

Consciousness in Systems Science: Transforming Psychology Medicine, Education and Community

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Abstract

The focus of this research paper is to bring consciousness within the ambit of systems science. Consciousness is incredible, and is extending across the spectrum of cosmology, psychology, neuroscience, biology, molecular chemistry and physics. Consciousness is the Source-field of all options and opportunities for any living systems. Its proper understanding has far reaching implications in mental health of the individual, education and management. It has lasting impact on community psychology reflected in population life-style, which contributes to epidemiology of health and disease. The systems psyche, which is the cognitive apparatus and the decision-making labyrinthine organ within the organism, works independent of any organ like brain although it uses the brain as an organ for its ultimate manifestations. Assuming that right note always offers the best high, we are to set the right note at the outset for bringing consciousness within systems science. Right concept notes for systematic research on consciousness are the systems psyche, layers between neuroscience and consciousness, inter-phase between systems (brain)-bound and systems (brain)-independent consciousness. The useful tools are the ladder of cognition and the canvas of cognition, which operate bottom up (or, from surface to depth) between the signal and the wisdom, and top-down (or from depth to surface) between the wisdom and the signal. It is possible to lay down the consciousness research within the cast of systems cosmology and systems psychology, which could be inclusive of the systems science of biology, chemistry and physics.

Keywords: *Systems psyche, Layers between neuroscience and consciousness, Ladder of Cognition, Education, Community*

INTRODUCTION

Consciousness is obvious for all of us. From sensation of toothache to conscious experience, in expression of our feelings and emotion, and decision-making, it has been increasingly difficult to ignore the proactive as well as the passive supporting role of consciousness as a subject in scientific study. Consciousness is that what looks after what all are going on in our autonomous orbits of mind, self and life in terms of quality management of information and phenomenon. Science of consciousness should not merely be a theory or a set of theories with explanatory and predictive power. Scientific study of human consciousness has vast implications in the study of individual's behavior, mental health, psychosomatic pathology, and psychiatric illness, self- and business management, individual and community education transcending the religious and cultural boundary.

In this paper, we will look into the nature of consciousness, the layers in natures and consciousness, ineffectiveness of bottom-up approach to explore consciousness and the possibilities in top-down approach in this exploration such as identification of the systems psyche and its ramifications and finally recognizing the tools; the ladder of cognition and the canvas of cognition. At the end we will briefly describe the impact of consciousness in education and community psychology followed by concluding remarks and the perspectives.

NATURE OF CONSCIOUSNESS

By nature, consciousness is nonlocal. It cannot be localized in space and in time. Popular belief in community psychology is that consciousness is inside our brain. But its location cannot be shown or

demonstrated within. Consciousness is also inside a cell, inside a unicellular organism reflected in the discipline of cellular cognition. But, exactly where consciousness is? No one has any evidence to respond to this question in science, although an accomplished spiritualist says where it is not? Consciousness is inside the plants, also in brainless animals or organisms. Still, we do not know where it is located? Or, at all could it be located?

Quite often, we relate consciousness with the living organism since consciousness expresses itself better in the living state. Manifestations of consciousness within the living state vanish with the death of the cell or organism, plants and animals irrespective of whether it has brain or not. "Consciousness is the guarantor of all we hold to be human and precious. Its permanent loss is considered equivalent to death, even if the body persists in its vital signs" (Gerald Edelman). Consciousness and life, although, complement to each other in their respective manifestation, they are difficult to distinguish. Their similarities and distinction have been described in author's earlier paper [1].

In natural science, as evident from phenomenon of self-organization, presence of intelligence in nature and nature's decision-revealing ability in complex natural situation, consciousness is considered to be present in nature too! At the bottom of the layers of nature, consciousness is considered as the ultimate ground, which using the language of mathematics has infinite length, width and depth and still it can be condensed into a 'Point'. On time line, consciousness extends over unending past, includes present and stretches to endless future. Still, consciousness can be localized as a 'Moment'. In this sense consciousness is 'momentous' as well as 'pointilistic'.

NATURE AND CONSCIOUSNESS

Physical nature has been described with Newtonian laws and Relativity of Einstein (classical nature), and microscopically with principles and laws of quantum physics (quantum nature). In contrast to belief of conventional quantum physicists, nature does not end with Planck's length and time. Deeper to this are sub-quantum and sub-sub-quantum nature. The recent trends in thoughts in physical science are that electrons have spherically symmetric subfields inside it, quanta are divisible, quarks have substructures, there are particles smaller than Planck's length and

quantum physics originates from deep sub-quantum plane. Emergence of this sub-quantum paradigm has been happening by works of several scientists (Mukhopadhyay, AK, Gerard 't Hooft, Paul A. Lavolette, Gerhard Groessing, Adrian Klein, Robert Neil Boyd and Ram Lakhan Pandey Vimal, for example) looking at the events behind vacuum fluctuation. The author states that immediately behind quantum fluctuations there are operations (which in psychology has been termed 'mind') conducted on information matrices. Deeper in the sub-sub-quantum nest of nature are operations of 'life' and 'self', both are deeper constituents of systems psyche. We will see the orbits of players within systems psyche in this depth of nature in subsequent paragraphs. Deeper to sub-sub-quantum plane of nature, there are five layers of consciousness; supporting consciousness, participating consciousness, intervening consciousness, creative consciousness and the consciousness as the ultimate ground.

BOTTOM-UP APPROACH TO CONSCIOUSNESS

We are all looking for or trying to build up a science, which can accommodate this nonlocal consciousness within the local systems of physical science. However, we are beating about the bush. We are trying to explain this consciousness with what is already known through limited bandwidth of knowledge and experience. We have been trying this through neural signals (neurocentric consciousness). Or else, we have been referring to some specific schools of philosophy. Or, we have been roping up with quantum physics or informatics. Or, we are equating mind with consciousness. We are not successful yet.

From brain Signals to Consciousness

In contrary to the popular belief, scientists have not found single evidence, which supports the view that consciousness is generated within this befuddling organ brain. Theories (e.g., of John Eccles, Gerald Edelman, and Antonio Damasio) are wandering in the coveted area of neuroscience and psychology without being successful to discover the precious layers in between neuroscience and consciousness. Had spatiotemporal pattern coordination, synchronization and harmonization of oscillatory signals in different neuronal assemblies been the source of origin of consciousness, then many machine-learning and deep-learning devices or supercomputers would have been conscious by now! Four metastable theory of consciousness, Global Workspace Theory (GWT) [2],

Dynamic Core Hypothesis (DCH) [3], Operational Architectonic Theory (OAT) [4], and Default Space Model (DSM) of Consciousness [5], fall flat here! It is rather other way round. Consciousness is the source of such oscillations! Consciousness requires the pattern of such oscillation for its manifestation! There is a call from the author [6] for working on the idea that the brain cannot generate consciousness, nor it can use consciousness. It is consciousness, which uses brain for its manifestation. Cognition, emotion and feelings, and volition are manifestations of systems-bound consciousness within the brain.

Philosophical Route to Consciousness

Most of the schools of philosophy cannot take us to consciousness. Why? Because most of the philosophies are *products of mind and intellect* and are *based on material science*. When 'mind' has no access to consciousness then how the products of mind are expected to have access to consciousness! There are some deep philosophies, found in almost all major religions, which are outcome of intuition, illumination and revelation from the orbit of consciousness. It is consciousness, which enriches a *primed philosophical mind* with intuition, and a *primed consciousness-oriented mind* with illumination and revelation. Such philosophies are deep transcendental in nature, transcending not only space and time but also causal/intentional network of information, transcending at superficial plane social taboo and culture, transcending deeply the phenomenon of death. Such philosophies could guide us in developing a science for consciousness.

Physical Science and Consciousness

Many quantum physicists believe that they would be successful to explain consciousness through quantum mechanical laws along with the puzzles and paradoxes in quantum physics. However, one continues to remain within the domain of quantum mechanics unless one leaves behind this domain by penetrating through quantum 'discontinuity' or quantum 'void', or piercing through quanta and starts looking at the quantum fields as the messengers of Infinity (consciousness). Behind the fluctuations in the quantum void and quantum discontinuity one enters the sub-quantum nest, the domain of information and operations, which has been traditionally called mind. Quantum potential and scalar potential are loaded with information, while quantum fields and scalar

fields are housing information manifolds. Strikingly, 'information' *per se* has no access to consciousness. The extensive information network and the vast information manifolds all over the universe, or spread over multiple universe(s) across the systems of the Multiversity (Systems cosmology) could be ultimately proved to be merely a deceptive cover or an illusory sheath on consciousness.

Mind and Consciousness

Material scientists have treated mind and consciousness synonymously in the past and ignored both as 'ghost' in the machine. This trend has been changing fast. Artificial Intelligence-scientists and depth psychologists are in dialogue to learn from each other [7,8]. Daniel Dennett's philosophy leads to mind, not consciousness. In fact, mind is categorically different from consciousness. Consciousness begins where the mind ends. Mind does not have direct access to consciousness although the reverse is not true. Mind reports to self, not to consciousness. Origin of mind is in the duality. There is no room for mind in material or consciousness monism. Mind acts as an organ of communication between two conscious systems. The strength of mind comes from its entanglement with the orbits of life, consciousness and self. What is perceived as 'problem' in the weak state of mind, appears as a 'challenge' when mind remains in balanced state and transforms into an 'opportunity' for a determined mind. In fact, mind does it by dealing with signal and information. Mind chooses signal from noise and converts signal into information. Top down, the mind converts information into signal. We would explore this more while identifying the systems psyche.

TOP-DOWN APPROACH TO CONSCIOUSNESS

It is obvious that the bottom-up approach to include nonlocal consciousness into local science, be it from mind, quantum physics, different schools of philosophy or neural signaling are not succeeding. For approaching consciousness bottom up, the spiritual psychologists advise individuals to harness faith, devotion and love, which at present are not considered 'scientific' in main stream science although the author believes it otherwise. Hard physical science has grown under the umbrella of Einstein's constant (nothing can move faster than light), Planck's constant (discontinuity of energy) and constancy of entropy barrier. Einstein's constant excludes simultaneity of events, Planck's constant excludes continuity of events and entropy

barrier excludes identity of events. For developing a science from the domain of consciousness, where events could be simultaneous, continuous and identical, it is necessary to begin top down, taking this non-observable, non-measurable, non-reducible and abstract *consciousness* as only inviolable constant and then to cascade it down with the systems science of physics chemistry and biology. How could it be done? During the effort to do it we identify several nonlocal orbits of the entities, which are constituent of the systems psyche [9].

IDENTIFICATION OF ELEMENTS OF THE SYSTEMS PSYCHE

In addition to consciousness and mind, two other nonlocal entities are close to consciousness; 'life' and 'self'. Self is categorically identical with consciousness. 'Life' is not! Only self can lead directly to consciousness. Life cannot! While 'self' could be described as legal heir of consciousness, 'life' might be called daughter darling of consciousness and Mother Nature. Self works as chief executive officer (CEO) appointed by consciousness for the systems. "Self has a central role but universal distribution" (Carl Jung). Self evokes the sense of 'I', 'Me' and 'Mine' within the systems. Self and 'life' within the systems maintain a relationship of tangled hierarchy between themselves. Both report independently to consciousness. From the top, consciousness, self and life make the beginning of the systems formation. Duality begins and mind joins the team.

Within the systems, consciousness, self and life together are responsible for awakened state, awareness (of contents of consciousness), feelings and experience, choice, and the ability to make a decision. None of consciousness, life and self has direct connection with the physical or material world. All of the three are 'supramental' (deeper than mind) in nonlocal state, in sub-sub-quantum nature and connect with the material or physical plane through the common route of mind. That is why mind is so important component of the systems psyche! However, mind is sterile bereft of consciousness. Fecundity of mind comes from its connection with consciousness, while infidelity of mind is observed because of its connection with matter. Mind connects with the quantum and classical physical nests through information-signal transformation. What is signal in the physical plane becomes information in sub-physical mental plane.

Signal is 'local'. Information is simultaneously local and nonlocal.

Since 2013, the author has been expressing an opinion (presented in TSC-2013, at DEI, Agra, India) that geometry of information is like a trifoliate leaf. Its measurable folium is local and is in the physical plane, 'content' folium works with mind and 'intent' folium is connected with the self. The petiole of the leaf gets its nourishment from 'life' (Figure 1). Information connects the domain of local science (space, time, matter and energy) with the domain of nonlocal science (self, life and mind, and through self consciousness).

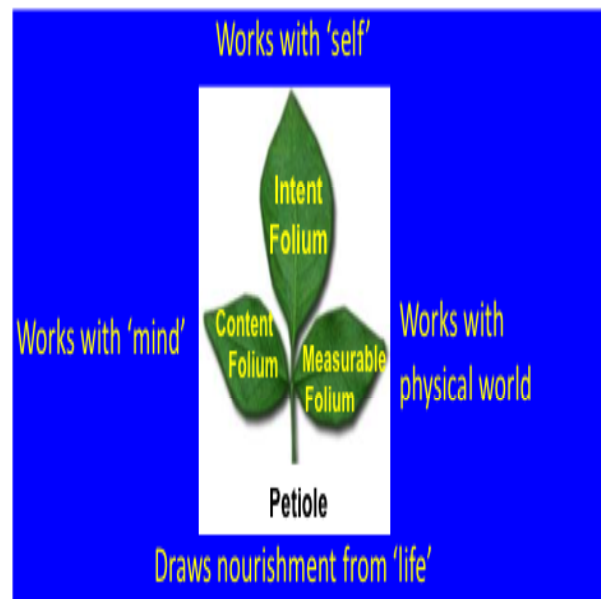


Fig 1. *Geometry of Information: Information connects physical/material plane with the mind and self. It could do so because of its specific geometry. Information is like a trifoliate leaf of which the measurable folium interacts with physical world, content folium interacts with mind world and intent folium interacts with 'self'. The petiole of leaf gets nourishment from 'life'. The strength of mind comes from 'life'. Information has no direct access to consciousness.*

Tentative Localization of the Orbits of Nonlocal Elements

Individual element of the cognitive apparatus, although, is nonlocal, their operational orbits could be localized within the systems. There is an emerging pattern in the complexity [10]. As depicted in figure 2, hierarchically below and superficial to the orbit of

operational systems of consciousness, there are the orbits of operation of 'life' and 'self' (sub-sub-quantum nest). Hierarchically below and superficial to operating orbits of 'self' and 'life', there are the orbits of operation of mind and information (sub-quantum nature). Intelligence, feelings and emotion originate deep in this sub-quantum nature by interaction between the orbits in sub-sub-quantum nature and sub-quantum nature. Communication between nonlocal and local players i.e., between sub-quantum nest and quantum nest is observed through conversion of information and signal and vice versa.

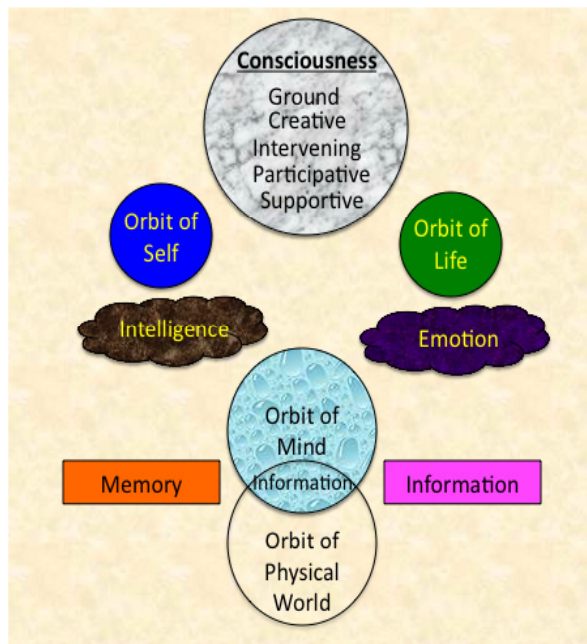


Fig 2. Tentative localization of the operational orbits of the nonlocal constituents of systems psyche: The orbit of consciousness is at the bottom of the depth. Consciousness also works in layers. Next begins the nature at nascent stage where the operational orbits of 'self' and 'life' could be located. This is sub-sub-quantum plane of nature. Superficial to this is the plane of emergence of intelligence and emotion, and more superficially are the orbits of operation of mind, memory and information. All are constituents of sub-quantum nest of nature. The orbit of operation of mind intercepts with the orbit of physical world. Physical world and mind world are connected through signal-information transformation.

Each orbit is independently infinite. However, they make a transient constellation to form systems psyche, which is simultaneously local and nonlocal, finite and infinite, closed and open in nature. Unlike self and life,

mind does not have an independent existence. Mind exists with duality, as an organ of communication between two conscious systems.

Interaction and Emergence

(i). Intelligence emerges out of triangular interaction of self, mind and memory. Life additionally is involved in production of emotional intelligence. Consciousness's involvement is necessary for emergence of intuitive intelligence.

(ii). Feelings and emotion are the outcome of triangular interaction of life, information and mind. Self is which experiences the feelings while life-processes carry out emotional expression.

(iii). Attitude generates out of triangular interaction of self, life and mind. Attitude determines the approach of the systems/being to a problem and therefore influences its outcome. Attitude is the quality most adored by human resource department of management.

(iv). Triangular interaction of self, life and consciousness is responsible for awakening, awareness, experience, choice and decision, generated respectively from five layers of consciousness namely supporting consciousness, participating consciousness, intervening consciousness, creative consciousness and ground consciousness in a cascading manner.

(v). Information-signal transition connects the psychological nest with the physical world, the 'inner' world with the 'outer' world and nonlocal world with the world of local science. This transition is the final common pathway for nonlocal becoming local. None of consciousness, self and life has direct connection with the physical or material. All of the three communicate with the physical/material through operation of mind.

Adjectives used to Describe the Power of Psyche

Even we use different adjectives for different constituents of psyche while describing the power/strength of our psyche. The adjective *power* is used in relation to 'will' (e.g., will power; will is an attribute of consciousness), adjective *capacity* is used for self (e.g., individual's capacity; capacity has a connotation of totality, a property seen in self), *ability* is used for intelligence (e.g. intellectual ability), *force* for life (e.g., life force) and *strength* for mind (e.g., mental strength). We also use such terms in physics with precise definition for power, capacity, ability, force,

and strength. This is certainly an area of fusion of physics, psychology and linguistics.

THE LAYERS BETWEEN NEUROSCIENCE AND CONSCIOUSNESS

At the physical plane of the brain there are neuronal signals. Most of the neuroscientists, including computational neuroscientists, work on the assumption that oscillation of signals at different neuronal assemblies produces a specific spatiotemporal pattern to generate consciousness. However, the pathway from signal to consciousness is layered and has been described in details in author's earlier paper [7]. Encoding, decoding, recoding of signals carried by neurons is followed by operation I of mind, which converts signal into information. 'Self' develops (operation II) an architectural symmetry of knowledge out of this combinational information geometry. The invariance of symmetry of knowledge develops further with operation of 'life' (operation III) as a design for experience, supported by neuronal manifolds. This happens spontaneously with a cascading effect. At this point of time, the whole development requires consciousness's accord, a feed forward projection from consciousness, which in psychological science is called attention. This awakening of the systems by attention is followed by awareness of contents, choice from different options and the 'will' to act for top-down manifestation of behavior. Bottom-up from this level of experience, there is a process of crystallization of experience (operation IV) into wisdom in sync with the universe/multiverse, that leads to multi-system concurrence and generation of worldview. Not every signal reaches, or needs to reach the level of wisdom in consciousness. However, for any wisdom to flourish in the material sensory world, its cascading down to the level of physical signal through the labyrinthine pathway within the psyche is mandatory.

CONSCIOUSNESS HAS REPRESENTATIONS IN MOLECULES OF BIOLOGY

Recently cell signaling and signal networks within a cell have come in the forefront of cell biology. Signaling ultimately affects the chemical molecules in biology. Molecules in biology could be broadly divided into two groups; non-informational molecules like urea, sugar etc., and informational molecules such as receptor protein, signaling polypeptides etc. Configurationally how a non-informational molecule becomes informational molecule, such change mostly observed

in protein molecules, is an interesting frontier in cell biology. Molecular cognition and molecular signaling are emerging disciplines. The author has suggested in his earlier paper [11] that at the molecular level of human body, there are specific representations of these psychic elements; for example, ion channels, especially calcium ion channels, are related to activity of mind while ion pumps and MHC molecules are modulated by operation of self. Cytoskeleton, information conduits/highway between cell membrane and membrane of other cell organelle is related to feelings and expression of cellular emotion. Histone, the spherical protein within the nucleus, could be recognized as the 'wisdom molecules' within a cell, which often acts as a guide to DNA transcription. Histone forms the basic for epigenetic pathway. It requires extensive research to decipher the complete representation of the psyche at the molecular level within a cell, within the systems especially nervous system. It is possible to classify the neurotransmitters according to various constituents of the psyche, they represent.

SENSITIVITY OF THE EACH ELEMENT OF THE PSYCHE

The elementary constituents of the psyche show specific sensitivity to particular stimulus. Sensitivity, in turn, determines the response. Mind is sensitive to signal and information. Self is sensitive to phenomena. 'Life' is sensitive to alteration of symmetry. Symmetry-asymmetry homeostasis is one of the hallmarks of 'life'. Consciousness is not sensitive to any of these three. Consciousness is the sensor for our 'attitude'. Attitude, as said, is the resultant of operation of self, life and mind. The attitude of member human beings is the gluing factor in formation of a community. It is consciousness, which orients us towards other's consciousness through attitudinal concurrence for developing and contributing to community health. Consciousness, the sensor of attitude, responds only to submission and surrender of individual's properties to consciousness. Consciousness's response is ideology-neutral, solution-centric and holistic as evident from the response of a biological cell [11].

THE LADDER OF COGNITION

Overarching the bottom-up and top-down approach to consciousness, the author has published a paper [12] on the ladder of cognition with suggestions on how consciousness can be incorporated within the systems science. From superficial to deep or bottom-up, the

rungs on the ladder are signal, information, knowledge, experience and wisdom. There are four operations in between. Operation I is for transformation of signal into information and vice versa. Operation II leads the information to knowledge transformation and vice versa. Operation III is for transformation of knowledge to experience and vice versa. Operation IV is for transformation of experience into wisdom and vice versa. Operator for operation I is what has been called mind, for operation II this is self, for operation III the operator is life, for operation IV the operator is consciousness. For transforming system's experience in sync with the worldview, operation of consciousness is essential.

THE CANVAS OF COGNITION

The operations as described are abstract. The operators are nonlocal and their hierarchy has been described with a metaphor of ladder. In author's latest paper [13], the cognition has been described with metaphor of a canvas. A canvas has embroidery on the surface, fabrics in the middle, which is set over a base. Therefore, one can go from superficial to deep, layer after layer and explore the canvas of cognition in all possible dimensions. The canvas is not static. It is dynamically changing in pattern of physical signaling, infinite ways of inter-looping of abstract operations in the sub-quantum nests, connecting physical science, psychology, cosmology and consciousness.

EDUCATION AND COMMUNITY PSYCHOLOGY

Our goal in developing a science for consciousness is to make education of consciousness free from community belief systems, religious prejudice and personal bias. Education brings desirable changes in the behavior of the learner in terms of knowledge, skill and attitude involving respectively the cognitive brain, the psychomotor brain and the affective brain. Education is movement of knowledge and experience without even actual movement of the people, a kind of knowledge-tourism. Education expands the boundary, opens up new horizons, highlights new frontiers, brings meaningful integration and therefore is a game-changer. Education ignites imagination, the greatest strength of mankind. Education on consciousness, therefore, is a must for an evolving community psychology.

Community psychology [14] uses psychological knowledge to handle social problems with a focus on individual's psychological power, capacity, ability

and strength in the context of betterment of a larger socio-cultural community environment and ecological milieu. It promotes healthy environment and lifestyles and is engaged in primary care by preventing anticipated problem.

With the concept of the psyche as depicted in this paper, the minds of the individuals in community, being nonlocal in nature, are all entangled. 'Life's of the individual in community, being nonlocal in nature, are entangled into a cosmological, universal or multiversal whole! This wholeness forms the binding values for the community. "Never doubt that a small group of thoughtful committed citizens can change the world. Indeed it is the only thing that ever has" (Margaret Mead). It is possible because of their attitude in the context of the wholeness of the collective consciousness!

CONCLUDING REMARKS AND PERSPECTIVES

In spite of remarkable and breath-taking inventions in technological fronts, face-to-face interaction and human handshake will continue to persist. We see this phenomenon in industry as MICE (Meeting, Incentive, Convention/Conference and Exhibition/Event). We see this in teacher-student interaction during teaching. We see this in the interaction between the accomplished Guru and his disciple. This is because of the presence and the role of human psychology in every sphere of communication. Therefore, to strengthen this communication, there is a necessity to develop a science for consciousness, which is independent of personal bias, religious prejudice and private belief systems. Recently there is a shift of focus in research in neuroscience for social cognition [15] from grey matter to white matter, from topological (regional brain) to hodological (neural pathways), from modularism to connectomics through functional and diffusion MRI. This is expected to deepen the understanding of social behavior when we combine it with conceptual developments on systems psyche and the ladder of cognition. Conceptual developments are worthy for their translational value to transform basic understanding of the psyche and psychological and psychiatric disorders. We expect its impact on psychosomatic medicine. All these are also relevant for the disciplines of education and management with far-reaching effect at community level. The ambitious plan is to bring cosmology, psychology and neuroscience at tandem with the systems science of biology, informatics and physics.

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