PRACTICISM

The Belief System Based on Science and Scientific Temperament

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INTRODUCTION

*Our demands are simple, normal, and therefore they are difficult to satisfy. All we ask is that an actor on the stage live in accordance with natural laws- **Konstantin Stanislavski***

As life evolved on this earth, the super-intelligent among them, the humans, evolving into beings that could not only become the fittest for a given environment, also became capable of altering the environment to suit their own needs. While this has resulted in humans becoming the most stably successful species, this ability has also engendered many problems for the earth and to other life forms.

In addition to this, the ability to think about and understand causes and effects and the extraordinary and unprecedented achievements in controlling some of the causes has also resulted in expectations that are unrealistic. This gap between human expectation and achievement is due to the fact that despite the sense of control, human beings are subject to the same natural laws that dictate Universal phenomena. This fact is frequently misunderstood, ignored or, worse, denied. Instructed by religious quotes from Lao Tsu to Jesus to Krishna to modern self-help teachers, most have come to believe that “nothing is impossible” and that any achievement is not only possible but actually very highly likely, if you put your steadfast efforts in prayer or meticulous planning and execution your work. While these instructions are very appropriate for people who would give up out of hopelessness or laziness, the usefulness of the instruction, for high or difficult achievements, is limited to few individuals who succeed through unique coincidences combined with their own efforts. The success of these few individuals, while inspiring, cannot be construed as proof that every one can fine tune their lives to achieve what they want or of the certainty of control over causes and effects.

The gap between desires, wants, expectations and hopes and achievements leads to frustration and a sense of failure which, in turn, leads to suffering. However genuine and just the expectation or a hope is, the results of a set of actions and circumstances are bound by natural laws that govern the situation. People resort to miracle remedies and the counsel of charlatans when the logic of natural phenomena does not provide scope for the fulfillment of their expectations. Religions that promote the idea that divine or spiritual power can overcome natural limits or state illogically, without proof, that such divine or spiritual powers to defeat natural laws are within natural laws, lead masses and individuals astray. For people on their last leg, such expectations of miracles are justifiable because these provide a slender rope to hang on until they come out at the other end without too much injury. But for the day to day wants and expectations, dependence on unproven, illogical or unnatural processes to give them their success, is unrealistic.

There are systems that follow rules of physics and chemistry accurately or almost accurately. The path of a bullet can be accounted for the wind and its final landing place can be predicted accurately with equations. The subatomic and even molecular behavior can be predicted precisely by scientific equations or empirical rules. There are several such phenomena in nature. But these are more exceptions than a rule in the macroscopic world. Complex

systems (including orbits of planets around a sun) cannot be predicted or can be predicted only for a short time duration.

Evolution determines how a life form behaves and develops and how, depending on the environment , a life form succeeds or fails. As environments change, as they will, adaptability determines a life form's fitness in the new environment. The supreme law in nature in dynamic systems (definition in a later chapter) is that, success in a given environment breeds success while failure creates further difficulties in a given environment and phenomena. Life forms thrive or disappear based on this rule. Biological and geological systems mostly follow rules of evolution. While a large number of present day life forms and geology of the earth are shaped by this, another factor which counters this orderly progression is also equally important:

Science shows that even after relatively stable conditions of progression, a small disturbance can grow and swamp the system (environment) and alter it radically. Add to this, a time delay between cause and effect, random variations in normal phenomena and critical phenomena (tipping points, instabilities and bifurcations) can dramatically defeat expected trend and results. This can then benefit or fail specific individuals, species or natural processes disproportionately. Where a tree sprouts a new branch, an avalanche, formation of a rain cloud, sudden death of a tree, dramatic climate change, change in the course of a river or a sudden spread of a serious disease are examples of this. Dynamic systems in such critical states are very sensitive to the initial condition that existed when the process dynamic started. This is also known as the Butterfly Effect.

The result is that in most such systems, each step can only be predicted with a probability and even then that probability may not be valid under special circumstances. In general , progress in each step depends upon the condition in the previous step and all the complex forces and seeds of instability (in response to the environment) in the system. Real events can range from wholly predictable to completely unpredictable.

For humans this can be both reassuring and upsetting. Most of the times, expected things happen over a short time. But life can slowly veer away from an expected path over a longer period or momentous and unexpected things can happen all of a sudden. Forgetting to post the mail for a day, missing a bus, a loose stone on a cliff, admission into a particular college, spilling of coffee on the shirt, being at the right or wrong place at the right or wrong time, can, sometimes or often, create major changes in a person's lives such that the rest of their and next generations' futures are altered indelibly. Religions tend to assign these unexpected consequences or effects to God's or gods' acts whereas in reality these too are naturally occurring phenomena, well explained by the science of complex systems. If we look at the history of an insect, a tree, a stone or a river, you discover that things that happen to us are very similar to those happening in nature every moment.

So one can see that while many things are controllable easily or with difficulty for a short time or for long, there is no guarantee or even predictability of a result of an action. Life forms are evolved to respond on the basis of a broad experience punctuated by specific past experience with individual events or people. While this experience can provide quite good rules for most animals adapted to stable environments, these are only a general rules for

human beings who lead lot more complex lives. But people are intent on exquisitely controlling their lives. They need to accept that the control can only be approximate and they will succeed or fail for no apparent reason. It may seem to be unfair that some should succeed and others not under similar conditions or some may feel that they are targeted for failure, but people need to understand that this too is natural. **The substance of this is that individual and group human lives follow the same rhythms and disruptions as do trees, rivers, mountains, weather and planetary and stellar phenomena and reap consequences, even extremely unfortunate or fortunate ones.**

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The brain (both non-human and human) brains are evolved to watch for differences. It helps us in feeding, sensing dangers and opportunities, mating and social interactions and, in general, making choices that are likely to lead to success. The understanding of the differences, like many things, is a matter of training as well as application for use. The emphasis on differences increases with competition and a strong ability to differentiate becomes the ability to succeed over others who are less, able to do so. There are many consequential facets of this:

The ability to see the wholeness or the broad interdependence of an environment is reduced. Religions often exhort people to see the unity, interconnections, harmony and spiritual union with the Universe. While science slices and dices physical phenomena, a well honed scientist, in her practice, often knows the primary directive of science that the Universe is to be understood as whole and details are just pieces of the jigsaw puzzle which make up the whole picture.

This desire to perceive difference is also reflected in human aesthetic. A combination of order with disorder and even randomness is delightful to the mind. A tree with perfectly symmetric layout and identical leaves and branch and a perfectly shaped canopy would not be interesting to the eye. A tree's beauty is its distinctive variety. The human mind gets bored if it cannot distinguish details. We enjoy unpredictability and complexity to the extent we can handle it comfortably. While we keep our furniture in order, matching color and a form of symmetry, we never make it too simple. We compete in mind games that involve variations, unpredictability and a controlled randomness. We prefer a combination of spontaneity and deliberate action and any one alone is perceived as a flaw in a person. In other words we create and prefer a world that imitates the real world complexities both for training and entertainment.

Human beings invite complexity and disorder into their lives and for that they pay the price of unpredictability and loss of control. (Humans even like this price to a little extent because it provides excitement). This is very much according to natural laws and is similar to the experience of non-human as well as non living things. In most situations this is understood by us, even if we do not admit it, but when it gets out hand, we blame God and our fortunes.

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One point of frequent questioning is the issue of whether foundations of science are themselves based on some specific belief or beliefs and science and its methodology are a

system of belief. These are fair questions, particularly for people who are not scientists in fundamental fields. Both belief systems such as religion or political ideologies and science and specific scientific theories are based on axioms, doctrines or postulates, which are accepted without proof and are, in effect, a priori. For example, while “God created the Universe” is a fundamental belief in theistic religion and “From each according to ability” is a communist axiom, science is based on the rule or postulate that scientific conclusions can only be drawn from physically observed evidence concerning phenomena in the physical Universe. The Theory of Relativity is based on the postulate that the value of speed of light is independent of the observer.

The difference with science is that the postulates, which cannot be proven, are however constantly checked for consistency with observations and that no circular arguments are in play, in the macroscopic world we live in, in the subatomic world and in the greater Universe of galaxies, stars, black holes etc. Therefore, scientific postulates are not doctrinaire and can be questioned. While most of the scientists do not work or bother to question the postulates, there are scientists who constantly look for violations of the postulates and such sentinels exist in each field. All good scientists would reveal any inconsistency with established concepts and participate in revealing cracks in the scientific enterprise. If these scientists demonstrate that a fundamental thesis, assumption, postulate is proven to be untrue, the scientists have to dismantle their work and redo and re-understand the science. In this sense, science is not a belief system and is an edifice built brick by brick, in which even some bricks are replaced periodically, breaking down a whole section, if necessary.

Science is a system in which objective validity does not rest in a person’s or a groups findings but the robustness of checking by competing (sometimes unfair or even untruthful) peers, application of the findings in further research where its validity is reaffirmed or its incorrectness revealed and the consistency with other findings in other network fields. Scientists, who may be good or cheats, modest or vain, are not necessarily to be trusted, but the scientific system with its ability to detect and exorcise mistakes should be trusted in matters relating to physical phenomena.

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We frequently operate and behave in our daily lives, as if we mostly understand our own and others interests, thoughts, emotions and motivations. However, we do not understand our own emotions, thoughts and feelings, especially how they came to be. We actually never know what another person sees, hears, tastes and feels.

Visually we do not even see what we think we see. We receive only 2 dimensional images in our eye, which are much more like flat pictures. The sight is only a result of brain creating a model of the view in front of us. During our early learning years we develop the ability to convert colors and shades and light and shadow into 3 dimensional information. This is the way we learn about every other sensation. Our hopes and fears are based on our training from our past experience with events that make an impression on us even if unconsciously. Our understanding of the world around us is an approximation of what reality might be and given additional training to our senses, this approximation can be refined or go farther from reality. This training also affects our relationships and our abilities to function under different

conditions. So, we are the sum of human evolutionary and hereditary experience (genetics), our surroundings (nature) and our personal experiences (nurture). No one part is more important than the other, even though it is often argued thus.

From the above we can understand that one cannot truly know if one's own reactions, feelings and intentions are founded in reality. So, one can hardly be expected to feel or know what other people's reactions and feelings are. Yes, by social training starting from our parent's faces we do learn to respond to each other as if we do and often we do so effectively for practical purposes. But, I cannot know that the color I see as blue is the color a certain other person sees. We just agree to call whatever color that is, as blue. This extends to every domain of our understanding of another person and our surmise as to their response. Relationships are shaped by how our abilities have been shaped by experience and how closely we picture other's responses.

In the absence of adequate sensory and other informational input, the brain makes up missing data and again depending on nature and nurture, this imagination can run in many or specific directions and return a sense to a person that what is imagined is real. There is truly no limit to the power of our imagination and our gullibility in believing that what is imagined is more or less or even perfectly true. The human brain is so creative that in specific circumstances (such as isolation with no sensory input or a mental disease) a person experiences a world that is wholly, vividly and convincingly made up by the brain and this made up experience is available only to that individual. In the spiritual domain, a specific group may claim this to be a vision seen by the blessed or the so-called self-realized. But, such "visions" are (also) seen by the people who have abnormal mental status created by abnormal conditions.

We operate in this fog of knowledge and a true and close to perfect understanding of even a modestly complex phenomenon, is beyond our reach. The limitations of our brains are quickly revealed to us, if we pay attention. For example, we cannot imagine 4 dimensional space, we recall incidents falsely or identify a person wrongly very often, we can be made to disbelieve facts that are staring in front of us and we can be made to like or dislike a thing or person not on its or his merits but purely on our mental status. Mental diseases reveal this capacity for making up a whole system of knowing and a worldview. Certain surgeries can change a whole personality or an injury/surgery can block out an experience or a bulk of memories.

Allowing ourselves to extend into areas that can only be mostly imagined or surmised by this foggy but highly imaginative brain, has led us to philosophies, religions, art, music and other creative and intellectual expressions, which themselves are as complex and often beautiful creations themselves. Yet, as to knowing reality, these are but creations by human minds. Therefore there is no place in human society for certitude and an arrogance of knowledge. One can have a skill set and contextual data with correlations, but there is no "knowing". Further, when something is stated as "realized", "knowing", "truth" or "faith", one has to exercise extreme caution.

So, what about the field of science? Science is not reality, but a description of the reality to pin down what the human mind perceives as objective observations and concepts, with evidence that may also be mediated by instruments which are untainted by mental influence. This edifice built by concepts and observations supported by pillars of evidence and mathematical logic is what can get closest to physical reality. There is an argument to be made that the whole of science is still a human construct and therefore may be an illusory picture of reality. For example, instruments are still read by or interpreted by human minds. Science is fully aware of this reasoning. For this reason, science not only seeks self-consistency, it also seeks consilience- evidence from diverse fields and sources confirming the same conclusion. It also seeks proof that shows that denial of a certain scientific conclusion is wrong. As the conclusions are constantly evaluated by whole and different fields through constant usage, it can at least be said that the scientific reality remains rooted.

However, science, in particular, physics has limits and therefore when we enter the frontiers which are ever expanding, scientific reality may be murky at the edges. All the same, examining a system that we are part of, is always fraught with danger. For example, it may not be possible to refute or confirm the speculation that this Universe or our perception of the Universe is not a simulation or a game that some super-intelligence is playing (as in movie Matrix or Hindu puranas- Bhagavat Lila) or even that there are no external phenomena and your brain is making up the whole thing including seeing and knowing someone or reading this article.

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The phenomenon of Emergence is all around us. When a collective of a large number of entities with specialized functions and rules of engagement work together for the benefit of the collective, there emerges either a real or an appearance of intelligence that acquires an identity. Clear examples are ant colonies, bee hives, migrating birds and schools of fish. The communication between individual members of this collective communicate through chemicals and result in a network that appears to become aware. The so-called “wisdom of the crowd” is an example of local emergence, in which a non-expert crowd without much information can predict, in some cases, a result or discovery more accurately than experts can.

Our bodies are an emergent organism which are actually made of trillions of cells, some hatched in our own genetic factory and others imported from the external environment. Virus that invaded human bodies eons ago, have insinuated themselves by recombination mechanisms and have become “us”. There is not a person in a human body.

Our brain cells too may form such collectives and the “consciousness” could be the Emergence from a large number of brain cells which are usually specialized (though, like in the ant colony, the ants may fill other roles when there is a dearth in that department, brains cells also retrain to do different tasks if needed). Most brain studies show that at no time, the whole brain lights up and also no central agency, a hub or a master group of brain cells order different parts of the brain and centralize analysis or cognition. They seem to function independently communicating through chemicals within the neural network, much like ants. To a casual fictitious observer of the brain will seem like an ant like colony collecting signals,

processing and sending them for cognition to other parts of the brain, with no central “mind” and there is not a person in the human brain.

There is, however, a significant difference between a physical hive and the brain. The brain structures and chemical changes encode memory which is absent in hives or colonies. This makes the brain cells utilize past experiences.

So there is no person in a human body and therefore no I in a person. This is a trained brain with a single goal of nurturing and protecting the physical body. Emotions, sensations and thoughts are trained by experience and genes to be what the brain considers to be b eneficial for the welfare of the body. This is a circus performance under the tent of the animal skin, by an extraordinary set of individual performers.

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It is well known that our color perception and gray scale perception are only relative. The same color or gray will look different or change when the background changes. So is our perception about everything. Our understanding, attitudes and opinions are rarely absolute and are only context dependent. A crime against ourselves or our loved ones seems worse than against others. A meal is tastier when one is hungry. Another person is more wrong when you are tired. A politician appears honest or dishonest depending on the times.. and so on. If a person dies of a car accident in front of one’s own house, it is more horrible than if it happened in some other city. The same cup of coffee tastes and smells immensely better at specific times, like first thing in the morning or late night after meals.

Our perception of the size or intensity of an event is not scalable or even constant. If three or four people die in an attack creates a certain emotional response, death of a thousand people in a similar attack is not felt hundred or more times intensely. In fact, it is often dulled. When we eat a very tasty food, the first bite is always wonderful and it progressively reduces in its appeal with more bites with the result that after many bites it is not wanted much. Familiarity breeds contempt. In the complementary way, familiarity also breeds comfort and acceptance. A horrible smell will go away if one smells it long enough. A certain sofa, initially uncomfortable, becomes the most comfortable one.

So when we say something or hold an opinion, we should know that that is only in that moment and based on perceptions along with accumulated wisdom and prejudices.

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