps, school stationary and toys) in just about 15 days. The order for additional 100, 000 items was awaited. That is how technology is used to create a maniacal obsession for celebrity culture and almost insatiable desire for consumption and non-stop entertainment.

The increasing numbers of 24x7 TV channels are willing to cater to anything that will amuse people to death. The lucrative entertainment business thrives on sensational soaps, family dramas, tele-shopping, paid news, advertizing, doomsday theories, reality shows, mythological serials, fear mongering, superstitious themes, faith preaching and dedicated time slots for highly paid astrology,

feng-shui, vastu and yoga experts. In particular, the live telecast of religious festivals (e.g. Kumbha Mela, Ganesh Chaturthi and Navratri etc), and big sporting events has been shown to boost the TRPs. Serious issues, no doubt, fail to touch the conscience of the nation. Otherwise, a country that is constantly struggling to meet its fuel and energy demand would not have chosen to disgrace itself by burning a whopping 2-lakhs liter of petrol to host a rather infamous *Formula-1* racing event (*Indian Express*, October 24, 2011). The dazzling show was endorsed by most famous sports personalities, business tycoons and cinema stars. Our national media, especially the English TV channels, who otherwise never shy away from pontificating to bureaucrats and politicians, colluded in this show-biz propaganda in an almost hysterical manner. Most '*prime time shows*' were virtually transformed to high-pitch '*sale time shows*' with a singular agenda to impress upon viewers that pride, prestige and prosperity of India was solely hinging on this one mega event!

There are many other examples how technology is used to (mis)educate and enslave people. These techno-hyper challenges pose a greater threat to the advancement of scientific temper and critical thinking among people. Someone seriously engaged in spreading science education, rational inquiry and developing scientific temper should also be prepared to deal with such pressing issues. We cannot stop propaganda, but we can certainly take some discrete steps to stay immune to it. The goal is not to spot other people's weakness and follies and laugh at it. The efforts should be directed, as Baruch Spinoza has famously said, "... not to ridicule, not to bewail, not to scorn human actions, but to understand them." First thing we can do is to learn how to identify various forms and means of propaganda and understand how human thinking can go wrong. Many ways in which errors and biases in human judgment can occur are explained with some well known examples.

Misinterpretation of existing theories: Theories can influence observations. This happens when new findings are wrongly interpreted to seek conformity with known theories. For instance, Christopher Columbus had set out on a westward journey with the hope to reach Asia that was well known for silk, spices and opium. He landed in the Caribbean islands and found people using red chilies which he mistook for pepper and wrongly thought that he had arrived in India. Another well known example of misrepresentation of scientific theory is social Darwinism. It is based on the misplaced notion that the biological principle of evolution and natural selection also regulate the social order and hierarchy among humans. Those who are rich and powerful are innately considered better than those who are weak and poor, thus legitimizing the existing structures of power and dominance in society.

Usage of scientific jargons: Products are sold with scientific sounding words and labels to fool people who are not quite familiar with their precise meaning. That explains why books written on quantum healing, thought waves, subtle energy fields, scientific astrology, trans-dimensional energy etc are so popular among the highly educated class of people!

Anecdotal and after the fact reasoning: Untested and ambiguous claims of miracles and magical cure are forcefully advanced based on personal experiences and experiences of others. Abnormal behavior of animals and birds is reported in the aftermath of major natural disasters such as earthquakes and tsunamis! Rumors of miracles spread like wild-fire. Claims such as Ganesha drinking milk, blood flowing from Jesus statue and Sai Baba's moon miracle are



Figure 3 – Independent evidences for the spherical shape of the earth.

assumed true by followers without casting any doubt! The Internet is full of studies claiming a positive effect of prayers on healing. But upon close scrutiny, it reveals more about the expectations and biases of the people conducting these studies than the efficacy of the prayer itself.

The burden of proof: "*Extraordinary claims require extraordinary evidences*". The burden of proof lies with those who make the claim at the first place. For example, there is hardly a shred of scientific evidence to support intelligent design. On the contrary, many line of evidences (genetics, DNA sequencing, evidence from fossil records etc) exist which independently prove that life has evolved on earth. Similarly, the spherical shape of the earth can be independently established from different observations as illustrated in Fig. 3. A belief should come from the positive evidence supporting the claim and not from the lack of evidence for or against it. For example, one cannot disprove the existence of aliens, fairies or ghosts. It does not mean that they exist; neither does it imply that they don't exist. Carl Sagan had conveyed it succinctly, "*the absence of evidence is not the evidence of absence.*"

Confusing coincidence with causation: Just because two events follow one another, it is assumed that one is responsible for the other. Coincidence and correlations do not imply causation. We have a strong tendency to remember false positives and ignore misses. Changing the bat at a particular stage of the game, wearing the left pad first or keeping a red handkerchief in the pocket while fielding, are some of the common forms of superstitions among cricketers!

Limitations of the experiment: Experiments are performed to deny or prove the validity of a particular claim and also deepen our knowledge of the phenomenon. However, the outcome of an experiment is limited by the range and sensitivity of the instrument. For example, the size of the fishnet cannot be used to infer the size of the largest or smallest fish in the ocean. Likewise, the knowledge of the observable universe is constrained by the size of the largest telescope available.

Unexplained is not inexplicable: It is said that our knowledge is limited but our ignorance is infinite. Given the limitations of human intellect, it is likely that many things will remain beyond the realm of our knowledge. Scientific frontiers are always stacked against terrains that are unknown and unexplored. What is the nature of dark matter and dark energy? Can we ever cure cancer and AIDS? How does human brain function? Why does the placebo effect work? We do not yet know answers to these questions. But unexplained does not imply inexplicable. Instead of drawing premature conclusions and attributing mysteries to the supernatural power, it is better to be agnostic and hopeful before they are understood.

Experimenter effects: Observations and experiments can change the observed phenomenon. For example, to detect an electron it must interact with light photons. But the very interaction of photon with electron changes its state, i.e., speed and direction. The expectations and biases of anthropologists studying a tribe can alter the behaviour of its members. This

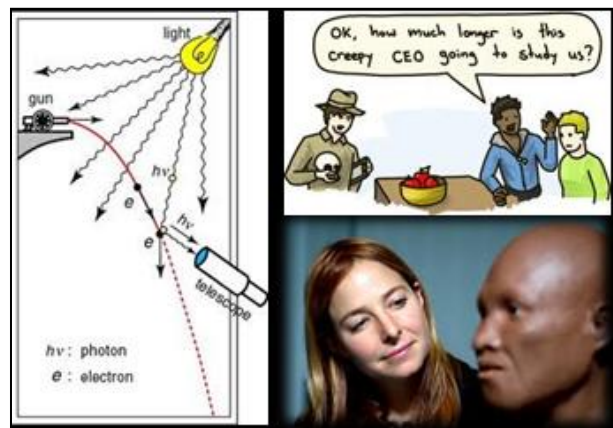


Figure 4 Observation & experiment influencing the observed.

may explain why only certain groups or individuals are able to perform a particular

experiment. Psychologists use blind and double blind tests to minimize the effect of observations.

Interestingly, a scientific study carried out to examine the impact of prayers on cardiac patients found no significant effect on health recovery. However, a slightly higher rate of complications was reported for patients who knew that they were receiving the prayers. In this case, as the researchers later explained, "patients' knowledge that they were the subject of intercessory prayer might have induced a form of performance anxiety or made them feel doubtful about their outcome."

Wishful thinking: The skeptic dictionary defines wishful thinking as, "interpreting facts, reports, events, perceptions, etc., according to what one would like to be the case rather than according to the actual evidence." One of the classic examples of wishful thinking is those who believe that ancient scriptures (e.g. Vedas, Quran or Bible) contain solutions to every problem in the world – be it global warming, terrorism, or chronic illness. Some people have well meaning, but intense wishful desire to see India becoming a superpower by 2020! The assumption that science and technology alone will solve all our problems is another example of wishful thinking. Genetically modified (GM) crops are expected to yield an "ever green revolution!" The energy crisis has to be met by import of nuclear reactors. It is safe and really green!

Glittering generalities: This is a technique of associating a product or an idea with some universally held virtue and emotions. Words like *patriotism, democracy, honesty, liberty, justice, morality, freedom, spirituality, national pride, truth, scientific, logical, love, human values, etc.* have positive connotations that are not only effective in concealing the ulterior motive of the perpetrator but also grant a certain degree of legitimacy and appeal to the idea. A significant surge in cigarette sale was recorded when the tobacco companies in the West explicitly tried to portray smoking as a symbol of women's *liberation*. A literate person is more likely to believe in *scientific* astrology and *scientific* Vastu as opposed to using astrology and Vastu alone. A perceived threat of *national security* is generally used to quash citizen's rights and genuine aspirations. A higher sale is expected when a consumer product is advertising with slogans like *be Indian buy Indian!* The support and justification for Iraq war was built on empty rhetoric of bringing '*democracy and freedom*' to the Iraqi people!

Name calling and ad hominem attack: Name calling and ad hominem attack is used as a tactic to arouse hatred and xenophobic feelings with intent to demonize and discredit the opponent. These fallacies deflect the focus from the main argument to personal attacks and baseless allegations. If you criticize someone's closely held beliefs then you will be called arrogant or atheists! People advocating Indo-Pak peace are labeled as traitors! In a vicious propaganda the Nazi blamed Jews for every malady that the Germans were allegedly suffering from. Senator Joseph McCarthy lead a witch-hunt in the 1950s in which he accused thousands of Americans, including Einstein and Charlie Chaplin, as Communists spies! In the 2008 U.S. presidential election, the right wing tabloid ran an insidious campaign against Barack Obama linking him to some secret Muslim brotherhood! Dr. Binayak Sen, a well known human rights activist, was wrongly implicated of charges of sedition and waging a war against the state on flimsy grounds. A strategic alliance is sought by peddling myths such as: "India is surrounded by powerful enemies from all sides. Hence, we must become a superpower by aligning economically and militarily with other



Figure 5 – Myths, ideological propaganda and social violence.

superpowers!" All kinds of conspiracy theories are propagated to target and question the patriotism and loyalty of certain religious groups!

Overreliance on authority: People have a tendency to place too much confidence in authorities. What we don't realize is that authorities too can be fallible. Trusting authorities when the matter lies outside their field of expertise is even more problematic. For example, there is a widely held belief that during the full moon there is high rate of crime, violence, suicides, and mental illness. Apparently, the popularity of the myth can be attributed to many mental health care experts and medical professionals who strongly believe in the phenomenon. Studies conducted so far, however, have failed to establish a credible link between the full moon and human behavior (e.g. see ref. 7).

Uncertainty and fear of the unknown: The human desire for certainty and simple explanation of events interferes with our ability for sound reasoning and critical analysis. The anxiety of unforeseeable events such as unfortunate accidents, death of near and dear ones, fear of financial loss in business, relationship breakup and visitation of a dreadful disease etc drives people to seek help from fortune tellers, astrologers, faith healers, psychics and new age gurus. Fake investors and insurance industry is known to exploit deep-seated fears and uncertainties to expand their business. Mystics, swamis and mullahs make use of irrational fears to spank more religiosity and obedience towards the leader.

The preceding description of myths, superstitions and ideological propaganda is neither rigorous nor complete. For a comprehensive and detailed study, the interested reader should consult a vast amount of published literature and excellent books written on the subject.

Conclusions

The underlying cause of erroneous beliefs and propaganda machinery which reinforce and exploit human fallibility for communal, political and financial purposes cannot be completely eradicated. It has to be compensated by cultivating certain habits of the mind that promote critical thinking and sound reasoning. An acquaintance and understanding of various kinds of myths, superstitions and propaganda tactics can reduce the likelihood of deception and entrapment. The habit of raising doubts and asking questions can prevent the formation of dubious beliefs. The authenticity of claims should be checked from credible and independent resources. One cannot expect to get a fair coverage of an event or a breaking story, if for example, the reporters are given patronage by interested lobbying groups (WEF: Red Spider, Black Spider Redux, *The Hindu*, November 24, 2011).

Another important thing to realize is that worldly events are not completely deterministic. Everyday life experience presents us only with limited and biased samples of information. In the real world, we have to deal with incomplete and unrepresentative datum. Developing an awareness and appreciation of the provisional nature of things can reduce the discomfort of uncertainties. Collecting and analyzing data from different case studies can be a valuable exercise in developing a rational approach and methodology to understand the role of chances and probabilities in real life experiences. Most importantly, greater familiarity and involvement with scientific concepts, methodologies and measurement processes can help in weeding out dubious and questionable propositions. Errors and uncertainties in data can teach us the importance of statistical reasoning to handle claims and counter claims based on numbers and prophecies. A valuable exposure to conduct control experiments is necessary to clearly recognize the significance of variables that can alter the outcome of an experiment in many possible ways.

Modern science and democracy have common origins. Making realistic and informed choices is the essence of democratic principles. Just as it is imperative to combat the menace of various forms of superstitions, pseudoscience and irrational practices in the society, it is equally important to recognize and resist the sophistic ploys and sly practice used by the entertainment industry, marketers and mass media that reduce people to helpless and passive consumers. The struggle for scientific temper and rationality has to overcome many such obstacles. In doing so, let me recall the inspiring words of George Orwell, "*In a time of universal deceit, telling the truth is a revolutionary act.*"

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