Yoga as the Science and the Āyurveda as Engineering to Construct a New World Order

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Abstract

World civilization seems to have originated from the land of Bhārata (India) as per cosmological consideration, genetic lineage, and linguistic links throughout the world. The primary reason for such an origin is geological that has provided a basis for India's continuous civilization uninterrupted by climatic calamities such as ice age. The factor in this process is the formation of Himalayas on the north side of Indian Subcontinent, and it being surrounded by ocean on the other three sides. These fairly stable geographical features of India provides it among other things a stable weather pattern and seasons throughout the year. A holistic view is critical for understanding human behavior within the ecological system surrounding them. Āyurveda system of knowledge and healthcare is one such system that integrates all elements of nature for a sustainable living.For scientists, Āyurveda is more of a folk practice and cultural tradition. However, Āyurveda is increasingly being examined through modern scientific lens. With the number of scientific publications on Āyurvedic system are at least quadrupling every five years. Philosophically, the āyurvedic system is primarily derived from Nyāya and Vaiśeṣika philosophies, but also incorporates Sāṅkhya philosophy. The Āyurvedic system considers humans and plants in the hierarchy of the cosmic evolution to consist of the same basic matter of five elements. The world is facing an unprecedented health and life emergency due to the pandemic, which provides a seminal opportunity to invoke basic human traits and nature to guide them not only in dealing with the current situation, but also to perhaps chart a new course of life by adopting the concepts of life and living from Āyurveda and Yoga, ushering truly a new era or world order.

Full paper

Any type of knowledge is only considered valid if its utility is operationally demonstrated to general public in a systematic and honest way. Whether only believes in God or science, there is enormous evidence of history and philosophy to suggest that there is a natural order in things on this Earth. These include cyclic phenomena that happen to change with time, origin and end of all the things that can be perceived, whether related to matter or mind, and that there is a form of unity of diversity, although at different planes of existence. Such concepts have been explored in India over millennia. What is so unique of about India that some of the major thoughts about the universe, include the human mind and consciousness has majorly come out of India? Part of the answer may come from the geology and geography of India.

Unique Indian Subcontinent

Some pertinent information is available from the Geological Survey of Ireland (https://www.gsi.ie/en-ie/education/our-planet-earth/Pages/The-Earth-through-time.aspx), suggesting that the entire landmass of India sifted from Africa, became an island over a long period of time (over 60 million years), before becoming the part of Asia continent. If there were animals, if there were organisms, they also lived and died on that island, from modern scientific point of view.

The Geological Society, UK, (https://www.geolsoc.org.uk/Plate-Tectonics/Chap3-Plate-Margins/Convergent/Continental-Collision) posits that the Himalayas are still rising by more than 1 cm

per year as India continues to move northwards into Asia, which explains the occurrence of shallow focus earthquakes in the region today. However, the forces of weathering and erosion are lowering the Himalayas at about the same rate. The Himalayas and Tibetan plateau trend east-west and extend for 2,900 km, reaching the maximum elevation of 8,848 meters (Mount Everest – the highest point on Earth).So, that subcontinent landmass (and the only subcontinent on this Earth) moved for nearly 60 million years, which means for 67 million years, it continued to move, and about 10 million years ago it slammed in Asian subcontinent. While humans are not expected on that land mass, as humans are believed to be in existence only for about 2 million years. 60-100 million years ago, during the Crestaecian period, organisms up to only birds had appeared on Earth (Goudarzi, 2008), So such predecessors of humans may have been on that piece of land mass that is Indian subcontinent today, which ranges from Afghanistan to Malaysia.

For human development, If one ignores the concept of 12,000 divine years in a *yuga* (era) as done by Singh (2008), and considering the current *yuga* as the 28th of 71 such *yugas* in a Manvantara (presiding time of each Manu), one could estimate age of modern humanity as about 336,000 years. This time frame is at least consistent with the out of Africa and into India migration of humans, 60,000 years ago, based on population genetics (Singh, 2021).

Implications of Himalayas

The Himalayas have been there from the very beginning of the Indian subcontinent, and thus influence the life there from ever, including a significant effect on the weather of the Indian Subcontinent. These mountains create conditions for heavy precipitation on the Indian side of the range, but a dry, arid climate on the northern side, in Tibet. Most of the southwesterly winds give up their rain in India before passing north over the Himalayas. The range is so high it also stops cold continental air from traveling north into India during wintertime (https://www.worldatlas.com/articles/ways-the-himalayas-influence-life-in-the-indian-subcontinent.html). This would include during the time of all major and minor ice ages, thus protecting the land and people from extreme weather conditions that is faced by almost rest of the planet, including southern tips such as Australia, South Africa, and South America, with no hurdle for the cold air to flow southwards (Dell'amore, 2011; Tibby et al., 2018, Wong, 2001).

According to the International Union for Conservation of Nature (IUCN), "India, a megadiverse country with only 2.4% of the world's land area, accounts for 7-8% of all recorded species, including over 45,000 species of plants and 91,000 species of animals. The country's diverse physical features and climatic conditions have resulted in a variety of ecosystems such as forests, wetlands, grasslands, desert, coastal and marine ecosystems which harbour and sustain high biodiversity and contribute to human well-being." (https://www.iucn.org/asia/countries/india). Therein lies the basis of much of the knowledge that has been compiled, practiced, and popularized in the entire world.

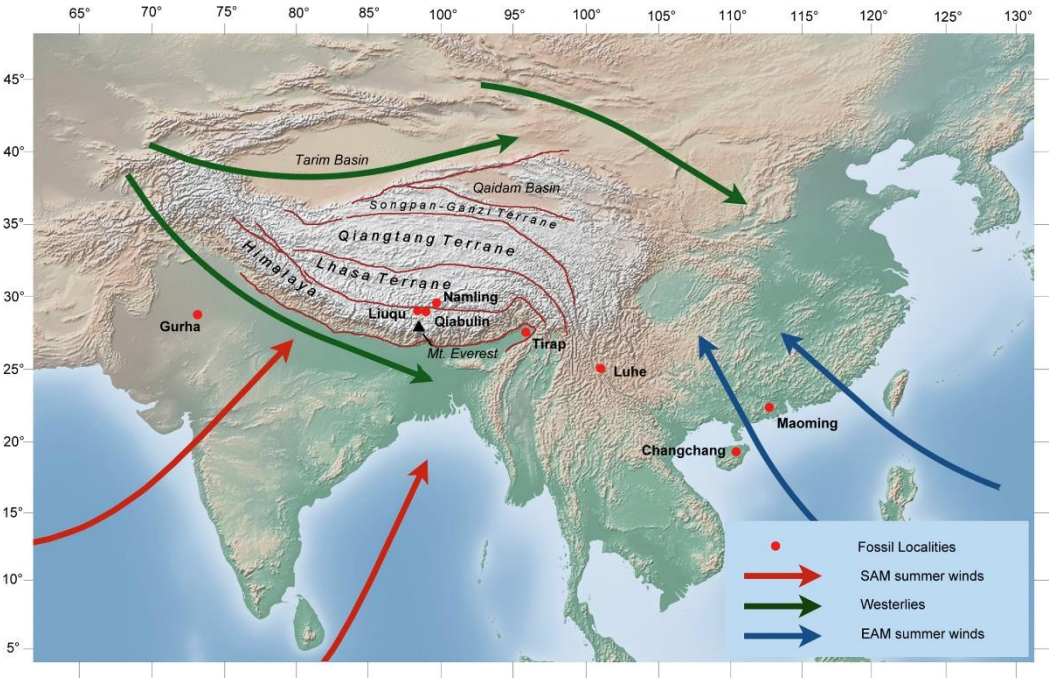

Figure 1. Map of southern Asia showing the major tectonic terranes and features referred to in the text, the positions of key fossil localities referred *to* in the text, and the directions of major wind patterns associated with the South Asia Monsoon and East Asia Monsoon in summer and winter Westerlies. (Taken from Spicer, 2017)

The Vedic Knowledge System and Order

The Vedic knowledge system is organized in *Shruti* and *Smriti* texts, whereby the four Vedas (Ṛgveda, Sāmaveda, Yajurveda, and Atharvaveda) along with their *Brāhmaṇas*, *Saṁhitās*, *Āraṇyakas*, and *Upaniṣads*, *Vedāngas (Kalpa, Ṡikshā, Vyākarṇa, Nirukta, Chanda, and Jyotiṣa*) and *Upaveda*s (*Arthaveda, Dhanurveda, Gandharvaveda*, and *Āyurveda*) are part of *Shruti* knowledge, and Ritual *sūtras*, *Tantras*, *Panchatantras*, *Purāṇas*, *Itihāsa*, and six *darṡanas* (*Sānkhya*, *Vaiṡeṣika*, *Nyāya*, *Mīmānsā*, Yoga, and *Vedānta*) are part of the *Smriti* knowledge. Together these texts provide a comprehensive understanding of the entire universe or the *brahmāṇḍa*, where *karma* becomes the most defining factor for the position of an entity, living or otherwise, to be placed in an orderly manner. Yoga provides a practical means for a human to transcend the sensory perception to 'see' the entire creation working in a perfect order. Humans of lesser realization tend to engrossed in their sensory perception and egotistical attitude. This comes handy when such humans tend to develop their own, mostly political world order.

Despite the misgivings of the term New World Order, which has aroused skepticism in various political and religious sections, it is perhaps the natural order of the day when we propose an Āyurvedic World Order. It is, in a way, an antithesis to the current meaning of world order, as has been propounded by political leaders from Woodrow Wilson, Winston Churchill to George W. H. Bush, or worse that has been portrayed by religious conspiracy theorists. On the other hand, it could be a transformative refinement to the ideas proposed by Harvard's Samuel Huntington (Clash of Civilizations), MIT's Noam Chomsky (World Order New and Old), and Henry Kissinger (World Order).

Āyurveda and Yoga

Āyurveda, as an *Upaveda* of the Vedic knowledge system, developed in part due to the keen observation of the tremendous diversity in India, but most importantly because of the sustained culture transcending major/minor ice ages, and other calamities that affect rest of the planet a lot more. There numerous aspects of traditions, thoughts, and texts, that carry the knowledge of Āyurveda, for balanced health of human, animal, plants, mountains, rivers, etc. Currently, there is a great concern about the climate change and environmental degradation in the Himalayan region, which will not only affect climatic conditions (Lee et al., 2021), but perhaps more importantly a culture of sustained knowledge system of India that has helped humanity for millennia.

According to Āyurvedic principles, the entire world, each entity in it, consists of the five primordial elements, Ether, Air, Fire, Water, and Earth. Consciousness (s*atva*), motion or action (*rajas*), and the inertia that resists them (*tamas*) are the three omnipresent non-material qualities (g*uṇas*), which govern the structure and function of all material forms of the basic matter (Chopra and Doiphode, 2002).

The basic matter produces three life forces or energy known as *doṣas t*hat pervade all existing matter. These three doṣas - *vāta, pitta, and kapha* - are the primary physiological forces which govern the biomotor, metabolic, and preservative (homeostasis) activities, respectively. Their combination defines the *prakṛti* (nature and constitution) of human beings, which is determined by genes, environment, maternal diet and lifestyle, and age of transmitting parents (Prasher et al., 2008). A living human body and sense organs operate with three *guṇas* (*sattva, rajas,* and *tamas*) affecting the mind or psyche, and self-consciousness (*Ātma*) governing the entire life operation (Fig. 2).

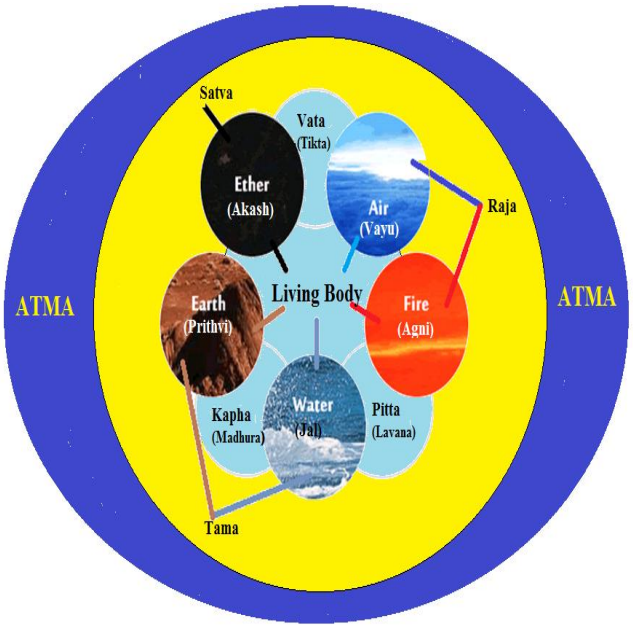

Figure 2. Schematics showing human life consisting of body and sense organs are made from *pañcabhūtas,* which are influenced by *tridoṣas* (*vāta, pitta, kapha*) and *triguṇas* (*satva, raja, tama*). Ātma (consciousness pervades all to create human life. *Madhura* (sweet), *lavaṇa* (salty), and *tikta* (bitter) aggravate *kapha, pitta,* and *vāta*, respectively.

To consider the global impact of Yoga and Āyurveda, one of the clearer things to do is to look at the economic impact. In 2015, yoga was currently an $80 billion industry globally, with United States accounting for about $27 billion or about 34% of the market (Singh, 2015). On the other hand, the global herbal trade, Āyurveda included, was more than a $120 billion global industry. The United States has been estimated to carry about 11% of the herbal product trade. It is estimated that the herbal trade will be worth $7 trillion by 2050. Just to put these figures in perspective, the global healthcare industry in 2015 was $9.3 trillion of which the U.S. share is about $4 trillion. The herbal trade will be bigger than the GDP of all but the top six (China, India, United States, Indonesia, Brazil, and Russia) countries in the world. Including Yoga market is likely to enhance its status to number 4 when compared to the country-wise GDP in 2050.

The Ayurveda World Order (AWO) is expected to be based on natural order of animate and inanimate beings, as Āyurveda considers consciousness in all the matter that originates from the *prānic* energy with its manifestation through the *pañchamahābhūta* – ether, air, fire, water, and earth. These five elements in combination with the *triguṇas – satva, rajas*, and *tamas*, form the *tridoṣas* (nature) – *vāta* (air), *pitta* (fire), and *kapha* (water), which classify the nature or *prakṛt*i of individuals. Any particular being is borne with a unique combination of these *tridoṣas* as their body constitution (Singh and Kumar, 2012).

Āyurveda, More than Health

To maintain health, one needs to maintain a balance of those natural constitution combinations under the varying conditions of daily, fortnightly, monthly, and yearly cycles. Seasonal foods, herbs, and lifestyles (sleeping, yoga-meditation, manner of speaking, thoughts, etc.), and their combinations based on age, gender, geographical locations, social situations, etc. Āyurveda derives its fundamental principles of classification and association with nature from the five fundamental elements of matter – ether, air, fire, water, and earth, signifying to their functional attributes of vibrations, flow, heat, fluidity, and grossness. Āyurveda framework is quite comprehensive encompassing the five elements which form the basis of power of the senses (hearing, touching, seeing, tasting, and smelling), five organs of senses (ear, skin, eye, tongue, and nose), five organs of action (mouth and tongue, hand, legs, reproductive, and excretory). These features together with the mind and intellect influence and get influenced by the body's *doṣa* constitution, providing the basis for diseases when there is imbalance, or to balance the body *doṣa* constitution with behavioral and dietary alterations. Ãyurveda considers the gastric system as the main source of impact on the *doṣa* constitution, as it reflects the imbalance and can also be used to balance the *tridoṣa* (Lad 1984). This provides the traditional, cultural, and philosophical basis of food, season, and lifestyle to be an integral part of Āyurveda.

In addition to gastric system for the digestive action, Āyurveda system also puts a heavy emphasis on the tastes, classifying food tastes as sweet, sour, salty, bitter, pungent, and astringent (Ambrin et al., 2021). These tastes can modulate the body *tridoṣa*. For example, sweet taste decreases *vāta* and *pitta*, but increases *kapha*. Sour taste decreases *vāta* but increases pitta and *kapha*. Chemical and biochemical mechanism of such effect is not known. However, given that the taste bud cells act as chemosensory processors, and involve several transmitters such as acetylcholine, serotonin, norepinephrine, GABA, and ATP (Roper, 2013), these are clearly impactful to the brain. In fact, taste impairment leads to major neurological disorders such as head trauma, multiple sclerosis, and seizure disorders. Also, such impairment also known to cause neurodegenerative diseases such as idiopathic Parkinson disease and dementia, mild cognitive impairment, and Alzheimer disease (Devere, 2017).

Thus, food is not just a source of energy for the body, but perhaps an important modulator of the mind as well. This is relevant to the society beyond health, and may have impact traditions, communications, and common emotions, which can develop from a common taste of food consumed together. For example, it is a tradition throughout the world to have feasts together to indicate human bonding allowing better communication. No wonder we see food involved in all major meetings of international importance when heads of countries or delegations from different countries meet to sort out their differences. Communication is a reality for humans, animals, plants, and even microbials. We all communicate things in one way or the other. Terms related to communication are community, commonality, communism, etc. The word communication is derived from the Latin word 'Communis', which means common. The Sanskrit term '*Sadhāraṇīkaraṇa'* in Bharata's Natya Shastra is usually associated with communication (Adhikary, 2009). '*Sadhāraṇīkaraṇa"* is a social process which can be achieved only among *Sahridayas,* people with a capacity and willingness to receive messages.

*Sahridaya*s literally means ‘of one heart’. This is an innate ability acquired through culture of adaptation or learning. This ancient Indian concept of communication is derived from the aesthetic theory of ‘*Rasa*’ (Sinha and Singh, 2018), which literally means taste. There are nine forms of *Rasa* which are used to communicate the *sthāi bhāvas* or permanent moods. Are these moods affected by food, which have been described in Āyurveda as belonging to six *rasas* – *madhura*, *āmla*, *lavaṇa*, *kaṭu*, *tikta*, and *kasāya.*

It has been observed that the food can alter moods (Naidoo, 2019). Payyappallimana and Padma Venkatasubramanian (2016) posit an interesting taxonomy of foods which is based on their effect on psychological dispositions of individuals. According to Āyurveda, there is a subtle link between disease manifestation and the six psychological expressions, such as lust, anger, greed, desire, attachment, and ego. These psychological states are closely linked to foods. This connection is further discussed in terms of three states of being including *sattva*, *rajas*, and *tamas. Sattva* is the contented state, *rajas* an excited state whereas tamas relates to a lethargic disposition, i.e., foods can induce these states of mind (cf. Payyappallimana and Padma Venkatasubramanian, 2016).

Depending on the geographical and climate differences in China, there are many different cuisines in different areas. Each province has its own unique style of cooking; the locally available food items and seasonings are also unique. In the cold and damp areas of Northern China, people are promoting hot and spicy foods such as chilies, onions, and garlic. They believe these foods will increase blood circulation and help get rid of the coldness and dampness. Generally, people from Southern China like to eat more mild and cooling foods because of the warmer climate. These foods reduce the hotness and dryness.

The Western concept of the chemistry of acid and alkali to explain food is a materialistic and current scientific approach to balance. The Western approach is also focused on how the food eaten creates the metabolic energy. But both the Eastern and Western theories agree that live biological system is not static, everything is constantly moving, changing, and shifting, just as the acid and alkali ratio, *tridoṣa* balance, or the Yin Yang balance shift in our bodies. Our life force can be improved and maintained by changing what we eat. The closer food is to its natural state, and the less sophisticated, processed, or refined it is, the more nutritional value is shared with our bodies.

Philosophical Connection of Āyurveda and Yoga

To address the questions about yoga and Āyurveda, one must look at them beyond the business and trade issues where they may be perceived as competing with each other. Health in Vedic philosophy is defined as a balance in body and mind. Āyurveda generally focuses on the body whereas yoga deals with the mind, but it is the equilibrium between the two that determines health, which in Sanskrit is called *svāsthya*, meaning to be established in self. The self is the *Ātman* or soul which completes the constitution of *tridaṇḍa* in Āyurveda that makes the immortal essence of a living individual[3]. Thus, yoga and Āyurveda are integral parts of the system for human health and wellbeing.

Āyurveda and yoga are sister sciences, according to Āyurveda master Vasant Lad. “Yoga is the science of union with the Ultimate Being. Āyurveda is the science of living, of daily life. When yogīs perform certain postures and follow certain disciplines, they open up and move energies [*prāṇas*] that have accumulated and stagnated in the energy centers [*cakras*][4].”

Āyurveda recommends specific types of yoga that are suitable for a person, according to his/her body constitution. For example, for asthmā in a *Vāta* constitution person, the recommended *āsanas* are

backward bend, plough, knee to chest and corpse, whereas for a *kapha* constitution person the recommended *āsanas* are half wheel, bow, boat, shoulder stand, palm tree, fish, and cobra[4].

Similarly, there is a correlation between Patanjali's *aṣṭāṅg*a yoga and Ayurveda's *aṣtacakra*, according to Acharya Balkrishna of Patanjali Yog Peeth, Haridwar, India. In this scheme, *Yamas* (non-violence, truth, non-stealing, celibacy, non-covetousness), *Niyamas* (cleanliness, satisfaction, penance, study of self, and surrender to supreme), *Āsanas* (postures), *Prāṇāyāmas* (breath extension), *Pratyāhāras* (sensory withdrawal), *Dhāraṇā* (concentration), *Dhyāna* (meditation), and *Samādhi* (deep transcendental meditation) are associated with *mulādhara, svādhiṣṭhāna, maṇipūra, anāhata, visuddhi, ājṇā, manas,* and *sahasrāra cakras*, respectively[3].

It is quite clear that the basic practices of Āyurveda and yoga are intertwined through *prāṇa*, the primordial energy that is the source of all vital forces of *tridoṣas* and *triguṇas*, both of which interact with the mind for the ultimate reflection from Ātma or the self. *Prāṇāyāma* of yoga and *Teja*s of Āyurveda allow the creation of balance in life forces. The question is, will *prāṇa* intertwine Āyurveda and yoga in advancing this knowledge in today's world for public health and harmony? If one is to believe a survey conducted in 2013, there is tremendous awareness and willingness in Yoga Studio operators in the United States to incorporate Āyurveda in their programs (Singh, 2014).

Yoga Science and Āyurveda Engineering

Yoga is a scientific pedagogy of approaching knowledge, whereas Āyurveda is consequence or product of that approach for living. If yoga is science then Āyurveda is the engineering and technology of that science. Is yoga really a science? The answer can be in several layers, from philosophy, psychology, and spirituality to biology, biochemistry, chemistry, and physics. However, a better way to answer that question for now is to point world's first academic yoga course that was established in 2005 in the University of Massachusetts Dartmouth that was evaluated and approved to meet the science requirement of undergraduate students for their graduation.

The Science of Kriyāyoga (IST 111-01) class covers understanding of self and surrounding by individuals through first making and practicing connections between body and mind. The content of the course includes explanation of objective and practical science, and the role of the mind in creating such an important field of study. The course also covers the meaning and description of yoga, which literally means union or process of uniting.

Students who are mostly non-science and non-engineering majors are introduced to scientific approach to address a problem. This includes basic definition of science, such as science is a systemic study of a problem, subject, or system, which provides consistent results. The basic goal of scientific study is described as seeking the scientific truth, which is a non-falsifiable truth. Students are made to understand that while absolute truth may not be possible, its pursuit is important through self-criticism, control experiments, and openness to change when new evidence is presented. More importantly, scientific pursuit invites criticism as its quality control. Ultimately, students are impressed that the key to scientific pursuit is objectivity. We must be objective to be able to make observations and draw conclusions. By organizing them systematically to derive scientific truth. Students are introduced to basic concepts of sciences, such as nervous system, respiration, photosynthesis, physical and natural forces, atomic and molecular structure, and coordinated function of a cell. Information from these topics is then used to construct an understanding of the process of yoga, first as a practice with self, which is transformed into learning lessons for the connection with others, including animals, plants, and the environment.

The students are provided with examples of holistic functioning of atoms, molecules, cells, bodies, societies, planet, and the universe. Discussion on science and yogic description of scientific facts and understanding, is heavily supplemented with yoga practices of postures (asana), controlled breathing (pranayama), and meditation (dhyana) during the class sessions as well as in extra-class sessions. Further description and details of this approach to science will be presented in subsequent articles for a new Āyurveda and Yoga World Order initiative.

Concluding Remarks

Āyurveda encompasses the origin of universe, considering the *prānic* energy as the source of all matter that consists of the five elements or *pañcabhūtas*. The *pañcabhūtas* in combination with *triguṇas* (*satva, raja, and tama*) define the *tridoṣa* or *prakṛti* , which together with mind (*mana*), and *Ātma* creates the world around us. This idea or order is created by enlightened ones, such as sages or *ṛṣis*. The Āyurveda thus forms the fundamental basis of the world order as visualized by human beings, although other beings and non-beings have equal access to their own vision of this reality. We as humans then make observations under the framework of our sensory organs and the organs of actions that provide inputs to our mind and intellect, which leads to an order based on social, psychological, philosophical, religious, scientific, environmental, and several other factors (*Figure 4*). One has to see these aspects in a detached way, which is possible only with the practice of yoga to understand oneself through *svādhyāya* (self-study). Such *svādhyāya* allows one to connect with one's nature and the nature itself, which allows the understanding the universe and its origin.

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